

Oswald U. Anders
801 Linwood Dr
Midland MI

Feb. 8, 1983

My name is Oswald Anders. I am a resident of Midland, Mich. I am a registered voter and have owned property in this city for more than a quarter century. For the past five years I have a small farm seven miles out of town. I have raised a family of three sons in Midland and been involved with various civic and church activities.

I know that the economy and welfare of Midland is closely tied to that of its major industry, the world size chemical plant of the Dow Chemical Co. which has its ~~root~~ origins and headquarters here. This chemical plant is based on local brines but has to import all its other raw materials and fuel. Foreseeing future energy shortages and the high projected need of the Midland plant, Dow's management in the 1960's concluded that the supply of energy would be best assured by a cogenerating nuclear plant built here in Midland. And this was a decade before the first oil crisis.

Since then the energy situation for the Midland plant has not changed and from what I have seen this plant is committed to, and has been preparing for the availability of nuclear generated steam. It has gone through a severe austerity program in recent years because of the continued delays of the availability of such steam, but expects to have such available by the end of next year.

It is my personal conviction that Dow's Midland plant, as a world size chemical plant will be dependent on this steam as its reliable energy supply after 1984. If the latter is not forthcoming this plant will have no future and as such will be eventually phased out and written off. If this happens Midland, which is a bright spot in cultural activity, sports, and science as well as industry on the map of Michigan will revert to a ghost town with no future. Its fate thus is closely tied to the completion of the Midland nuclear plant.

I have personally built two structures, a log house and a pole barn and completely rebuilt from the exterior walls a

concrete block haure and redecorated two others. All these were constructed according to local building codes and passed ~~local~~ inspections by local authorities. I have been in Europe and visited many great cathedrals and castles. I have also over the years visited the construction site of the Midland nuclear plant four times. I was impressed both by the attention to detail and the level of activity at that site. The codes to which this mammoth high-technology machine is built are an order of magnitude more demanding than the local building codes in accordance to which I did my constructions, installation of electrical wiring and plumbing.

In my projects I often found it less confusing to first finish one type of construction with a straight forward objective and a specialized crew and then tear down part of that construction to install other work with a different crew rather than have two crews wait for each other and putting details in as they went along. This saved me money and time. I am not surprised to hear

some such is also done on the Midland nuclear plant project.

In this context I find it quite understandable that the rough work be completed first, even if initially not to final specifications and that after a thorough subsequent inspection which identifies the deficiencies, the latter are remedied. In case of the Midland nuclear plant project one has, after all, take into account that the same construction people who built our local ~~concr~~ structures and ~~were used to the guidelines of our local codes had to be used to build the nuclear plant~~ according to the specifications of our local codes are employed at the nuclear plant site and had to learn to meet the much more restrictive codes to which they are not accustomed.

Relative to the size of the project the speed of construction at the Midland project recently has been amazing. The size of the turbine building alone may be compared to Westminster Abbey in London, England. Yet while the construction time for European cathedrals were at times counted in centuries, a few years must do to build the

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nuclear plant. This is a mammoth undertaking. The Midland project for a decade has been the largest construction site in Michigan. The logistics is mind boggling. Former generations tried to build the tower of Babel and could not finish it. Our project is much more complex and is also built by people of different tongues collaborating to achieve a historic objective: the energy independence of Mid Michigan for a hundred years. Yet the leaders of this project have been able thus far to bring it to more than 80% of completion. The safety record is absolutely exemplary and the quality of construction, when measured by ordinary yardsticks, phenomenal. By all rights they ought to be able to complete the job before being criticized.

As part of a former assignment at Dow I have had the opportunity to get acquainted with regulatory action by NRC. I have observed on several occasions NRC inspectors spending enormous amounts of time reading every line of the dull maintenance operating logs of nuclear equipment. I had written these logs, prepared and signed

... 5 - while reading up a log entry
at a time from cover a cover

them and yet, the inspectors found that I had entered a different date at the top of the page than on the bottom, although the context proved they were written on the same day. And I was embarrassed and promised to be more careful. And my boss was told. Yet overall the inspector was satisfied with the log. Look at me. Not even I am perfect in the eyes of God nor the NRC, and I have easy arrangements. Who can expect that such constant surveillance of excellent work will not result in occasional non-compliance of the very strict regulations applying to nuclear construction. Yet the items inspected are legion at the Midland nuclear plant site and even a 0.1% non-compliance rate would fill a book and give the critics and self-righteous food for a feast of hypocritical outrage.

The point is that this type inspection, as frustrating as it is at times to the people concerned, does discover the errors and over-rights and gives the opportunity to set them right. For the Midland nuclear plant they are necessary and a means to complete the plant not an indication of sloppy work.

One of the prerequisites for NRC granting an operating license to the Midland nuclear plant is the availability of a tested nuclear emergency plan. As part of this plan the Michigan Div. of the Dow Chemical Co. has put into action a training and information program that by now has involved every employee. As representative of my building I participated in the training as nuclear emergency warden and spent a whole week in training. I was impressed by the wealth of detail, the quality of the and scope of the plan and the no-nonsense attitude of the responsible people from Dow and Consumers Power Co. who put on the program. They definitely count on the Nuclear Plant to be completed on time. They believe it can be done within the difficult and stringent regulatory specifications. They are confident that they can do it and they appeared credible to me.

From what I have experienced and heard I believe that the project is healthy and the plan for its completion sound. I have read it as submitted by Consumers Power Co. I believe that the criticisms repeatedly appearing in the press, touch but the expectable small number of ~~steps~~ remediable deficiencies, blowing them all out of proportion. I am not afraid of the plant. I believe it can be operated safely. I think it should be licensed and believe it.

Construction Completion Plans submitted is sound and should be permitted to be implemented.

Ronald W. Tucker



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

FEB 8 1983

Docket No. 50-329
Docket No. 50-330
EA 83-3

Consumers Power Company
ATTN: Mr. John D. Selby
President
212 West Michigan Avenue
Jackson, MI 49201

Gentlemen:

This letter refers to the special inspection conducted by the Office of Special Cases, Midland Section, of this office on October 12 - November 25, 1982, and on January 19-21, 1983 of activities at the Midland Nuclear Power Plant, Units 1 and 2, authorized by NRC Construction Permits No. CPPR-81 and No. CPPR-82. The results of the inspection were discussed with you on November 10 and 23, 1982, on January 21, 1983 at the conclusion of the inspection and on January 18, 1983 in the Region III office during an enforcement conference between you and others of your staff and me and others of the NRC staff.

The inspection was primarily a physical inspection of installed equipment to verify conformance to approved drawings and specifications. The results of the inspection indicate a breakdown in the implementation of your quality assurance program as evidenced by numerous examples of noncompliance with nine of the eighteen different criteria as set forth in 10 CFR 50, Appendix B. The breakdown was caused by personnel who failed to follow procedures, drawings, and specifications; by first line supervisors and field engineers who failed to identify and correct unacceptable work; by construction management who failed to call for quality control inspections in a timely manner, allowing a backlog of almost 16,000 inspections to develop; and by quality assurance personnel who failed to identify the problems and ensure that corrective actions were taken. As a result, you failed to fulfill your primary responsibility under Criterion 1 of Appendix B to 10 CFR 50 to assure the execution of a quality assurance program. In addition, of particular concern to the NRC is the fact that quality control (QC) supervisors instructed QC inspectors to suspend inspections if excessive deficiencies were found during the performance of inspections. Consequently, not all observed deficiencies were reported, and complete inspections were not performed by all QC inspectors after the reported deficiencies were corrected.

I understand that, because of our findings, you have inspected other areas of the plant and found similar deficiencies. As a result of our findings, your findings, and your assessment of the overall project, you halted certain safety-related work at the Midland site, reduced the work force by approximately 1100

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RETURN RECEIPT REQUESTED

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FEB 8 1983

people, committed to building cleanup and system layup, committed to organize teams of construction and engineering personnel responsible for the completion of one or more plant systems, and committed to reinspect safety-related systems. I expect that you will also conduct an inspection to determine the extent to which QC supervisors at the Midland site have been instructing QC inspectors to limit findings of deficiencies and the extent to which QC inspectors have been conducting reinspections based only on reported deficiencies.

To emphasize the need for CPCo management to ensure implementation of an effective quality assurance program that identifies and corrects construction deficiencies, we propose to impose civil penalties for the items set forth in the Notice of Violation that is enclosed with this letter. The violations in the Notice have been categorized as Severity Level III violations in accordance with the General Statement of Policy and Procedure for Enforcement Actions, Appendix C of 10 CFR 2. The base value for a Severity Level III violation is \$40,000. However, as a result of your past enforcement history involving quality assurance and the multiple examples of QC deficiencies for the areas inspected, the base civil penalty for each violation is being increased by fifty percent.

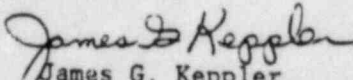
After consultation with the Director of the Office of Inspection and Enforcement, I have been authorized to issue the enclosed Notice of Violation and Proposed Imposition of Civil Penalties in the cumulative amount of One Hundred Twenty Thousand Dollars (\$120,000).

You are required to respond to this letter and should follow the instructions in the Notice when preparing your response. In your response you should describe the results of your inspections to determine the extent to which QC supervisors instructed QC inspectors to limit findings of deficiencies, the systems affected, and your corrective actions to ensure that all affected systems are adequately reinspected. Your reply to this letter and the results of future inspections will be considered in determining whether further enforcement action is appropriate.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosures will be placed in the NRC Public Document Room.

The responses directed by this letter and the enclosed Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

Sincerely,


James G. Keppler
Regional Administrator

Enclosure:
Notice of Violation and
Proposed Imposition of Civil Penalties

FEB 8 1983

cc w/encl:

DMB/Document Control Desk (RIDS)
Resident Inspector, RIII
The Honorable Charles Bechhoefer, ASLB
The Honorable Jerry Harbour, ASLB
The Honorable Frederick P. Cowan, ASLB
The Honorable Ralph S. Decker, ASLB
William Paton, ELD
Michael Miller
Ronald Callen, Michigan
Public Service Commission
Myron M. Cherry
Barbara Stamiris
Mary Sinclair
Wendell Marshall
Colonel Steve J. Gadler (P.E.)
RCDeYoung, IE
JHSniezek, IE
JAxelrad, IE
JTaylor, IE
EJordan, IE
CThayer, IE
JLieberman, ELD
VStello, DED/ROGR
FIngram, PA
JCummings, OIA
JFitzgerald, OI
HDenton, NRR
JKeppler, RIII
Enforcement Coordinators
RI, RII, RIII, RIV, RV
MWilliams, NRR
JCrooks, AEOD
GKlingler, IE
IE:ES Files
IE:EA Files
EDO Rdg File

NOTICE OF VIOLATION

AND

PROPOSED IMPOSITION OF CIVIL PENALTIES

Consumers Power Company
Midland Nuclear Power Plant
Units 1 and 2

Docket Nos. 50-329
50-330
Permit Nos. CPPR-81
CPPR-82
EA 83-3

As a result of the inspections conducted at the Midland Nuclear Plant on October 12 - November 25, 1982 and January 19 - 21, 1983, the violations of 10 CFR 50, Appendix B listed below were identified. These violations demonstrate that you failed to exercise adequate oversight and control of your principal contractor, to whom you had delegated the work of executing the quality assurance program. Your failure manifested itself in a breakdown in the implementation of your quality assurance program and, at least in part, caused Consumers Power Company to halt some safety-related work and take other significant actions to provide assurance that safety-related structures and systems are constructed as designed.

As described in item A, QC supervisors instructed QC inspectors to suspend an inspection if an excessive number of deficiencies was observed. Consequently, there was no assurance that a complete inspection was being performed after the reported deficiencies were corrected and we have found several instances in which final QC inspections were based on only the limited deficiencies reported during the initial inspection. In addition, this failure to report all identified deficiencies resulted in incorrect data being fed into your Trend Analysis Program, inhibiting your ability to determine the root cause of deficiencies and prevent their recurrence.

As illustrated in the numerous examples set forth in Item B, personnel failed to follow procedures, drawings, and specifications; first line supervisors and field engineers failed to identify and correct unacceptable work; construction management failed to call for quality control inspections in a timely manner, allowing a backlog of almost 16,000 inspections to develop; and quality assurance personnel failed to identify the problems and ensure that corrective actions were taken.

In order to emphasize the need for improvements in your control of your quality assurance program, we propose to impose civil penalties in the cumulative amount of One Hundred Twenty Thousand Dollars (\$120,000).

In accordance with the NRC Enforcement Policy (10 CFR Part 2, Appendix C) 47 FR 9987 (March 9, 1982), and pursuant to Section 234 of the Atomic Energy Act of 1954, as amended ("Act"), 42 U.S.C. 2282, PL 96-295, and 10 CFR 2.205, the particular violations and the associated civil penalties are set forth below:

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CIVIL PENALTY VIOLATIONS

- A. 10 CFR 50, Appendix B, Criterion X requires, in part, "A program for inspection of activities affecting quality shall be established and executed...to verify conformance with the documented instructions, procedures and drawings for accomplishing the activity."

10 CFR 50, Appendix B, Criterion XV requires, in part, "Measures shall be established to control materials, parts, or components which do not conform to requirements in order to prevent their inadvertent use or installation."

Consumers Power Quality Assurance Program Policy No. 15, Revision 12, Paragraph 1.0, requires, in part, "Items, services or activities which are deficient in characteristic, documentation or procedure which renders the quality unacceptable or indeterminate and which is considered significant to safety are identified as nonconformances. Nonconforming items... are identified by marking, tagging, segregating or by documentation. Nonconforming items are controlled to prevent their inadvertent installation or use. Nonconforming items and activities are recorded and are considered for corrective action to prevent recurrence...."

Contrary to the above, during the inspection conducted between October 12 - November 25, 1982 and January 19-21, 1983, NRC inspectors determined that quality control inspectors were not documenting as nonconformances all of the deficiencies which they observed during their inspections. Inspections were suspended by the QC inspector if too many nonconformances were observed. In-process inspection notices (IPINs) associated with suspended inspections, identified as nonconformances only a portion of the observed deficiencies. Supervisory QC personnel stated that they directed QC inspectors to limit the number of nonconformances documented during an inspection. This directive was verified by discussions with QC inspectors. Several QC inspectors interviewed, confirmed that inspections were closed after reviewing only the deficiencies documented on the IPIN. As a result, measures were not established to prevent the continued installation and use of these nonconforming items. In addition, corrective actions were not implemented to prevent recurrence of these nonconformances.

This is a Severity Level III violation (Supplement II)
(Civil Penalty - \$60,000)

- B. 10 CFR 50, Appendix B, Criterion II requires holders of construction permits for nuclear power plants to document, by written policies, procedures, or instructions, a quality assurance program which complies with the requirements of Appendix B for all activities affecting the quality of safety-related structures, systems, and components and to implement that program in accordance with those documents.

Contrary to the above, Consumers Power Company and its contractor did not adequately implement a quality assurance program to comply with the requirements of Appendix B as evidenced by the following examples:

1. 10 CFR 50, Appendix B, Criterion V requires, in part, "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

Consumers Power Quality Assurance Program Policy No. 5, Revision 12, Paragraph 1.0 states, in part, "Instructions for controlling and performing activities affecting quality of equipment or activities such as...construction, installation...are documented in instructions, procedures...and other forms of documents."

Contrary to the above, the following instances of failure to accomplish activities affecting quality in accordance with instructions, procedures, specifications, or drawing requirements were identified:

- a. Installation of diesel generator engine control panels 1C111, 1C112, 2C111, and 2C112 was not in accordance with the requirements delineated on foundation Drawing 7220-M18-250 in that the foundation bolt washers required by the subject drawing were not installed.
- b. Unscheduled pull box associated with conduits 2BN006, 2BN007, and 2BDA002 was not sized in accordance with the requirements delineated on Sheet 42 of Drawing E-42 in that the 12" x 12" x 6" as-built dimensions of the subject pull box did not conform to the 13½" x 12" x 6" dimension requirements delineated on Sheet 42 of Drawing E-42.
- c. The 1'-10" wall to support dimension required by raceway support Drawing E-796(Q), Sheet 2 of 2, Revision 5, for hanger No. 86 was not correctly translated into the as-built installation of the subject hanger in that the as-built wall to support dimension was 2'-1½" in lieu of the required 1'-10".
- d. The 6'-6" wall to support dimension required by raceway support Drawing E-796(Q) Sheet 1 of 2, Revision 11 for hanger No. 14 was not correctly translated into the as-built installation of the subject hanger in that the as-built wall to support dimension was 5'-5" in lieu of the required 6'-6".

- e. The inspectors identified high strength steel plate placed in the laydown area which was not marked with the material type and grade as required by Field Instruction FIG-9.600, Revision 1.
- f. The inspectors identified various stock steel shapes in the "Q" area with yellow-colored paint on the ends (indicating the material was non "Q") and various steel stock shapes in the non "Q" area without painted ends (indicating "Q" material), contrary to the requirements of Field Instruction FIG-9.600, Revision 1.
- g. The slots in the muffler support plates were not machined but were determined to be irregular and flame cut, leaving rough slot edges not in conformance with design Drawing M18-425(5)-1.
- h. Jacking plates were not installed beneath the center support plates of Bay 1 diesel generator muffler as required by Drawing M18-250-6.
- i. Procedure FID-2.100, "Outstanding FCR/FCN Retirement," Revision 2 was inadequate in that the design drawings were not changed when an FCR/FCN had been retired and no further reference to the FCR existed on the revised drawing. As a result, the retired FCR C-2103 relating to HVAC structural steel was lost and could not be traced to the design drawing to ensure a complete quality record.
- j. Field Sketch CY-1035 which illustrated the bottom gusset plates for HVAC fan supports was not identified as "Q", nor was there a reference to the affected drawing on the sketch as required by Procedure FPD-5.000, "Preparation of Field Sketches."
- k. Procedure FPD-5.000, "Preparation of Field Sketches," Revision 1 did not require design drawings to reference appropriate field sketches to ensure a complete quality record.
- l. The eight bracing top gusset plates identified on Drawing C-1004, Revision 10, as 5/16" thick were measured by the inspectors to be 1/4" thick in all four diesel generator bays. This change was neither reviewed nor properly authorized.
- m. The as-built gusset plate connections in Bay 1 were not built as identified on Detail 3 of Drawing C-1004. The angle braces were welded together as opposed to having separate welds for each brace. This change was neither reviewed nor properly authorized.

- n. None of the sixteen $\frac{1}{4}$ " bracing angles identified on Drawing C-1004 were constructed utilizing $\frac{1}{4}$ " material. This change was neither reviewed nor properly authorized.
 - o. Drawing C-1004, Detail 2, required the W10 beam-to-beam connection to be welded. In Bay No. 3, a bolted connection was constructed in lieu of the required welded connection, without review nor proper authorization.
 - p. The column cover plate identified on FCR-C4401 was not constructed in Bay No. 3 as required. The plate was slotted instead of solid as required. This change was neither reviewed nor properly authorized.
 - q. A section (approximately 18 x 10 x 4 inches deep) of the primary containment wall in Containment Purge Room 702 was removed (by chipping) without obtaining approval as required by FIG-1-111, Revision 4, Concrete Drilling Permit.
2. 10 CFR 50, Appendix B, Criterion III requires, in part, "Measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components. Design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design and be approved by the organization that performed the original design unless the applicant designates another responsible organization."

Consumers Power Company Quality Assurance Program Policy No. 3, Revision 12, Paragraphs 3.3 and 3.5 state, in part, "Each group or organization performing detailed design translates the applicable regulatory requirements, design bases, codes, standards, and design criteria into design documents, such as...drawings.... Changes to the design require the same review and approval as the original design by the group or organization delegated lead design responsibility."

Contrary to the above:

- a. Measures were not established for the selection and review for suitability of application of "Q" materials associated with the diesel generator exhaust muffler in that design drawings and specifications did not indicate the material identity of the installed muffler saddle supports and plates.

- b. Design Drawing C-147 required bolted bracing connections for the diesel generator building HVAC bracing gusset plates. Field Sketch CY-1035 was used to change the design to welded connections in lieu of the specified bolted connections. This design change was neither properly reviewed nor approved.
 - c. Design Drawings C-1004 and C-147 did not specify the sizes of the diesel generator building HVAC fan gusset plates. A "combo" shop work order request was used to design the gusset plates without appropriate review and approval.
 - d. The licensee failed to analyze the four diesel generator building monorails as seismic Category I as described in their commitment to Regulatory Guide 1.29, in Appendix 3A of the FSAR.
 - e. The licensee designed and constructed thirty-two diesel generator building exhaust system hangers without ensuring that the applicable requirements for "Q" components were included in the design documents.
 - f. The licensee purchased armor stone for a "Q" portion of the perimeter dike without translating the applicable regulatory requirements into appropriate specifications and design documents.
3. 10 CFR 50, Appendix B, Criterion VII requires, in part, "Measures shall be established to assure that purchased...equipment...conforms to the procurement documents. These measures shall include provisions, as appropriate, for...inspection at the contractor or subcontractor source, and examination of products upon delivery."

Consumers Power Quality Assurance Program Policy No. 7, Revision 12, Paragraphs 1.0 and 3.4, state, in part, "The Midland Project Office and the Midland Project Quality Assurance Department verify that procurement requirements are met. This is accomplished through... source evaluation and inspection...receipt inspections are made to verify that the items...conform to procurement requirements not verified by source surveillance or inspection..."

Contrary to the above, source inspections at the panel supplier facility and receipt inspections at the Midland site failed to ensure conformance of the internal wiring within diesel generator engine control panels 1C111, 1C112, 2C111, and 2C112 to Procurement Specification 7220-G-5, Revision 1. Paragraph 6.0 of Specification 7220-G-5 states, "All electrical wiring...within the board enclosure shall conform to the highest industrial standards of design and

workmanship." An NRC inspection on October 15, 1982 identified the following examples of defective terminations of internal wiring within the subject panels.

- a. The output lead on the Relay Tach device had numerous broken strands at the termination lug.
 - b. The K1 lead on the Relay Tach device had two broken strands resulting in a potential short circuit between the K1 lead and an adjacent conductor.
 - c. The 1- lead on the CE-1 device did not have all strands inserted into the compression lug.
4. 10 CFR 50, Appendix B, Criterion X requires, in part, "A program for inspection of activities affecting quality shall be established and executed. To verify conformance with the documented...drawings for accomplishing the activity."

Consumers Power Company Quality Assurance Program Policy No. 10, Revision 12, Section 1.0 states, in part, "Inspection and surveillance are performed to assure that activities affecting quality comply with documented...design documents...inspection and surveillance are performed according to written instructions."

Contrary to the above:

- a. An inspection program was not established to ensure segregation of cables installed in horizontal trays which used metal dividers to segregate control and instrumentation cables in accordance with design requirements.
 - b. Quality Control (QC) inspections failed to ensure that activities affecting quality conformed to design documents in that QC inspections performed on July 1, 1981 and documented on QCIR Q210-172 failed to detect and identify nonconformances B.1.(1) through (c) of this Notice of Violation. These nonconformances were associated with installation of the diesel generator building HVAC fan support steel.
5. 10 CFR 50, Appendix B, Criterion XIII requires, in part, "Measures shall be established to control the...cleaning and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. When necessary for particular products, special protective environments...shall be specified."

Consumers Power Company Quality Assurance Program Policy No. 13, Revision 12, Paragraph 3.3, states, in part, "Suppliers provide plans...maintain and control items upon arrival at the site."

Contrary to the above, the licensee did not implement a maintenance program to prevent five of sixteen installed diesel generator slide bearing muffler plates from accumulating dirt and dust as required by the vendor's manual.

6. 10 CFR 50, Appendix B, Criterion IX requires, in part, "Measures shall be established to assure that special processes, including welding, heat-treating, and nondestructive testing, are controlled...."

Consumers Power Company Quality Assurance Program Policy No. 9, Revision 12, Paragraph 1.0 states, in part, "Where the required level of quality cannot be measured by inspection only of the item...accomplish these processes under controlled conditions in accordance with applicable codes, standards and specifications using qualified procedures, equipment and personnel." Paragraph 3.3 states, in part, "...Personnel performing special processes maintain records to verify that the required activities were accomplished in accordance with qualified procedures by qualified personnel."

Contrary to the above, during welding of the diesel generator building exhaust piping hanger support steel, the licensee did not verify preheat of existing safety-related structural steel to a temperature of 70°F as required by site specifications and the AWS 1974 Code.

7. 10 CFR 50, Appendix B, Criterion VI requires in part, that "Measures shall be established to control the issuance of documents, such as instructions, procedures, and drawings including changes hereto, which prescribe all activities affecting quality...."

The Consumers Power Company Quality Assurance Program Policy No. 6, Revision 12, Paragraph 1.0 states, in part, "Measures are included to assure that documents, including changes,...are distributed according to a controlled distribution to the user functions."

Contrary to the above, measures were not established to control the distribution of changes (red lines) to hanger isometric drawings in that changes to Drawing 1-652-2-25(Q) were not controlled utilizing the Site Document Control Center.

8. 10 CFR 50, Appendix B, Criterion XV requires in part, "Measures shall be established to control materials, parts, or components which do not conform to requirements in order to prevent their inadvertent use or installation."

Consumers Power Quality Assurance Program Policy No. 15, Revision 12, Paragraph 1.0, states, in part, "Items, services or activities which are deficient in characteristic, documentation or procedure which renders the quality unacceptable or indeterminate and which is considered significant to safety are identified as nonconformances. Nonconforming items...are identified by marking, tagging, segregating or by documentation. Nonconforming items are controlled to prevent their inadvertent installation or use. Nonconforming items and activities are recorded and are considered for corrective action to prevent recurrence...."

Contrary to the above:

- a. Measures were not established or implemented to determine if materials ultimately restricted (per Nonconformance Report No. 3266) from installation or use in ASME Class I systems were actually installed or used in Class I systems.
- b. As of November 10, 1982, two nonconforming conditions identified by the NRC on October 12, 1982, and confirmed by the licensee on October 19 and 25, respectively, had not been documented on a nonconformance report, a quality assurance report, or other appropriate report. The two nonconforming conditions were:
- (1) The diesel generator exhaust hangers were not classified, designed, or built as "Q" as committed to in the FSAR. (See item 2.c.)
 - (2) The design of the diesel generator monorail was not analyzed to seismic Category I design requirements as committed to in the FSAR. (See item 2.d.)

This is a Severity Level III violation (Supplement II).
(Civil Penalty - \$60,000)

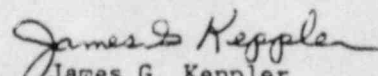
Pursuant to the provisions of 10 CFR 2.201, Consumers Power Company is hereby required to submit to the Director, Office of Inspection and Enforcement, U. S. Nuclear Regulatory Commission, Washington, DC 20555 and a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region III, 799 Roosevelt Road, Glen Ellyn, Illinois 60137, within 30 days of the date of this Notice a written statement or explanation, including for each alleged violation: (1) admission or denial of the alleged violation; (2) the reasons

for the violation, if admitted; (3) the corrective steps which have been taken and the results achieved; (4) the corrective steps which will be taken to avoid further violations; and (5) the date when full compliance will be achieved. Consideration may be given to extending the response time for good cause shown. Under the authority of Section 182 of the Act, 42 U.S.C. 2232, this response shall be submitted under oath or affirmation.

Within the same time as provided for the response required above under 10 CFR 2.201, Consumers Power Company may pay the civil penalties in the cumulative amount of \$120,000 or may protest imposition of the civil penalties, in whole or in part, by a written answer. Should Consumers Power Company fail to answer within the time specified, the Director, Office of Inspection and Enforcement will issue an order imposing the civil penalties proposed above. Should Consumers Power Company elect to file an answer in accordance with 10 CFR 2.205 protesting the civil penalties, such answer may: (1) deny the violations listed in this Notice, in whole or in part; (2) demonstrate extenuating circumstances; (3) show error in this Notice; or (4) show other reasons why the penalties should not be imposed. In addition to protesting the civil penalties, in whole or in part, such answer may request remission or mitigation of the penalties. In requesting mitigation of the proposed penalties, the five factors contained in Section IV(B) of 10 CFR Part 2, Appendix C should be addressed. Any written answer in accordance with 10 CFR 2.205 should be set forth separately from the statement or explanation in reply pursuant to 10 CFR 2.201, but may incorporate statements or explanations by specific reference (e.g., citing page and paragraph numbers) to avoid repetition. Consumers Power Company's attention is directed to the other provisions of 10 CFR 2.205, regarding the procedures for imposing a civil penalty.

Upon failure to pay any civil penalties due, which have been subsequently determined in accordance with the applicable provisions of 10 CFR 2.205, this matter may be referred to the Attorney General, and the penalties, unless compromised, remitted, or mitigated, may be collected by civil action pursuant to Section 234c of the Act, 42 U.S.C. 2282.

FOR THE NUCLEAR REGULATORY COMMISSION


James G. Keppler
Regional Administrator

Dated at Glen Ellyn, Illinois
this 8th day February of 1983

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UNITED STATES NUCLEAR REGULATORY COMMISSION

OFFICE OF PUBLIC AFFAIRS, REGION III
799 Roosevelt Road, Glen Ellyn, Illinois 60137

NEWS ANNOUNCEMENT 83-08

CONTACT: Jan Strasma 312/932-2674
Russ Marabito 312/932-2667

NRC STAFF PROPOSES \$120,000 FINE FOR QUALITY ASSURANCE VIOLATIONS AT MIDLAND NUCLEAR POWER STATION

The Nuclear Regulatory Commission's Region III Office has proposed a \$120,000 fine against Consumers Power Company for an alleged breakdown in the quality assurance program at the Midland Nuclear Power Station construction site in Midland, Michigan.

An NRC inspection of equipment installation in the plant's diesel generator building between October 12 and November 25, 1982, identified numerous items of noncompliance with NRC Quality Assurance requirements.

The proposed fine consists of two alleged violations, each carrying a \$60,000 penalty.

The first violation is for multiple examples of plant personnel failing to follow procedures, drawings and specifications in the installation of equipment. In one instance, an inspection program was not established to ensure the segregation of electrical cables in accordance with design requirements. In other cases, changes in drawings or specifications were made without proper authorization.

The second violation was the result of the NRC's determination that quality control supervisors instructed quality control (QC) inspectors to suspend inspections when excessive numbers of deficiencies were observed.

The construction being inspected was then turned back to the construction staff for rework. The intent of this practice was to improve construction quality prior to the QC inspections. In some cases, however, the follow-up QC inspections focused only on the previously identified deficiencies, instead of conducting a full reinspection. This practice, therefore, provided no assurance that unreported deficiencies were later identified or repaired. Reinspections will be required for those areas where this QC practice was utilized.

This inspection practice also resulted in incorrect data being fed into the licensee's Trend Analysis Program, thereby inhibiting the utility's ability to determine the root causes of deficiencies and to prevent their recurrence.

In a letter to Consumers announcing the proposed fine, Regional Administrator James G. Keppler said the violations demonstrate the company's "failure to exercise adequate oversight and control" of its principal contractor (Bechtel Power Corporation), which had the responsibility for executing the QA program.

Keppler added that the QA breakdown, in part, caused Consumers to halt some safety-related construction work at the plant last December, and to take "other significant actions to provide assurance that safety-related structures and systems are constructed as designed."

As part of its corrective action, Consumers has proposed a "Construction Completion Program," outlining the steps it will take to complete the Mid-

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land plant. It includes a reinspection of safety-related systems, third-party reviews to monitor project performance, and QA/QC organizational changes, among other things.

Consumers also will be required by the NRC to determine the extent to which QC supervisors instructed inspectors to limit their findings of deficiencies and to inform the NRC of what corrective action will be taken to prevent this from occurring in the future.

The licensee has until March 10, 1983, to either pay the fine or to protest it. If the fine is protested and subsequently imposed formally by the NRC staff, Consumers Power may request a hearing.

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February 8, 1983



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February 8, 1983

ANALYSIS
of
CONSUMERS POWER COMPANY'S
PROPOSED CONSTRUCTION COMPLETION PLAN

By the
GOVERNMENT ACCOUNTABILITY PROJECT
CITIZENS CLINIC

On behalf of the
LONE TREE COUNCIL

Presented to the
NUCLEAR REGULATORY COMMISSION
AT MIDLAND, MICHIGAN

February 8, 1983

Prepared by:

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1901 Que Street, N. W.
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On behalf of the Lone Tree Council and concerned Michigan citizens and nuclear workers, the Government Accountability Project (GAP) recommends that the Nuclear Regulatory Commission (NRC or Commission):

- 1) withhold approval of the Construction Completion Plan (CCP) proposed by Consumers Power Company (Consumers) for the Midland Nuclear Power Plant until the Commission discloses the quality assurance (QA) violations that made the CCP necessary;
- 2) restructure the multiple proposed audits/third-party reviews into one comprehensive independent third-party review;
- 3) require a separate public meeting to deal specifically with the specific methodology and procedures to be used in the third-party review;
- 4) modify the Construction Permit to maintain suspension of all safety-related work until the entire third-party review program, including but not limited to third-party selection, scope, procedures and other methodological considerations, is approved and incorporated into the Construction Permit;
- 5) request Consumers to release the new cost and projected completion date estimates; and
- 6) immediately halt the ongoing soils work until the quality assurance implementation auditor is approved.

I. BACKGROUND

The Government Accountability Project is a project of the Institute for Policy Studies (IPS), Washington, D.C. The purpose of GAP's three clinics -- Federal Government Clinic, Citizens Clinic and Nuclear Clinic -- is to broaden the understanding of the vital role of the public employee, private citizen and nuclear worker, respectively, in preventing waste, corruption or health and safety concerns. GAP also offers legal and strategic counsel to whistleblowers, provides a unique legal education for law student interns, brings meaningful and significant reform to the government workplace, and exposes government actions that are repressive, wasteful or illegal, or that pose a threat to the health and safety of the American public. Presently, GAP provides a

program of multi-level assistance for government employees, citizens and corporate employees who report illegal, wasteful or improper actions. GAP also regularly monitors governmental reforms, offers expertise to Executive Branch offices and agencies, and state and local governmental bodies, and responds to requests by Congress and state legislatures for analysis of legislation to make government more accountable to the public.

In March 1982, GAP's Citizens Clinic became actively involved with the Midland Nuclear Power Plant. The Lone Tree Council asked GAP to pursue allegations from workers of major problems at the Midland plant. After our preliminary investigation, we compiled six affidavits which we filed with the NRC on June 29, 1982. Since then we have filed four additional affidavits resulting from the heating/ventilation/air conditioning (HVAC) system's quality assurance breakdown revelations. We are also preparing an expanded affidavit from one of our original witnesses, Mr. E. Earl Kent, who has alleged serious welding construction problems at the Midland site. Other alarming allegations, ranging from security system breakdowns to worker safety problems, have come to our attention recently. As a result, we have expanded our investigation of the Midland plant.

In October and November 1982, GAP participated in two other public meetings at NRC offices in Bethesda, Maryland. These meetings dealt with Consumers' proposals to the NRC Staff on a soils remedial construction implementation audit and an independent review program that was to assure the Staff of construction quality and the "as-built" condition of the facility. GAP submitted its analysis of the September 17 and October 5 proposals in October 27 and November 11 letters, respectively. The GAP comments revealed substantial weaknesses in the programs, inadequate information to judge program adequacy, and basic lack of independence of the proposed main independent review contractors.

Following those meetings, the NRC Staff-- (1) rejected the Management Analysis Corporation (MAC) due to lack of independence; (2) requested that the Terra Corporation review a second safety system in its "vertical slice" plan; (3) requested expansion of the review of the "as-built" condition of the plant; and (4) failed to take a position on the Stone & Webster audit of soil underpinning work.

In late November the NRC Region III Special Section on the Midland plant completed an extensive inspection of the hardware and materials in the nuclear plant's diesel generator building. According to NRC public statements, this inspection revealed major

problems related to the quality assurance of the plant and included an extensive backlog of quality assurance/quality control documentation, inability to provide materials traceability, unqualified and/or uncertified welders, and other serious problems.

Yet, in spite of the major revelations of inadequate construction practices, in late December the NRC Staff permitted soils remedial work to begin. It is GAP's position, well known to the Staff, that this premature approval violates the June 1982 request of the Advisory Committee on Reactor Safeguards (ACRS) to NRC Chairman Nunzio Palladino. The June 8 letter further states that ACRS would defer its own "recommendation regarding operation at full power until we have had the opportunity to review the plan for an audit of plant quality...." This assessment, according to the letter, should include "...Midland's design adequacy and construction quality with emphasis on installed electrical, control, and mechanical equipment as well as piping and foundation... design and construction problems, their disposition, and the overall effectiveness of the effort to assure appropriate quality."

Finally, in the past two months GAP has continued its attempt to determine the seriousness of the situation and the adequacy of proposed solutions for the Midland plant. Our efforts at working with the Office of Inspection and Enforcement (IE) and Office of Investigation (OI) staffs have been frustrating. For example, although NRC letters and public presentations responding to GAP's October 22 and November 11 requests were informative, they failed to provide the key methodology necessary to assess the adequacy of the program. When GAP investigators attempted to pursue the questions at the public meeting, they were told "to allow the NRC time to ask for those documents." (NRC Public Meeting, Bethesda, Maryland, November 5, 1982.) Subsequently, GAP repeated the request in its November 11 letter. Over two-and-one-half months after the original request, GAP finally received the NRC's response: "You may wish to request access to the documents from Consumers Power." (December 14, 1982 letter from James G. Keppler to Billie Garde.)

It is clear that the NRC Staff plans to evade or ignore public requests for the minimum information necessary to complete a responsible review of the proposed independent audit.

Our experiences at the William H. Zimmer plant in Ohio and at the LaSalle plant in Illinois have led us to be extremely skeptical of the NRC Staff's conclusions about the safety of nuclear power plants. In those cases the Staff either deliberately covered up or

missed major QA violations at plants 97% and 100% complete, respectively. To illustrate, after the Staff virtually ignored GAP analysis and granted approval for full power operations at LaSalle, the plant was able to operate for less than 24 hours before being shutdown due to a hardware breakdown. At Zimmer, the Staff-approved Quality Confirmation Plan was so ineffective that on November 12, 1982 the Commission suspended all safety-related construction.

As a result, there is no basis for confidence in an NRC-approved CCP on faith. The basis for this extraordinary remedy must be full disclosed, as well as the methodology for an independent review. In order to accomplish this goal, the Regional Administrator should be suspending all construction until the above recommendations (infra, at 1) are incorporated into the Construction Permit.

II. GROUNDS FOR SUSPENSION OF A CONSTRUCTION PERMIT

A. Legal Requirements

The law gives the Commission broad discretion to revoke, suspend or modify the construction permit of an NRC licensee. 42 U.S.C. §2236 states that:

A license or construction permit may be revoked, suspended or modified in whole or in part, for any material false statement in the application for license or in the supplemental or other statement of fact required by the applicant; or because of conditions revealed by the application for license or statement of fact or any report, record, inspection, or other means which would warrant the Commission to refuse to grant a license on an original application; or for failure to construct or operate a facility in accordance with the terms of the construction permit or license or the technical specifications in the application; or for the violation of or failure to observe any of the terms and provisions of this chapter or of any regulation of the Commission.

Part 50.100 of Title 10 of the Code of Federal Regulations states the same criteria for the revocation, suspension or modification of a construction permit.

The NRC has a mandatory duty to exercise this authority when necessary. According to the decision in Natural Resources Defense Council v. U.S. Nuclear Regulatory Commission, 582 F.2d 166 (2nd Cir. 1978), under the Atomic Energy Act of 1954, the NRC is required to determine that there will be adequate protection of the health and safety of the public. The issue of safety must be resolved before the Commission issues a construction permit. (Porter Cty. Ch. of Izaak Walton League v. Atomic Energy Commission, 515 F.2d

513, 524 (7th Cir. 1975).)

B. Criteria to Exercise Discretion

According to 10 C.F.R. §2.202, the NRC "may institute a proceeding to modify, suspend, or revoke a license or for such other action as may be proper by serving on the licensee an order to show cause which will: (1) allege the violations with which the licensee is charged, or the potentially hazardous conditions or other facts deemed to be sufficient ground for the proposed action." As interpreted by the Proposed General Statement of Policy and Procedure for Enforcement Actions, published in the Federal Register, 44 Fed. Reg. 66754, Oct. 7, 1980 (10 C.F.R. §§2.202, 2.204), suspending orders can be used to remove a threat to the public health and safety, the common defense and security or the environment. More specifically, suspension orders can be issued to stop facility construction when further work would preclude or significantly hinder the identification and correction of an improperly constructed safety-related system or component; or if the licensee's quality assurance program implementation is not adequate and effective to provide confidence that construction activities are being properly carried out. Moreover, orders can be issued when the licensee has not responded adequately to other enforcement action or when the licensee interferes with the conduct of an inspection or investigation or for any reason not mentioned above for which license revocation is legally authorized. In order to help determine the significance of violations within this list, the Commission established "severity categories" ranging from the most fundamental structural flaws (Severity I), to minor technicalities (Severity VI). 44 Fed. Reg. at 66758-59.

Region III's enforcement criteria are consistent with these guidelines. For example, in a February 26, 1981 meeting on the Zimmer plant, Regional Administrator Keppler explained that if there is faulty construction and the program to control the problem is inadequate, there is no choice but to stop the project. This criterion was illustrated through the example of an across-the-board breakdown in a quality assurance program. (February 26, 1981 Transcript of Taped Meeting Between Members of the Region III Staff and Representative of the Government Accountability Project and Mr. Thomas Applegate, at 127, 129.)

C. Specific Bases for Suspension

The Region III Staff has characterized the problems at Midland as both extremely serious and directly relating to a quality assurance breakdown. (Detroit Free Press,

December 5, 1982.)

In light of two previous amendments to Mr. Keppler's testimony before the Atomic Safety and Licensing Board and a pending third revision, it is apparent that the only course of action available to the NRC is to modify the construction permit now, before construction resumes.

1. Safety-related defects

GAP's review of inspection reports, interviews with nuclear workers, and review of the ASLB hearing testimony reveals an historical pattern of increasingly significant safety-related problems at Midland, including failures to comply with the law and NRC regulations, as well as to correct past non-compliances.

Although the GAP investigation and analysis of NRC records is far from complete, significant threats to the safety of the Midland plant include the following:

a. Welder qualification

10 C.F.R. 50, Appendix B, Criterion IX requires--

Measures shall be established to assure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.

At Midland welder qualification problems are well known to the public. On December 2, 1982 Consumers laid off all of the welders of the Zack Company. They were trained by a vendor, Photon Testing, that was not NRC-approved. Although Consumers has publicly characterized this as "only a paper work problem" (Norman Saari to local NBC Channel 5 television, January 1982), it remains a serious unanswered question about the Midland plant. Until the public knows the extent of "uncertified/unqualified welders, it is virtually impossible to determine the adequacy of any plan -- short of a 100% reinspection of all unqualified welds performed by welders whose qualifications have not been verified.

2. Documentation and care of welding equipment

As seen above, Criterion IX requires careful verified maintenance of welding equipment. For example, portable ovens, or "caddies," must be plugged in at all times, except during transport to and from the rod shack. Affidavits submitted by GAP in June reveal serious problems with welding equipment, welding rods, and a failure to comply

with either professional codes or NRC requirements.

In fact, the NRC's own report into the initial Zack allegations confirmed that the welding rods had not been adequately controlled by attendants. Attendants did not even know that the weld rods were to be heated. At least one caddy was slightly warm and another "relatively cold." The ovens apparently had been unplugged for "quite a while." The QC inspector also found welding equipment that was uncalibrated.*/

3. Inadequate corrective action for welding violations

Of course, once violations are identified, the utility is legally obligated to correct them. 10 C.F.R. 50, Appendix B, Criterion XVI, requires, in part--

Measures shall be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition.

It is all too clear that Consumers did not take seriously the \$88,000 fine for identified Zack deficiencies or the order to ensure compliance with the law. The December 1982 Zack welder lay-off may be prophetic of what the public can expect if Consumers is put in charge of the plant's completion.

4. Electrical cables

10 C.F.R. 50, Appendix B, Criterion XV requires--

Measures shall be established to control materials, parts, or components which do not conform to requirements in order to prevent their inadvertent use or installation. These measures shall include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations. Nonconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures.

GAP witnesses revealed widespread inaccuracies in the use of electrical cables critical to safe operation of the plant, and shutdown in case of an accident. In September 1982 the NRC ordered 100% reinspection of all cables on site. Currently, the public has no idea how many nonconforming cables are being found on site. Witnesses inside the plant have reported to GAP that only a small percentage of those discovered are being

*/NRC Region III investigation into allegations of Mr. Dean Darty, March 1979.

reported. In one affidavit, a witness reported that others have been replaced without documentation.

The violations summarized above provide only a few examples of the suspect safety components at Midland. Other whistleblowing disclosures to Region III referred to welding standards below ASME specifications; undersized welds; anchor bolts improperly installed; excessive weight on electrical conduits; hollow walls; corrosion in the small bore piping; unapproved design modifications; and other safety defects.

Even if management systems and security measures were sound, the physical deficiencies already documented at Midland justify a suspension of construction. Before permitting work to continue, the Commission should thoroughly assess the damage through independent tests; monitor the results of a comprehensive, independent audits; and modify the construction permit to include the changes.

D. Quality Assurance

A licensee's quality assurance program is its internal structure of checks and balances to guarantee safe operations. Every applicant for a construction permit is required by the provisions of 10 C.F.R. §50.34 to include in its preliminary safety analysis report a description of the quality assurance program to be applied to the design, fabrication, construction and testing of the structures, systems and components of the facility. Quality assurance comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system or component will perform satisfactorily in service. Each structure, system or component must be documented, inspected and periodically audited to verify compliance with all aspects of the quality assurance program.

The cause of the safety defects described above is an inadequate quality assurance program, which has been in shambles for a decade. In fact, in 1973 the original Midland licensing appeal board members felt so strongly about QA violations that the Director of Regulations pointed out that even though the Appeals Board could not take action on the IE findings--

[H]ad the construction permit proceeding still been before our Board at the time that the results of the November 6-8 inspection were announced, it is a virtual certainty that we would have ordered forthwith a cessation of all construction activities....

(November 25, 1973 Letter from L. Manning Muntzing, Director of Regulations, re: Quality Assurance Deficiencies Encountered at Midland Facility, p. 2.)

The 1973 warning should have served as notice to both Bechtel and Consumers Power to resolve their QA problems. Quite the contrary, however, they ignored the notice. So did the NRC Staff. The QA problems at Midland continued unabated.

Both the 1979 and 1980 Systematic Assessment of Licensee Performance (SALP) reports give notice of further and expanded problems at Midland. The problems identified then (lack of qualifications of QC inspectors, continuation of work prior to corrective action) are similar to those cited as causes in the recent stop-work order. The reports also included acknowledgements of excessive QA backlogs and lack of timeliness. (SALP Report 1980.) Consumers' failure to learn from its mistakes passed the stage of accidental oversight long ago.

The lack of quality assurance at Midland has been a continuous concern to Region III. In the spring of 1982 at the release of the 1981 SALP rating, Mr. Keppler publicly reported that it was necessary to change previous testimony before the ASLB which had provided a "reasonable assurance" that the plant would be constructed in accordance with nuclear construction regulations. The revised testimony was submitted October 27, 1982. Although the original testimony was not modified substantially, it is clear that QA problems at Midland are unresolved.

Unfortunately, the Region III Staff seems satisfied with the basis upon which the Construction Completion Plan is developed: put Consumers in charge of the program.

The public already has had an opportunity to preview the results of Consumers' internal policy with the Zack debacle over the past three years. Its performance has been disappointing, at most.

Although the NRC fined Consumers \$38,000 for Zack's non-compliance with federal regulations and forced a major QA reorganization, further actions by the utility revealed a determination to hide problems -- regardless of the consequences. In fact, a December 22, 1982 NRC report about the revelations of a quality assurance breakdown at Zack headquarters acknowledges the role that Consumers played in the response to the 1979 citation:

On September 2, 1981, the services of a Senior Quality Assurance Engineer from Project Assistance Corporation (consultants) were retained by Consumers Power Company for assignment at Zack for the purposes of establishing a formal document control system and performing an indepth review of the conditions described by Zack in their September letter (Zack notified Consumers of [a] 10 CFR 50.55(e) on August 28, 1981).

Consumers Power Company, unlike the two other utilities receiving materials from Zack, did not notify the NRC about the major problems in QA documentations. Those problems included falsified and altered documentation.

This example of the utility's response to the discovery of any major problems completely undermines the assumption upon which the Construction Completion Plan is based -- voluntary disclosure of QA violations. This assumption is both historically inaccurate and structurally flawed.

D. Maximizing Human Errors

"Human error" recently has been recognized as the Achilles Heel of even the most well-constructed plants. At Midland the phrase "comedy of human errors" would be more appropriate if the potential consequences were not so disastrous.

A key cause of human error is intoxication, which the NRC recognized last summer in proposed fitness-for-duty regulations. Our disclosures have reported widespread drunkenness on the job. Witness after witness has confirmed the routine of red-eyed employees who did their work under the handicap of an alcoholic stupor. Witnesses have also confirmed the frequent use of marijuana and stronger drugs. Intoxication weakens the capacity to install safety components, just as it debilitates the ability to drive or to engage in almost any other activity. At a minimum, the widespread use of drugs and liquor on-the-job increases the significance of a superficial quality control program. There are likely to be more defects: A nuclear plant constructed by drunken employees is likely to stagger into an accident.

III. RESTRUCTURE THE MULTIPLE AUDIT/THIRD-PARTY REVIEWS INTO ONE COMPREHENSIVE, INDEPENDENT REVIEW

In October and November 1982, two meetings were held to review Consumers proposed resolution for major quality assurance problems. These proposals and subsequent comments provided by CAP were made prior to completion of the major NRC inspection in November. Presumably, the audit suggested in the Construction Completion Plan (see CCP, at 16 and Figure 1.1) will incorporate those audits already discussed last fall. However, the CCP as proposed fails to resolve basic third-party review questions.

The CCP states: "This section describes third party evaluations that have been performed and are planned to assess the effectiveness of design and construction activity implementation." Yet, closer scrutiny of the proposal shows that it fails to include even the most basic information about the promised third-party review. In fact, although the CCP states that an INPO evaluation has been completed, there is no indication of what that report revealed.

Most significant, the entire CCP is premature until all the third parties eventually chosen have completed their evaluations. The point of the third-party reviews is to define the QA violations and deficiencies at Midland. By rushing into the CCP before that process has begun in some areas, the utility is putting the cart before the horse. In effect, the utility's CCP is competing with the third-party program. At best, the two "reforms" will be operating simultaneously, stumbling over each other. Depending on the results of the outside reviews, CCP work may have to be redone -- consistent with the costly tradition at Midland of doing the same work over and over.

A. The INPO Construction Evaluation

This evaluation is limited by definition. It is only a "self-initiated evaluation." Neither the NRC nor GAP found the Management Analysis Corporation (MAC) adequately independent to provide a truly independent review of the problems at Midland. In fact, they have been involved in at least two other major audits of the plant -- neither of which turned up any of the significant construction deficiencies now facing Consumers.

A December 14, 1982 Region III letter to GAP underscored the NRC position on MAC:

The INPO and biennial QA audit are not an acceptable substitute for the third party review. ... Questions were raised concerning whether Management Analysis Company was sufficiently independent to assume lead responsibility for the independent review.

Although the MAC analysis may have provided a tool for Consumers to judge the quality of the plant, it simply is not an independent third-party evaluation. Instead, it was a test of INPO's ability to assess the "as-built" condition of the plant. Its adequacy is completely unknown, because the public does not even know if the INPO evaluation discovered the same flaws that the NRC found in its inspection.

B. The Independent Construction Overview

This is the "meat" of the third-party review plan, yet it remains an ambiguous promise from Consumers to the NRC. Although the schedule (CCP, at 18) indicates that the scope has been defined and the consultant selected, this information has not yet been shared with the public. Until and unless the scope of the third-party review has been defined and the audit contractor selected, it is premature to make any judgments on the role and adequacy of the third-party review. Further, it is clearly inappropriate to indicate that a legitimate third-party review has been in place from the beginning of this reform effort, as Figure 1-1 suggests.

At Diablo Canyon the Commission set out very clear criteria by which an independent auditor would be chosen. ^{*/} At Zimmer GAP and the NRC are currently embroiled in a debate over the application of these guidelines in the selection of Bechtel for that role.

At Midland we again request that the NRC reestablish the fading legitimacy of the Commission's third-party reform efforts by requiring Consumers to provide the details of the selection process, the identification of the third party and the methodology by which it will accomplish its review.

We are alarmed that even in the sketchy details provided in the CCP, the proposed third-party review is only to be conducted for six months, "top management" will determine "what modification, if any, should be made to the consultant's scope of work." At a minimum, the NRC should recognize that any Construction Completion Plan must be based on the results of completed third-party findings, as well as an ongoing commitment for the duration of the project. The third-party review program must provide a comprehensive view of the as-built condition of the plant, and an independent assessment of all future construction. Nothing less will provide the public with any assurance that the Midland plant can operate safely.

^{*/} In a letter of February 1, 1982, Chairman Palladino explained to Congressmen Dingell and Ottinger the criteria according to which an independent auditor would be chosen at Diablo Canyon:

(1) Competence: Competence must be based on knowledge of and experience with the matters under review.

(2) Independence: "Independence means that the individuals or companies selected must be able to provide an objective, dispassionate technical judgment, provided solely on the basis of technical merit. Independence also means that the design verification program must be conducted by companies or individuals not previously involved with the activities...they will now be reviewing."

(3) Integrity: "Their integrity must be such that they are regarded as respectable companies or individuals."

C. The Independent Design Verification (IDV)

The Tera Corporation already is conducting the "vertical slice" of the project. Because the auxiliary feedwater system selected by Tera has already been the subject of numerous audits, GAP suggested that it is not representative of potential problems at Midland. The NRC agreed and required Tera to review a second system.

Although that system has not yet been selected, we understand that Consumers has nominated three systems for review, of which one will be chosen by the NRC. Since October 22, GAP has recommended that the second system should be a safety system with a history of QA violations. Specifically GAP suggested the HVAC system. Certainly if the CCP's third-party review is to determine the plant's safety, it should be able to account for the most troubled systems.

In Mr. Keppler's October 12, 1982 letter to Billie Garde, he agreed with that position:

My decision regarding the independent audit of Zack work at Midland will be based on findings of [NRC inspections] and the licensee's third party independent assessments.

* * * * *

The fragmented and overlapping approach of the NRC, the utility and the "independent" auditors is self-defeating. It must stop, if Midland is to progress from a theoretical design to an operating plant. A truly independent, objective review must first be completed. Only then can a CCP begin to operate legitimately, with ongoing oversight from the outside auditors and the NRC.

IV. REJECT CONSUMERS' CONSTRUCTION COMPLETION PLAN

On April 8, 1981 Region III management overruled its investigative staff's recommendations to suspend construction at the William H. Zimmer Nuclear Power Station near Cincinnati, Ohio. Instead, the NRC issued an Immediate Action Letter which, inter alia, required the Cincinnati Gas & Electric Company to develop a Quality Confirmation Program (QCP). On November 12, 1982 the utter failure of the QCP forced the Commissioners to suspend all safety-related construction at Zimmer. Unfortunately, the Construction

Completion Plan proposed for Midland bears a striking resemblance to the key flaws that doomed the QCP. In some cases, the CCP exacerbates the painful mistakes of Zimmer.

More specifically, the Construction Completion Plan-- (a) is permeated by an inherent conflict-of-interest; (b) institutionalizes a lack of organizational freedom for the quality assurance department; (c) fails to specify inspection procedures and evaluation criteria; and (d) is not comprehensive.

A. Inherent Conflict of Interest

The foundation of the CCP is to complete "integration of the Bechtel QC function into the Midland Project Quality Assurance Department (MPQAD) under Consumers Power Company management...." (CCP Executive Summary, at 3.)

Since Consumers has always played a significant role in the MPQAD, in effect the "reform" calls for the utility to second-guess its own previous decisions. This is the equivalent of the fox offering to do a better job of guarding the henhouse. If anything, the CCP intensifies the conflicts of interest in the QCP. At Zimmer the utility only imposed quality assurance violations clandestinely; at Midland the utility has openly participated in decisions to break the law.

B. Lack of Organizational Freedom for the Quality Assurance Department

The organizational premise of the CCP is a "team" concept that integrates construction, engineering and quality assurance personnel. The "team members will be physically located together to the extent practicable...." Although the proposal does not specify the identity of Team Supervisors, there is only one MPQAD representative among six specified in the plan. (CCP, at 8.)

The CCP supposedly is the reform to compensate for a quality assurance breakdown. Unfortunately, the plan would violate the criteria of 10 C.F.R. 50, Appendix B, Criterion I even for a healthy nuclear construction organization. The regulations require organizational freedom for QA functions. The QA department is required by law to serve as an independent check and balance on the construction program. The CCP turns that premise on its head by reducing QA representatives to a token minority on construction-dominated "teams."

C. Failure to Specify Inspection Procedures and Evaluation Criteria

The proposal promises to develop and revise the procedures that will be used to conduct the reinspections. (CCP, at 8-9, 12.) Neither the procedures nor the evaluation criteria for the inspections are specified, beyond vague references to professional codes. This issue is the heart of the quality verification program. Unfortunately, at present the methodology of the program is a mystery. As a result, it is impossible to judge whether the CCP will represent a thorough reinspection or a superficial skimming. Further, the necessity to establish new QC procedures casts a shadow over all the current inspection procedures.

D. Lack of Comprehensiveness

CCP reinspections will only cover "accessible" completed construction, an undefined term. "Inaccessible" items will be handled by paperwork reviews. (CCP, at 10.) Further, the proposal defines-out from coverage "[t]hose activities that have demonstrated effectiveness in the Quality Program implementation...." (Id., at 20.) Included in this latter category are activities such as "HVAC Installation work being performed by Zack Company," and "[r]emedial [s]oils work which is proceeding as authorized by NRC."

This piecemeal approach effectively surrenders any pretensions that the CCP will provide a definitive answer to the Midland QA problems, even if the program were otherwise legitimate. To illustrate, the necessity for the reinspections in the first place is the inaccuracy of current quality records. Paperwork reviews will not contribute anything new.

The list of systems that have "demonstrated" quality effectiveness suggests the utility has completely lost touch with reality, or expects that the NRC Staff and the public have taken leave of their senses. Both the Zack HVAC and soils remedial work have been among the most scandal-ridden embarrassments of the Midland project. The crude deficiencies and violations have led to fines, multiple criminal investigations, and public humiliation for Consumers. The utility has only been able to continue soils remedial work by manipulating the public hearing process to circumvent NRC Staff enforcement orders. The list of "proven" systems proves only that Consumers is determined to impose the same nightmare on Midland that the Quality Confirmation Program represented at Zimmer. Hopefully, the NRC Staff will not be fooled again.

D. Flaws in the CCP Program Implementation and Quality Program Review

By their terms, Section 5 (Program Implementation) and Section 6 (Quality Program Review) indicate that the CCP simply reflects the "status quo" attitude of Midland's management that propelled Consumers into this particular construction/regulation nightmare in the first place.

Although the CCP proposal is premature, inadequate, and **fatally flawed**, the language of the proposal reveals that management believes the Midland plant's QA program is "basically sound" (CCP, at 15), even in the face of deliberations by legal and advisory bodies on Consumers' ability to adequately implement any QA plan, no matter how sound.

The amount of management influence and interference has already been a subject of NRC concern. (See NRC Memorandum from C. E. Norelius and R. L. Spessard to James E. Keppler, June 21, 1982.) Yet, the CCP proposes as an answer to increase management involvement at every step of the implementation process (CCP, at 13-15). Further, the implementation fails to refer to how the inevitable conflicts between management officials watching the calendar and conscientious QA officials trying to do their jobs will be resolved.

The only clue that GAP has as to how Consumers plans to change the mindset of its demoralized workers is the Quality Improvement Plan (QIP) mentioned extensively in the fall proposals. This plan, referred to as the catalyst for ensuring new commitment and compliance to quality standards on the Midland site, is, according to the NRC officials familiar with it, an incentive-bonus concept for construction workers who "do the job right the first time." (NRC-GAP Telephone Conversation, January 27, 1983.) Like the Bechtel cost-plus contract, the Quality Improvement Plan is a series of rewards for doing the same job a worker was hired to do right in the first place. A quality improvement plan that bases critical construction adequacy on "prizes" given to its workers reveals a serious misunderstanding on the part of Consumers about the ultimate value of its work.

V. IMMEDIATELY HALT THE ONGOING SOILS WORK UNTIL THE QUALITY ASSURANCE IMPLEMENTATION AUDITOR IS APPROVED

Two significant milestones in the soils work have now been approved to proceed underneath the turbine building. This Staff approval is entirely inappropriate given the legal and advisory controversy over this operation. It is inexcusable to allow work to

proceed without the independent audit upon which Mr. Keppler based his "reasonable assurance" testimony (October 27, 1982 Testimony to the Midland ASLB), and upon which the ACRS is depending to complete their own technical assessment before granting a full power license. Further, in light of administrative hearings which cover the adequacy of the soils quality assurance implementation (OM Proceedings), the NRC Staff approval is an insult to the court and to the citizen intervenors struggling to achieve a measure of fairness in the proceeding.

GAP's view on Stone & Webster, the proposed third-party for QA implementation audit, is documented in our October 22, 1982 letter. As an update and summary we believe that Stone & Webster meets only one of the three criteria for a legitimate third party. Yes, Stone & Webster has demonstrated economic independence from Consumers, disclosing other minor construction contracts with Consumers as well as their financial independence. But, Stone & Webster has not demonstrated its competence. Its long history of nuclear plant construction includes massive cost overruns, major Quality Control problems, significant design errors and poor construction management. Further, Stone & Webster's corporate integrity remains the subject of much skepticism, particularly in light of its six-month involvement on the Midland site without NRC approval of their work.

However, if the NRC is going to approve Stone & Webster -- as seems obvious -- and hold it responsible under 10 C.F.R. Part 21 for reporting violations or QA failures, then the Region should so so. Someone other than Consumers must watch the QA implementation of critical soils work.

VI. ENCOURAGE CONSUMERS TO RELEASE THE NEW COST ESTIMATE AND PROJECTED COMPLETION DATE INFORMATION

Although neither cost nor scheduling is an NRC concern, both are critical concerns of the residents of Central Michigan who must constantly balance the risks and costs of this nuclear plant. If public confidence is ever to be restored in the Midland facility, it will come after Consumers demonstrates candor and openness with the public. It would benefit everyone to have the yoke of the December 1984 "on-line target date" removed as

soon as possible from the necks of the nuclear workers.

Likewise, the new cost projection is unknown by local residents. GAP sources indicate a \$4-billion-plus price tag, but that was an estimate which did not include the major stop-work order in December of last year.

If the plant is ever going to be included in the Michigan rate base, Consumers should begin today to adopt a new and candid approach to all of its problems. Public trust simply cannot be restored on anything less than honest admissions.

VII. CONCLUSION

There are too many questions about the Midland Nuclear Power Plant left unanswered at this time. These questions are forming the basis for growing public skepticism about the NRC's ability or willingness to regulate nuclear power. In Central Michigan this uneasiness and distrust have led previously inactive citizens and local government bodies to become involved in their own protection. The citizens' desire to be informed about the ultimate safety of the Midland plant led them to request assistance from the Citizens Clinic of the Government Accountability Project. Our investigation into worker allegations and analysis of the situation confirms the needs for a comprehensive answer.

Midland needs a verification program implemented by a truly independent company with no stake in the outcome of its audit. This independent third party is not serving a client's requirements, but rather the public interest in ensuring the quality of construction at the plant. That third party must be accountable only to the NRC and the public.

* * * * *

U. S. NUCLEAR REGULATORY COMMISSION
REGION III

SUBJECT: ARES REPORT ON DESIGN AND CONSTRUCTION PROBLEMS FOR VTR-100
FROM START OF CONSTRUCTION THROUGH JUNE 1981 - MIDLAND

DATE: 10/15/81

CONTENTS MUST NOT BE REMOVED

RETURN TO: REGION II CENTRAL FILES

File

PRINCIPAL STAFF	

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

Dr. Paul Shewmon, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Dr. Shewmon:

Subject: Report on Midland Design and Construction Problems,
Their Disposition, and Overall Effectiveness of the
Effort to Assure Appropriate Quality

DISTRIBUTION:

Docket Nos. 50-329/330

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bcc: PRC System

NRC PDR

Local PDR

NSIC

TIC

ACRS (16)

~~W~~Paton

WHaass

JGilray

JPKnight

JKeppler

The ACRS Interim Report on Midland Plant, Units 1 and 2 dated June 8, 1982, requested, in part, "a report which discusses design and construction problems, their disposition, and the overall effectiveness of the effort to assure appropriate quality."

Supplement No. 1 to the Midland Safety Evaluation Report (SSER 1) replied that Region III would prepare such a report addressing construction problems for the period from the beginning of construction through June 30, 1982. The enclosed report responds to that reply. SSER 1 also indicates that a final report on overall quality of plant construction will be issued for the remaining period following completion of construction.

In addition, the staff is currently reviewing the several programs proposed by the applicant to independently verify design and construction of the Midland Plant. The results of this review will be addressed in a future supplement to the SER.

Sincerely,

Original signed by:

Thomas M. Novak

Thomas M. Novak, Assistant Director
for Licensing
Division of Licensing

Enclosure:
As stated

cc: See next page

NOV 26 1982

80-1130004

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MIDLAND

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OCT 29 1982

Warnick
(2) file

Docket No. 50-329
Docket No. 50-330

MEMORANDUM FOR: D. G. Eisenhut, Director, Division of Licensing, NRR

FROM: R. F. Warnick, Acting Director, Office of Special Cases

SUBJECT: REPORT ON MIDLAND DESIGN AND CONSTRUCTION PROBLEMS,
THEIR DISPOSITION, AND OVERALL EFFECTIVENESS OF THE
EFFORT TO ASSURE APPROPRIATE QUALITY

In a letter to Chairman Palladino dated June 8, 1982, entitled, ACRS Interim Report on Midland Plant, Units 1 and 2, Dr. Paul S. Shewman, Chairman of the Advisory Committee on Reactor Safeguards, requested "a report which discusses design and construction problems, their disposition, and the overall effectiveness of the effort to assure appropriate quality."

Supplement No. 1 to the Midland Safety Evaluation Report (SSER 1) indicates Region III would prepare such a report for the period from the beginning of construction through June 30, 1982. The SSER 1 also indicates that a final report will be issued on the above subjects for the period from July 1, 1982 through the completion of construction.

The enclosed report is submitted in response to the first part of above referenced request and commitments. We request it be forwarded to the ACRS. A final report will be submitted following completion of construction.

It is our understanding that NRR has lead responsibility for the disposition of some of the construction problems. This is noted in the report. (See item III, paragraphs H.10 and J.8.)

Please contact me if you have any questions.

R. F. Warnick
R. F. Warnick, Acting Director
Office of Special Cases

Enclosure: As stated

cc w/encl:
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R. Hernan, NRR
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~~8311200120~~

OCT 29 1982

Midland

Docket No. 50-329

Docket No. 50-330

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FROM: R. F. Warnick, Acting Director, Office of Special Cases

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Please contact me if you have any questions.

15/ for R. F. Warnick

R. F. Warnick, Acting Director
Office of Special Cases

Enclosure: As stated

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DATE		10/28/82			10/29	10/29

Midland Nuclear Power Plant, Units 1 and 2

Docket No. 50-329
Docket No. 50-330

REPORT ON DESIGN AND CONSTRUCTION PROBLEMS FOR PERIOD FROM
START OF CONSTRUCTION THROUGH JUNE 30, 1982

Report Requested by Advisory Committee on Reactor Safeguards

I. Introduction

The following report prepared by the NRC, through its Region III office, discusses Midland construction problems, their disposition, and the overall effectiveness of the Consumers Power Company's efforts to ensure appropriate quality. The report was prepared at the request of the Advisory Committee on Reactor Safeguards and in response to commitments made in Supplement No. 1 of the Safety Evaluation Report. The report covers the period starting with the beginning of construction up to June 30, 1982. A final report will be issued on the above subjects for the period from July 1, 1982 through the completion of construction discussing the overall quality of plant construction.

II. Summary and Conclusions of Overall Effectiveness

Since the start of construction, Midland has experienced some significant problems resulting in enforcement action (enforcement statistics are summarized in Table 1). Following the identification of each of these problems, the licensee has taken action to correct the problems and to upgrade the QA program and QA/QC staff. The most prominent action has been an overview program which has been steadily expanded to cover safety related activities. In spite of the corrective actions taken, the licensee continues to experience problems in the implementation of quality in construction.

Significant construction problems identified to date include: (1) 1973 - cadweld splicing deficiencies (Paragraph C.2); (2) 1976 - rebar omissions (Paragraph F.5); (3) 1977 - bulge in the Unit 2 Containment Liner Plate (Paragraph G.3); (4) 1977 - tendon sheath location errors (Paragraph G.4); (5) 1978 - Diesel Generator Building settlement (Paragraph H.10); (6) 1980 - allegations pertaining to Zack Company heating, ventilating, and air conditioning (HVAC) deficiencies (Paragraph J.7); (7) 1980 - reactor pressure vessel anchor stud failures (Paragraph J.8); (8) 1981 - piping suspension system installation deficiencies (Paragraph K.4); and (9) 1982 - electrical cable misinstallations (Paragraph L.2).

Consumers Power has on repeated occasions not reviewed problems to the depth required for full and timely resolution. Examples are: (1) rebar omissions (1976); (2) tendon sheath location errors (1977); (3) Diesel Generator Building settlement (1978); and (4) Zack Company HVAC deficiencies (1980). In each of these cases the NRC, in its investigation, has determined that the problem was of greater significance than first reported or that the problem was more generic than identified by Consumers Power Company.

The Region III inspection staff believes problems have kept recurring at Midland for the following reasons: (1) Overreliance on the architect-engineer, (2) failure to recognize and correct root causes, (3) failure to recognize the significance of isolated events (4) failure to review isolated events for their generic application, and (5) lack of an aggressive quality assurance attitude.

A history of the Midland design and construction problems and their disposition, as identified and described in NRC inspection reports, is contained in the following section (III). This history is for the period from the beginning of construction through June 30, 1982.

Table 1

ENFORCEMENT STATISTICS

YEAR	RESPECTORS	NONCOMPLIANCES/ DEVIATIONS	HEADQUARTERS NOTICE OF VIOLATION	CIVIL PENALTIES	FALS/ CAL'S	ORDERS MODIFYING CP/ SHOW CAUSE ORDERS	SIGNIFICANT CONSTRUCTION PROBLEMS
1970	6	4	0	0	0	0	0
1971	2	0	0	0	0	0	0
1972	1	0	0	0	0	0	0
1973	11	6	0	0	0	1 (Cadmiums)	1 (Cadmiums)
1974	11	3	0	0	0	0	0
1975	7	0	0	0	0	0	0
1976	9	17	1 (Rebar)	0	1 (Rebar)	0	1 (Rebar)
1977	15	10	0	0	1 Sheath	0	(Bulge in Containment Liner and 2 Tendon Sheath Installation Errors)
1978	23	14	0	0	0	0	1 (Diesel Generator Bldg. Settlement)
1979	30	17	0	0	0	1 (Diesel Generator Bldg. Settlement)	0
1980	37	21	0	1 (Zack)	1 (Zack)	0	2 (Zack HVAC & Reactor Anchor Studs)
1981	23	21	0	0	1 System	0	1 (Pipe Suspension System)
1982	14	7	0	0	0	2 (Diesel Generator Bldg. Settlement)	1 (Electric Cable Routing)

III. Design and Construction Problems As Documented in NRC Inspection Reports

A. 1970

Six inspection reports were issued in 1970. In July 1970, construction activities authorized by the Midland Construction Permit Exemption commenced. A total of four items of noncompliance were identified in 1970. These items are described below:

Four items of nonconformance were identified in Inspection Report Nos. 50-329/70-06 and 50-330/70-06 concerning the installation of concrete. The nonconformances regarded: (1) concrete placement activities violated ACI Code; (2) laboratory not performing tests per PSAR; (3) sampling not per ASTM; and (4) QA/QC personnel did not act on deviations when identified. Licensee corrective actions included: (1) Bechtel to provide a report attesting to the Auxiliary Building base slab where lack of consolidation was apparent; (2) a commitment to perform tests at frequencies specified in the PSAR; and (3) a commitment to train workers and the inspection staff. This matter was discussed during the Construction Permit Hearings and is considered closed.

B. 1971-1972

Three inspections were conducted during this period. No items of noncompliance were identified. Midland construction activities were suspended pending the pre-construction permit hearings.

On December 15, 1972, the Midland Construction Permit was issued.

C. 1973

Eleven inspection reports were issued in 1973 of which two pertained to special management meetings, two to vendor inspections, one to an audit of the architect engineer, and six to onsite inspections. A total of six items of noncompliance were identified during 1973. One significant construction problem was identified involving deficiencies in cadweld splicing of rebar (see Paragraph 2). These items/problems are described below:

1. Noncompliances involving two separate Appendix B criteria with five different examples were identified during a special audit of the architect engineer's Quality Assurance Program. The noncompliances were documented in Inspection Report Nos. 50-329/73-08 and 50-330/73-08. The items of noncompliance regarded: (1) inadequate requirements for quality record retention; (2) inadequate drawing control; (3) inadequate procedures; and (4) unapproved specifications used for vendor control. Licensee corrective actions included: (1) revision of Bechtel Nuclear Quality Assurance Manual; (2) revision of Midland Internal Procedures Manual; (3) personnel instructed to audit the status of the drawing stick files weekly; (4) project administrator assigned the

responsibility for maintenance of master stick file; and (5) project engineer and staff to perform monthly surveillance of project record file. Inspection Report Nos. 50-329/74-03 and 50-330/74-03 concluded that appropriate corrective actions had been taken by the licensee relative to the identified violations.

2. One significant construction problem was identified during 1973. It involved cadweld splicing deficiencies and resulted in the issuance of a Show Cause Order. Details are as follows:

A routine inspection, conducted on November 6-8, 1973, identified eleven examples of four noncompliance items relative to rebar cadwelding operations. The noncompliances were documented in Inspection Report Nos. 50-329/73-10 and 50-330/73-10. These items were summarized as: (1) untrained cadweld inspectors; (2) rejectable cadwelds accepted by QC inspectors; (3) records inadequate to establish cadwelds met requirements; and (4) inadequate procedures.

As a result, the licensee stopped work on cadweld operations on November 9, 1973, which in turn stopped rebar installation and concrete placement work. The licensee agreed not to resume work until the NRC reviewed and accepted their corrective action. A Show Cause Order was issued on December 3, 1973, formally suspending cadwelding operations. On December 6-7, 1973, Region III and Headquarters personnel conducted a special inspection and determined that construction activities could be resumed in a manner consistent with quality criteria. Licensee corrective actions included: (1) the revision of the Bechtel specification to reflect requalification requirements; (2) development of instructions requiring that work specifications be reviewed prior to Class 1 work; (3) the establishment of provisions for Consumers Power QA review of work procedures; and (4) the establishment of procedures for the audit of Class 1 work.

The Show Cause Order was modified on December 17, 1973 allowing resumption of cadwelding operations based on inspection results. The licensee answered the Show Cause Order on December 29, 1973 committing to revise and improve the QA manuals and procedures and make QA/QC personnel changes.

On September 25, 1974, the Hearing Board found that the licensee was implementing its QA program in compliance with regulations and that construction should not be stopped.

D. 1974

Eleven inspection reports were issued in 1974 of which one pertained to a vendor inspection, one to an inspection at the licensee's corporate offices, and nine to onsite inspections. Three items of noncompliance were identified during 1974. These items are described below:

1. One noncompliance was identified in Inspection Report No. 50-329/74-01 and 50-330/74-01 concerning the use of unapproved procedures during the preparation of containment building liner plates for erection. Licensee corrective actions included: (1) intensive review of liner plate records for accuracy; (2) issuance of nonconformance report; (3) requirement imposed that unapproved copies of procedures transmitted to the site be marked "advance copy;" and (4) identification of procedure approval status. The licensee's actions in regards to this matter were reviewed and the noncompliance closed by the NRC as documented in Inspection Report Nos. 50-329/74-01 and 50-330/74-01.
2. One noncompliance was identified in Inspection Report Nos. 50-329/74-04 and 50-330/74-04, concerning the use of a weld method which was not part of the applicable weld procedure. Licensee corrective actions included: (1) issuance of a nonconformance report; (2) repair of subject welds; (3) reinstruction of welders; and (4) increased surveillance of containment liner plate field fabrications. The licensee's actions in regards to this matter were reviewed and the noncompliance closed by the NRC as documented in Inspection Report Nos. 50-329/74-04 and 50-330/74-04.
3. One noncompliance was identified in Inspection Report Nos. 50-329/74-11 and 50-330/74-11 concerning the failure of QC inspections to identify nonconforming rebar spacing. This violation is discussed further in the 1976 section of this report, Paragraph F.5.

E. 1975

Seven inspection reports were issued in 1975 of which one pertained to a meeting in Region III, one to an inspection at the licensee's corporate offices, and five to onsite inspection.

No noncompliances were identified in 1975, however, the licensee in March and August of 1975 identified additional rebar deviations and omissions. This matter is further discussed in the 1976 section of this report, Paragraph F.5.

F. 1976

Nine inspection reports were issued in 1976 pertaining to nine onsite inspections. A total of seventeen items of noncompliance were identified during 1976. One significant construction problem was identified involving rebar omissions/placement errors and the issuance of a Headquarters Notice of violation (see Paragraph 5). These items/problems are described below:

1. Three items of noncompliance were identified in Inspection Report Nos. 50-329/76-01 and 50-330/76-01. These items regarded: (1) inadequate concrete oven temperature controls; (2) no measures to control nonconforming aggregate; and (3) failure to dispose of nonconforming aggregate as required. Licensee corrective actions included: (1) implementing a requirement for the reverification of oven temperature controls every three months; (2) removal of nonconforming aggregate from the batch plant area; (3) modification of subcontractor's QA manual; and (4) training of subcontractor's personnel to the revised QA manual. The corrective actions implemented by the licensee in regards to these noncompliances were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/76-02 and 50-330/76-02.
2. Two items of noncompliance were identified in Inspection Report Nos. 50-329/76-02 and 50-330/76-02. These items regarded: (1) the Vice President of Engineering Inspection did not audit test reports as required; and (2) corrective actions required by audit findings had not been performed. Corrective actions taken by the licensee included revising the U.S. Testing QA manual. The licensee's corrective actions taken in regards to these matters were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/76-08 and 50-330/76-08.
3. Three items of noncompliance were identified in Inspection Report Nos. 50-329/76-08 and 50-330/76-08. These items regarded: (1) inadequate classification, review, and approval of field engineering procedures and instructions; (2) inadequate documentation of concrete form work deficiencies; and (3) inadequate control of site storage of post tension embedments. Licensee corrective actions included: (1) revision of the Bechtel Nuclear QA manual; (2) revision of Bechtel field procedure for "Initiating and Processing Field Procedures and Instructions;" (3) initiation of Bechtel Discrepancy Report; (4) training sessions for Bechtel QC; and (5) revision of storage inspection procedures. The licensee's corrective actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/77-01 and 50-330/77-01.
4. Two items of noncompliance were identified in Inspection Report Nos. 50-329/76-09 and 50-330/76-09. These items regarded: (1) noncompliance report not written to identify broken reinforcing steel; and (2) hold down studs for the reactor vessel skirt were not protected. Licensee corrective actions included: (1) inspection of all rebar dowels; (2) initiation of new field procedure; and (3) initiation of new

procedure for inspecting reactor vessel and steam generator anchor bolts. The licensee's corrective actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/77-01 and 50-330/77-01.

5. One significant construction problem was identified during 1976. It involved rebar omissions/placement errors and the issuance of a Headquarters Notice of Violation. Details are as follows:

During an NRC inspection conducted in December 1974 the licensee informed the inspector that an audit had identified rebar spacing problems in the Unit 2 containment. The failure of QC inspectors to identify the nonconforming rebar spacing was identified in the 1974 NRC inspection report as an item of noncompliance. (See the 1974 section of this report, Paragraph D.3.) This matter was subsequently reported by the licensee as required by 10 CFR 50.55(e).

Additional rebar deviations and omissions were identified in March and August 1975 and in April, May and June 1976.

Five items of noncompliance regarding reinforcement steel deficiencies were identified in Inspection Report Nos. 50-329/76-04 and 50-330/76-04. These items regarded: (1) no documented instructions for the drilling and placement of reinforcement steel dowels; (2) nonconformance reports concerning reinforcement steel deficiencies were not adequately evaluated; (3) inadequate inspections of reinforcement steel; (4) inadequate evaluations of a nonconformance report problem relative to 10 CFR 50.55(e) reportability requirements; and (5) results of reviews, interim inspections, and monitoring of reinforcement steel installations were not documented.

The licensee's response, dated June 18, 1976, listed 21 separate items (commitments) for corrective actions. A June 24, 1976 letter from the licensee provided a plan of action schedule for implementing the 21 items. The licensee suspended concrete placement work until the items addressed in the licensee's June 24 letter were resolved or implemented. This commitment was documented in a Region III Immediate Action Letter (IAL) to the licensee, dated June 25, 1976.

Rebar installation and concrete placement activities were resumed in early July, 1976 following satisfactory completion of the corrective actions and verification by Region III as documented in Inspection Report Nos. 50-329/76-05 and 50-330/76-05.

A subsequent inspection to followup on reinforcing steel placement problems identified two noncompliances. These noncompliances are documented in Inspection Report Nos. 50-329/76-07 and 50-330/76-07. The noncompliances regarded: (1) failure to follow procedures; and (2) inadequate Bechtel inspections of rebar installations. The inspection report documents licensee corrective actions which included: (1) removal of cognizant field engineer and lead Civil engineer from the project; (2) removal of lead Civil Quality Control engineer from the project; (3) reprimand of cognizant inspector; (4) additional training given to cognizant foremen, field engineers, superintendants and Quality Control inspectors; and (5) assignment of additional field engineers and Quality Control engineers. The licensee's actions in regard to these items were reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/76-07 and 50-330/76-07.

As a result of the rebar omissions and placement errors, a Headquarters Notice of Violation was issued on August 13, 1976.

Additional actions taken by the licensee included the establishment of an overview inspection program to provide 100% reinspection of embedments by the licensee following acceptance by the contractor Quality Control personnel.

Additional actions taken by the contractor included: (1) personnel changes and retraining of personnel; (2) preparation of a technical evaluation for the acceptability of each identified construction deficiency; and (3) improvement in the QA/QC program coverage of civil work.

G. 1977

Twelve inspections pertaining to Unit 1 and fifteen inspections pertaining to Unit 2 were conducted in 1977. Ten items of non-compliance were identified during 1977. Two significant construction problems were identified involving a bulge in the Unit 2 containment liner plate (see Paragraph 3) and errors in the placement of tendon sheathings (see Paragraph 4). These items/problems are described below:

1. Five examples of noncompliance with Criterion V of 10 CFR 50, Appendix B, were identified in Inspection Report Nos. 50-329/77-05 and 50-330/77-08. The examples of noncompliance regarded: (1) inadequate clearance between concrete wall and pipe support plates; (2) assembly of pipe supports using handwritten drawing changes; (3) inadequate preparation and issue of audit reports; (4) inadequate review of nonconformance reports and audit findings for trends; and (5) inadequate tagging of defective measuring equipment. Licensee corrective actions included: (1) clarification of

design and acceptance criteria contained in pertinent specifications; (2) modification and review of Quality Control Instructions; (3) issuance of two field procedures relative to field modifications of piping hanger drawings; (4) staffing of additional QA personnel at the site; (5) closer management attention; and (6) additional training in the area of tagging. The licensee actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/77-08, 50-330/77-11, 50-329/78-01, and 50-330/78-01.

2. Three items of noncompliance were identified in Inspection Report Nos. 50-329/77-09 and 50-330/77-12. The items regarded: (1) failure to follow audit procedures; (2) failure to qualify stud welding procedures; and (3) inadequate welding inspection criteria. Licensee corrective actions included: (1) administrative instruction issued to require the audit manager to obtain a semi-monthly audit findings status report from the project manager; (2) administrative instruction issued for the close out and followup of internal corrective action requests; (3) revision of Quality Control Instruction; (4) special inspections and audit; and (5) prescribing specific acceptance criteria. The licensee's actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/78-01, 50-330/78-01, 50-329/78-05, and 50-330/78-05.
3. A significant construction problem involving a bulge in the Unit 2 containment liner plate was identified in 1977. Details of the liner plate bulge follow:

The initial identification by the licensee of a bulge in the Unit 2 liner plate occurred on February 26, 1977. The liner plate bulge occurred between column line azimuths 250 degrees and 270 degrees and between elevations 593 and 700. Inspection Report No. 50-330/77-02 documents a special inspection concerning the liner plate bulge. This report further identifies an item of noncompliance relative to the failure of the licensee to report the bulge deficiency pursuant to the requirements of 10 CFR 50.55(e). The licensee's corrective actions in regard to this item were reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/77-14.

The cause of the liner plate bulge was determined to be due to a leaking 2 inch water line installed in the containment concrete as a construction convenience. It was theorized that the water line froze, started to leak, allowing water to seep behind the liner. The water line was supplied by a construction water pump that was set to cycle between 100 and 130 PSI. This pressure was considered to be sufficient to cause the liner plate bulge.

A meeting was held on April 4, 1977 at the Ann Arbor, Michigan Office of Bechtel to review the original design and construction concept of the containment liner, the procedures and actions taken during the removal of bulge affected zones, the investigation activities and results, and to ascertain the concepts involved in the licensee's proposed repair program.

The containment liner bulge deficiency repair was started on August 1, 1977. Inspection Report No. 50-330/77-11 documents the observed fit up and welding of the first four foot lift of replacement liner plate installed. The completion of repair and the repair records were subsequently reviewed as documented in Inspection Report No. 50-330/79-25.

4. A second significant construction problem involved tendon sheath placement errors and resulted in an Immediate Action Letter (IAL). Details are as follows:

The licensee reported, on April 19, 1977, the discovery of an error in the Unit 1 containment building which resulted in two tendon sheathings (H32-036 and H13-036) being misplaced, and two tendon sheathings (H32-037 and H13-037) being omitted. As shown on pertinent vendor drawings, these four tendons were to be deflected downward to clear the two main steam penetrations at center line elevation 707' 0". Concrete had been placed to a construction joint at elevation 703' 7" approximately one week before these tendon deficiencies were discovered.

Corrective actions resulted in the rerouting of tendon sheathing H32-037, originally planned for below the penetration, to a new alignment above the penetration. Tendon sheathing H13-037 was installed below the penetration. Tendon sheathings H32-036 and H13-036 did not require modification.

The tendon sheath placement errors and the past history of rebar placement errors indicated the need for further NRC evaluation of the licensee's QA/QC program. As a result, an IAL was issued to the licensee on April 29, 1977. Licensee commitments addressed by this IAL included: (1) NRC notification prior to repairs or modifications involving the placement of concrete in the area of the misplaced and omitted tendon sheaths; (2) identification of the cause of the tendon sheath deficiencies and implementation of required corrective action; (3) expansion of the licensee's QC overview program; (4) NRC notification of all embedment placement errors identified after QC acceptance; (5) review and revision of QC inspection procedures; and (6) training of construction and inspection personnel.

A special QA program inspection was conducted in May 1977 as documented in Inspection Report Nos. 50-329/77-05 and 50-330/77-08. The inspection team was made up of personnel from Region I, Region III, and Headquarters. It was the consensus of opinion of the inspectors that the licensee's program was acceptable.

The licensee issued the final 50.55(e) report on this matter on August 12, 1977. Final onsite review was conducted and documented in Inspection Report Nos. 50-329/77-08 and 50-329/79-15.

H. 1978

Twenty-two inspections and one investigation were conducted during 1978. A total of fourteen items of noncompliance were identified in 1978. One significant construction problem was identified involving excessive settlement of the Diesel Generator Building foundation (see Paragraph 10). These items/problems are described below:

1. Three items of noncompliance were identified in Inspection Report Nos. 50-329/78-03 and 50-330/78-03. These items regarded: (1) inadequate inspections of welds on cable tray supports; (2) inadequate control of welding voltage and amperage as required by AWS; and (3) inadequate documentation of repairs on purchased equipment. Licensee corrective actions included: (1) additional training given Quality Control Engineers and craft welders; (2) revision of pertinent technical specifications and weld acceptance requirements; (3) revision of welding procedures; (4) revisions of vendor QA manual; and (5) reinspections and engineering evaluations. The licensee actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/78-15, 50-330/78-15, 50-329/79-25, 50-330/79-25, 50-329/81-12, 50-330/81-12, 50-329/79-22, and 50-330/79-22.
2. Two items of noncompliance were identified in Inspection Report Nos. 50-329/78-05 and 50-330/78-05. These items regarded: (1) inadequate control of welding filler material; and (2) inadequate protection of spool pieces. Licensee corrective actions included: (1) additional instructions given to welding personnel; (2) generation of nonconformance report to require Bechtel to perform a thorough inspection of the facility, correct and document discrepancies noted, and instruct craft personnel. The licensee actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/78-05, 50-330/78-05, 50-329/79-22, and 50-330/79-22.
3. Two examples of noncompliance with one 10 CFR 50 Appendix B criterion were identified in Inspection Report Nos. 50-329/78-07 and 50-330/78-07. These examples regarded: (1) inadequate

control of drawings; and (2) inadequate drawing control procedures. Licensee corrective actions included: (1) Zack and Bechtel revised drawing control procedures; and (2) extensive audits of drawing controls. The licensee actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/79-25 and 50-330/79-25.

4. One item of noncompliance was identified in Inspection Report No. 50-330/78-09 concerning inadequate backing gas flow rate during welding operations. Licensee corrective actions included: (1) revision of Bechtel welding procedure specifications; (2) revision of Bechtel Quality Control Instruction; and (3) additional training for all welding Quality Control Engineers. The licensee's actions in regard to this item were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/78-16.
5. Two items of noncompliance were identified in Inspection Report Nos. 50-329/78-13 and 50-330/78-13. The items regarded: (1) inadequate inspection of weld joints; and (2) inadequate storage of Class 1E equipment. Licensee corrective actions included: (1) revision of welding specifications; (2) additional instructions to QC inspectors; (3) additional overinspections; (4) upgrade of administrative procedures; and (5) actions to bring storage environment within controlled specifications. The licensee's actions in regard to these items were reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/78-13 and 50-330/78-13.
6. Two items of noncompliance were identified in Inspection Report Nos. 50-329/78-15 and 50-330/78-15. These items regarded: (1) nonconforming welds on Main Steam Isolation Valve support structures; and (2) inadequate corrective action taken to repair nonconforming Nelson Stud weld attachments. Licensee corrective actions included: (1) responsible welding Quality Control Engineer required to attend training course; (2) defective welds reworked; and (3) engineering evaluation. The licensee's actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/79-22, 50-330/79-22, 50-329/79-25 and 50-330/79-25.
7. One deviation was identified in Inspection Report No. 50-330/78-16 concerning the failure to meet ASME code requirements for nuclear piping. Licensee corrective actions included the determination that the impact test values of the pipe material in question met the code requirements, and the UT thickness measurements made by ITT Grinnell were in error and

voided by measurements made by Bechtel. The licensee's actions in regard to this item were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/79-24.

8. One item of noncompliance was identified in Inspection Report Nos. 50-329/78-17 and 50-330/78-17 regarding the failure to follow weld procedures pertaining to the repair welding of cracked welds on the personnel air locks. The licensee's corrective actions included steps to revise affected drawings and to update the stress analysis report for the air locks. The corrective actions taken by the licensee will be reviewed during future NRC inspections.
9. One item of noncompliance was identified in Inspection Report Nos. 50-329/78-22 and 50-330/78-22 concerning the failure to perform specified maintenance and inspection activities on Auxiliary Feed Pumps. Licensee corrective actions included:
 - (1) training of pertinent Quality Control engineers;
 - (2) transition of personnel in QC department relative to storage and maintenance activities; and
 - (3) inspections and evaluations of omitted maintenance.The licensee's actions in regard to this item were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/78-22 and 50-330/78-22.
10. One significant construction problem was identified during 1978. It involved excessive settlement of the Diesel Generator Building foundation. Details are as follows:

The licensee informed the Region III office on September 8, 1978, per requirements of 10 CFR 50.55(e), that settlement of the Diesel Generator foundations and structures was greater than expected.

Fill material in this area was placed between 1975 and 1977, with construction starting on the diesel generator building in mid-1977. Review of the results of the Region III investigation/inspection into the plant fill/Diesel Generator building settlement problem indicate many events occurred between late 1973 and early 1978 which should have alerted Bechtel and the licensee to the pending problem. These events included non-conformance reports, audit findings, field memos to engineering, and problems with the administration building fill which caused modification and replacement of the already poured footing and replacement of the fill material with lean concrete.

Causes of the excessive settlement included: (1) inadequate placement method - unqualified compaction equipment and excessive lift thickness; (2) inadequate testing of the soil material; (3) inadequate QC inspection procedures; (4) unqualified Quality Control inspectors and field engineers; and (5) overreliance on inadequate test results.

Lead technical responsibility and program review for this issue was transferred to NRR from IE by memo, dated November 17, 1978.

During 1978 the licensee conducted soil borings in the area of the Diesel Generator building and in other plant fill areas. In addition, a team of consultants who specialize in soils was retained by the licensee to provide an independent evaluation and provide recommendations concerning the soil conditions existing under the Diesel Generator building.

As previously stated, an investigation was initiated in December 1978 by the NRC to obtain information relating to design and construction activities affecting the Diesel Generator Building foundation and the activities involved in the identification and reporting of unusual settlement of the building. The results of the investigation and additional developments in regard to this matter are discussed in the 1979 section of this report, Paragraph I.11.

I. 1979

Thirty inspection reports were issued in 1979 of which one pertained to an onsite management meeting, two to investigations, one to a vendor inspection, one to a meeting in Region III, and twenty-five to onsite inspections. A total of seventeen items of noncompliance were identified in 1979. These items are described below:

1. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-10 and 50-330/79-10 concerning inadequate measures to assure that the design basis was included in drawings and specifications. Licensee corrective actions included: (1) revision to Midland FSAR; and (2) revision to pertinent specification. The licensee's actions in regard to this item were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/79-19 and 50-330/79-19.
2. Three items of noncompliance were identified in Inspection Report Nos. 50-329/79-12 and 50-330/79-12. The items were: (1) inadequate corrective action in regard to drawing controls; (2) discrepancy in Zack Welding Procedure Specification; and (3) inadequate control of purchased material. Licensee corrective actions included: (1) audit of drawing control program; (2) revision to drawing control requirements; (3) revision of Zack Welding Procedure Specification; (4) review of other Zack procedures; (5) missing data added to documentation packages; and (6) audits of other documentation packages. The actions taken by the licensee were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/81-01, 50-330/81-01, 50-329/80-15, 50-330/80-16, 50-329/79-22, and 50-330/79-22.

3. One item of noncompliance was identified in Inspection Report No. 50-330/79-13 concerning the failure to inspect all joints and connections on the Incore Instrument Tank as prescribed in the hydrostatic test procedure. Licensee corrective actions included a supplemental test of the Incore Instrument Tank and the initiation of a supplemental test report. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/80-38.
4. One item of noncompliance was identified in Inspection Report No. 50-330/79-14 concerning the use of a wad of paper in making a purge dam during welding activities. Licensee corrective actions included: (1) revision of pertinent procedures; (2) revision of pertinent Quality Control inspection checklist; and (3) training sessions for welders and Quality Control inspectors. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/80-16.
5. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-18 and 50-330/79-18 concerning inadequate controls to protect materials and equipment from welding activities. Licensee corrective actions included training sessions for cognizant Field Engineers, Superintendents, General Foremen and Foremen. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/80-15 and 50-330/80-16.
6. Two items of noncompliance were identified in Inspection Report Nos. 50-329/79-19 and 50-330/79-19. These items regarded: (1) failure to ensure that appropriate quality standards were in the specification for structural backfill; and (2) Quality Control inspection personnel performing containment prestressing activities were not being qualified as required. Licensee corrective actions included: (1) revision of pertinent specification; (2) examination given to Level I and Level II inspector; and (3) reinspection of selected tendons. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-330/80-09, 50-329/80-04 and 50-330/80-04.
7. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-20 and 50-330/79-20 concerning inadequate controls for welding activities pertaining to 4.16 KV switchgear. Licensee corrective actions included: (1) correction of relevant records; (2) additional training for Quality Control Engineers; and (3) additional training for the Quality Control Document Coordinator. The licensee's actions were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/80-15 and 50-330/80-16.

8. One item of noncompliance was identified in Inspection Report No. 50-330/79-22 concerning inadequate weld rod controls. Licensee corrective actions included a training session for cognizant welding personnel. The actions taken by the licensee in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/80-01.
9. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-26 and 50-330/79-26 concerning failure to follow procedures relative to the shipment of auxiliary feed water pumps to the site with nonconforming oil coolers. Licensee corrective actions included: (1) reinstruction given to cognizant engineer; and (2) Supplied Deviation Disposition Request (SDDR) generated by the vendor. The licensee's actions in regards to this matter were reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/79-26 and 50-330/79-26.
10. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-27 and 50-330/79-27 concerning the violation of QC Hold Tags. Licensee corrective actions included: (1) a training session for Construction Supervisors and Field Engineers; and (2) a Field Instruction on Quality Control Hold Tags was issued. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/81-04 and 50-330/81-04.
11. As a followup to the significant construction problem identified in 1978 (see Paragraph H.10), an investigation was initiated in December, 1978 to obtain information relating to design and construction activities affecting the Diesel Generator Building foundations and the activities involved in the identification and reporting of unusual settlement of the building. The investigation findings were documented in Inspection Report Nos. 50-329/78-20 and 50-330/78-20, dated March 22, 1979. Information obtained during this investigation indicated: (1) a lack of control and supervision of plant fill activities contributed to the inadequate compaction of foundation material; (2) corrective action regarding nonconformances related to plant fill was insufficient or inadequate as evidenced by the repeated deviations from specification requirements; (3) certain design bases and construction specifications related to foundation type, material properties, and compaction requirements were not followed; (4) there was a lack of clear direction and support between the contractor's engineering office and construction site personnel; and (5) the FSAR contained inconsistent, incorrect and unsupported statements with respect to foundation type, soil properties, and settlement values. Nine examples of noncompliance involving four different 10 CFR 50, Appendix B Criteria were identified in the subject inspection report.

Meetings were held on February 23, 1979 and March 5, 1979 at the NRC Region III office to discuss the circumstances associated with the settlement of the Diesel Generator Building at the Midland facility. The NRC staff stated that it's concerns were not limited to the narrow scope of the settlement on the Diesel Generator Building, but extended to various buildings, utilities and other structures located in and on the plant area fill. In addition, the staff expressed concern with the Consumers Power Company Quality Assurance Program. Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, and Section 50.54(f) of 10 CFR Part 50, additional information was requested regarding the adequacy of the fill and the quality assurance program for the Midland site in order for the Commission to determine whether enforcement action such as license modification, suspension or revocation should be taken. Question 1 of the 50.54(f) letter dated March 21, 1979 requested information regarding the quality assurance program. On April 24, 1979, Consumers Power Company submitted the initial response to the 50.54(f) request, Questions 1 through 22. As a result of the NRC staff review of Question 1, the NRC concluded that the information provided was not sufficient for a complete review. Subsequently, on September 11, 1979, the NRC issued a request for additional quality assurance information (Question 23). On November 13, 1979, Consumers Power Company submitted Revision 4 to the 50.54(f) responses which included response to Question 23. As a result of the Region III investigation report and CPCo responses, the NRC issued an Order modifying construction Permits No. CPPR-81 and No. CPPR-82, dated December 6, 1979. This order prohibited further soils related activities until the submission of an amendment to the application seeking approval of the Remedial Soils work with the provision that the order would not become effective in the event that the licensee requested a hearing. Due to the licensee's decision to request a hearing this order forms the basis for the ongoing ASLB Hearings.

During 1979, the licensee continued soil boring operations in order to identify and develop the quality of material in the plant area fill and beneath safety related structures. The licensee completed a program regarding the application of a surcharge of sand material in and around the Diesel Generator Building. This surcharge was an attempt to accelerate any future settlement of the Diesel Generator Building by consolidating the foundation material.

Additional developments in this matter are discussed in the 1980 section of this report, Paragraph J.9.

J. 1980

Thirty-seven inspection reports were issued in 1980 of which two pertained to meetings at the licensee's corporate office, one to a meeting in Glen Ellyn, two to investigations, and thirty-two to onsite inspections. A total of twenty-one items of noncompliance were identified during 1980. Two significant construction problems were identified involving quality assurance problems at the Zack Company (see Paragraph 7) and deficient reactor vessel anchor studs (see Paragraph 8). These items/problems are described below:

1. Two items of noncompliance and one deviation were identified in Inspection Report Nos. 50-329/80-01 and 50-330/80-01. These items regarded: (1) a welder welding on material of thickness which exceeded his qualified range; (2) failure to date and sign the cleanliness inspection of Unit 2 Service Water System valve; and (3) failure to implement a design change or prepare a Field Change Request. Licensee corrective actions in regards to the items of noncompliance included: (1) testing and qualification of the subject welder; (2) reinstruction of QC engineer; (3) review of the inspection records for additional valves; and (4) the revision of applicable turnover procedures. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/80-20, 50-330/80-21, 50-329/82-04 and 50-330/82-04.
2. One item of noncompliance was identified in Inspection Report No. 50-329/80-09 concerning the failure to maintain levelness requirements during core support assembly lifts. The licensee's corrective actions in response to the item of noncompliance included the issuance of a nonconformance report and the commitment to ensure compliance with Quality Control procedures. The licensee's corrective actions in regards to this matter will be reviewed during subsequent NRC inspections.
3. One item of noncompliance was identified in Inspection Report Nos. 50-329/80-20 and 50-330/80-21 concerning the failure of a Bechtel purchase order for E7018 welding rods to specify the applicable codes. Licensee commitments in regards to corrective actions included an audit of the ordering and receiving records of weld filler material. The licensee's corrective actions in regards to this matter will be reviewed during subsequent NRC inspections.
4. One item of noncompliance was identified in Inspection Report Nos. 50-329/80-21 and 50-330/80-22 concerning the failure to perform an audit of Photon Testing, Inc. for services to qualify Zack Company welders. Licensee corrective actions included an audit of Photon Testing, Inc. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/81-03 and 50-330/81-03.

5. One item of noncompliance was identified in Inspection Report Nos. 50-329/80-28 and 50-330/80-29 concerning the bypassing of a hold point on a Pressure Surge System weld. The inspection report further identifies that action had been taken to correct the identified noncompliance and to prevent recurrence. The item is closed.
6. One item of noncompliance was identified in Inspection Report Nos. 50-329/80-31 and 50-330/80-32 concerning substantial delays by the licensee in making 10 CFR Part 21 reportability determinations. Licensee corrective actions included training sessions for key personnel in recognizing 10 CFR 21 reporting obligations. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/81-07 and 50-330/81-07.
7. A significant construction problem involving quality assurance problems at the Zack Company, the heating, ventilating, and air condition contractor was identified in 1980. Details of the Zack problem follow:

During March and April, 1980 the NRC received numerous allegations pertaining to the Zack Company. The Zack Company is the heating, ventilation and air conditioning (HVAC) subcontractor at the Midland construction site. The allegations dealt with material traceability, violations of procedures, falsification of documents, and the training of quality control inspectors.

As the result of the allegations, an investigation was initiated by the NRC. During the initial phases of the investigation, the NRC determined that Consumers Power Company had issued a Management Corrective Action Request (MCAR), dated January 8, 1980, pertaining to the Zack Company. The MCAR showed that Zack had failed to initiate corrective action in a timely manner on a large number of nonconformance reports and audit findings and had failed to address other requirements and commitments of the quality program.

Consumers Power Company had issued seven nonconformance reports during the period of May 23 to October 2, 1979 all of which recommended 100% reinspection of work as a corrective action. The investigation determined that as of March 19, 1980, corrective action had not been completed on any of the nonconformance reports.

Based on preliminary findings during the investigation, which revealed some instances of continued nonconformance in the implementation of Zack's Quality Assurance Program, an Immediate Action Letter (IAL) was issued to the licensee on March 21, 1980. The IAL stated the NRC's understanding that a Stop Work Order had been issued to the Zack Corporation for all its safety related construction activities.

Seventeen examples of noncompliance involving eight different 10 CFR 50, Appendix B, criteria were identified during the investigation. The investigation findings are documented in Inspection Report Nos. 50-329/80-10 and 50-330/80-11. The licensee's actions in regards to the items of noncompliance were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/82-15 and 50-330/82-15.

On June 30, 1980, the NRC received from the licensee a letter documenting a Program Plan for resumption of safety related work by the Zack Company. The licensee identified that corrective actions required prior to lifting the Stop Work included: (1) the review and approval of all Field Quality Control Procedures and specific Weld Procedure Specifications; (2) the review and approval of the revised Zack QA Manual; (3) the training and certification of the QC personnel; and (4) the training of site production personnel.

Subsequent to followup NRC inspections to determine the effectiveness of licensee corrective actions, it was determined by the NRC, on August 14, 1980 that HVAC safety related work could resume.

The Bechtel Power Corporation released the Zack Company from the Stop Work Order by letter dated August 14, 1980.

As a result of the aforementioned investigation findings, the NRC imposed a Civil Penalty, on January 7, 1981, on Consumers Power Company for the amount of \$38,000.

8. The second significant construction problem involved reactor pressure vessel anchor stud failures. Details are as follows:

On September 14, 1979, Consumers Power Company personnel notified the NRC of the discovery of a broken reactor vessel anchor stud on the Midland Unit 1 reactor vessel. On October 12, 1979, this condition was reported under the requirements of 10 CFR 50.55(e). Two other studs were subsequently found to be broken. As this condition reflected a significant deficiency, an NRC investigation was initiated in February 1980 to review the materials, manufacturer, and installation of the studs.

The investigation findings, as documented in Inspection Report Nos. 50-329/80-13 and 50-330/80-14, indicate several Quality Assurance deficiencies: (1) lack of licensee involvement; (2) failure to advise the heat treater of different heats of material; (3) inadequate document review; (4) failure to respond to indications that the studs were deficient; (5) failure to review materials previously purchased when the purchase specification was revised; and (6) miscalculation of

the stud stress area resulting in a slight over-specification stressing of the studs (this item was identified by the licensee).

Three items of noncompliance were identified in the inspection report. These items regarded: (1) failure to identify Subsection NF of the ASME Code as the applicable requirement for the reactor vessel anchor bolts; (2) failure to establish measures to assure that purchased material conforms to the procurement documents; and (3) failure to establish measures to assure that heat treating and nondestructive tests were controlled in accordance with applicable codes and specifications. Licensee commitments in regards to corrective actions included: (1) a commitment to conduct a review to confirm that safety related low alloy steel bolting and/or component support materials, which have been tempered and quenched and are 7/8" or greater in diameter, have been procured in accordance with proper codes and standards; (2) a commitment to obtain NRR approval of the acceptability of the Unit 2 reactor vessel anchor bolts and (3) a commitment that actual plant modifications to compensate for the defective bolts would not be started on Unit 1 until approval of the design concept was received from NRR.

The stud failure mechanism was identified as stress corrosion cracking which propagated to the point that the studs failed by cleavage fracture. Tests indicated that some studs utilized in Unit 2, although of different material and heat treatment, have above specification surface hardness readings.

The final report per 50.55(e) requirements was submitted by the licensee on December 1, 1981.

NRR has the lead responsibility for evaluation and approval of the licensee's proposals for resolution of this matter.

9. A special inspection was conducted in December, 1980 at the Bechtel Power Company Ann Arbor, Michigan offices to verify implementation of the specific commitments and action items reflected in Consumers Power Company response to 10 CFR 50.54(f) questions (regarding excessive settlement of the Diesel Generator Building foundations). The results of this inspection were documented in Inspection Report Nos. 50-329/80-32 and 50-330/80-33. Two items of noncompliance were identified regarding: (1) failure to provide adequate corrective actions with regard to identified audit results; and (2) inadequate design control. Licensee corrective actions included: (1) revision of procedures; (2) revision of specification; and (3) audit of FSAR sections. The licensee actions were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/81-12, 50-330/81-12, 50-329/81-19 and 50-330/81-19.

Additional information regarding this matter is discussed in the 1981 section of this report, Paragraph K.6.

K. 1981

Twenty-three inspection reports were issued in 1981 of which one pertained to a management meeting and twenty-two to onsite inspections. A total of twenty-one items of noncompliance were identified during 1981. One significant construction problem was identified involving deficiencies in piping suspension system installations (see Paragraph 4). These items/problems are described below:

1. Two items of noncompliance were identified in Inspection Report Nos. 50-329/81-04 and 50-330/81-04. These items regarded: (1) failure to account for all tools and materials used in a controlled clean room area; and (2) inadequate procedure for the installation of the Unit 2 vent valves in the core support assembly. Licensee corrective actions included: (1) the upgrading of personnel and equipment logs; (2) the addition of new logs; (3) issuance of a formal Stop Work Order for further work on the installation of vent valves; (4) the revision of installation procedures; (6) training and indoctrination of personnel performing vent valve installations; and (5) the revision of the overview inspection plan. The licensee's actions in regards to these items were reviewed and it was determined that action had been taken to correct the identified non-compliances and to prevent recurrence. This determination is documented in Inspection Report Nos. 50-329/81-04 and 50-330/81-04.
2. One item of noncompliance was identified in Inspection Report Nos. 50-329/81-08 and 50-330/81-08 regarding the failure to provide adequate storage conditions for Class 1E equipment. Licensee corrective actions included: (1) additional training for Bechtel maintenance engineers; (2) an audit of maintenance activities; and (3) reinspections of affected equipment. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/81-23 and 50-330/81-23.
3. Four items of noncompliance were identified in Inspection Report Nos. 50-329/81-11 and 50-330/81-11. These items regarded: (1) inadequate procedures for the temporary support of cables and for the routing of cables into equipment; (2) failure of QC inspectors to identify inadequate cable separation; (3) inadequate control of nonconforming raceway installations; and (4) failure to translate the FSAR requirements into instrumentation specifications. Licensee corrective actions in regards to (1) and (2) above, included: (1) the revision of cable pulling procedures;

(2) the repair of damaged cables; (3) training given to the termination personnel and the involved QC inspector; and (4) the revision of the cable termination procedure. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/81-20, 50-330/81-20, 50-329/82-03 and 50-330/82-03. Licensee commitments in regards to corrective actions pertaining to items (3) and (4), above, included: (1) the addition of required barriers on pertinent raceway drawings; (2) the revision of Project Quality Control Instruction; (3) and the revision of the instrumentation specification. The licensee's actions in regards to these items will be reviewed during subsequent NRC inspections.

4. Eight items of noncompliance were identified during a special indepth team inspection to examine the implementation status and effectiveness of the Quality Assurance Program. The results of the inspection are documented in Inspection Report Nos. 50-329/81-12 and 50-330/81-12. Three of the items of noncompliance regarded: (1) failure to take adequate corrective action concerning the trend analysis procedure; (2) failure of QC inspections to identify a nonconforming cable bend radius; and (3) failure to take adequate corrective action in regards to the lack of rework procedures. Licensee corrective actions in regards to items (1) and (2) above, included: (1) the issuance of a new procedure for trending; (2) the revision of cable termination procedures; and (3) additional training given to the responsible QC inspector. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/82-02, 50-330/82-02, 50-329/82-03 and 50-330/82-03. The licensee's commitments in regards to corrective actions pertaining to item (3) above, included: (1) the development of Administrative Guidelines and Instructions for rework; and (2) the revision of field procedures. The licensee's actions in regards to this item will be reviewed during subsequent NRC inspections.

The remaining five items of noncompliance identified in Inspection Report Nos. 50-329/81-12 and 50-330/81-12 are considered to be a significant construction problem. Safety related pipe support and restraint installations and QC inspection deficiencies in regard to those installations were identified. The five items of noncompliance pertaining to this issue regarded: (1) failure to install large bore pipe restraints, supports and anchors in accordance with design drawings and specifications; (2) failure of QC inspectors to reject large bore pipe restraints, supports and anchors that were not installed in accordance with design drawings and specifications; (3) failure to prepare,

review and approve small bore pipe and piping suspension system designs performed onsite in accordance with design control procedures; (4) failure to adequately control documents used in site small bore piping design activities; and (5) failure of audits to include a detailed review of system stress analysis and to follow up on previously identified hanger calculation problems. Licensee corrective actions in regards to items (3) through (5) included: (1) the review and upgrading of small bore piping calculations (2) audits of small bore piping activities; (3) revision of Engineering Directive; (4) additional training in QA procedures; and (5) audits of document control. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/82-07 and 50-330/82-07.

As a result of the adverse findings, an Immediate Action Letter (IAL) was issued by the NRC on May 22, 1981 acknowledging the NRC's understanding that the licensee would not issue fabrication and construction drawings for the installation of the safety related small bore pipe and piping suspension systems until requirements identified in the IAL had been completed and audited.

The IAL requirements were subsequently reviewed and determined to have been satisfactorily addressed. This is documented in Inspection Report Nos. 50-329/81-14 and 50-330/81-14.

The licensee's actions in regards to noncompliance items (1) and (2) above, are discussed in Paragraph 1 of the following report section for 1982(L).

5. One item of noncompliance was identified in Inspection Report Nos. 50-329/81-14 and 50-330/81-14 concerning inadequate design controls involving the Bechtel Resident Engineer's review of the field engineers redline drawings for small bore piping. Licensee corrective actions included: (1) a 100% review of all questionable systems; and (2) the revision of a Project Instruction. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/82-07 and 50-330/82-07.
6. In January, 1981 an inspection was conducted by the NRC to verify whether adequate corrective actions had been implemented as described in the Consumers Power Company response to Questions 1 and 23 of 10 CFR 50.54(f) submittals (regarding excessive settlement of the Diesel Generator Building foundation). The findings during this inspection, which include three items of noncompliance and one deviation, are documented in Inspection Report Nos. 50-329/81-01 and

50-330/81-01. The items of noncompliance and the deviation regarded: (1) failure to develop test procedures for soils work activities; (2) failure to have soils laboratory records under complete document control; (3) failure to have explicit instructions for the onsite Geotechnical Engineer's review of test results; and (4) failure to have a qualified Geotechnical Engineer onsite. Licensee corrective actions included: (1) revision of Quality Control Procedures and Specification; (2) development of new Quality Control Procedures; and (3) the addition of a qualified Geotechnical Engineer. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/81-12 and 50-330/81-12.

7. In March 1981, an inspection was initiated by the NRC to verify the licensee's Quality Assurance Program for the ongoing soil borings. The soil borings were performed by the licensee in response to a request from the Corps of Engineers for additional soil information for their review of the licensee's 10 CFR 50.54(f) answers. The findings of this inspection, which includes one item of noncompliance, are documented in Inspection Report Nos. 50-329/81-09 and 50-330/81-09. The noncompliance regards the lack of evaluation of Woodward-Clyde technical capabilities prior to the commencement of drilling operations. Licensee commitments in regards to corrective actions included: (1) the review, for compliance, of Midland Project major procurements and contracts; and (2) the review and revision of pertinent procedures. The licensee's corrective actions in regards to these items will be reviewed during subsequent NRC inspections.

L. 1982

Fourteen inspection reports have been issued during 1982 covering the period through June 30, 1982 of which two pertain to management meetings, one to an investigation, one to the SALP meeting, and ten to onsite inspections. During this period of time seven items of noncompliance were identified. One significant construction problem was identified involving electrical cable misinstallations (see Paragraph 2). These items/problems are discussed below:

1. The licensee conducted reinspections to determine the seriousness of the safety related support and restraint installation and QC inspection deficiencies identified in Inspection Report Nos. 50-329/81-12 and 50-330/81-12. The results of the reinspections are documented in Inspection Report Nos. 50-329/82-07 and 50-330/82-07. From a sample size of 123 safety related supports and restraints installed and inspected by Quality Control, approximately 45% were identified by the licensee as rejectable.

On August 30, 1982, the licensee was informed of the NRC's position that the licensee shall reinspect all the supports and restraints installed prior to 1981 and perform sample reinspections of the components installed after 1981. The licensee has agreed to perform the reinspections.

2. One significant construction problem was identified during 1982. It involved electrical cable misinstallations. Details are as follows:

During the special team inspection conducted in May 1981, the NRC identified concerns in regards to the adequacy of inspections performed by electrical Quality Control inspectors. These concerns were the result of the NRC's review of numerous Nonconformance Reports (NCR) issued by Midland Project Quality Assurance Department (MPQAD) personnel during reinspections of items previously inspected and accepted by Bechtel QC inspectors. The NRC required the licensee to perform reinspections of the items previously inspected by the QC inspectors associated with the MPQAD NCRs. The licensee, in reports submitted to the NRC in May and June 1982, reported that of the 1084 electrical cables reinspected, 55 had been determined to be misrouted in one or more vias. This concern was upgraded to an item of non-compliance and is documented in Inspection Report Nos. 50-329/82-06 and 50-330/82-06.

On September 2, 1982, the licensee was informed by the NRC that a 100% reinspection of class 1E cables installed or partially installed before March 15, 1982 was required. In addition, the licensee was required to develop a sample reinspection program for those cables installed after March 15, 1982. The licensee has agreed to perform the reinspections.

3. Three examples of noncompliance to one 10 CFR 50 Appendix B Criterion were identified in Inspection Report Nos. 50-329/82-03 and 50-330/82-03. These examples regarded: (1) failure to follow procedures concerning drawing changes; (2) inadequate specification resulting in the undermining of BWST No. 2 valve pit; and (3) inadequate control of changes to procedures. The licensee's response to the identified item of noncompliance is presently under review. Corrective actions taken by the licensee in regards to this item will be reviewed during future inspections.
4. Four examples of noncompliance to one 10 CFR 50 Appendix B Criterion and a deviation were identified in Inspection Report Nos. 50-329/82-05 and 50-330/82-05. The examples of noncompliance and the deviation regarded: (1) failure to review and approve a Mergentine (the soils contractor) field procedure prior to initiation of work; (2) inadequate control of specification changes; (3) inadequate acceptance

criteria for dewatering specification; (4) inadequate instruction to prepare or implement reinspection plans; and (5) inadequately qualified remedial soils staff. The corrective actions taken by the licensee in regards to this item will be reviewed during future inspections.

5. One item of noncompliance was identified in Inspection Report Nos. 50-329/82-06 and 50-330/82-06 concerning the licensee's failure to establish a QA program to provide controls over the installation of remedial soils instrumentation. This item resulted in the issuance of a letter by the licensee on March 31, 1982 confirming the licensee's suspension of all underpinning instrumentation installation activities until: (1) approved, controlled drawings and procedures or instructions were developed to prescribe underpinning instrumentation installation activities; (2) plans were established to inspect and audit instrumentation installation activities; and (3) Region III had concurred that (1) and (2), above, were acceptable.

A followup inspection by Region III in April 1982 identified that the licensee had developed acceptable drawings, procedures, and instructions for underpinning instrumentation installations such that instrumentation installation activities could be resumed. An additional followup inspection on August 23, 1982 determined that the installation of underpinning instrumentation for the Auxiliary Building was complete and acceptable. This item will remain open pending the licensee's development of drawings, procedures, and instructions for the future installation of underpinning instrumentation for the Service Water Building.

6. One item of noncompliance and a deviation were identified in Inspection Report Nos. 50-329/82-11 and 50-330/82-11. The items regarded: (1) inadequate anchor bolt installation; and (2) the use of unapproved installation/coordination forms during remedial soils instrumentation installations. The licensee's responses to the identified items of noncompliance are presently under review. Corrective actions taken by the licensee in regards to these items will be reviewed during future inspections.

The ASLB issued an order modifying Construction Permits No. CPPR-81 and No. CPFR-82, dated April 30, 1982. This order suspended all remedial soils activities on "Q" soils for which the licensee did not have prior explicit approval. The ASLB issued another order, dated May 7, 1982 clarifying the April 30, 1982 order. This order only includes those activities bounded by the limits identified on Drawing C-45.

As a result of past Region LII findings, the Region III Administrator created a special Midland Section staffed with individuals assigned solely to the Midland project. Since the formation of the Midland Section a work authorization procedure has been developed by Region III and the licensee to control work and ensure compliance to the ASLB Order.

Remedial Soils activities performed by the licensee thus far in 1982 involve: (1) the drilling of a number of wells which function as part of the temporary and permanent dewatering systems; (2) the installation of the freeze wall associated with the Auxiliary Building Underpinning activity; (3) the completion of the initial work on the access shaft; and (4) the completion of the Auxiliary Building instrumentation for remedial soils activities.

Midland Nuclear Power Plant, Units 1 and 2

Docket No. 50-329

Docket No. 50-330

REPORT ON DESIGN AND CONSTRUCTION PROBLEMS FOR PERIOD FROM
START OF CONSTRUCTION THROUGH JUNE 30, 1982

Report Requested by Advisory Committee on Reactor Safeguards

I. Introduction

The following report prepared by the NRC, through its Region III office, discusses Midland construction problems, their disposition, and the overall effectiveness of the Consumers Power Company's efforts to ensure appropriate quality. The report was prepared at the request of the Advisory Committee on Reactor Safeguards and in response to commitments made in Supplement No. 1 of the Safety Evaluation Report. The report covers the period starting with the beginning of construction up to June 30, 1982. A final report will be issued on the above subjects for the period from July 1, 1982 through the completion of construction discussing the overall quality of plant construction.

II Summary and Conclusions of Overall Effectiveness

Since the start of construction, Midland has experienced some significant problems resulting in enforcement action (enforcement statistics are summarized in Table 1). Following the identification of each of these problems, the licensee has taken action to correct the problems and to upgrade the QA program and QA/QC staff. The most prominent action has been an overview program which has been steadily expanded to cover safety related activities. In spite of the corrective actions taken, the licensee continues to experience problems in the implementation of quality in construction.

Significant construction problems identified to date include: (1) 1973 - cadweld splicing deficiencies (Paragraph C.2); (2) 1976 - rebar omissions (Paragraph F.5); (3) 1977 - bulge in the Unit 2 Containment Liner Plate (Paragraph G.3); (4) 1977 - tendon sheath location errors (Paragraph G.4); (5) 1978 - Diesel Generator Building settlement (Paragraph H.10); (6) 1980 - allegations pertaining to Zack Company heating, ventilating, and air conditioning (HVAC) deficiencies (Paragraph J.7); (7) 1980 - reactor pressure vessel anchor stud failures (Paragraph J.8); (8) 1981 - piping suspension system installation deficiencies (Paragraph K.4); and (9) 1982 - electrical cable misinstallations (Paragraph L.2).

Consumers Power has on repeated occasions not reviewed problems to the depth required for full and timely resolution. Examples are: (1) rebar omissions (1976); (2) tendon sheath location errors (1977); (3) Diesel Generator Building settlement (1978); and (4) Zack Company HVAC deficiencies (1980). In each of these cases the NRC, in its investigation, has determined that the problem was of greater significance than first reported or that the problem was more generic than identified by Consumers Power Company.

The Region III inspection staff believes problems have kept recurring at Midland for the following reasons: (1) Overreliance on the architect-engineer, (2) failure to recognize and correct root causes, (3) failure to recognize the significance of isolated events (4) failure to review isolated events for their generic application, and (5) lack of an aggressive quality assurance attitude.

A history of the Midland design and construction problems and their disposition, as identified and described in NRC inspection reports, is contained in the following section (III). This history is for the period from the beginning of construction through June 30, 1982.

Table 1

ENFORCEMENT STATISTICS

YEAR	DISPLEASURES	NONCOMPLIANCES/ DEVIATIONS	HEADQUARTERS NOTICE OF VIOLATION	CIVIL PENALTIES	FALS/ CAL'S	ORDERS MODIFYING CP/ SMBR CAUSE ORDERS	SIGNIFICANT CONSTRUCTION PROBLEMS
1970	6	4	0	0	0	0	0
1971	2	0	0	0	0	0	0
1972	1	0	0	0	0	0	0
1973	11	6	0	0	0	1 (Cablebeds)	1 (Cablebeds)
1974	11	3	0	0	0	0	0
1975	7	0	0	0	0	0	0
1976	9	17	1 (Rebar)	0	1 (Rebar)	0	1 (Rebar)
1977	15	10	0	0	1 (Tendon 1 Sheath)	0	(Bulge in Containment Liner and 2 Tendon Sheath Installation Errors)
1978	21	14	0	0	0	0	1 (Diesel Generator Bldg. Settlement)
1979	30	17	0	0	0	(Diesel Generator 1 Bldg. Settlement)	0
1980	37	21	0	1 (Zack)	1 (Zack)	0	2 (Zack HVAC & Reactor Anchor Studs)
1981	23	21	0	0	1 (Pipe Suspension 1 System)	0	1 (Pipe Suspension System)
1982	14	7	0	0	0	2 (Diesel Generator Bldg. Settlement)	1 (Electric Cable Routing)

III. Design and Construction Problems As Documented in NRC Inspection Reports

A. 1970

Six inspection reports were issued in 1970. In July 1970, construction activities authorized by the Midland Construction Permit Exemption commenced. A total of four items of noncompliance were identified in 1970. These items are described below:

Four items of nonconformance were identified in Inspection Report Nos. 50-329/70-06 and 50-330/70-06 concerning the installation of concrete. The nonconformances regarded: (1) concrete placement activities violated ACI Code; (2) laboratory not performing tests per PSAR; (3) sampling not per ASTM; and (4) QA/QC personnel did not act on deviations when identified. Licensee corrective actions included: (1) Bechtel to provide a report attesting to the Auxiliary Building base slab where lack of consolidation was apparent; (2) a commitment to perform tests at frequencies specified in the PSAR; and (3) a commitment to train workers and the inspection staff. This matter was discussed during the Construction Permit Hearings and is considered closed.

B. 1971-1972

Three inspections were conducted during this period. No items of noncompliance were identified. Midland construction activities were suspended pending the pre-construction permit hearings.

On December 15, 1972, the Midland Construction Permit was issued.

C. 1973

Eleven inspection reports were issued in 1973 of which two pertained to special management meetings, two to vendor inspections, one to an audit of the architect engineer, and six to onsite inspections. A total of six items of noncompliance were identified during 1973. One significant construction problem was identified involving deficiencies in cadweld splicing of rebar (see Paragraph 2). These items/problems are described below:

1. Noncompliances involving two separate Appendix B criteria with five different examples were identified during a special audit of the architect engineer's Quality Assurance Program. The noncompliances were documented in Inspection Report Nos. 50-329/73-08 and 50-330/73-08. The items of noncompliance regarded: (1) inadequate requirements for quality record retention; (2) inadequate drawing control; (3) inadequate procedures; and (4) unapproved specifications used for vendor control. Licensee corrective actions included: (1) revision of Bechtel Nuclear Quality Assurance Manual; (2) revision of Midland Internal Procedures Manual; (3) personnel instructed to audit the status of the drawing stick files weekly; (4) project administrator assigned the

responsibility for maintenance of master stick file; and (5) project engineer and staff to perform monthly surveillance of project record file. Inspection Report Nos. 50-329/74-03 and 50-330/74-03 concluded that appropriate corrective actions had been taken by the licensee relative to the identified violations.

2. One significant construction problem was identified during 1973. It involved cadweld splicing deficiencies and resulted in the issuance of a Show Cause Order. Details are as follows:

A routine inspection, conducted on November 6-8, 1973, identified eleven examples of four noncompliance items relative to rebar cadwelding operations. The noncompliances were documented in Inspection Report Nos. 50-329/73-10 and 50-330/73-10. These items were summarized as: (1) untrained cadweld inspectors; (2) rejectable cadwelds accepted by QC inspectors; (3) records inadequate to establish cadwelds met requirements; and (4) inadequate procedures.

As a result, the licensee stopped work on cadweld operations on November 9, 1973, which in turn stopped rebar installation and concrete placement work. The licensee agreed not to resume work until the NRC reviewed and accepted their corrective action. A Show Cause Order was issued on December 3, 1973, formally suspending cadwelding operations. On December 6-7, 1973, Region III and Headquarters personnel conducted a special inspection and determined that construction activities could be resumed in a manner consistent with quality criteria. Licensee corrective actions included: (1) the revision of the Bechtel specification to reflect requalification requirements; (2) development of instructions requiring that work specifications be reviewed prior to Class 1 work; (3) the establishment of provisions for Consumers Power QA review of work procedures; and (4) the establishment of procedures for the audit of Class 1 work.

The Show Cause Order was modified on December 17, 1973 allowing resumption of cadwelding operations based on inspection results. The licensee answered the Show Cause Order on December 29, 1973 committing to revise and improve the QA manuals and procedures and make QA/QC personnel changes.

On September 25, 1974, the Hearing Board found that the licensee was implementing its QA program in compliance with regulations and that construction should not be stopped.

D. 1974

Eleven inspection reports were issued in 1974 of which one pertained to a vendor inspection, one to an inspection at the licensee's corporate offices, and nine to onsite inspections. Three items of noncompliance were identified during 1974. These items are described below:

1. One noncompliance was identified in Inspection Report No. 50-329/74-01 and 50-330/74-01 concerning the use of unapproved procedures during the preparation of containment building liner plates for erection. Licensee corrective actions included: (1) intensive review of liner plate records for accuracy; (2) issuance of nonconformance report; (3) requirement imposed that unapproved copies of procedures transmitted to the site be marked "advance copy;" and (4) identification of procedure approval status. The licensee's actions in regards to this matter were reviewed and the noncompliance closed by the NRC as documented in Inspection Report Nos. 50-329/74-01 and 50-330/74-01.
2. One noncompliance was identified in Inspection Report Nos. 50-329/74-04 and 50-330/74-04, concerning the use of a weld method which was not part of the applicable weld procedure. Licensee corrective actions included: (1) issuance of a nonconformance report; (2) repair of subject welds; (3) reinstruction of welders; and (4) increased surveillance of containment liner plate field fabrications. The licensee's actions in regards to this matter were reviewed and the noncompliance closed by the NRC as documented in Inspection Report Nos. 50-329/74-04 and 50-330/74-04.
3. One noncompliance was identified in Inspection Report Nos. 50-329/74-11 and 50-330/74-11 concerning the failure of QC inspections to identify nonconforming rebar spacing. This violation is discussed further in the 1976 section of this report, Paragraph F.5.

E. 1975

Seven inspection reports were issued in 1975 of which one pertained to a meeting in Region III, one to an inspection at the licensee's corporate offices, and five to onsite inspection.

No noncompliances were identified in 1975, however, the licensee in March and August of 1975 identified additional rebar deviations and omissions. This matter is further discussed in the 1976 section of this report, Paragraph F.5.

F. 1976

Nine inspection reports were issued in 1976 pertaining to nine onsite inspections. A total of seventeen items of noncompliance were identified during 1976. One significant construction problem was identified involving rebar omissions/placement errors and the issuance of a Headquarters Notice of violation (see Paragraph 5). These items/problems are described below:

1. Three items of noncompliance were identified in Inspection Report Nos. 50-329/76-01 and 50-330/76-01. These items regarded: (1) inadequate concrete oven temperature controls; (2) no measures to control nonconforming aggregate; and (3) failure to dispose of nonconforming aggregate as required. Licensee corrective actions included: (1) implementing a requirement for the reverification of oven temperature controls every three months; (2) removal of nonconforming aggregate from the batch plant area; (3) modification of subcontractor's QA manual; and (4) training of subcontractor's personnel to the revised QA manual. The corrective actions implemented by the licensee in regards to these noncompliances were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/76-02 and 50-330/76-02.
2. Two items of noncompliance were identified in Inspection Report Nos. 50-329/76-02 and 50-330/76-02. These items regarded: (1) the Vice President of Engineering Inspection did not audit test reports as required; and (2) corrective actions required by audit findings had not been performed. Corrective actions taken by the licensee included revising the U.S. Testing QA manual. The licensee's corrective actions taken in regards to these matters were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/76-08 and 50-330/76-08.
3. Three items of noncompliance were identified in Inspection Report Nos. 50-329/76-08 and 50-330/76-08. These items regarded: (1) inadequate classification, review, and approval of field engineering procedures and instructions; (2) inadequate documentation of concrete form work deficiencies; and (3) inadequate control of site storage of post tension embedments. Licensee corrective actions included: (1) revision of the Bechtel Nuclear QA manual; (2) revision of Bechtel field procedure for "Initiating and Processing Field Procedures and Instructions;" (3) initiation of Bechtel Discrepancy Report; (4) training sessions for Bechtel QC; and (5) revision of storage inspection procedures. The licensee's corrective actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/77-01 and 50-330/77-01.
4. Two items of noncompliance were identified in Inspection Report Nos. 50-329/76-09 and 50-330/76-09. These items regarded: (1) noncompliance report not written to identify broken reinforcing steel; and (2) hold down studs for the reactor vessel skirt were not protected. Licensee corrective actions included: (1) inspection of all rebar dowels; (2) initiation of new field procedure; and (3) initiation of new

procedure for inspecting reactor vessel and steam generator anchor bolts. The licensee's corrective actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/77-01 and 50-330/77-01.

5. One significant construction problem was identified during 1976. It involved rebar omissions/placement errors and the issuance of a Headquarters Notice of Violation. Details are as follows:

During an NRC inspection conducted in December 1974 the licensee informed the inspector that an audit had identified rebar spacing problems in the Unit 2 containment. The failure of QC inspectors to identify the nonconforming rebar spacing was identified in the 1974 NRC inspection report as an item of noncompliance. (See the 1974 section of this report, Paragraph D.3.) This matter was subsequently reported by the licensee as required by 10 CFR 50.55(e).

Additional rebar deviations and omissions were identified in March and August 1975 and in April, May and June 1976.

Five items of noncompliance regarding reinforcement steel deficiencies were identified in Inspection Report Nos. 50-329/76-04 and 50-330/76-04. These items regarded: (1) no documented instructions for the drilling and placement of reinforcement steel dowels; (2) nonconformance reports concerning reinforcement steel deficiencies were not adequately evaluated; (3) inadequate inspections of reinforcement steel; (4) inadequate evaluations of a nonconformance report problem relative to 10 CFR 50.55(e) reportability requirements; and (5) results of reviews, interim inspections, and monitoring of reinforcement steel installations were not documented.

The licensee's response, dated June 18, 1976, listed 21 separate items (commitments) for corrective actions. A June 24, 1976 letter from the licensee provided a plan of action schedule for implementing the 21 items. The licensee suspended concrete placement work until the items addressed in the licensee's June 24 letter were resolved or implemented. This commitment was documented in a Region III Immediate Action Letter (IAL) to the licensee, dated June 25, 1976.

Rebar installation and concrete placement activities were resumed in early July, 1976 following satisfactory completion of the corrective actions and verification by Region III as documented in Inspection Report Nos. 50-329/76-05 and 50-330/76-05.

A subsequent inspection to followup on reinforcing steel placement problems identified two noncompliances. These noncompliances are documented in Inspection Report Nos. 50-329/76-07 and 50-330/76-07. The noncompliances regarded: (1) failure to follow procedures; and (2) inadequate Bechtel inspections of rebar installations. The inspection report documents licensee corrective actions which included: (1) removal of cognizant field engineer and lead Civil engineer from the project; (2) removal of lead Civil Quality Control engineer from the project; (3) reprimand of cognizant inspector; (4) additional training given to cognizant foremen, field engineers, superintendents and Quality Control inspectors; and (5) assignment of additional field engineers and Quality Control engineers. The licensee's actions in regard to these items were reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/76-07 and 50-330/76-07.

As a result of the rebar omissions and placement errors, a Headquarters Notice of Violation was issued on August 13, 1976.

Additional actions taken by the licensee included the establishment of an overview inspection program to provide 100% reinspection of embedments by the licensee following acceptance by the contractor Quality Control personnel.

Additional actions taken by the contractor included: (1) personnel changes and retraining of personnel; (2) preparation of a technical evaluation for the acceptability of each identified construction deficiency; and (3) improvement in the QA/QC program coverage of civil work.

G. 1977

Twelve inspections pertaining to Unit 1 and fifteen inspections pertaining to Unit 2 were conducted in 1977. Ten items of non-compliance were identified during 1977. Two significant construction problems were identified involving a bulge in the Unit 2 containment liner plate (see Paragraph 3) and errors in the placement of tendon sheathings (see Paragraph 4). These items/problems are described below:

1. Five examples of noncompliance with Criterion V of 10 CFR 50, Appendix B, were identified in Inspection Report Nos. 50-329/77-05 and 50-330/77-08. The examples of noncompliance regarded: (1) inadequate clearance between concrete wall and pipe support plates; (2) assembly of pipe supports using handwritten drawing changes; (3) inadequate preparation and issue of audit reports; (4) inadequate review of nonconformance reports and audit findings for trends; and (5) inadequate tagging of defective measuring equipment. Licensee corrective actions included: (1) clarification of

design and acceptance criteria contained in pertinent specifications; (2) modification and review of Quality Control Instructions; (3) issuance of two field procedures relative to field modifications of piping hanger drawings; (4) staffing of additional QA personnel at the site; (5) closer management attention; and (6) additional training in the area of tagging. The licensee actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/77-08, 50-330/77-11, 50-329/78-01, and 50-330/78-01.

2. Three items of noncompliance were identified in Inspection Report Nos. 50-329/77-09 and 50-330/77-12. The items regarded: (1) failure to follow audit procedures; (2) failure to qualify stud welding procedures; and (3) inadequate welding inspection criteria. Licensee corrective actions included: (1) administrative instruction issued to require the audit manager to obtain a semi-monthly audit findings status report from the project manager; (2) administrative instruction issued for the close out and followup of internal corrective action requests; (3) revision of Quality Control Instruction; (4) special inspections and audit; and (5) prescribing specific acceptance criteria. The licensee's actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/78-01, 50-330/78-01, 50-329/78-05, and 50-330/78-05.
3. A significant construction problem involving a bulge in the Unit 2 containment liner plate was identified in 1977. Details of the liner plate bulge follow:

The initial identification by the licensee of a bulge in the Unit 2 liner plate occurred on February 26, 1977. The liner plate bulge occurred between column line azimuths 250 degrees and 270 degrees and between elevations 593 and 700. Inspection Report No. 50-330/77-02 documents a special inspection concerning the liner plate bulge. This report further identifies an item of noncompliance relative to the failure of the licensee to report the bulge deficiency pursuant to the requirements of 10 CFR 50.55(e). The licensee's corrective actions in regard to this item were reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/77-14.

The cause of the liner plate bulge was determined to be due to a leaking 2 inch water line installed in the containment concrete as a construction convenience. It was theorized that the water line froze, started to leak, allowing water to seep behind the liner. The water line was supplied by a construction water pump that was set to cycle between 100 and 130 PSI. This pressure was considered to be sufficient to cause the liner plate bulge.

A meeting was held on April 4, 1977 at the Ann Arbor, Michigan Office of Bechtel to review the original design and construction concept of the containment liner, the procedures and actions taken during the removal of bulge affected zones, the investigation activities and results, and to ascertain the concepts involved in the licensee's proposed repair program.

The containment liner bulge deficiency repair was started on August 1, 1977. Inspection Report No. 50-330/77-11 documents the observed fit up and welding of the first four foot lift of replacement liner plate installed. The completion of repair and the repair records were subsequently reviewed as documented in Inspection Report No. 50-330/79-25.

4. A second significant construction problem involved tendon sheath placement errors and resulted in an Immediate Action Letter (IAL). Details are as follows:

The licensee reported, on April 19, 1977, the discovery of an error in the Unit 1 containment building which resulted in two tendon sheathings (H32-036 and H13-036) being misplaced, and two tendon sheathings (H32-037 and H13-037) being omitted. As shown on pertinent vendor drawings, these four tendons were to be deflected downward to clear the two main steam penetrations at center line elevation 707' 0". Concrete had been placed to a construction joint at elevation 703' 7" approximately one week before these tendon deficiencies were discovered.

Corrective actions resulted in the rerouting of tendon sheathing H32-037, originally planned for below the penetration, to a new alignment above the penetration. Tendon sheathing H13-037 was installed below the penetration. Tendon sheathings H32-036 and H13-036 did not require modification.

The tendon sheath placement errors and the past history of rebar placement errors indicated the need for further NRC evaluation of the licensee's QA/QC program. As a result, an IAL was issued to the licensee on April 29, 1977. Licensee commitments addressed by this IAL included: (1) NRC notification prior to repairs or modifications involving the placement of concrete in the area of the misplaced and omitted tendon sheaths; (2) identification of the cause of the tendon sheath deficiencies and implementation of required corrective action; (3) expansion of the licensee's QC overview program; (4) NRC notification of all embedment placement errors identified after QC acceptance; (5) review and revision of QC inspection procedures; and (6) training of construction and inspection personnel.

A special QA program inspection was conducted in May 1977 as documented in Inspection Report Nos. 50-329/77-05 and 50-330/77-08. The inspection team was made up of personnel from Region I, Region III, and Headquarters. It was the consensus of opinion of the inspectors that the licensee's program was acceptable.

The licensee issued the final 50.55(e) report on this matter on August 12, 1977. Final onsite review was conducted and documented in Inspection Report Nos. 50-329/77-08 and 50-329/79-15.

H. 1978

Twenty-two inspections and one investigation were conducted during 1978. A total of fourteen items of noncompliance were identified in 1978. One significant construction problem was identified involving excessive settlement of the Diesel Generator Building foundation (see Paragraph 10). These items/problems are described below:

1. Three items of noncompliance were identified in Inspection Report Nos. 50-329/78-03 and 50-330/78-03. These items regarded: (1) inadequate inspections of welds on cable tray supports; (2) inadequate control of welding voltage and amperage as required by AWS; and (3) inadequate documentation of repairs on purchased equipment. Licensee corrective actions included: (1) additional training given Quality Control Engineers and craft welders; (2) revision of pertinent technical specifications and weld acceptance requirements; (3) revision of welding procedures; (4) revisions of vendor QA manual; and (5) reinspections and engineering evaluations. The licensee actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/78-15, 50-330/78-15, 50-329/79-25, 50-330/79-25, 50-329/81-12, 50-330/81-12, 50-329/79-22, and 50-330/79-22.
2. Two items of noncompliance were identified in Inspection Report Nos. 50-329/78-05 and 50-330/78-05. These items regarded: (1) inadequate control of welding filler material; and (2) inadequate protection of spool pieces. Licensee corrective actions included: (1) additional instructions given to welding personnel; (2) generation of nonconformance report to require Bechtel to perform a thorough inspection of the facility, correct and document discrepancies noted, and instruct craft personnel. The licensee actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/78-05, 50-330/78-05, 50-329/79-22, and 50-330/79-22.
3. Two examples of noncompliance with one 10 CFR 50 Appendix B criterion were identified in Inspection Report Nos. 50-329/78-07 and 50-330/78-07. These examples regarded: (1) inadequate

control of drawings; and (2) inadequate drawing control procedures. Licensee corrective actions included: (1) Zack and Bechtel revised drawing control procedures; and (2) extensive audits of drawing controls. The licensee actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/79-25 and 50-330/79-25.

4. One item of noncompliance was identified in Inspection Report No. 50-330/78-09 concerning inadequate backing gas flow rate during welding operations. Licensee corrective actions included: (1) revision of Bechtel welding procedure specifications; (2) revision of Bechtel Quality Control Instruction; and (3) additional training for all welding Quality Control Engineers. The licensee's actions in regard to this item were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/78-16.
5. Two items of noncompliance were identified in Inspection Report Nos. 50-329/78-13 and 50-330/78-13. The items regarded: (1) inadequate inspection of weld joints; and (2) inadequate storage of Class 1E equipment. Licensee corrective actions included: (1) revision of welding specifications; (2) additional instructions to QC inspectors; (3) additional overinspections; (4) upgrade of administrative procedures; and (5) actions to bring storage environment within controlled specifications. The licensee's actions in regard to these items were reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/78-13 and 50-330/78-13.
6. Two items of noncompliance were identified in Inspection Report Nos. 50-329/78-15 and 50-330/78-15. These items regarded: (1) nonconforming welds on Main Steam Isolation Valve support structures; and (2) inadequate corrective action taken to repair nonconforming Nelson Stud weld attachments. Licensee corrective actions included: (1) responsible welding Quality Control Engineer required to attend training course; (2) defective welds reworked; and (3) engineering evaluation. The licensee's actions in regard to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/79-22, 50-330/79-22, 50-329/79-25 and 50-330/79-25.
7. One deviation was identified in Inspection Report No. 50-330/78-16 concerning the failure to meet ASME code requirements for nuclear piping. Licensee corrective actions included the determination that the impact test values of the pipe material in question met the code requirements, and the UT thickness measurements made by ITT Grinnell were in error and

voided by measurements made by Bechtel. The licensee's actions in regard to this item were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/79-24.

8. One item of noncompliance was identified in Inspection Report Nos. 50-329/78-17 and 50-330/78-17 regarding the failure to follow weld procedures pertaining to the repair welding of cracked welds on the personnel air locks. The licensee's corrective actions included steps to revise affected drawings and to update the stress analysis report for the air locks. The corrective actions taken by the licensee will be reviewed during future NRC inspections.
9. One item of noncompliance was identified in Inspection Report Nos. 50-329/78-22 and 50-330/78-22 concerning the failure to perform specified maintenance and inspection activities on Auxiliary Feed Pumps. Licensee corrective actions included: (1) training of pertinent Quality Control engineers; (2) transition of personnel in QC department relative to storage and maintenance activities; and (3) inspections and evaluations of omitted maintenance. The licensee's actions in regard to this item were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/78-22 and 50-330/78-22.
10. One significant construction problem was identified during 1978. It involved excessive settlement of the Diesel Generator Building foundation. Details are as follows:

The licensee informed the Region III office on September 8, 1978, per requirements of 10 CFR 50.55(e), that settlement of the Diesel Generator foundations and structures was greater than expected.

Fill material in this area was placed between 1975 and 1977, with construction starting on the diesel generator building in mid-1977. Review of the results of the Region III investigation/inspection into the plant fill/Diesel Generator building settlement problem indicate many events occurred between late 1973 and early 1978 which should have alerted Bechtel and the licensee to the pending problem. These events included non-conformance reports, audit findings, field memos to engineering, and problems with the administration building fill which caused modification and replacement of the already poured footing and replacement of the fill material with lean concrete.

Causes of the excessive settlement included: (1) inadequate placement method - unqualified compaction equipment and excessive lift thickness; (2) inadequate testing of the soil material; (3) inadequate QC inspection procedures; (4) unqualified Quality Control inspectors and field engineers; and (5) overreliance on inadequate test results.

Lead technical responsibility and program review for this issue was transferred to NRR from IE by memo, dated November 17, 1978.

During 1978 the licensee conducted soil borings in the area of the Diesel Generator building and in other plant fill areas. In addition, a team of consultants who specialize in soils was retained by the licensee to provide an independent evaluation and provide recommendations concerning the soil conditions existing under the Diesel Generator building.

As previously stated, an investigation was initiated in December 1978 by the NRC to obtain information relating to design and construction activities affecting the Diesel Generator Building foundation and the activities involved in the identification and reporting of unusual settlement of the building. The results of the investigation and additional developments in regard to this matter are discussed in the 1979 section of this report, Paragraph I.11.

I. 1979

Thirty inspection reports were issued in 1979 of which one pertained to an onsite management meeting, two to investigations, one to a vendor inspection, one to a meeting in Region III, and twenty-five to onsite inspections. A total of seventeen items of noncompliance were identified in 1979. These items are described below:

1. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-10 and 50-330/79-10 concerning inadequate measures to assure that the design basis was included in drawings and specifications. Licensee corrective actions included: (1) revision to Midland FSAR; and (2) revision to pertinent specification. The licensee's actions in regard to this item were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/79-19 and 50-330/79-19.
2. Three items of noncompliance were identified in Inspection Report Nos. 50-329/79-12 and 50-330/79-12. The items were: (1) inadequate corrective action in regard to drawing controls; (2) discrepancy in Zack Welding Procedure Specification; and (3) inadequate control of purchased material. Licensee corrective actions included: (1) audit of drawing control program; (2) revision to drawing control requirements; (3) revision of Zack Welding Procedure Specification; (4) review of other Zack procedures; (5) missing data added to documentation packages; and (6) audits of other documentation packages. The actions taken by the licensee were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/81-01, 50-330/81-01, 50-329/80-15, 50-330/80-16, 50-329/79-22, and 50-330/79-22.

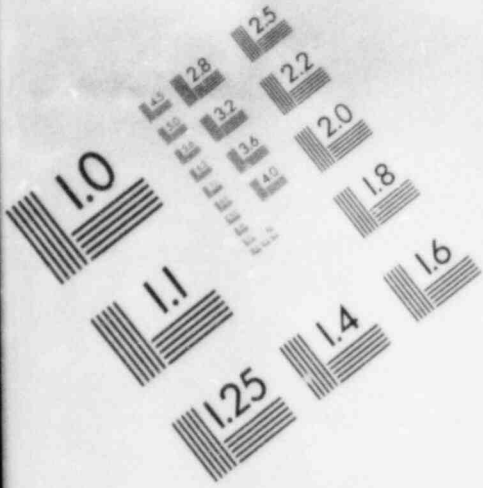
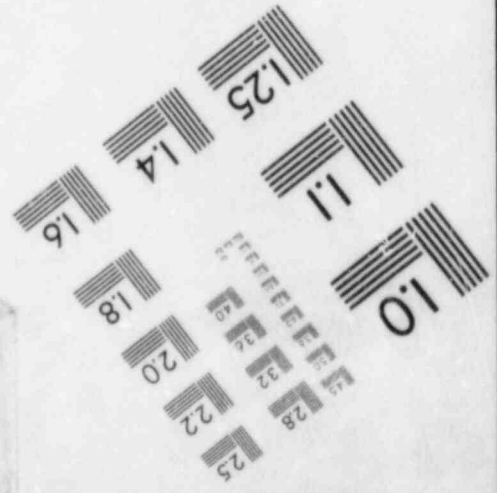
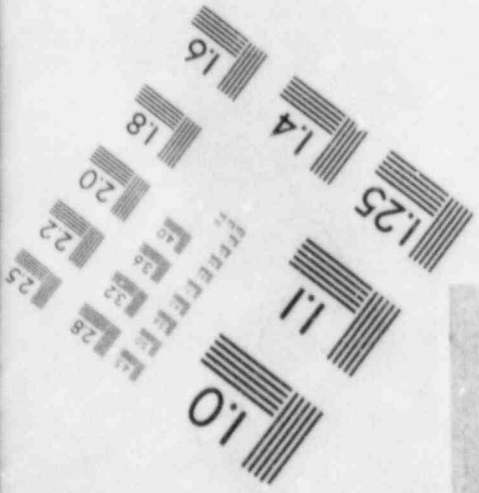
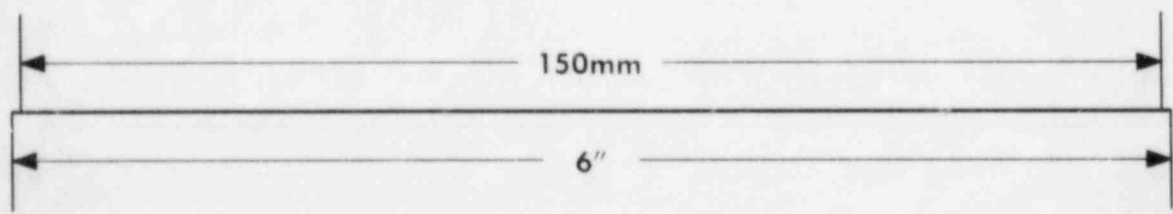
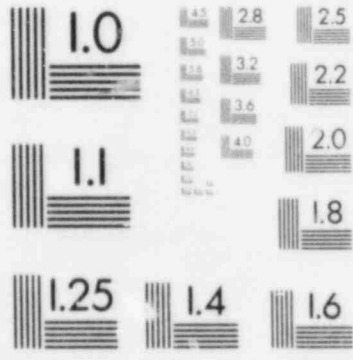
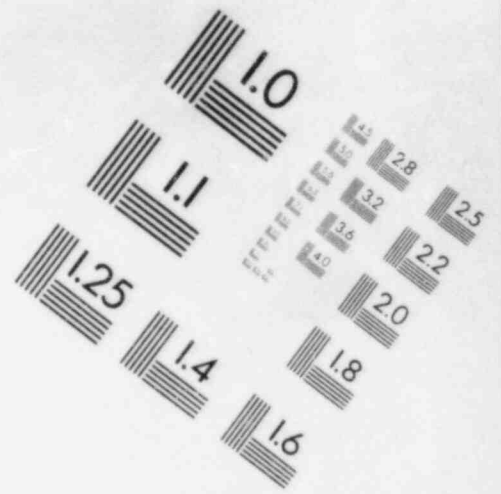


IMAGE EVALUATION
TEST TARGET (MT-3)



3. One item of noncompliance was identified in Inspection Report No. 50-330/79-13 concerning the failure to inspect all joints and connections on the Incore Instrument Tank as prescribed in the hydrostatic test procedure. Licensee corrective actions included a supplemental test of the Incore Instrument Tank and the initiation of a supplemental test report. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/80-38.
4. One item of noncompliance was identified in Inspection Report No. 50-330/79-14 concerning the use of a wad of paper in making a purge dam during welding activities. Licensee corrective actions included: (1) revision of pertinent procedures; (2) revision of pertinent Quality Control inspection checklist; and (3) training sessions for welders and Quality Control inspectors. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/80-16.
5. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-18 and 50-330/79-18 concerning inadequate controls to protect materials and equipment from welding activities. Licensee corrective actions included training sessions for cognizant Field Engineers, Superintendents, General Foremen and Foremen. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/80-15 and 50-330/80-16.
6. Two items of noncompliance were identified in Inspection Report Nos. 50-329/79-19 and 50-330/79-19. These items regarded: (1) failure to ensure that appropriate quality standards were in the specification for structural backfill; and (2) Quality Control inspection personnel performing containment prestressing activities were not being qualified as required. Licensee corrective actions included: (1) revision of pertinent specification; (2) examination given to Level I and Level II inspector; and (3) reinspection of selected tendons. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-330/80-09, 50-329/80-04 and 50-330/80-04.
7. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-20 and 50-330/79-20 concerning inadequate controls for welding activities pertaining to 4.16 KV switchgear. Licensee corrective actions included: (1) correction of relevant records; (2) additional training for Quality Control Engineers; and (3) additional training for the Quality Control Document Coordinator. The licensee's actions were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/80-15 and 50-330/80-16.

8. One item of noncompliance was identified in Inspection Report No. 50-330/79-22 concerning inadequate weld rod controls. Licensee corrective actions included a training session for cognizant welding personnel. The actions taken by the licensee in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report No. 50-330/80-01.
9. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-26 and 50-330/79-26 concerning failure to follow procedures relative to the shipment of auxiliary feed water pumps to the site with nonconforming oil coolers. Licensee corrective actions included: (1) reinstruction given to cognizant engineer; and (2) Supplied Deviation Disposition Request (SDDR) generated by the vendor. The licensee's actions in regards to this matter were reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/79-26 and 50-330/79-26.
10. One item of noncompliance was identified in Inspection Report Nos. 50-329/79-27 and 50-330/79-27 concerning the violation of QC Hold Tags. Licensee corrective actions included: (1) a training session for Construction Supervisors and Field Engineers; and (2) a Field Instruction on Quality Control Hold Tags was issued. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/81-04 and 50-330/81-04.
11. As a followup to the significant construction problem identified in 1978 (see Paragraph H.10), an investigation was initiated in December, 1978 to obtain information relating to design and construction activities affecting the Diesel Generator Building foundations and the activities involved in the identification and reporting of unusual settlement of the building. The investigation findings were documented in Inspection Report Nos. 50-329/78-20 and 50-330/78-20, dated March 22, 1979. Information obtained during this investigation indicated: (1) a lack of control and supervision of plant fill activities contributed to the inadequate compaction of foundation material; (2) corrective action regarding nonconformances related to plant fill was insufficient or inadequate as evidenced by the repeated deviations from specification requirements; (3) certain design bases and construction specifications related to foundation type, material properties, and compaction requirements were not followed; (4) there was a lack of clear direction and support between the contractor's engineering office and construction site personnel; and (5) the FSAR contained inconsistent, incorrect and unsupported statements with respect to foundation type, soil properties, and settlement values. Nine examples of noncompliance involving four different 10 CFR 50, Appendix B Criteria were identified in the subject inspection report.

Meetings were held on February 23, 1979 and March 5, 1979 at the NRC Region III office to discuss the circumstances associated with the settlement of the Diesel Generator Building at the Midland facility. The NRC staff stated that its concerns were not limited to the narrow scope of the settlement on the Diesel Generator Building, but extended to various buildings, utilities and other structures located in and on the plant area fill. In addition, the staff expressed concern with the Consumers Power Company Quality Assurance Program. Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, and Section 50.54(f) of 10 CFR Part 50, additional information was requested regarding the adequacy of the fill and the quality assurance program for the Midland site in order for the Commission to determine whether enforcement action such as license modification, suspension or revocation should be taken. Question 1 of the 50.54(f) letter dated March 21, 1979 requested information regarding the quality assurance program. On April 24, 1979, Consumers Power Company submitted the initial response to the 50.54(f) request, Questions 1 through 22. As a result of the NRC staff review of Question 1, the NRC concluded that the information provided was not sufficient for a complete review. Subsequently, on September 11, 1979, the NRC issued a request for additional quality assurance information (Question 23). On November 13, 1979, Consumers Power Company submitted Revision 4 to the 50.54(f) responses which included response to Question 23. As a result of the Region III investigation report and CPCo responses, the NRC issued an Order modifying construction Permits No. CPPR-81 and No. CPPR-82, dated December 6, 1979. This order prohibited further soils related activities until the submission of an amendment to the application seeking approval of the Remedial Soils work with the provision that the order would not become effective in the event that the licensee requested a hearing. Due to the licensee's decision to request a hearing this order forms the basis for the ongoing ASLB Hearings.

During 1979, the licensee continued soil boring operations in order to identify and develop the quality of material in the plant area fill and beneath safety related structures. The licensee completed a program regarding the application of a surcharge of sand material in and around the Diesel Generator Building. This surcharge was an attempt to accelerate any future settlement of the Diesel Generator Building by consolidating the foundation material.

Additional developments in this matter are discussed in the 1980 section of this report, Paragraph J.9.

J. 1980

Thirty-seven inspection reports were issued in 1980 of which two pertained to meetings at the licensee's corporate office, one to a meeting in Glen Ellyn, two to investigations, and thirty-two to onsite inspections. A total of twenty-one items of noncompliance were identified during 1980. Two significant construction problems were identified involving quality assurance problems at the Zack Company (see Paragraph 7) and deficient reactor vessel anchor studs (see Paragraph 8). These items/problems are described below:

1. Two items of noncompliance and one deviation were identified in Inspection Report Nos. 50-329/80-01 and 50-330/80-01. These items regarded: (1) a welder welding on material of thickness which exceeded his qualified range; (2) failure to date and sign the cleanliness inspection of Unit 2 Service Water System valve; and (3) failure to implement a design change or prepare a Field Change Request. Licensee corrective actions in regards to the items of noncompliance included: (1) testing and qualification of the subject welder; (2) reinstruction of QC engineer; (3) review of the inspection records for additional valves; and (4) the revision of applicable turnover procedures. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/80-20, 50-330/80-21, 50-329/82-04 and 50-330/82-04.
2. One item of noncompliance was identified in Inspection Report No. 50-329/80-09 concerning the failure to maintain levelness requirements during core support assembly lifts. The licensee's corrective actions in response to the item of noncompliance included the issuance of a nonconformance report and the commitment to ensure compliance with Quality Control procedures. The licensee's corrective actions in regards to this matter will be reviewed during subsequent NRC inspections.
3. One item of noncompliance was identified in Inspection Report Nos. 50-329/80-20 and 50-330/80-21 concerning the failure of a Bechtel purchase order for E7018 welding rods to specify the applicable codes. Licensee commitments in regards to corrective actions included an audit of the ordering and receiving records of weld filler material. The licensee's corrective actions in regards to this matter will be reviewed during subsequent NRC inspections.
4. One item of noncompliance was identified in Inspection Report Nos. 50-329/80-21 and 50-330/80-22 concerning the failure to perform an audit of Photon Testing, Inc. for services to qualify Zack Company welders. Licensee corrective actions included an audit of Photon Testing, Inc. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/81-03 and 50-330/81-03.

5. One item of noncompliance was identified in Inspection Report Nos. 50-329/80-28 and 50-330/80-29 concerning the bypassing of a hold point on a Pressure Surge System weld. The inspection report further identifies that action had been taken to correct the identified noncompliance and to prevent recurrence. The item is closed.
6. One item of noncompliance was identified in Inspection Report Nos. 50-329/80-31 and 50-330/80-32 concerning substantial delays by the licensee in making 10 CFR Part 21 reportability determinations. Licensee corrective actions included training sessions for key personnel in recognizing 10 CFR 21 reporting obligations. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/81-07 and 50-330/81-07.
7. A significant construction problem involving quality assurance problems at the Zack Company, the heating, ventilating, and air condition contractor was identified in 1980. Details of the Zack problem follow:

During March and April, 1980 the NRC received numerous allegations pertaining to the Zack Company. The Zack Company is the heating, ventilation and air conditioning (HVAC) subcontractor at the Midland construction site. The allegations dealt with material traceability, violations of procedures, falsification of documents, and the training of quality control inspectors.

As the result of the allegations, an investigation was initiated by the NRC. During the initial phases of the investigation, the NRC determined that Consumers Power Company had issued a Management Corrective Action Request (MCAR), dated January 8, 1980, pertaining to the Zack Company. The MCAR showed that Zack had failed to initiate corrective action in a timely manner on a large number of nonconformance reports and audit findings and had failed to address other requirements and commitments of the quality program.

Consumers Power Company had issued seven nonconformance reports during the period of May 23 to October 2, 1979 all of which recommended 100% reinspection of work as a corrective action. The investigation determined that as of March 19, 1980, corrective action had not been completed on any of the nonconformance reports.

Based on preliminary findings during the investigation, which revealed some instances of continued nonconformance in the implementation of Zack's Quality Assurance Program, an Immediate Action Letter (IAL) was issued to the licensee on March 21, 1980. The IAL stated the NRC's understanding that a Stop Work Order had been issued to the Zack Corporation for all its safety related construction activities.

Seventeen examples of noncompliance involving eight different 10 CFR 50, Appendix B, criteria were identified during the investigation. The investigation findings are documented in Inspection Report Nos. 50-329/80-10 and 50-330/80-11. The licensee's actions in regards to the items of noncompliance were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/82-15 and 50-330/82-15.

On June 30, 1980, the NRC received from the licensee a letter documenting a Program Plan for resumption of safety related work by the Zack Company. The licensee identified that corrective actions required prior to lifting the Stop Work included: (1) the review and approval of all Field Quality Control Procedures and specific Weld Procedure Specifications; (2) the review and approval of the revised Zack QA Manual; (3) the training and certification of the QC personnel; and (4) the training of site production personnel.

Subsequent to followup NRC inspections to determine the effectiveness of licensee corrective actions, it was determined by the NRC, on August 14, 1980 that HVAC safety related work could resume.

The Bechtel Power Corporation released the Zack Company from the Stop Work Order by letter dated August 14, 1980.

As a result of the aforementioned investigation findings, the NRC imposed a Civil Penalty, on January 7, 1981, on Consumers Power Company for the amount of \$38,000.

8. The second significant construction problem involved reactor pressure vessel anchor stud failures. Details are as follows:

On September 14, 1979, Consumers Power Company personnel notified the NRC of the discovery of a broken reactor vessel anchor stud on the Midland Unit 1 reactor vessel. On October 12, 1979, this condition was reported under the requirements of 10 CFR 50.55(e). Two other studs were subsequently found to be broken. As this condition reflected a significant deficiency, an NRC investigation was initiated in February 1980 to review the materials, manufacturer, and installation of the studs.

The investigation findings, as documented in Inspection Report Nos. 50-329/80-13 and 50-330/80-14, indicate several Quality Assurance deficiencies: (1) lack of licensee involvement; (2) failure to advise the heat treater of different heats of material; (3) inadequate document review; (4) failure to respond to indications that the studs were deficient; (5) failure to review materials previously purchased when the purchase specification was revised; and (6) miscalculation of

the stud stress area resulting in a slight over-specification stressing of the studs (this item was identified by the licensee).

Three items of noncompliance were identified in the inspection report. These items regarded: (1) failure to identify Subsection NF of the ASME Code as the applicable requirement for the reactor vessel anchor bolts; (2) failure to establish measures to assure that purchased material conforms to the procurement documents; and (3) failure to establish measures to assure that heat treating and nondestructive tests were controlled in accordance with applicable codes and specifications. Licensee commitments in regards to corrective actions included: (1) a commitment to conduct a review to confirm that safety related low alloy steel bolting and/or component support materials, which have been tempered and quenched and are 7/8" or greater in diameter, have been procured in accordance with proper codes and standards; (2) a commitment to obtain NRR approval of the acceptability of the Unit 2 reactor vessel anchor bolts and (3) a commitment that actual plant modifications to compensate for the defective bolts would not be started on Unit 1 until approval of the design concept was received from NRR.

The stud failure mechanism was identified as stress corrosion cracking which propagated to the point that the studs failed by cleavage fracture. Tests indicated that some studs utilized in Unit 2, although of different material and heat treatment, have above specification surface hardness readings.

The final report per 50.55(e) requirements was submitted by the licensee on December 1, 1981.

NRR has the lead responsibility for evaluation and approval of the licensee's proposals for resolution of this matter.

9. A special inspection was conducted in December, 1980 at the Bechtel Power Company Ann Arbor, Michigan offices to verify implementation of the specific commitments and action items reflected in Consumers Power Company response to 10 CFR 50.54(f) questions (regarding excessive settlement of the Diesel Generator Building foundations). The results of this inspection were documented in Inspection Report Nos. 50-329/80-32 and 50-330/80-33. Two items of noncompliance were identified regarding: (1) failure to provide adequate corrective actions with regard to identified audit results; and (2) inadequate design control. Licensee corrective actions included: (1) revision of procedures; (2) revision of specification; and (3) audit of FSAR sections. The licensee actions were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/81-12, 50-330/81-12, 50-329/81-19 and 50-330/81-19.

Additional information regarding this matter is discussed in the 1981 section of this report, Paragraph K.6.

K. 1981

Twenty-three inspection reports were issued in 1981 of which one pertained to a management meeting and twenty-two to onsite inspections. A total of twenty-one items of noncompliance were identified during 1981. One significant construction problem was identified involving deficiencies in piping suspension system installations (see Paragraph 4). These items/problems are described below:

1. Two items of noncompliance were identified in Inspection Report Nos. 50-329/81-04 and 50-330/81-04. These items regarded: (1) failure to account for all tools and materials used in a controlled clean room area; and (2) inadequate procedure for the installation of the Unit 2 vent valves in the core support assembly. Licensee corrective actions included: (1) the upgrading of personnel and equipment logs; (2) the addition of new logs; (3) issuance of a formal Stop Work Order for further work on the installation of vent valves; (4) the revision of installation procedures; (6) training and indoctrination of personnel performing vent valve installations; and (5) the revision of the overview inspection plan. The licensee's actions in regards to these items were reviewed and it was determined that action had been taken to correct the identified non-compliances and to prevent recurrence. This determination is documented in Inspection Report Nos. 50-329/81-04 and 50-330/81-04.
2. One item of noncompliance was identified in Inspection Report Nos. 50-329/81-08 and 50-330/81-08 regarding the failure to provide adequate storage conditions for Class 1E equipment. Licensee corrective actions included: (1) additional training for Bechtel maintenance engineers; (2) an audit of maintenance activities; and (3) reinspections of affected equipment. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/81-23 and 50-330/81-23.
3. Four items of noncompliance were identified in Inspection Report Nos. 50-329/81-11 and 50-330/81-11. These items regarded: (1) inadequate procedures for the temporary support of cables and for the routing of cables into equipment; (2) failure of QC inspectors to identify inadequate cable separation; (3) inadequate control of nonconforming raceway installations; and (4) failure to translate the FSAR requirements into instrumentation specifications. Licensee corrective actions in regards to (1) and (2) above, included: (1) the revision of cable pulling procedures;

(2) the repair of damaged cables; (3) training given to the termination personnel and the involved QC inspector; and (4) the revision of the cable termination procedure. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/81-20, 50-330/81-20, 50-329/82-03 and 50-330/82-03. Licensee commitments in regards to corrective actions pertaining to items (3) and (4), above, included: (1) the addition of required barriers on pertinent raceway drawings; (2) the revision of Project Quality Control Instruction; (3) and the revision of the instrumentation specification. The licensee's actions in regards to these items will be reviewed during subsequent NRC inspections.

4. Eight items of noncompliance were identified during a special indepth team inspection to examine the implementation status and effectiveness of the Quality Assurance Program. The results of the inspection are documented in Inspection Report Nos. 50-329/81-12 and 50-330/81-12. Three of the items of noncompliance regarded: (1) failure to take adequate corrective action concerning the trend analysis procedure; (2) failure of QC inspections to identify a nonconforming cable bend radius; and (3) failure to take adequate corrective action in regards to the lack of rework procedures. Licensee corrective actions in regards to items (1) and (2) above, included: (1) the issuance of a new procedure for trending; (2) the revision of cable termination procedures; and (3) additional training given to the responsible QC inspector. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/82-02, 50-330/82-02, 50-329/82-03 and 50-330/82-03. The licensee's commitments in regards to corrective actions pertaining to item (3) above, included: (1) the development of Administrative Guidelines and Instructions for rework; and (2) the revision of field procedures. The licensee's actions in regards to this item will be reviewed during subsequent NRC inspections.

The remaining five items of noncompliance identified in Inspection Report Nos. 50-329/81-12 and 50-330/81-12 are considered to be a significant construction problem. Safety related pipe support and restraint installations and QC inspection deficiencies in regard to those installations were identified. The five items of noncompliance pertaining to this issue regarded: (1) failure to install large bore pipe restraints, supports and anchors in accordance with design drawings and specifications; (2) failure of QC inspectors to reject large bore pipe restraints, supports and anchors that were not installed in accordance with design drawings and specifications; (3) failure to prepare,

review and approve small bore pipe and piping suspension system designs performed onsite in accordance with design control procedures; (4) failure to adequately control documents used in site small bore piping design activities; and (5) failure of audits to include a detailed review of system stress analysis and to follow up on previously identified hanger calculation problems. Licensee corrective actions in regards to items (3) through (5) included: (1) the review and upgrading of small bore piping calculations (2) audits of small bore piping activities; (3) revision of Engineering Directive; (4) additional training in QA procedures; and (5) audits of document control. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/82-07 and 50-330/82-07.

As a result of the adverse findings, an Immediate Action Letter (IAL) was issued by the NRC on May 22, 1981 acknowledging the NRC's understanding that the licensee would not issue fabrication and construction drawings for the installation of the safety related small bore pipe and piping suspension systems until requirements identified in the IAL had been completed and audited.

The IAL requirements were subsequently reviewed and determined to have been satisfactorily addressed. This is documented in Inspection Report Nos. 50-329/81-14 and 50-330/81-14.

The licensee's actions in regards to noncompliance items (1) and (2) above, are discussed in Paragraph 1 of the following report section for 1982(L).

5. One item of noncompliance was identified in Inspection Report Nos. 50-329/81-14 and 50-330/81-14 concerning inadequate design controls involving the Bechtel Resident Engineer's review of the field engineers redline drawings for small bore piping. Licensee corrective actions included: (1) a 100% review of all questionable systems; and (2) the revision of a Project Instruction. The licensee's actions in regards to this matter were subsequently reviewed and the item closed by the NRC as documented in Inspection Report Nos. 50-329/82-07 and 50-330/82-07.
6. In January, 1981 an inspection was conducted by the NRC to verify whether adequate corrective actions had been implemented as described in the Consumers Power Company response to Questions 1 and 23 of 10 CFR 50.54(f) submittals (regarding excessive settlement of the Diesel Generator Building foundation). The findings during this inspection, which include three items of noncompliance and one deviation, are documented in Inspection Report Nos. 50-329/81-01 and

50-330/81-01. The items of noncompliance and the deviation regarded: (1) failure to develop test procedures for soils work activities; (2) failure to have soils laboratory records under complete document control; (3) failure to have explicit instructions for the onsite Geotechnical Engineer's review of test results; and (4) failure to have a qualified Geotechnical Engineer onsite. Licensee corrective actions included: (1) revision of Quality Control Procedures and Specification; (2) development of new Quality Control Procedures; and (3) the addition of a qualified Geotechnical Engineer. The licensee's actions in regards to these items were subsequently reviewed and the items closed by the NRC as documented in Inspection Report Nos. 50-329/81-12 and 50-330/81-12.

7. In March 1981, an inspection was initiated by the NRC to verify the licensee's Quality Assurance Program for the ongoing soil borings. The soil borings were performed by the licensee in response to a request from the Corps of Engineers for additional soil information for their review of the licensee's 10 CFR 50.54(f) answers. The findings of this inspection, which includes one item of noncompliance, are documented in Inspection Report Nos. 50-329/81-09 and 50-330/81-09. The noncompliance regards the lack of evaluation of Woodward-Clyde technical capabilities prior to the commencement of drilling operations. Licensee commitments in regards to corrective actions included: (1) the review, for compliance, of Midland Project major procurements and contracts; and (2) the review and revision of pertinent procedures. The licensee's corrective actions in regards to these items will be reviewed during subsequent NRC inspections.

L. 1982

Fourteen inspection reports have been issued during 1982 covering the period through June 30, 1982 of which two pertain to management meetings, one to an investigation, one to the SALP meeting, and ten to onsite inspections. During this period of time seven items of noncompliance were identified. One significant construction problem was identified involving electrical cable misinstallations (see Paragraph 2). These items/problems are discussed below:

1. The licensee conducted reinspections to determine the seriousness of the safety related support and restraint installation and QC inspection deficiencies identified in Inspection Report Nos. 50-329/81-12 and 50-330/81-12. The results of the reinspections are documented in Inspection Report Nos. 50-329/82-07 and 50-330/82-07. From a sample size of 123 safety related supports and restraints installed and inspected by Quality Control, approximately 45% were identified by the licensee as rejectable.

On August 30, 1982, the licensee was informed of the NRC's posit that the licensee shall reinspect all the supports and restraints installed prior to 1981 and perform sample reinspections of the components installed after 1981. The licensee has agreed to perform the reinspections.

2. One significant construction problem was identified during 1982. It involved electrical cable misinstallations. Details are as follows:

During the special team inspection conducted in May 1981, the NRC identified concerns in regards to the adequacy of inspections performed by electrical Quality Control inspectors. These concerns were the result of the NRC's review of numerous Nonconformance Reports (NCR) issued by Midland Project Quality Assurance Department (MPQAD) personnel during reinspections of items previously inspected and accepted by Bechtel QC inspectors. The NRC required the licensee to perform reinspections of the items previously inspected by the QC inspectors associated with the MPQAD NCRs. The licensee, in reports submitted to the NRC in May and June 1982, reported that of the 1084 electrical cables reinspected, 55 had been determined to be misrouted in one or more vias. This concern was upgraded to an item of non-compliance and is documented in Inspection Report Nos. 50-329/82-06 and 50-330/82-06.

On September 2, 1982, the licensee was informed by the NRC that a 100% reinspection of class 1E cables installed or partially installed before March 15, 1982 was required. In addition, the licensee was required to develop a sample reinspection program for those cables installed after March 15, 1982. The licensee has agreed to perform the reinspections.

3. Three examples of noncompliance to one 10 CFR 50 Appendix B Criterion were identified in Inspection Report Nos. 50-329/82-03 and 50-330/82-03. These examples regarded: (1) failure to follow procedures concerning drawing changes; (2) inadequate specification resulting in the undermining of BWST No. 2 valve pit; and (3) inadequate control of changes to procedures. The licensee's response to the identified item of noncompliance is presently under review. Corrective actions taken by the licensee in regards to this item will be reviewed during future inspections.
4. Four examples of noncompliance to one 10 CFR 50 Appendix B Criterion and a deviation were identified in Inspection Report Nos. 50-329/82-05 and 50-330/82-05. The examples of noncompliance and the deviation regarded: (1) failure to review and approve a Mergentine (the soils contractor) field procedure prior to initiation of work; (2) inadequate control of specification changes; (3) inadequate acceptance

criteria for dewatering specification; (4) inadequate instruction to prepare or implement reinspection plans; and (5) inadequately qualified remedial soils staff. The corrective actions taken by the licensee in regards to this item will be reviewed during future inspections.

5. One item of noncompliance was identified in Inspection Report Nos. 50-329/82-06 and 50-330/82-06 concerning the licensee's failure to establish a QA program to provide controls over the installation of remedial soils instrumentation. This item resulted in the issuance of a letter by the licensee on March 31, 1982 confirming the licensee's suspension of all underpinning instrumentation installation activities until: (1) approved, controlled drawings and procedures or instructions were developed to prescribe underpinning instrumentation installation activities; (2) plans were established to inspect and audit instrumentation installation activities; and (3) Region III had concurred that (1) and (2), above, were acceptable.

A followup inspection by Region III in April 1982 identified that the licensee had developed acceptable drawings, procedures, and instructions for underpinning instrumentation installations such that instrumentation installation activities could be resumed. An additional followup inspection on August 23, 1982 determined that the installation of underpinning instrumentation for the Auxiliary Building was complete and acceptable. This item will remain open pending the licensee's development of drawings, procedures, and instructions for the future installation of underpinning instrumentation for the Service Water Building.

6. One item of noncompliance and a deviation were identified in Inspection Report Nos. 50-329/82-11 and 50-330/82-11. The items regarded: (1) inadequate anchor bolt installation; and (2) the use of unapproved installation/coordination forms during remedial soils instrumentation installations. The licensee's responses to the identified items of noncompliance are presently under review. Corrective actions taken by the licensee in regards to these items will be reviewed during future inspections.

The ASLB issued an order modifying Construction Permits No. CPPR-81 and No. CPPR-82, dated April 30, 1982. This order suspended all remedial soils activities on "Q" soils for which the licensee did not have prior explicit approval. The ASLB issued another order, dated May 7, 1982 clarifying the April 30, 1982 order. This order only includes those activities bounded by the limits identified on Drawing C-45.

As a result of past Region III findings, the Region III Administrator created a special Midland Section staffed with individuals assigned solely to the Midland project. Since the formation of the Midland Section a work authorization procedure has been developed by Region III and the licensee to control work and ensure compliance to the ASLB Order.

Remedial Soils activities performed by the licensee thus far in 1982 involve: (1) the drilling of a number of wells which function as part of the temporary and permanent dewatering systems; (2) the installation of the freeze wall associated with the Auxiliary Building Underpinning activity; (3) the completion of the initial work on the access shaft; and (4) the completion of the Auxiliary Building instrumentation for remedial soils activities.



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
 WASHINGTON, D. C. 20555

June 8, 1982

Midland

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Honorable Nunzio J. Palladino
 Chairman
 U. S. Nuclear Regulatory Commission
 Washington, D.C. 20555

Dear Dr. Palladino:

SUBJECT: ACRS INTERIM REPORT ON MIDLAND PLANT, UNITS 1 AND 2

During its 266th meeting, June 3-5, 1982, the Advisory Committee on Reactor Safeguards reviewed the application of Consumers Power Company for a license to operate the Midland Plant, Units 1 and 2. This application was also considered at Subcommittee meetings held on April 29, 1982 in Washington, D. C., on May 20-21, 1982 in Midland, Michigan and on June 2, 1982 in Washington, D. C. On May 20, 1982 members of the Subcommittee toured the plant. In the course of these meetings the Committee had the benefit of discussions with representatives and consultants of Consumers Power Company, Babcock and Wilcox Company, Bechtel Corporation, the Nuclear Regulatory Commission Staff, and members of the public. The Committee also had the benefit of the documents listed below.

The ACRS reported on June 18, 1970 regarding the construction permit application for the Midland Plant; on September 23, 1970 regarding several amendments to the application; and on November 18, 1976 regarding applicable generic matters.

The Midland Plant site is located on the south bank of the Tittabawassee River adjacent to the southern city limits of Midland. The main industrial complex of the Dow Chemical Company lies within the city limits directly across the river from the site. There are about 2000 industrial workers within one mile of the site, and the estimated 1980 population was about 51,400 residents within five miles of the site. This makes the Midland site one of the more densely populated sites at distances close to the Plant.

Each of the two Midland units employs a Babcock and Wilcox designed nuclear steam supply system rated at 2468 Mwt with a stretch power rating of 2552 Mwt. The Midland Plant is unique in that the heat generated will be used not only to produce electricity but also to produce process steam for the Dow Chemical Company plant via a tertiary system.

The Midland Plant has been the subject of several major problems related to quality assurance during plant construction. One of these problems relates to the soil fill under several safety-related structures. The

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deficiencies relating to soil fill have led to excessive settlement and some cracking of these structures, and have also introduced questions concerning the adequacy of protection against liquefaction of the granular portions of the fill in the event of strong vibratory motion accompanying an earthquake.

The Applicant has proposed and is implementing, under close surveillance by the NRC Staff, remedial measures with regard to the foundation deficiencies. We are generally satisfied with the approach being taken, subject to confirmation of the overall quality assurance program and the seismic design basis. Both of these items are discussed below.

With regard to quality control of design and construction, the report of the NRC Staff's Systematic Assessment of Licensee Performance (SALP) review for the period July 1, 1980 to June 30, 1981 revealed deficiencies in the installation of piping and piping suspension systems, in the pulling of electrical cables, and in the handling of problems relating to soils and foundation. Deficiencies by the Applicant in the handling of soils-related matters have continued to occur, subsequent to issuance of the SALP report. We believe that the NRC Staff is handling the corrective actions for specifically identified quality assurance deficiencies in an appropriate manner.

In view of the overall concern about Midland quality assurance the NRC should arrange for a broader assessment of Midland's design adequacy and construction quality with emphasis on installed electrical, control, and mechanical equipment as well as piping and foundations. We wish to receive a report which discusses design and construction problems, their disposition, and the overall effectiveness of the effort to assure appropriate quality.

Our reservation concerning seismic design relates to the lack of adequate assurance that the Midland Plant will be capable of accomplishing shutdown heat removal for low probability earthquakes more severe than the safe shutdown earthquake (SSE). The Midland seismic design basis at the construction permit stage corresponded to a MMI VI, peak ground acceleration of 0.12g, employing a modified Housner spectrum. For the operating license review, the NRC Staff has reevaluated the original seismic design basis and the Applicant and the NRC Staff have agreed on the use of site-specific analyses which have led to increases in the design response spectra for frequencies above about 2 cycles/sec.

Historically, no earthquakes stronger than the newly proposed SSE have occurred within 200 miles of the Plant. However, expert opinion differs widely on the exceedance frequency of the proposed SSE and on the severity at the site of earthquakes whose likelihood is less than 1 in 10^4 or 1 in 10^5 per year.

The Applicant is currently reevaluating by selective audit the seismic capability of the plant, as originally designed, to withstand the revised SSE. Measures taken to assure safe shutdown in the event of an earthquake include the use of dewatering to reduce the potential for soil liquefaction. We recommend that all systems and components important to decay heat removal be carefully evaluated for their ability to accomplish necessary functions in the unlikely event of lower-probability, more severe earthquakes in order to provide the necessary degree of assurance. This matter should be resolved in a manner satisfactory to the NRC Staff. We wish to be kept informed about the resolution of this matter. We believe that any recommendations for changes in the plant resulting from this evaluation should be implemented by the end of the second refueling outage.

The Applicant has agreed to provide core exit thermocouples, a hot-leg-level measurement system, and subcooled margin monitors as instrumentation to detect inadequate core cooling. Consumers Power Company also plans to include a remotely operable vent on top of both inlet loops to the steam generators; however, Consumers has not committed to supply a high point vent on the reactor vessel head. This matter should be resolved in a manner satisfactory to the NRC Staff. The ACRS recommends that the Applicant review further the potential for providing indications of water content or level within the reactor vessel.

The staff of the Applicant includes many personnel who have had nuclear power plant experience. However, operating experience with this B&W type power reactor is limited, and the NRC Staff is requiring that at least one person having experience on a large commercial PWR be included on each shift for one year. We support the NRC Staff position.

The Applicant's experience with the operation of nuclear power plants should, in principle, place Consumers in a favorable position to provide continuing, careful oversight of the operations at the Midland Plant. In view of some prior adverse operating experience at the Palisades Plant however, we recommend that the NRC Staff institute an augmented audit of operations at Midland, at least during the early years of operation at power.

We have reviewed the evaluation made of the tertiary process steam system for use by Dow Chemical Company. This system appears not to impose any unacceptable impacts either on the safe operation of the Midland Plant or on the people working at the Dow Chemical Company.

The Applicant has undertaken an effort to have a probabilistic risk assessment (PRA) performed for the Midland Plant and stated that the results will be available in the fall of 1982. We believe it desirable to have plant-specific PRAs performed for each commercial nuclear power plant and that

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it is particularly appropriate for the Midland Plant because of its relatively high, close-in population density. We wish to have the opportunity to review the Midland PRA with assistance from the NRC Staff, and to offer comments or recommendations as appropriate. We do not believe that this review need delay licensing of the Midland Plant for operation.

Recently, questions have come to light in connection with B&W plants concerning the availability of natural circulation in the presence of an interrupted or continuing small break loss-of-coolant accident. We wish to see a proposed NRC Staff resolution of this issue.

The Applicant described an extensive systems interactions study being undertaken for the Midland Plant. We wish to be informed of the results of this study.

We believe that, in view of the population density near this plant, additional prudence is appropriate for the Midland Plant in the resolution of the ATWS issue and other Unresolved Safety Issues.

We endorse the participation of Dow Chemical Company plant personnel in emergency procedures developed on the basis of an assumed failure at the Midland Plant. Similarly, there should be active participation by Midland Plant personnel in emergency procedures developed on the basis of an assumed failure at the Dow Chemical plant. The Applicant and the NRC Staff should promote continued coordination of these types of relationships, as well as those involving appropriate state and local groups to assure that the capability for an effective emergency response is developed and maintained.

With regard to the eleven items identified in the ACRS Supplemental Report on Midland Plant, Units 1 and 2 dated November 18, 1976, we have the following comments. The issues related to vibration and loose-parts monitoring, potential for axial xenon oscillations, behavior of core-barrel check valves during normal operation, fuel handling accidents, effects of blowdown forces on core internals, LOCA-related fuel rod failures, and improved quality assurance and in-service inspection for the primary system have all been resolved or are in a confirmatory stage of being resolved. Separation of protection and control equipment has been accomplished in an appropriate manner; however, the safety implications of control systems remains an Unresolved Safety Issue directly applicable to Midland. Resolution awaits completion of the NRC Staff Task Action Plan A-47. The effect of ECCS induced thermal shock on pressure vessel integrity has been resolved in part; however, the Unresolved Safety Issue on pressurized thermal shock will apply. Environmental qualification of equipment remains a generic

June 8, 1982

issue which is under review by the NRC Staff and whose resolution will apply to the Midland Plant. Instrumentation to follow the course of an accident has been resolved in part by the development of revised Regulatory Guide 1.97. We do not believe that licensing of the Midland Plant for operation need await further resolution of any of the eleven issues discussed above.

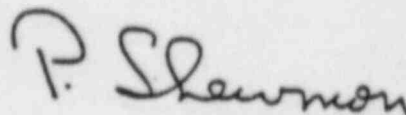
The various other matters identified by the NRC Staff as open or confirmatory in the Safety Evaluation Report should be resolved in a manner satisfactory to the NRC Staff. We wish to be kept advised concerning resolution of the turbine missile issue.

The ACRS believes that, subject to satisfactory completion of construction and staffing and if due regard is given to the comments above, the Midland Plant, Units 1 and 2 can be operated at power levels up to 5 percent of full power with reasonable assurance that there is no undue risk to the health and safety of the public.

We defer our recommendation regarding operation at full power until we have had the opportunity to review the plan for an audit of plant quality and the proposed resolution of the question regarding natural circulation in the presence of a small break LOCA.

Dr. Kerr did not participate in the Committee's review of this matter.

Sincerely,



P. Shewmon
Chairman

References:

1. Consumers Power Company, "Midland Plant Units 1 and 2 - Final Safety Analysis Report" including Amendments 1-43
2. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the Operation of Midland Plant, Units 1 and 2," NUREG-0793, dated May 1982
3. U.S. Nuclear Regulatory Commission, "NRC Licensee Assessments," NUREG-0834, dated August 1981
4. Letter from J. Cook, Consumers Power Company, to J. Keppler, NRC, Subject: Midland Project Response to Draft SALP Report, dated May 17, 1982
5. Letter from J. Cook, Consumers Power Company, to J. Keppler, NRC, Subject: Midland Project Quality Assurance Program Update, dated April 30, 1981

June 8, 1982

6. Letter from J. Hind, NRC, to J. Cook, Consumers Power Company, Subject: Systematic Assessment of Licensee Performance (SALP), dated April 20, 1982
7. Letter from J. Cook, Consumers Power Company, to H. Denton, NRC, Subject: Summary of Soils-Related Issues at the Midland Nuclear Plant, dated April 19, 1982
8. Letter from K. Drehobl, Consumers Power Company, to D. Fischer, ACRS, Subject: Midland Project Soils Information, dated April 12, 1982
9. Statement of Ms. M. Sinclair to ACRS, dated June 4, 1982
10. Letter from B. Stamiris to Dr. D. Okrent and ACRS Members, Subject: Midland OL Review, dated May 29, 1982
11. Letter from M. Sinclair to Dr. P. Shewmon, ACRS, Subject: Midland OL Review, dated May 28, 1982
12. Statement by Dr. C. Anderson to ACRS Midland Plant Subcommittee dated May 20-21, 1982
13. Statement by Ms. M. Sinclair to ACRS Midland Plant Subcommittee dated May 20-21, 1982
14. Letter from B. Stamiris to D. Fischer and ACRS Members, Subject: Soil Settlement and QA Issues, dated May 20, 1982
15. Letter from M. Sinclair to Dr. C. Siess, ACRS, Subject: Midland Soil Settlement, dated April 26, 1982



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D. 20555

June 9, 1983

Docket Nos. 50-329/330, OM,OL

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File *11/11*

PRINCIPAL STAFF	
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D/RA	ESCS
V/RA	PAO
OPRP	FLO
DEIA	RC
CONSP	
DE	
ML	
OL	FILE <i>PR</i>

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APPLICANT: Consumers Power Company
 FACILITY: Midland Plant, Units 1 and 2
 SUBJECT: SUMMARY OF APRIL 13, 1983 MEETING ON INDEPENDENT DESIGN
 AND CONSTRUCTION VERIFICATION PROGRAM

On April 13, 1983 the NRC met in Bethesda, Maryland with the Tera Corporation and Consumers Power Company (CPCo) to discuss plans for the independent design and construction verification (IDCV) program for Midland Plant, Units 1 & 2. Meeting attendees are listed by Enclosure 1. Enclosure 2 shows viewgraph slides used during the presentations by the Tera Corporation.

Presentations by various members of Tera described the current scope of review for the Auxiliary Feedwater (AFW) System, including additions and deletions to the scope as defined in Tera's Engineering Program Plan (EPP) and Project Quality Assurance Plan (PQAP) of February 9 and 17, 1983. The presentations also described the conceptual scope planned for the Standby Electric Power System and the control room portion of the Heating, Ventilation and Air Conditioning (HVAC) System. Addition of the latter two systems to the IDCV program are in accordance with the selections indicated in the NRC's letter of March 22, 1983. These matters will be incorporated into a revision of the EPP and PQAP documents about mid-May 1983. Other items discussed included (1) the protocol for reporting and communications, and (2) Tera team organization and experience.

Mr. T. Novak of NRR reviewed the NRC's role in third-party type reviews. The NRC's major role is acceptance review of the candidate firm selected by the Utility with respect to its independence and qualifications. Beyond this, the NRC's role is generally that of advisor rather than regulator. Mr. Novak noted that specific comments on the program by the NRC made during the meeting are intended as suggestions in a "peer review" context and should not be considered to be binding in the normal regulatory sense.

Selected comments and suggestions during presentations

1. Tera would like to receive copies of NRC Inspection Reports.
2. The NRC is re-examining its prior position that the construction verification portion of Tera's program should not be conducted until Phase I of the Construction Completion Program (CCP) (defined in CPCo's letter of January 10, 1983) and any needed construction rework for

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Complex systems has been completed. Since adoption of this position, another third-party has been named to overview the CCP. Tera noted certain disadvantages associated with a pause in execution of its program.

3. The NRC agrees that in order to preserve the independence of the IDCV process, the normal auditing function of CPCo with respect to subvendors should be waived for the Tera IDCV Program. Tera will perform self-audits. The NRC reserves its rights to audit Tera as appropriate. Tera will maintain auditable records at its office in Bethesda, Maryland.
4. Mr. G. Keeley of CPCo proposed a rewrite of the protocol (Enclosure 3). The NRC will examine the proposal later, but requested that the protocol attached to J. Keppler's letter should be followed unless formally changed. Tera noted its interpretation that the protocol regarding the noticing of meetings to discuss substantive matters is intended to apply to the findings stage, not during solicitation of information. CPCo suggested that once Tera is accepted by the NRC, notices for meetings should be provided by Tera, not CPCo.
5. Tera proposes to provide monthly status reports consisting of (1) a tracking system summary for open, confirmed and resolved (OCR) items, finding reports and finding resolution reports; (2) a narrative summary emphasizing progress and any changes to the review scope; (3) identification of any significant safety issues for finding reports; and (4) actual confirmed items, finding reports and finding resolution reports not included in previous monthly reports. The first monthly report will be issued in May 1983 and will cover the program from inception to April 30, 1983. Tera also plans to issue topical interim reports as completed for each system, and a final report. The service list for reporting was addressed by NRC letter of March 24, 1983. Proprietary information should not be included in these reports.
6. NRC contacts for the IDCV program are D. Hood, NRR (301-492-8474) and J. Harrison, RIII (312-384-2635). The Tera contact is H. Levin (301-654-8960). The CPCo contact is L. Gibson (517-788-0501).
7. The forms used for Findings Reports and Findings Resolution Reports identify whether the reported item is classified as "safety related" or "non-safety related." The NRC noted that a third category identified by Regulatory Guide 1.29, Paragraph C.2, is "important to safety." Tera discussed its plans to monitor some of the Seismic II/I and Proximity walkdowns by CPCo's System-Interactions Teams which are planned to identify and evaluate items of this classification. The NRC noted its strong endorsement of third-party monitoring and evaluation of this walkdown program.

8. Tera discussed its sample selection criteria which is primarily based on engineering judgment of the more experienced members of the team, but which is sometimes based on statistical techniques when appropriate for the particular item. One NRC member noted that a professional statistician could be a significant enhancement to the Tera team.
9. The NRC requested Tera to clarify what is meant by "provide safety evaluations" as used in the March 30, 1983 affidavits of Tera members with prior NRC experience. The NRC stated that its review of Tera's independence and qualifications for the AFW Systems program would be completed in the near future.

At the conclusion of the meeting the NRC noted that the concepts described for the control room HVAC system and standby electric power system were consistent with the NRC's March 22, 1983 letter. Tera's current plans appear consistent with the establishment of an effective program, and will be the subject of a revision to the EPP and PQAP around mid-May 1983.


Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosures:
As stated

NRR Service List for Midland Independent Design
and Construction Verification Program

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Ms. Lynne Bernabei
Government Accountability Project
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Washington, D. C. 20009

ENCLOSURE 1
ATTENDEES
April 13, 1983

<u>NAME</u>	<u>ORGANIZATION</u>
Darl S. Hood	LB4/NRR/DL
Dick Vollmer	NRR/DE
T. M. Novak	NRR/DL
Bob Bosnak	NRR/DE/MEB
Douglas M. Witt	Tera
Lionel D. Bates	Tera
Gil Keeley	Consumers
Fred Buckman	Consumers
Louis Gibson	Consumers
Frank Rinaldi	NRR/DE/SGEB
Moe Messier	NRR/DE/SAB
Jim Stone	NRC/IE
H. L. Brammer	NRC/DE/MEB
Arnold Lee	NRC/DE/EQB
John Tsao	NRC/DST/RRAB
David Rubinstein	NRC/DST/RRAB
Goutam Bagchi	NRC/DE/EQB
Don K. Davis	Tera
E. G. Adensam	NRC/DL/LB#4
Howard Levin	Tera
John Beck	Tera
Curt Staley	Tera
Frank A. Dougherty	Tera
Ted Sullivan	NRC/DE
Horace Shaw	NRC/DE/MEB
Paul Keshishian	NRC/IE
J. Harrison	NRC/IE/RIII
R. F. Warnick	NRC-RIII
W. T. LeFave	NRC-ASB/DSI
Paulette Meier	NIRS (Nuclear Info Research Service)
Billie Garde	GAP
L. S. Rubenstein	DSI/NRR
Ron Hernan	NRR/LB #4

ENCLOSURE 2

VIEWGRAPH SLIDES USED BY TERA CORPORATION

APRIL 13, 1983

John Cook
4/13/83

MEETING AGENDA
MIDLAND IDCV PROGRAM
APRIL 13, 1983

- PURPOSE
- MEETING OBJECTIVES
- BACKGROUND
 - PHILOSOPHY OF REVIEW
 - REVIEW APPROACH
 - BASES FOR SAMPLE SELECTION
- PROTOCOL
 - RESULTS REPORTING
 - STATUS REPORTING
 - COMMUNICATIONS
- DETAILS OF IDCV SCOPE
 - OVERVIEW
 - AUXILIARY FEEDWATER SYSTEM
 - STANDBY ELECTRIC POWER SYSTEM
 - CONTROL ROOM HVAC



PURPOSE

- ALLOW TERA TO BE RESPONSIVE TO NRC'S MARCH 22, 1983 LETTER



OBJECTIVES

- DISCUSSION OF IDCV PROTOCOL
- RECEIVE ANY COMMENTS GENERATED BY NRC'S REVIEW OF THE IDCV ENGINEERING PROGRAM PLAN
- CURRENT SCOPE OF TERA'S AFW SYSTEM REVIEW
- CONCEPTUAL DESCRIPTION OF SCOPE FOR STANDBY ELECTRIC POWER SYSTEM AND CONTROL ROOM HVAC SYSTEM

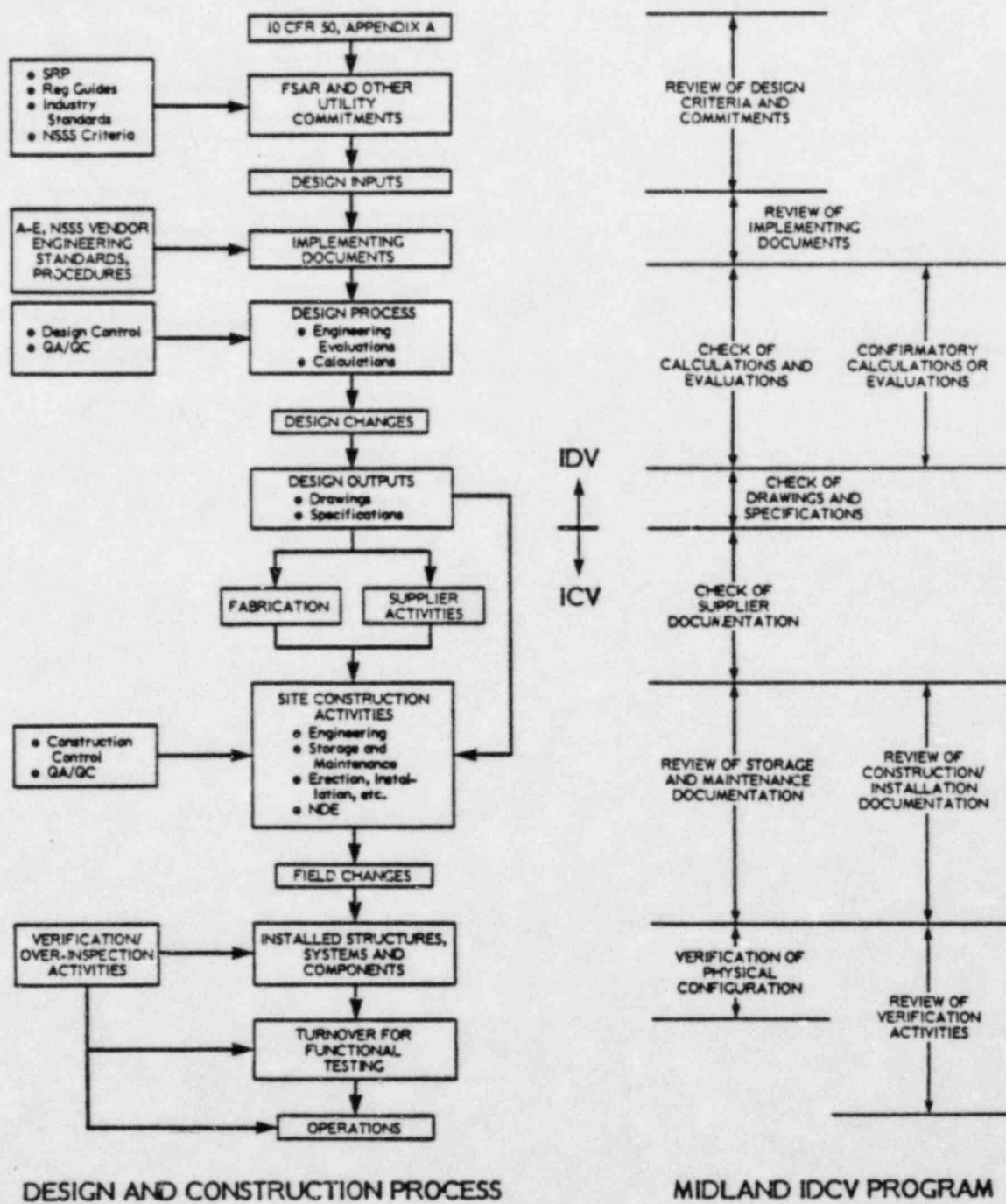


PHILOSOPHY OF REVIEW

- SELECT A REPRESENTATIVE SAMPLE OF ENGINEERED SYSTEMS, COMPONENTS, AND STRUCTURES WHICH WILL FACILITATE:
 - AN INTEGRATED ASSESSMENT OF IMPORTANT PARAMETERS AFFECTING THE FUNCTIONAL CAPABILITY OF THE TWO SYSTEMS, AND
 - THE ABILITY TO EXTRAPOLATE FINDINGS TO SIMILARLY DESIGNED FEATURES WITH A HIGH DEGREE OF CONFIDENCE
- CONSIDER POSITIVE AND NEGATIVE FINDINGS WHICH WILL ALLOW A BALANCED VIEW OF OVERALL QUALITY
- ASSESS ROOT CAUSE AND EXTENT OF IDENTIFIED FINDINGS
- REVIEW CORRECTIVE ACTION TAKEN TO ADDRESS FINDINGS



INTER-RELATIONSHIP BETWEEN THE MIDLAND DESIGN AND CONSTRUCTION PROCESS AND THE MIDLAND IDCV PROGRAM



**INITIAL SAMPLE REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM**

DESIGN AREA	SCOPE OF REVIEW				
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS
I. AFW SYSTEM PERFORMANCE REQUIREMENTS					
SYSTEM OPERATING LIMITS	X	X	X		
ACCIDENT ANALYSIS CONSIDERATIONS	X				
SINGLE FAILURE	X	X	X	•	
TECHNICAL SPECIFICATIONS	X	X			
SYSTEM ALIGNMENT/SWITCHOVER	X	X			
REMOTE OPERATION AND SHUTDOWN	X				
SYSTEM ISOLATION/INTERLOCKS	X	X			
OVERPRESSURE PROTECTION	X	•	•	•	
COMPONENT FUNCTIONAL REQUIREMENTS	X	X	X		X
SYSTEM HYDRAULIC DESIGN	X	X	X	•	
SYSTEM HEAT REMOVAL CAPABILITY	X	X	X	•	
COOLING REQUIREMENTS	X				
WATER SUPPLIES	X	X			
PRESERVICE TESTING/CAPABILITY FOR OPERATIONAL TESTING	X	•	•		•
POWER SUPPLIES	X	X			•
ELECTRICAL CHARACTERISTICS	X	•	•		
PROTECTIVE DEVICES/SETTINGS	X	X			X
INSTRUMENTATION	X	X	X		X
CONTROL SYSTEMS	X	X	X		•
ACTUATION SYSTEMS	X				•
NDE COMMITMENTS	X	•			•
MATERIALS SELECTION	X	X			
FAILURE MODES AND EFFECTS	•	•		•	

KEY

- X - INITIAL SCOPE OF REVIEW
- (X) - DELETED SCOPE OF REVIEW
- - ADDED SCOPE OF REVIEW

BASES FOR SAMPLE SELECTION

- SIMILAR TO SYSTEM SELECTION CRITERIA
 - IMPORTANCE TO SAFETY
 - INCLUSION OF DESIGN/CONSTRUCTION INTERFACES
 - ABILITY TO EXTRAPOLATE RESULTS
 - DIVERSE IN CONTENT
 - SENSITIVE TO PREVIOUS EXPERIENCE
 - ABILITY TO TEST AS-BUILT INSTALLATION
- STRONG RELIANCE UPON ENGINEERING JUDGMENT
- POTENTIAL USE OF STATISTICAL TECHNIQUES TO ESTABLISH SAMPLE SIZE FOR REPETITIVE PRODUCTION ACTIVITIES (E.G., CONCRETE AND STEEL PROPERTIES, WELDING RECORDS, ETC.)
- INDUSTRY DESIGN/CONSTRUCTION EXPERIENCE
- INDUSTRY OPERATING EXPERIENCE
- PROJECT DESIGN/CONSTRUCTION EXPERIENCE
 - AREAS EXPERIENCING REPEATED PROBLEMS
 - AREAS WHICH MAY NOT HAVE RECEIVED EXTENSIVE PRIOR REVIEW
- AREAS WHERE FINDINGS HAVE BEEN IDENTIFIED



PROTOCOL FOR REPORTING AND COMMUNICATIONS
MIDLAND IDCV PROGRAM

- INTERPRETATION OF NRC PROTOCOL GOVERNING COMMUNICATIONS
 - ALL CONTACTS AND INFORMATION EXCHANGE ARE RECORDED AND AUDITABLE
 - PROPRIETARY MATERIAL WILL BE AUDITABLE, BUT EXCLUDED FROM SUBMITTALS
 - PRIOR NOTICE OF MEETINGS TO DISCUSS "SUBSTANTIVE MATTERS"
 - AT FINDING STAGE, NOT DURING SOLICITATION OF INFORMATION
 - SPECIAL CASES - CONFIRMATORY CALCULATIONS, PROGRAM CHANGES, SIGNIFICANT SAFETY ISSUE IDENTIFICATION
- REPORTING
 - PERIODIC^(monthly) STATUS REPORTS
 - TRACKING SYSTEM SUMMARY FOR OCR ITEMS, FINDING REPORTS AND FINDING RESOLUTION REPORTS
 - PROGRESS SUMMARY AND CHANGES TO REVIEW SCOPE



PROTOCOL FOR REPORTING AND COMMUNICATIONS
MIDLAND IDCV PROGRAM

(Continued)

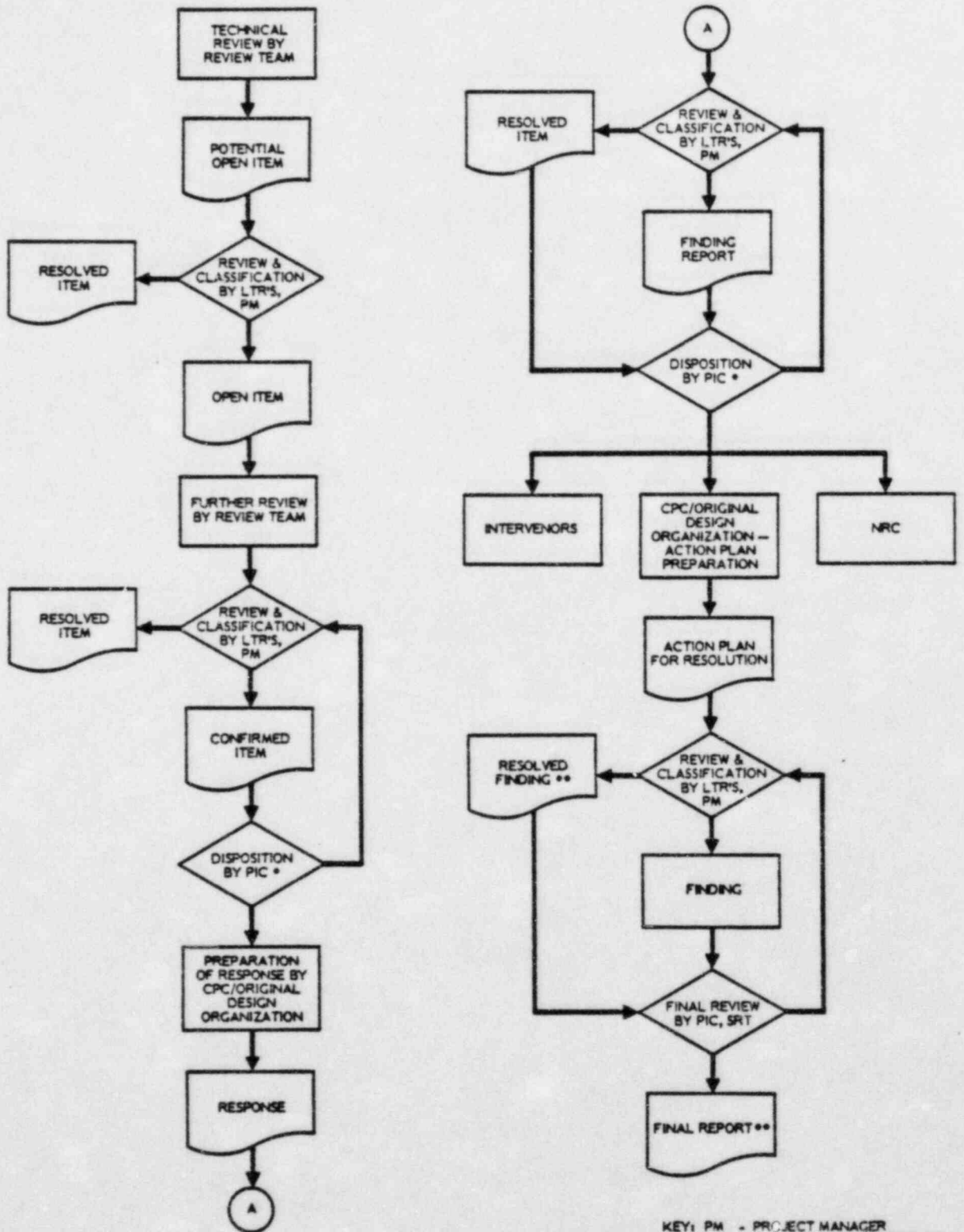
- REPORTING (CONTINUED)
 - FOR FINDING REPORTS, IDENTIFICATION OF SIGNIFICANT SAFETY ISSUES
 - CURRENT CONFIRMED ITEMS, FINDING REPORTS AND FINDING RESOLUTION REPORTS
 - ^(as needed)
INTERIM AND FINAL REPORTS
 - TOPICAL INTERIM REPORTS AS COMPLETED FOR EACH SYSTEM
 - FINAL REPORT

- DOCUMENTATION
 - TERA RECORDS LOCATED IN BETHESDA, MARYLAND AND AVAILABLE FOR NRC AUDIT
 - INTERNAL QA AUDIT RESULTS AVAILABLE FOR NRC INSPECTION



REPORT FLOW CHART

MIDLAND INDEPENDENT DESIGN AND CONSTRUCTION VERIFICATION PROGRAM



NOTE: * PIC TO DETERMINE SRT REVIEW AND CONCURRENCE REQUIRED
 ** DISTRIBUTED TO CPC, NRC AND INTERVENORS

KEY: PM - PROJECT MANAGER
 LTR - LEAD TECHNICAL REVIEWER
 PIC - PRINCIPAL-IN-CHARGE
 SRT - SENIOR REVIEW TEAM
 CPC - CONSUMERS POWER COMPANY

FIGURE 5.2-1

SCOPE OF DESIGN VERIFICATION REVIEW

- REVIEW OF DESIGN CRITERIA AND COMMITMENTS
 - REGULATIONS AND LICENSING COMMITMENTS
 - ADEQUACY, CONSISTENCY, AND ACCURACY
- REVIEW OF IMPLEMENTING DOCUMENTS
 - EXISTENCE OF IMPLEMENTING DOCUMENT (E.G., DISCIPLINE DESIGN INSTRUCTIONS, STANDARD DESIGN PRACTICES, INTERFACE DOCUMENTS BETWEEN NSSS AND A-E, ETC.)
 - DESIGN CRITERIA ADEQUATELY DEFINED AND INTERPRETABLE
- CHECK OF CALCULATIONS AND EVALUATIONS
 - SAMPLING CHECK OF ORIGINAL ANALYSES, CALCULATIONS OR EVALUATIONS; REVIEW OF
 - DESIGN INPUTS (INCORPORATION OF DESIGN CRITERIA, CONFORMANCE WITH COMMITMENTS, TRANSFER OF INFORMATION)
 - ASSUMPTIONS
 - METHODOLOGY (INCLUDING ANALYTICAL TECHNIQUES, EVALUATION PROCEDURES)
 - VALIDATION AND USE OF COMPUTER CODES
 - REVIEW OF OUTPUTS
 - COMPLIANCE WITH CODES, STANDARDS, NRC GUIDANCE



SCOPE OF DESIGN VERIFICATION REVIEW

(continued)

- CONFIRMATORY CALCULATIONS OR EVALUATIONS
 - "BLIND" INDEPENDENT RE-ANALYSIS OR RE-EVALUATION FOR SELECTED DESIGN AREAS
 - INDEPENDENT RE-ANALYSIS OR RE-EVALUATION FOR DESIGN AREA THAT MAY BE SUSPECT ON BASIS OF A REVIEW OF ORIGINAL CALCULATIONS OR EVALUATIONS
 - ALTERNATIVE TECHNIQUES, SIMPLE BOUNDING EVALUATIONS OR DETAILED ANALYTICAL TECHNIQUES MAY BE EMPLOYED
- CHECK OF DRAWINGS AND SPECIFICATIONS
 - VERIFICATION THAT THE DRAWING OR SPECIFICATION REFLECTS DESIGN REQUIREMENTS SPECIFIED IN THE DESIGN CALCULATIONS OR EVALUATIONS



SCOPE OF CONSTRUCTION VERIFICATION REVIEW

- REVIEW OF SUPPLIER DOCUMENTATION
 - SAMPLING CHECK AGAINST DESIGN SPECS AND DRAWINGS;
REVIEW OF
 - DRAWINGS
 - TEST REPORTS
 - CERTIFIED MATERIAL PROPERTY REPORTS
 - STORAGE AND INSTALLATION REQUIREMENTS
 - OPERATION AND MAINTENANCE REQUIREMENTS

- REVIEW OF STORAGE AND MAINTENANCE DOCUMENTATION
 - RECEIPT INSPECTION DOCUMENTATION

 - STORAGE, INCLUDING IN-STORAGE AND IN-PLACE MAINTENANCE
 - REQUIREMENTS INCLUDING PARAMETERS SUCH AS TEMPERATURE, HUMIDITY, CLEANLINESS, LUBRICATION, ENERGIZATION, ETC.

 - OBSERVATION OF ON-GOING ACTIVITIES

- REVIEW OF CONSTRUCTION/INSTALLATION DOCUMENTATION
 - IMPLEMENTATION OF PROPER REQUIREMENTS SUCH AS ERECTION SPECIFICATIONS, INSTALLATION REQUIREMENTS, CONSTRUCTION PROCEDURES, CODES AND STANDARDS, ETC.

 - REVIEW OF DESIGN CHANGES, FIELD MODIFICATIONS, ETC.

 - EVALUATION OF DOCUMENTATION FOR ITEMS SUCH AS CONCRETE, WELDING, BOLTING ACTIVITIES, ETC.



SCOPE OF CONSTRUCTION VERIFICATION REVIEW

(continued)

- OBSERVATION OF ON-GOING CONSTRUCTION ACTIVITIES
- REVIEW OF SELECTED VERIFICATION ACTIVITIES
 - CABLE SEPARATION, PIPE SUPPORT, AND BOLTING OVER-INSPECTION PROGRAMS, ETC.
 - OBSERVATION OF VARIOUS WALKDOWN ACTIVITIES (E.G., SYSTEMS INTERACTION - SEISMIC II/I)
 - COLD HYDROS
 - COMPONENT AND SYSTEM FUNCTIONAL TESTING PROGRAMS
 - CONSTRUCTION COMPLETION PROGRAM
- VERIFICATION OF PHYSICAL CONFIGURATION
 - INSTALLATION OF SYSTEM IN ACCORDANCE WITH PIPING AND INSTRUMENTATION DIAGRAMS
 - INSTALLATION OF COMPONENTS AND PIPING IN ACCORDANCE WITH ARRANGEMENT DRAWINGS AND ISOMETRICS (APPROXIMATE LOCATION AND ORIENTATION)
 - INSPECTION OF SELECTED FEATURES FOR COMPLIANCE WITH DESIGN DETAILS (APPROXIMATE DIMENSIONS)
 - VERIFICATION OF IDENTITY (EQUIPMENT PART NUMBERS, ETC.) IN ACCORDANCE WITH DRAWINGS, SPECIFICATIONS, OR SCHEMATICS
 - QUALITY OF WORKMANSHIP



AFW SYSTEM SAMPLE SELECTION BOUNDARIES ^{1/}

INTERFACING SYSTEM

INTERFACE POINT

Main Steam	Valves 074 and 077 ^{2/} (motor-operated steam inlet valves to AFW pump turbine)
NSSS	Steam Generator Nozzles
Service Water A	Valve 283 (manual supply valve to AFW suction)
Service Water B	Valve 282 (manual supply valve to AFW suction)
Unit 2 Condensate Tank (from)	Valve 008 (motor-operated supply valve to AFW suction)
Deaerators	Valve 006 (check valve to AFW suction)
Unit 1 Condensate Tank (return)	Valve 019 (test and low flow manual valve)
Cooling Pond (return)	Valve 017 (manual isolation valve)
ac/dc Power System ^{3/}	Breaker or fuse interfacing AFW components with power source
ESFAS	AFW actuation system and FOGG
Main FW Loop A	Valve 303 (isolation valve between AFW and MFW used for startups)
Vents and Drains	First Valve
HVAC	AFW pump room fan coolers and associated ductwork and supports

^{1/} P&ID M-439, Sheet 3A, Revision 9 and 3B, Revision 10

^{2/} P&ID M-432, Sheet 1A, Revision 5

^{3/} Power supplies dedicated to AFW system are within sample selection boundaries.



**INITIAL SAMPLE REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM**

DESIGN AREA	SCOPE OF REVIEW				
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS
I. AFW SYSTEM PERFORMANCE REQUIREMENTS					
SYSTEM OPERATING LIMITS	X	X	X		
ACCIDENT ANALYSIS CONSIDERATIONS	X				
SINGLE FAILURE TECHNICAL SPECIFICATIONS	X	X	X	•	
SYSTEM ALIGNMENT/SWITCHOVER	X	X			
REMOTE OPERATION AND SHUTDOWN	X				
SYSTEM ISOLATION/INTERLOCKS	X	X			
OVERPRESSURE PROTECTION	X	•	•	•	
COMPONENT FUNCTIONAL REQUIREMENTS	X	X	X		X
SYSTEM HYDRAULIC DESIGN	X	X	X	•	
SYSTEM HEAT REMOVAL CAPABILITY	X	X	X	•	
COOLING REQUIREMENTS	X				
WATER SUPPLIES	X	X			
PRESERVICE TESTING/CAPABILITY FOR OPERATIONAL TESTING	X	•	•		•
POWER SUPPLIES	X	X			•
ELECTRICAL CHARACTERISTICS	X	•	•		
PROTECTIVE DEVICES/SETTINGS	X	X			X
INSTRUMENTATION	X	X	X		X
CONTROL SYSTEMS	X	X	X		•
ACTUATION SYSTEMS	X				•
NDE COMMITMENTS	X	•			•
MATERIALS SELECTION	X	X			
FAILURE MODES AND EFFECTS	•	•		•	

KEY

- X - INITIAL SCOPE OF REVIEW
- (X) - DELETED SCOPE OF REVIEW
- - ADDED SCOPE OF REVIEW

INITIAL SAMPLE REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM (CONTINUED)

DESIGN AREA	SCOPE OF REVIEW				
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS
II. AFW SYSTEM PROTECTION FEATURES					
SEISMIC DESIGN	X				
• PRESSURE BOUNDARY	X	X	X	X	X
• PIPE/EQUIPMENT SUPPORT	X	X	X	X	X
• EQUIPMENT QUALIFICATION	X	X	X		X
HIGH ENERGY LINE BREAK ACCIDENTS	X				
• PIPE WHIP	X	X	X		X
• JET IMPINGEMENT	X				
ENVIRONMENTAL PROTECTION	X				
• ENVIRONMENTAL ENVELOPES	X	X	X		X
• EQUIPMENT QUALIFICATION	X	X	X		X
• HVAC DESIGN	X				
FIRE PROTECTION	X	X	X		
MISSILE PROTECTION	X				
SYSTEMS INTERACTION	X	X	X		
III. STRUCTURES THAT HOUSE THE AFW SYSTEM					
SEISMIC DESIGN/INPUT TO EQUIPMENT	X	X	X		X
WIND & TORNADO DESIGN/MISSILE PROTECTION	X				
FLOOD PROTECTION	X				
HELBA LOADS	X				
CIVIL/STRUCTURAL DESIGN CONSIDERATIONS	X				
• FOUNDATIONS	X	X	X		
• CONCRETE/STEEL DESIGN	X	X	X		X
• TANKS	(X)	(X)	(X)		

KEY

X - INITIAL SCOPE OF REVIEW

(X) - DELETED SCOPE OF REVIEW

• - ADDED SCOPE OF REVIEW

**INITIAL SAMPLE REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM
MIDLAND INDEPENDENT CONSTRUCTION VERIFICATION PROGRAM**

SYSTEM/COMPONENT	SCOPE OF REVIEW				
	REVIEW OF SUPPLIER DOCUMENTATION	REVIEW OF STORAGE AND MAINTENANCE DOCUMENTATION	REVIEW OF CONSTRUCTION/INSTALLATION DOCUMENTATION	REVIEW OF SELECTED VERIFICATION ACTIVITIES	VERIFICATION OF PHYSICAL CONFIGURATION
I. MECHANICAL					
• EQUIPMENT	X	X	X	X	X
• PIPING	X		X	X	X
• PIPE SUPPORTS	X		X	X	X
II. ELECTRICAL					
• EQUIPMENT	X	X	X	X	X
• TRAYS AND SUPPORTS	X		•	•	X
• CONDUIT AND SUPPORTS	X		•	•	X
• CABLE	X	X	X	X	X
III. INSTRUMENTATION AND CONTROL					
• INSTRUMENTS	X	X	X	X	X
• PIPING/TUBING	X				X
• CABLE	X		•	•	X
IV. HVAC					
• EQUIPMENT	X	X	X	X	X
• DUCTS AND SUPPORTS	X				X
V. STRUCTURAL					
• FOUNDATIONS	X		X		
• CONCRETE	X		X		X
• STRUCTURAL STEEL	X		X		X
VI. NDE/MATERIAL TESTING PROGRAM					X

KEY

X - INITIAL SCOPE OF REVIEW

(X) - DELETED SCOPE OF REVIEW

• - ADDED SCOPE OF REVIEW

**MIDLAND IDCV
SUPPLIER DOCUMENTATION REVIEW**

Item No.	Type	Component ID		Gen Cmpl	Dwgs	Fnct Reqs	EQ	SQRT	Weld	Mat	Misc	Comments
		ID No.	P.O. No.						NDE QA	Props		
1.	Pump	2P-005A	M-14	X	X	X		X	X	X	X	
2.	Motor	2P-005A	M-14	X	X	X		X	X	X	X	
3.	Pump	2P-005B	M-14	X	X	X		X	X	X	X	
4.	Turbine	2G-005B	M-14	X	X	X			X	X	X	
5.	Valve	2LV-3975AIV	J-255	X	X	X	X	X	X	X	X	
6.	Operator	2LV-3975AI	J-255	X	X	X	X	X			X	
7.	Valve	2MO-3965AV	M-117	X	X	X	X		X	X	X	
8.	Operator	2MO-3965A	M-117	X	X	X	X				X	
9.	Valve	2MO-3993A2V	M-398		X	X		X				
10.	Operator	2MO-3993A2	M-398		X	X		X				
11.	Valve	2XV-3989	M-118	X	X	X						
12.	Operator	2XV-3989AI	M-118		X	X						
13.	Valve	25V-3969A	J-256	X	X	X			X	X	X	
14.	Valve	2MO-3226V	M-117		X	X	X					
15.	Operator	2MO-3226	M-117		X	X	X					
16.	Valve	2MO-3277AV	M-117		X	X	X	X	X			
17.	Operator	2MO-3277A	M-117		X	X	X	X				
18.	Heat-X	2E-105A	M-14		X	X		X				

**MIDLAND IDCV
STORAGE AND MAINTENANCE DOCUMENTATION REVIEW**

Item No.	Type	Component ID		Receipt Inspection		Storage & Maintenance		Visual Inspection	Comments
		ID No.	P.O. No.	Doc. Review	Observ.	Doc. Review	Observ.		
1.	Pump	2P-005A	M-14	X		X		X	
2.	Motor	2P-005A	M-14	X		X		X	
3.	Pump	2P-005B	M-14	X		X		X	
4.	Turbine	2G-005B	M-14	X		X		X	
5.	Valve	2LV-3975AIV	J-255	X		X		X	
6.	Operator	2LV-3975AI	J-255	X		X		X	
7.	Valve	2MO-3965AV	M-117	X		X		X	
8.	Operator	2MO-3965A	M-117	X		X		X	
9.	Valve	2MO-3993A2V	M-398						
10.	Operator	2MO-3993A2	M-398						
11.	Valve	2XV-3989	M-118						
12.	Operator	2XV-3989AI	M-118						
13.	Valve	2SV-3969A	J-256	X					
14.	Valve	2MO-3226V	M-117						
15.	Operator	2MO-3226	M-117						
16.	Valve	2MO-3277AV	M-117						
17.	Operator	2MO-3277A	M-117						

ADDITIONAL VERIFICATION AND SAMPLING

- CLASSIFICATION OF "OPEN ITEMS", "CONFIRMED ITEMS" AND "RESOLVED ITEMS"

- INCREASE REVIEWER'S LEVEL OF CONFIDENCE

- DETERMINATION OF EXTENT OF FINDINGS

- ROOT-CAUSE IDENTIFICATION
 - RANDOM ERROR
 - SYSTEMATIC ERROR

- REQUESTED BY CPC OR NRC



SUMMARY
SYSTEMS REVIEW TOPICS
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3.1.3.1

TOPIC 1.1-1 SYSTEM OPERATING LIMITS

REVIEW OF SPECIFIED SYSTEM OPERATING LIMITS (TEMPERATURE, PRESSURE, FLOW RATE, ETC.) TO ASCERTAIN WHETHER THEY ARE SPECIFIED IN CONSIDERATION OF FUNCTIONAL PERFORMANCE REQUIREMENTS.

- REVIEW OF APPLICABLE CRITERIA, SUCH AS B&W BOP CRITERIA DOCUMENT.
- CHECK CALCULATIONS RELATED TO VALVE OPENING TIMES, SYSTEM TEMPERATURE, PRESSURE, AND FLOWRATES.
- REVIEW SELECTED LIMITS IDENTIFIED IN THIS TOPIC AS PART OF TOPICS COVERING COMPONENT FUNCTIONAL REQUIREMENTS, SYSTEM HYDRAULIC DESIGN, SYSTEM HEAT REMOVAL CAPABILITY, COOLING REQUIREMENTS, AND WATER SUPPLIES.

TOPIC 1.2-1 ACCIDENT ANALYSIS CONSIDERATIONS

REVIEW OF FSAR ACCIDENT ANALYSES TO IDENTIFY ACCIDENTS IN WHICH AFWS MAY BE INVOLVED EITHER AS A CONTRIBUTOR OR AS AN ENGINEERED SAFETY SYSTEM.



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SYSTEMS REVIEW TOPICS
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(Continued)

- FEED BACK INFORMATION INTO TOPICS CONCERNING COMPONENT FUNCTIONAL REQUIREMENTS, SYSTEM HYDRAULIC DESIGN, AND SYSTEM HEAT REMOVAL CAPABILITY.
- REVIEW ASSUMPTIONS REGARDING OPERATOR "INVERSION" OF FOGG DURING STEAM GENERATOR TUBE RUPTURE.
- REVIEW ANTICIPATED TRANSIENT OPERATOR GUIDELINE DOCUMENT REGARDING FOGG OPERABILITY.

TOPIC I.3-1 SINGLE FAILURE

REVIEW OF ALL ACTIVE MECHANICAL COMPONENTS AND ELECTRICAL COMPONENTS TO DETERMINE WHETHER THE FAILURE OF ONE COMPONENT CAN INCAPACITATE THE SYSTEM.

- REVIEW FSAR DOCUMENTATION
- PERFORM CONFIRMATORY SINGLE FAILURE ANALYSIS FOR PORTION OF AFW



SUMMARY
SYSTEMS REVIEW TOPICS
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NEW TOPIC - FAILURE MODES AND EFFECTS ANALYSIS

REVIEW EXISTING FMEA TO ASCERTAIN COMPLETENESS, INCLUSION OF ALL IMPORTANT SUBSYSTEMS AND COMPONENTS.

TOPIC 1.4-1 TECHNICAL SPECIFICATIONS

REVIEW OF MIDLAND TECHNICAL SPECIFICATIONS (AND FSAR COMMITMENTS) AGAINST NRC STS.

- REVIEW HELD IN ABEYANCE WHILE APPLICANT AND NRC DEVELOP SPECIFICATIONS.

TOPIC 1.5-1 SYSTEM ALIGNMENT/SWITCHOVER

REVIEW SYSTEM ALIGNMENT CRITERIA, APPLICABLE SWITCHOVERS AND ALIGNMENTS, AND AVAILABLE PROCEDURES TO DETERMINE WHETHER SYSTEM CAN MEET DESIGN OBJECTIVES.

- REVIEW AVAILABLE SYSTEM ALIGNMENT PROCEDURES.
- REVIEW RELATED ELECTRICAL TOPICS, INCLUDING SWITCHOVER TO AUXILIARY SHUTDOWN PANEL, AS PART OF CONTROL SYSTEMS, ACTUATION SYSTEMS.



SUMMARY
SYSTEMS REVIEW TOPICS
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(Continued)

TOPIC I.6-I REMOTE OPERATION AND SHUTDOWN

REVIEW OF CAPABILITY FOR SAFE SHUTDOWN FROM OUTSIDE THE CONTROL ROOM.

- CONCLUSIONS BASED ON CPC'S ANALYSES FOR FIRE PROTECTION WILL BE TESTED AS PART OF THE TOPICS REGARDING COMPONENT FUNCTIONAL REQUIREMENTS, FIRE PROTECTION, INSTRUMENTATION, AND CONTROL SYSTEMS.

TOPIC I.7-I SYSTEM ISOLATION/INTERLOCKS

REVIEW ADEQUACY OF ALL ISOLATION REQUIREMENTS AND INTERLOCKS DESIGNED TO IMPLEMENT SYSTEM PERFORMANCE REQUIREMENTS.

- REVIEW ISOLATION OF THE SYSTEM UNDER CONSIDERATIONS OF LOSS OF AC POWER/SEISMIC EVENT.
- REVIEW SYSTEM ISOLATION UPON NEED FOR SERVICE WATER INSTEAD OF "NORMAL" SOURCES.



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SYSTEMS REVIEW TOPICS
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TOPIC I.8-1 OVERPRESSURE PROTECTION

REVIEW OF AFW SYSTEM TO ASSESS NEED FOR PROTECTIVE DEVICES TO PREVENT OVERPRESSURIZATION FOR ANY MODES OF OPERATION.

- REVIEW CALCULATION WHICH INCLUDED PIPE RATING DETERMINATIONS.
- PERFORM CONFIRMATORY CALCULATION FOR PIPING BOTH INSIDE AND OUTSIDE CONTAINMENT.
- REVIEW MANAGEMENT CORRECTIVE ACTION REPORT RELATED TO SUCTION OVERPRESSURE CONDITION REPORTED ON ANOTHER B&W REACTOR.
- REVIEW RECENT DESIGN PRESSURE CHANGES REQUESTED FOR SOME DRAIN PIPING ON AFW TURBINE.

TOPIC II.14-1 SYSTEMS INTERACTION

REVIEW OF THE POTENTIAL FOR SYSTEMS INTERACTION AND MEANS FOR PREVENTION THEREOF.

- REVIEW BECHTEL/CPCO PROGRAM FOR SEISMIC II/I AND PROXIMITY.
- WILL AUDIT "WALK-DOWN" IN AREAS CONTAINING AFW'S EQUIPMENT.



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TOPIC I.9-1 COMPONENT FUNCTIONAL REQUIREMENTS

REVIEW IS A FOCAL POINT OF THE RESULTS OF MANY OTHER REVIEWS TO DETERMINE IF COMPONENTS MEET FUNCTIONAL REQUIREMENTS IDENTIFIED THEREIN.

- USES INPUT FROM SYSTEM HYDRAULIC DESIGN, SYSTEM HEAT REMOVAL CAPABILITY, SYSTEM OPERATING LIMITS, AND OTHER REVIEW AREAS.
- EVALUATE PUMPS AND DRIVERS AND LEVEL CONTROL VALVES; CHECK OTHER COMPONENTS AFTER FURTHER EVALUATIONS ARE COMPLETE.
- REVIEW PUMPS AND DRIVERS FOR:
 - FLOW
 - HEAD
 - NPSH
 - DRIVER SIZING
- REVIEW LEVEL CONTROL VALVES FOR:
 - PRESSURE DROPS
 - CAPABILITY TO MEET DESIGN BASIS
 - ENVIRONMENTAL QUALIFICATION
 - INTERFACE WITH POWER SUPPLY



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TOPIC I.10-I SYSTEM HYDRAULIC DESIGN

REVIEW FLUID FLOW CONSIDERATION FOR PIPING SYSTEM.

- REVIEW NPSH CALCULATIONS
- PREPARE CONFIRMATORY EVALUATION TO CHECK HYDRAULIC PARAMETERS DURING AUTOMATIC SWITCHOVER.
- PREPARE CONFIRMATORY CALCULATION BASED ON HEAT GENERATION RATE.

TOPIC I.11-I SYSTEM HEAT REMOVAL CAPABILITY

REVIEW STEAM GENERATOR HEAT TRANSFER FROM PRIMARY TO SECONDARY AND SECONDARY SIDE RESPONSE.

- PREPARE CONFIRMATORY CALCULATION OF HEAT GENERATION RATE TO EVALUATE AVAILABLE DOCUMENTATION AND PROVIDE INPUT TO HYDRAULIC DESIGN REVIEW.
- COMPARE AFW WATER TEMPERATURE AGAINST OTHER PLANT DESIGN PARAMETERS.
- ✓ ● EVALUATE STATION BLACKOUT EVENT.



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TOPIC I.12-1 COOLING REQUIREMENTS

REVIEW REQUIREMENT FOR HEAT REJECTION FROM AFW.

- EVALUATE STATION BLACKOUT EVENT.
- COMPARE AFW HEAT LOADS AND ROOM COOLER SIZING.

TOPIC I.13-1 WATER SUPPLIES

CHECK SIZING OF WATER SUPPLIES IN THE SYSTEM HEAT REMOVAL CAPABILITY EVALUATION.

- EVALUATE TEMPERATURE OF WATER SUPPLIES.
- REVIEW SEISMIC/NON-SEISMIC INTERFACE FOR SUCTION LINES.



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TOPICS II.5-I THROUGH II.7-I HELBA/PIPE WHIP/JET IMPINGEMENT

REVIEW BASIS FOR BREAK POSTULATION AND DYNAMIC EFFECTS OF RESULTING INTERACTION

- REVIEW SUCTION LINE BREAK AS PART OF EQUIPMENT QUALIFICATION AREA.
- REVIEW OTHER LINES USING STRESS ANALYSIS RESULTS.

TOPICS II.8-I THROUGH II.11-I ENVIRONMENTAL PROTECTION

REVIEW PREDICTION OF TEMPERATURE AND PRESSURE ENVIRONMENT AND FLOODING, AND EXAMINE QUALIFICATION RECORDS FOR AFFECTED EQUIPMENT

- REVIEW AUXILIARY BUILDING PRESSURE/TEMPERATURE CALCULATIONS.
- PREPARE CONFIRMATORY CALCULATION FOR PRESSURE/TEMPERATURE INSIDE CONTAINMENT.
- REVIEW EQUIPMENT QUALIFICATION REPORT AND BACKUP DATA FOR SELECTED COMPONENTS.



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- CONSIDER HVAC DESIGN AS PART OF COOLING REQUIREMENTS.
- REVIEW FLOODING CALCULATIONS.
- VERIFY EQUIPMENT LOCATIONS IN FIELD.

TOPIC II.12-1 FIRE PROTECTION

REVIEW MEASURES, INCLUDING DETECTION AND SUPPRESSION, FOR ADDRESSING CONSEQUENCES OF A FIRE TO ENSURE SAFETY DESIGN BASIS CAN BE SATISFIED.

- FOR SELECTED AFW COMPONENTS AND FIRE ZONES, VERIFY THAT LOCATION, SEPARATION, BARRIERS, FIRE LOADING, AND PROTECTION SATISFY FSAR CRITERIA AND INFORMATION.
- VERIFY SUPPRESSION SYSTEM AND DETECTION SYSTEM SPECIFICATIONS SATISFY FSAR CRITERIA, AND CHECK SUPPRESSION SYSTEM FLOW CALCULATIONS, FOR SAMPLE ZONE CONTAINING REDUNDANT AFW COMPONENTS.
- CONFIRM EMERGENCY LIGHTING LOCATION FOR SAMPLE ZONES.
- CONFIRM TRANSFER SWITCH DESIGN (ISOLATE PORTIONS OF CIRCUIT DAMAGED BY FIRE, AND PERMIT REQUIRED OPERATION OF COMPONENTS).



SUMMARY
MECHANICAL REVIEW TOPICS
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(Continued)

TOPIC II.I3-1 MISSILE PROTECTION (IN PLANT)

REVIEW BASIS FOR SELECTING INTERNAL MISSILES AND REVIEW CONCLUSIONS REGARDING ADEQUACY OF PROTECTION FOR AFW OR OTHER SYSTEMS IF AFW GENERATES MISSILE.

- CONSIDER MISSILES WITHIN AFW AND FROM OTHER SYSTEMS.



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TOPIC I.15-1 POWER SUPPLIES

REVIEW ELECTRICAL INDEPENDENCE AND DIVERSITY OF AFW POWER SOURCES TO ASSESS SYSTEM CAPABILITY TO OPERATE DURING LOSS OF OFFSITE POWER WITH SINGLE FAILURE OR STATION BLACKOUT

- REVIEW INCLUDES POWER SUPPLIES TO PUMPS, INSTRUMENTATION, VALVES AND CONTROLS FOR BOTH AFW TRAINS

TOPIC I.16-1 ELECTRICAL CHARACTERISTICS

REVIEW CABLE SIZING DESIGN AND PHYSICAL INDEPENDENCE OF ELECTRICAL SYSTEMS

- EVALUATE CABLE QUALIFICATION FOR FIRE PROTECTION WITH ENVIRONMENTAL QUALIFICATION
- REVIEW CABLE SIZING CALCULATION AND APPLICATION OF CALCULATION TO SEVERAL AFW CABLES
- REVIEW PHYSICAL INDEPENDENCE CRITERIA APPLICATION TO CABLE ROUTING PROCESS



SUMMARY
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TOPIC I.17-1 PROTECTIVE DEVICES/SETTINGS

REVIEW APPLICATION OF PROTECTIVE DEVICES/FEATURES TO MOTORS AND ELECTRICAL PENETRATION ASSEMBLIES. ALSO REVIEW PROTECTIVE DEVICE BYPASS DESIGN

- REVIEW AFW PUMP MOTOR PROTECTIVE RELAY FEATURES AND SETTINGS
- REVIEW DC POWER AND INSTRUMENT PENETRATION ASSEMBLIES AND RELATED CIRCUITS TO VERIFY PROTECTIVE DESIGN FEATURES
- VERIFY THERMAL OVERLOAD AND TORQUE SWITCH BYPASS FEATURES FOR ALL MOTOR OPERATED VALVES

TOPIC I.18-1 INSTRUMENTATION

REVIEW ADEQUACY TO MONITOR OR ALARM SYSTEM STATUS AND PERFORMANCE

- REVIEW ACCURACY OF S/G WATER LEVEL MEASUREMENT SYSTEM UNDER APPLICABLE DESIGN ENVIRONMENTS
- CHECK MONITORING AND ALARM OF PROCESS VARIABLES AGAINST DESIGN CRITERIA
- CHECK SELECTED INSTRUMENT RANGES AGAINST EXPECTED VALUES OF PROCESS VARIABLES



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TOPIC I.18-1 (CONTINUED)

- REVIEW AFWAS LOW S/G WATER LEVEL SETPOINT CALCULATION

TOPIC I.19-1 CONTROL SYSTEMS

REVIEW ADEQUACY TO CONTROL IN ACCORDANCE WITH DESIGN CRITERIA

- REVIEW S/G LEVEL CONTROL SYSTEM DESIGN ADEQUACY FROM DESIGN INPUT, ANALYSES AND CIRCUITRY
- REVIEW SUCTION AUTO SWITCHOVER, FOGG, MOTOR OPERATED VALVES AND PUMP MOTOR CONTROL

TOPIC I.20-1 ACTUATION

REVIEW OF AFWAS AND FOGG CAPABILITY TO ACTUATE AFW COMPONENTS

- REVIEW AFWAS AND FOGG SPECIFICATION AGAINST DESIGN INPUT/CRITERIA
- REVIEW MOTOR OPERATED AND LEVEL CONTROL VALVES, PUMP MOTOR AND TURBINE LOGIC DIAGRAMS AND SCHEMATICS



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TOPIC II.2-1 SEISMIC DESIGN - PRESSURE BOUNDARY

- A CHECK OF THE PIPING STRESS ANALYSIS FOR A SELECTED PORTION OF THE AFW.
- AN INDEPENDENT CONFIRMATORY PIPING STRESS ANALYSIS OF A PORTION OF THE AFW UTILIZING AS-BUILT CONFIGURATION.
- A REVIEW OF ASSOCIATED ISOMETRIC DRAWINGS.
- A REVIEW OF ASSOCIATED SPECIFICATIONS INCLUDING PIPING FABRICATION AND INSTALLATION.

TOPIC II.3-1 SEISMIC DESIGN - PIPE/EQUIPMENT SUPPORTS

- A CHECK OF THE CALCULATIONS OF EACH TYPE OF PIPE SUPPORT ASSOCIATED WITH THE SELECTED PORTIONS OF THE AFW SYSTEM.
- AN INDEPENDENT CONFIRMATORY LOAD CALCULATION FOR ALL SUPPORTS WITHIN SELECTED PORTION OF AFW CHECKED FOR PIPING STRESS
- AN INDEPENDENT CONFIRMATORY STRESS ANALYSIS OF EACH TYPE OF PIPE SUPPORT ASSOCIATED WITH SELECTED PORTIONS OF THE AFW SYSTEM.



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- A REVIEW OF ASSOCIATED PIPE SUPPORT DRAWINGS AND SPECIFICATIONS INCLUDING FABRICATION AND INSTALLATION OF PIPE SUPPORTS.

TOPIC II.4-I SEISMIC DESIGN - EQUIPMENT QUALIFICATION

- A REVIEW OF THE BASES AND ASSOCIATED SPECIFICATIONS FOR SEISMIC QUALIFICATION FOR SEVENTEEN REPRESENTATIVE AFW COMPONENTS.

TOPIC III.I-I SEISMIC DESIGN/INPUT TO EQUIPMENT

- AN OVERALL REVIEW OF THE SEISMIC ANALYSIS OF THE AUXILIARY BUILDING INCLUDING:
 - REVIEW OF THREE DIMENSIONAL LUMPED MASS SPRING MODEL
 - CHECK OF SPECIFIC LUMPED MASS AND SPRING ELEMENTS
 - REVIEW OF OUTPUT MODE SHAPES AND FREQUENCIES
 - REVIEW OF TIME HISTORY ANALYSIS
 - CHECK OF SPECIFIC FLOOR RESPONSE SPECTRA, INCLUDING SPECTRA BROADENING



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CIVIL/STRUCTURAL REVIEW TOPICS
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(Continued)

- CHECK OF PROPER INPUT TO EQUIPMENT SPECIFICATIONS FOR COMPONENTS REVIEWED FOR SEISMIC QUALIFICATION

TOPICS III.2-1 THROUGH III.4-1 WIND AND TORNADO MISSILE/FLOOD PROTECTION/HELBA LOADS

- REVIEW BASIS FOR WIND AND TORNADO WIND LOADS, TORNADO DEPRESSURIZATION AND MISSILES, FLOOD PROTECTION FROM INTERNAL AND EXTERNAL SOURCES AND HIGH ENERGY LINE BREAK ANALYSIS LOADINGS.

TOPIC III.6-1 FOUNDATIONS

- A CHECK OF THE CALCULATIONS FOR THE AUXILIARY BUILDING BASE MAT AT ELEVATION 568'-0" INCLUDING A REVIEW OF THE THREE DIMENSIONAL FINITE ELEMENT MODEL.

TOPIC III.7-1 CONCRETE/STEEL DESIGN

- A CHECK OF THE CALCULATIONS FOR SELECTED MAJOR STRUCTURAL COMPONENTS OF THE AUXILIARY BUILDING INCLUDING:
 - FLOOR SLAB AT ELEVATION 614'-0" AND 659'-0"
 - WALL AT LINE C AND LINE 5.6



SUMMARY
CIVIL/STRUCTURAL REVIEW TOPICS
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- A REVIEW OF THE MAJOR CIVIL SPECIFICATIONS INCLUDING REINFORCING STEEL, CONCRETE AND STRUCTURAL STEEL.
- A REVIEW OF THE ASSOCIATED CONCRETE AND STRUCTURAL STEEL DRAWINGS.

TOPIC I.14-1 PRESERVICE TESTING/CAPABILITY FOR OPERATIONAL TESTING

- REVIEW OF P&ID'S FOR TESTING CAPABILITY.
- REVIEW OF PRESERVICE AND FIRST 10 YEAR INTERVAL INSPECTION PLAN FOR NDE AND SYSTEM PRESSURE TESTING.
- REVIEW OF PREOPERATIONAL TEST PROCEDURES.
- REVIEW OF PRESERVICE INSPECTION MANUAL.
- REVIEW OF TESTING PROGRAM MANUAL.
- REVIEW OF PUMP AND VALVE INSERVICE TESTING PLAN.
- REVIEW OF CLEANING AND TESTING PROCEDURES



SUMMARY
CIVIL/STRUCTURAL REVIEW TOPICS
AFW SYSTEM
MIDLAND IDCV PROGRAM
(Continued)

TOPIC 1.21-1 NDE COMMITMENTS

- REVIEW OF PRESERVICE AND FIRST 10 YEAR INTERVAL INSPECTION PLAN FOR NDE AND SYSTEM PRESSURE TESTING.
- REVIEW OF SELECTED WELDING AND NDE SPECIFICATIONS, INSTRUCTIONS AND FIELD PROCEDURES.

TOPIC 1.22-1 MATERIALS SELECTION

- REVIEW OF THE PROCESS FOR ESTABLISHING THE BASIS FOR SELECTION OF MATERIALS FOR SELECTED STRUCTURAL ELEMENTS, COMPONENTS AND A PORTION OF THE AFWS PIPING SYSTEM.
- INCLUDE REQUIREMENTS RELATED TO STRENGTH, TOUGHNESS, HARDNESS, COMPATIBILITY, ELECTRICAL INSULATION PROPERTIES, PROTECTIVE COATINGS, CORROSION RESISTANCE, FIRE PROTECTION AND OTHER CHEMICAL AND PHYSICAL REQUIREMENTS.



SUMMARY
ICV REVIEW TOPICS
AFW SYSTEM
MIDLAND ICV PROGRAM

TOPICS I.1-1c THRU V.3-1c: CONSTRUCTION VERIFICATION

FOR SELECT GROUPS OF 44 REPRESENTATIVE COMPONENTS,
SUBMATRICES DEVELOPED FOR EACH REVIEW SCOPE:

- SUPPLIER DOCUMENTATION REVIEW AGAINST DESIGN SPECIFICATIONS AND DRAWINGS:
 - GENERAL COMPLETION
 - DRAWINGS
 - FUNCTIONAL REQUIREMENTS/TEST REPORTS
 - ENVIRONMENTAL QUALIFICATION
 - SGRT
 - WELDING, NDE, QA RECORDS
 - MATERIAL PROPERTY REPORTS
 - MISC. (STORAGE & INSTALLATION AND O&M INSTRUCTIONS, COATINGS, ETC.)

- STORAGE AND MAINTENANCE DOCUMENTATION REVIEW
 - RECEIPT INSPECTION
 - STORAGE, INCLUDING IN-STORAGE AND IN-PLACE MAINTENANCE, ADDRESSING TEMPERATURE, HUMIDITY, CLEANLINESS, LUBRICATION, ENERGIZATION, ETC.

(DOCUMENTATION REVIEW AND OBSERVATION OF ACTIVITIES)



SUMMARY
ICV REVIEW TOPICS
AFW SYSTEM
MIDLAND IDCV PROGRAM

(Continued)

- CONSTRUCTION/INSTALLATION DOCUMENTATION REVIEW
 - IMPLEMENTATION OF PROPER REQUIREMENTS SUCH AS ERECTION SPECIFICATIONS, INSTALLATION REQUIREMENTS, CONSTRUCTION PROCEDURES, CODES AND STANDARDS, ETC.
 - REVIEW OF DESIGN CHANGES, FIELD MODIFICATIONS, ETC.
 - EVALUATION OF DOCUMENTATION FOR ITEMS SUCH AS CONCRETE, WELDING, BOLTING ACTIVITIES, ETC.
 - OBSERVATION OF ON-GOING CONSTRUCTION ACTIVITIES
- REVIEW OF SELECTED VERIFICATION ACTIVITIES
 - CABLE ROUTING, PIPE SUPPORT, AND BOLTING OVERINSPECTION PROGRAMS, ETC.
 - OBSERVATION OF VARIOUS WALKDOWN ACTIVITIES (E.G., SYSTEM INTERACTION - SEISMIC II/I)
 - COLD HYDROS
 - COMPONENT AND SYSTEM FUNCTIONAL TESTING PROGRAMS
 - CONSTRUCTION COMPLETION PROGRAM



SUMMARY
ICV REVIEW TOPICS
AFW SYSTEM
MIDLAND IDCV PROGRAM

(Continued)

- VERIFICATION OF PHYSICAL CONFIGURATION
 - VISUAL INSPECTION INCLUDING QUALITY OF WORKMANSHIP, IDENTIFICATION, APPROX. SIZE AND LOCATION, ORIENTATION AND MAJOR FEATURES
 - SELECTED DETAILED VERIFICATION INCLUDING NAME PLATE DATA, GROUNDING, MATERIALS, INSULATION, PHYSICAL DIMENSIONS
 - 100% DIMENSIONAL VERIFICATION OF THE PIPING AND HANGERS OF A SELECTED PORTION OF THE AFW SYSTEM

TOPIC VI.I-1c NDE/MATERIALS TESTING PROGRAM

- VISUAL INSPECTION/MEASUREMENT OF SELECTED SHOP AND FIELD WELDING:
 - PIPING¹
 - PIPE SUPPORTS
 - PENETRATIONS
 - STRUCTURAL STEEL
- MAG. PARTICLE/RADIOGRAPHY OF SELECTED SHOP AND FIELD WELDING, UT AS NECESSARY



**STANDBY ELECTRIC POWER SYSTEM
SAMPLE SELECTION BOUNDARY**

INTERFACING SYSTEM

INTERFACE POINT

Offsite Power

Breaker connecting offsite power to Class IE 4160V bus

Non-Class IE Distribution/Loads

Breaker connecting Non-Class IE Distribution/Load to Class IE bus

Class IE 480 Volt Buses

Breaker connecting 480 volt bus to step-down side of Class IE XFMR from 4160V bus

Class IE AC Distribution to 125 VDC System

Breaker connecting battery charger to AC system

Class IE 125 VDC Distribution

Breakers connecting Non-DG or AFW related loads to 125 VDC bus

120 Vac Preferred Power Distribution

Connecting device of non DG or AFW related loads to 120 Vac preferred distribution

120 Vac Control and Instrument Power

Connecting device or non DG or AFW related load to instrument bus - connecting breaker to MCC feed

Raw Water

Cooling water interface to raw water shown on FSAR Figure 9.5-26

DG Support Systems

DG starting system, lubrication and fuel oil

Structures

DG building and foundations



**INITIAL SAMPLE REVIEW MATRIX FOR THE STANDBY ELECTRIC POWER SYSTEM
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM**

DESIGN AREA	SCOPE OF REVIEW				
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS
I. STANDBY ELECTRIC POWER SYSTEM PERFORMANCE REQUIREMENTS					
SYSTEM OPERATING LIMITS - DG	X	X	X		
ACCIDENT ANALYSIS CONSIDERATIONS - DG, AC, DC	X	X			
SINGLE FAILURE - DG, PDS, AC, DC	X	X	X	X	
TECHNICAL SPECIFICATIONS - DG, DC	X	X			
LOCAL OPERATION - DG	X				
SYSTEM INTERLOCKS - DG	X	X			
COMPONENT FUNCTIONAL REQUIREMENTS - DG, PDS, AC, DC	X	X	X		X
COOLING/HEATING REQUIREMENTS - DG	X	X	X		
PRESERVICE TESTING/CAPABILITY FOR OPERATIONAL TESTING - DG	X	X	X		X
ELECTRICAL CHARACTERISTICS - DG, PDS, AC, DC	X	X	X		X
PROTECTIVE DEVICES/SETTINGS - DG, PDS	X	X	X		
INSTRUMENTATION - DG, AC, DC	X	X	X		X
CONTROL SYSTEMS - DG	X	X	X		X
ACTUATION SYSTEMS - DG	X	X	X		X
FAILURE MODES AND EFFECTS - DG, PDS, AC, DC	X	X	X		
ELECTRICAL LOAD CAPACITY - DG, PDS, AC, DC	X	X	X	X	
ELECTRICAL LOADS SEQUENCING - DG, PDS	X	X	X		X
ELECTRICAL LOAD SHEDDING - DG, PDS	X	X	X		
FUEL OIL SYSTEM - DG	X	X			
LUBE OIL SYSTEM - DG	X	X			
STARTING MECHANISM AND AIR SUPPLY SYSTEM - DG	X	X	X		X
COMBUSTION AIR SUPPLY - DG	X	X	X		
INDEPENDENCE - DG, PDS, AC, DC	X	X	X		
CABLE SIZING/ROUTING/SEPARATION - PDS	X	X	X	X	X

KEY
 DG - DIESEL GENERATOR
 DGB - DIESEL GENERATOR BUILDING
 PDS - POWER DISTRIBUTION SYSTEM
 AC - PREFERRED 120V AC POWER SYSTEM SERVICING AFW SYSTEM
 DC - 125V DC POWER SYSTEM SERVICING AFW SYSTEM

**INITIAL SAMPLE REVIEW MATRIX FOR THE STANDBY ELECTRIC POWER SYSTEM
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM (CONTINUED)**

DESIGN AREA	SCOPE OF REVIEW				
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS
II. <u>STANDBY ELECTRIC POWER SYSTEM PROTECTION FEATURES</u>					
SEISMIC DESIGN	X				
● PRESSURE BOUNDARY - DG	X	X	X		
● PIPE/EQUIPMENT SUPPORT - DG, PDS	X	X	X	X	X
● EQUIPMENT QUALIFICATION - DG, PDS	X	X	X		X
HIGH ENERGY LINE BREAK ACCIDENTS	X				
● PIPE WHIP - PDS, AC, DC	X				
● JET IMPINGEMENT - PDS, AC, DC	X				
ENVIRONMENTAL PROTECTION	X				
● ENVIRONMENTAL ENVELOPES - DG, PDS	X				
● EQUIPMENT QUALIFICATION - DG, PDS	X	X	X		X
● HVAC DESIGN - DG	X				
FIRE PROTECTION - DG	X	X	X		
MISSILE PROTECTION - DG	X				
SYSTEMS INTERACTION - DG, PDS, AC, DC	X	X			
III. <u>STRUCTURES THAT HOUSE THE STANDBY ELECTRIC POWER SYSTEM</u>					
SEISMIC DESIGN/INPUT TO EQUIPMENT - DGB	X	X	X		X
WIND & TORNADO DESIGN/MISSILE PROTECTION - DGB	X	X	X		X
FLOOD PROTECTION - DGB	X	X	X		
HELBA LOADS - DGB	X				
CIVIL/STRUCTURAL DESIGN CONSIDERATIONS					
● FOUNDATIONS - DGB	X	X	X		
● CONCRETE/STEEL DESIGN - DGB	X	X	X		X
● TANKS	X	X	X	X	X

KEY

- DG - DIESEL GENERATOR
- DGB - DIESEL GENERATOR BUILDING
- PDS - POWER DISTRIBUTION SYSTEM
- AC - PREFERRED 120V AC POWER SYSTEM
- DC - 125V DC POWER SYSTEM SERVICING AFW SYSTEM

**INITIAL SAMPLE REVIEW MATRIX FOR THE STANDBY ELECTRIC POWER SYSTEM
MIDLAND INDEPENDENT CONSTRUCTION VERIFICATION PROGRAM**

SYSTEM/COMPONENT	SCOPE OF REVIEW				
	REVIEW OF SUPPLIER DOCUMENTATION	REVIEW OF STORAGE AND MAINTENANCE DOCUMENTATION	REVIEW OF CONSTRUCTION/INSTALLATION DOCUMENTATION	REVIEW OF SELECTED VERIFICATION ACTIVITIES	VERIFICATION OF PHYSICAL CONFIGURATION
I. MECHANICAL					
● EQUIPMENT - DG	X	X	X	X	X
● PIPING - DG	X		X		X
● PIPE SUPPORTS - DG	X		X		X
II. ELECTRICAL					
● EQUIPMENT - DG, PDS, AC, DC	X	X	X	X	X
● TRAYS AND SUPPORTS - PDS	X		X	X	X
● CONDUIT AND SUPPORTS - PDS	X		X	X	X
● CABLE - PDS	X	X	X	X	X
III. INSTRUMENTATION AND CONTROL					
● INSTRUMENTS - DG	X	X	X	X	X
● PIPING/TUBING - DG	X		X		X
● CABLE - DG, PDS	X	X	X	X	X
IV. HVAC					
● EQUIPMENT - DG	X				X
● DUCTS AND SUPPORTS - DG	X				X
V. STRUCTURAL					
● FOUNDATIONS - DG	X		X		
● CONCRETE - DG	X		X		
● STRUCTURAL STEEL - DG	X		X		

KEY
 DG - DIESEL GENERATOR
 DGB - DIESEL GENERATOR BUILDING
 PDS - POWER DISTRIBUTION SYSTEM
 AC - PREFERRED 120V AC POWER SYSTEM SERVICING AFW SYSTEM
 DC - 125V DC POWER SYSTEM SERVICING AFW SYSTEM

SUMMARY
ELECTRICAL REVIEW TOPICS
STANDBY ELECTRIC POWER SYSTEM
MIDLAND IDC V PROGRAM

FAILURE MODES AND EFFECTS ANALYSIS

IDENTIFY FAILURE MODES OF D/G, PDS, AC, DC SYSTEM COMPONENTS, DETERMINE EFFECTS ON STANDBY POWER AND AFW SYSTEMS; IDENTIFY METHOD OF FAILURE DETECTION.

ELECTRICAL LOAD CAPACITY

REVIEW PLANT DRAWINGS AND SELECTED DG, PDS, AC, DC ELECTRICAL LOAD CALCULATIONS TO VERIFY LOAD CALCULATION METHODOLOGY AND D/G EXPECTED ELECTRICAL LOAD. REVIEW BOTH CONTINUOUS LOAD AND LOAD VERSUS TIME CALCULATIONS FOR D/G. CHECK AGAINST PRESERVICE TEST RESULTS - VERIFY D/G RATING.

ELECTRICAL LOAD SEQUENCING

REVIEW D/G, PDS LOAD SEQUENCER FOR DESIGN COMPLIANCE WITH IEEE 279 AND 308. (CLASS 1E DESIGN CRITERIA). VERIFY SEQUENCER LOAD CONTROL VERSUS TIME FOR INPUT INTO LOAD CAPACITY REVIEW.

ELECTRICAL LOAD SHEDDING

REVIEW 4.16 KV AND 6.9 KV BUS LOAD SHEDDING LOGIC DESIGN, ACTUATION INPUTS, OUTPUTS, AND INTERLOCKS/PERMISSIVES ASSOCIATED WITH LOAD SEQUENCING.



SUMMARY
ELECTRICAL REVIEW TOPICS
STANDBY ELECTRIC POWER SYSTEM
MIDLAND IDC V PROGRAM

INDEPENDENCE

THE ELECTRICAL INDEPENDENCE OF REDUNDANT D/G, PDS, AC AND DC SYSTEMS WILL BE CHECKED BY REVIEWING THE LOAD GROUP INDEPENDENCE CRITERIA, PLANT SINGLE LINE DRAWINGS AND SELECTED LOAD GROUP CABLE DESIGNATIONS.

CABLE SIZING/ROUTING/SEPARATION

THE CABLE SIZING CALCULATION APPLICABLE TO 4160V CABLE WILL BE REVIEWED. SELECTED CABLE SIZES WILL BE CHECKED BY CALCULATION AND THE APPLICABLE CIRCUIT SCHEDULE. THE DESIGN PROCESS FOR ROUTING 4160V CABLE WILL BE REVIEWED TO VERIFY COMPLIANCE WITH REQUIREMENTS.



SUMMARY
MECHANICAL REVIEW TOPICS
STANDBY ELECTRICAL POWER SYSTEM
MIDLAND IDCV

FUEL OIL SYSTEM

FUEL OIL STORAGE AND TRANSFER SYSTEM TO PROVIDE SEPARATE AND INDEPENDENT SUPPLY TO EACH DIESEL GENERATOR FOR 7 DAYS AT ESF LOAD.

- o CHECK OF DESIGN CALCULATIONS AND EVALUATIONS
 - PUMP PERFORMANCE
 - NPSH
 - DELIVERY PRESSURE
 - FLOW RATE
 - FUEL CONSUMPTION AND TANK CAPACITY
 - SYSTEM CONTROL LOGIC INCLUDING MANUAL ACTION
 - FLOODING CONSIDERATIONS FOR BURIED TANK AND ATTACHMENTS
 - PIPING DESIGN
 - SEISMIC
 - VIBRATION FROM DIESEL GENERATOR
 - ALLOWABLE DIESEL ENGINE INTERFACE LOADS
 - UNIQUE FIRE PROTECTION CONSIDERATIONS



SUMMARY
MECHANICAL REVIEW TOPICS
STANDBY ELECTRIC POWER SYSTEM
MIDLAND IDCV

(Continued)

STARTING SYSTEM

PRESSURIZED AIR SUPPLY AND DISTRIBUTION SYSTEM TO PROVIDE INDEPENDENT AND REDUNDANT CAPABILITY TO START EACH DIESEL ENGINE WITH TIMED AIR INJECTION TO EACH CYLINDER.

- o CHECK OF DESIGN CALCULATIONS AND EVALUATIONS
 - VENDOR PERFORMANCE SPECIFICATION FOR STARTING AIR
 - PNEUMATIC DESIGN AND COMPRESSOR SIZING
 - CONTROL LOGIC FOR AIR DISTRIBUTION TO CYLINDERS
 - MOISTURE ENTRAINMENT
 - CLOGGING OF AIR FILTERS
 - PREVENTIVE MEASURES
 - DETECTION
 - IMPACT ON PNEUMATIC DESIGN
- o REVIEW ELECTRIC AUTOMATIC START PROVISIONS INCLUDING DC POWER SUPPLIES AND FIELD FLASHING



SUMMARY
MECHANICAL REVIEW TOPICS
STANDBY ELECTRIC POWER SYSTEM
MIDLAND IDCV

(Continued)

COMBUSTION INTAKE AND EXHAUST SYSTEM

COMBUSTION AIR SUPPLY AND ENGINE EXHAUST DISCHARGE SYSTEM
CONSISTING OF AIR INTAKES, FILTERS, TURBOCHARGERS, SILENCERS,
AND EXHAUST STACK.

- o CHECK OF DESIGN CALCULATIONS AND EVALUATION
 - TORNADO MISSILE AND DEBRIS CONSIDERATIONS
 - SEISMIC DESIGN OF STACK AND INTAKE
 - EXHAUST BACK PRESSURE
 - INTAKE FLOW RATE
 - EXHAUST RECYCLE/METEOROLOGICAL EFFECTS
 - OFFSITE GAS RELEASE
 - OXYGEN SUPPLY
 - COMBUSTIBLE INTAKE



SUMMARY
CIVIL/STRUCTURAL REVIEW TOPICS
STANDBY ELECTRIC POWER SYSTEM
MIDLAND IDCV PROGRAM

CIVIL/STRUCTURAL DESIGN CONSIDERATIONS - TANKS

A REVIEW OF THE CALCULATIONS OF THE UNDERGROUND EMERGENCY DIESEL OIL STORAGE TANK AND FOUNDATION.

AN INDEPENDENT CONFIRMATORY ANALYSIS OF THE DIESEL OIL DAY TANK AND SUPPORT SYSTEM.

A REVIEW OF APPLICABLE DRAWINGS AND SPECIFICATIONS.



**CONTROL ROOM HVAC SAMPLE
SELECTION BOUNDARY**

INTERFACING SYSTEM

INTERFACE POINT

AC/DC Power System 1/

Breaker or fuse interfacing HVAC components with Class IE source

Plant HVAC

Mechanical components 2/ in Control Room Area Ventilation System (CRAVS)

HVAC Switchgear, battery and Spreading Room

Portions Integral with CRAVS included

ESFAS

Control Room Isolation System (CRIS)

Accident Monitoring Inst.

Portions essential for Control Room Habitability

Plant I&C 1/

Portions essential for isolation of Control Room and operation of CRAVS

Control Room Structure

Portions required for pressure boundary including penetration and doors

1/ Portions dedicated to Control Room HVAC are within sample selection boundaries.

2/ Includes supports, equipment and ducting.



INITIAL SAMPLE REVIEW MATRIX FOR THE CONTROL ROOM HVAC SYSTEM
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM

DESIGN AREA	SCOPE OF REVIEW				
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS
<u>I. CONTROL ROOM HVAC SYSTEM PERFORMANCE REQUIREMENTS</u>					
SYSTEM OPERATING LIMITS	X	X	X		
ACCIDENT ANALYSIS CONSIDERATIONS	X	X			
SINGLE FAILURE	X	X	X		
TECHNICAL SPECIFICATIONS	X	X			
SYSTEM ALIGNMENT/SWITCHOVER	X	X			
SYSTEM ISOLATION/INTERLOCKS	X	X	X		X
COMPONENT FUNCTIONAL REQUIREMENTS	X	X	X		X
SYSTEM PNEUMATIC DESIGN	X	X	X	X	X
COOLING/HEATING REQUIREMENTS	X	X	X		
PRESERVICE TESTING/CAPABILITY FOR OPERATIONAL TESTING	X	X			
POWER SUPPLIES	X	X			
INSTRUMENTATION/DETECTION	X	X	X		X
CONTROL SYSTEMS	X	X			X
ACTUATION SYSTEMS	X	X	X		X
NDE COMMITMENTS	X	X	X		
MATERIALS SELECTION	X	X	X		X
FAILURE MODES AND EFFECTS	X	X	X		
FILTRATION	X	X	X		X
PRESSURIZATION	X	X	X		X
VENTILATION	X	X	X	X	X

INITIAL SAMPLE REVIEW MATRIX FOR THE CONTROL ROOM HVAC SYSTEM
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM (CONTINUED)

DESIGN AREA	SCOPE OF REVIEW				
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS
II. CONTROL ROOM HVAC SYSTEM PROTECTION FEATURES					
SEISMIC DESIGN	X				
● PRESSURE BOUNDARY	X	X	X		
● DUCT/PIPE/EQUIPMENT SUPPORT	X	X	X		X
● EQUIPMENT QUALIFICATION	X	X	X		X
HIGH ENERGY LINE BREAK ACCIDENTS	X				
● PIPE WHIP	X				
● JET IMPINGEMENT	X				
ENVIRONMENTAL PROTECTION	X				
● ENVIRONMENTAL ENVELOPES	X	X	X	X	X
● EQUIPMENT QUALIFICATION	X	X	X		X
FIRE PROTECTION	X	X			
MISSILE PROTECTION	X				
SYSTEMS INTERACTIONS	X				
III. STRUCTURES THAT HOUSE THE CONTROL ROOM HVAC SYSTEM					
SEISMIC DESIGN/INPUT TO EQUIPMENT	X	X	X		
CIVIL/STRUCTURAL DESIGN CONSIDERATIONS	X				
● CONCRETE/STEEL DESIGN	X	X			
● LEAK TIGHTNESS	X	X	X		

INITIAL SAMPLE REVIEW MATRIX FOR THE CONTROL ROOM HVAC SYSTEM
MIDLAND INDEPENDENT CONSTRUCTION VERIFICATION PROGRAM

SYSTEM/COMPONENT	SCOPE OF REVIEW				
	REVIEW OF SUPPLIER DOCUMENTATION	REVIEW OF STORAGE AND MAINTENANCE DOCUMENTATION	REVIEW OF CONSTRUCTION/INSTALLATION DOCUMENTATION	REVIEW OF SELECTED VERIFICATION ACTIVITIES	VERIFICATION OF PHYSICAL CONFIGURATION
I. <u>MECHANICAL</u>					
• EQUIPMENT	X	X	X	X	X
• PIPING	X		X		X
• PIPE SUPPORTS	X		X		X
II. <u>ELECTRICAL</u>					
• EQUIPMENT	X		X	X	X
• TRAYS AND SUPPORTS	X		X		X
• CONDUIT AND SUPPORTS	X		X		X
• CABLE	X		X		X
III. <u>INSTRUMENTATION AND CONTROL</u>					
• INSTRUMENTS/DETECTORS	X	X	X	X	X
• PIPING/TUBING	X		X		X
• CABLE	X		X		X
IV. <u>HVAC</u>					
• DUCTS AND SUPPORTS	X	X	X		X
V. <u>STRUCTURAL</u>					
• CONCRETE	X		X		X
• STRUCTURAL STEEL	X		X		X
VI. <u>NDE/MATERIALS TESTING PROGRAM</u>					X

SUMMARY
MECHANICAL REVIEW TOPICS
CONTROL ROOM HVAC SYSTEM
MIDLAND IDCV PROGRAM

DUCT AIR FLOW

REVIEW OF SYSTEM PRESSURE DROP AND FLOW FOR SAFETY RELATED SYSTEM ALIGNMENT.

- DETERMINE FLOW PATHS FOR SAFETY RELATED OPERATING MODES.
- CHECK DUCT SIZING CALCULATIONS AND PRESSURE DROP THROUGH DAMPERS, VALVES, FILTERS ETC.
- PERFORM CONFIRMATORY CALCULATION FOR CRITICAL ALIGNMENT.

FILTRATION

REVIEW TECHNICAL SPECIFICATIONS AND RELATED DOCUMENTS USED TO PROCURE ALL HEPA FILTERS, AND REVIEW DESIGN.

- CHECK SPECIFICATION OF CRITICAL PARAMETERS.
 - PARTICULATE FILTERING EFFICIENCY
 - TOXIC GAS ADSORPTION
 - PRESSURE DROP



SUMMARY
MECHANICAL REVIEW TOPICS
CONTROL ROOM HVAC SYSTEM
MIDLAND IDCV PROGRAM
(Continued)

- REVIEW CALCULATIONS FOR AIRBORNE DOSE RATE AFTER ACCIDENT.
- CHECK FILTER PRESSURE DROP AGREEMENT WITH FLOW CALCULATIONS.

PRESSURIZATION

REVIEW CALCULATIONS FOR PRESSURE DIFFERENTIAL DRIVING INFILTRATION OR EXFILTRATION UNDER POST-ACCIDENT AND OFFSITE HAZARDOUS GASEOUS RELEASE MODES.

- REVIEW QUANTITATIVE BASIS FOR LEAKAGE PATH.
- USE SYSTEM FLOW CHARACTERISTICS AND FAN CURVE PERFORMANCE TO CHECK GLOBAL PRESSURE DIFFERENTIAL.
- REVIEW LOCAL PRESSURE DIFFERENCES DUE TO EXTERNAL WIND OR LOCAL INTERNAL SUBCOMPARTMENT EFFECTS.
- CHECK METEOROLOGICAL ASSUMPTIONS.



SUMMARY
MECHANICAL REVIEW TOPICS
CONTROL ROOM HVAC SYSTEM
MIDLAND IDCV PROGRAM *
(Continued)

VENTILATION

CHECK DESIGN FOR ADEQUATE TEMPERATURE CONTROL AND OXYGEN SUPPLY, AND CONTROL OF ACCIDENT AIRBORNE RADIATION CONCENTRATIONS OR TOXIC LEVELS OF HAZARDOUS GASEOUS CONSTITUENTS.

- CHECK EQUILIBRIUM TEMPERATURE FOR ISOLATED MODE.
- CHECK OXYGEN CONTENT AND OTHER AIR CONSTITUENTS AT END OF ISOLATION PERIOD.
- REVIEW EXTERNAL AIRBORNE RADIATION LEVELS AT INTAKE.
- REVIEW TOXIC GASEOUS COMPONENT CONCENTRATIONS.
- PERFORM CONFIRMATORY CALCULATION OF HABITABILITY DURING ONE CRITICAL MODE.



SUMMARY
ELECTRICAL REVIEW TOPICS
CONTROL ROOM HVAC
MIDLAND IDCV PROGRAM

HVAC INSTRUMENTATION

REVIEW INSTRUMENTATION ADEQUACY FOR MONITORING STATUS OF CONTROL ROOM VENTILATION SYSTEM. REVIEW DESIGN CRITERIA, DRAWINGS, AND SPECIFICATIONS FOR MAKE-UP AIR RADIATION AND TOXIC GAS DETECTORS. INCLUDE REVIEW OF BASIS FOR SELECTED TOXIC GAS CONCENTRATION LIMITS AND SETPOINTS IN HAZARDOUS GAS MONITORING SYSTEM (HGMS). VENDOR DATA FOR HGMS WILL BE REVIEWED FOR COMPLIANCE WITH SPECIFICATIONS.



SUMMARY
CIVIL/STRUCTURAL REVIEW TOPICS
CONTROL ROOM HVAC SYSTEM
MIDLAND IDCV PROGRAM

STRUCTURES - LEAKTIGHTNESS

A REVIEW OF COMPONENT SPECIFICATIONS TO ENSURE
LEAKTIGHTNESS OF THE CONTROL ROOM.



ENCLOSURE 3

FOR DISCUSSION PURPOSES ONLY 4/13/83

PROTOCOL GOVERNING COMMUNICATIONS BETWEEN
CP CO, NRC AND TERA DURING CONDUCT OF IDV

*Proposed Rewrite
by Ed Healey*

1. The independent reviewer (Tera) has a clear need to prompt access to whatever information is required to fulfill its role. To this end, the independent reviewer may request documentary material, meet with and interview individuals, conduct telephone conversations, or visit the site or offices to obtain information without prior notification to the NRC. All verbal communications that address scope, findings, recommendations, or evaluations and all transmittals of information shall however, be documented and such documentation shall be maintained by Consumers Power Co in a location accessible for NRC examination. Detailed information utilized by Tera to conduct the evaluation such as drawings, specs, procedures and design calculations shall be maintained by Tera in a location accessible for NRC examination. To the extent that any individual contacted or interviewed requests that his or her name not be revealed, that information need not be included in the documentation, but shall, if requested be made available to appropriate NRC personnel.
2. All exchanges of correspondence, including drafts and final copies of recommendations, findings, evaluations and the final report between the independent reviewer and CP Co* will be submitted by Tera to NRR for the design area and to the Regional Administrator for the construction area at the same time they are submitted to CP Co.
3. If the NRC, CP Co, or Tera wishes to discuss substantive matters related to information concerning recommendations, findings, evaluations and the

*Anywhere CP Co appears it also includes CP Co Contractors

final report, such discussions shall be accomplished in meetings open to public observation. Such communications must avoid any real or apparent attempt by CP Co or NRR or the Region to influence the work, judgement, or conclusions of the IDV. Examples of substantive matters are those matters which concern engineering judgements, engineering calculations, disagreements on design bases, disagreements on interpretation of licensing or code requirements and resolution of findings. Tera is responsible for determining when a matter is considered substantive.

In this regard, Tera shall provide a minimum of five days advance notice to NRR and the Regional Administrator of any such meeting. NRR or the Regional Administrator shall make reasonable efforts to notify representatives of interested members of the public of the meeting, but the inability of any person to attend shall not be cause for delay or postponement of the meeting. Transcripts or written minutes of all such meetings shall be prepared by Tera and provided to NRR, the Regional Administrator and CP Co in a timely manner. Any portions of such meetings which deal with proprietary information may be closed to the public.

4. All meetings resulting from 3 above between NRR, the Region, CP Co or Tera will be open to public observation, except where NRR or the Region determines that it is appropriate to conduct a meeting in private with CP Co and Tera. NRC to notify intervenors of record of meetings in 3 above.
5. All documents submitted to, or transmitted by, the NRC subject to this Protocol, unless exempt from mandatory public disclosure, will be placed in the NRC Public Document Rooms in Midland, Michigan and Washington, DC and will be available there for public examination and copying.

6. There will be no audits by CP Co of Tera activities. Tera will be responsible for auditing their own program with copies of audit findings reports provided to NRC and CP Co in status reports.
7. Communications between Tera and CP Co on commercial and administrative items are outside the scope of the above.



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

NOV 8 1982

Warwick
Q file

Docket Nos.: 50-329
and 50-330 OM, OL

PRINCIPAL STAFF	
RA	OL
D/RA	SP
A/RA	SP <i>2</i>
D/IRP	PAO
DEPSUS	ISLO
DEGTP	
HL	
OL	FILE <i>has</i>

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 25, 1982 MEETING ON INDEPENDENT DESIGN VERIFICATION PROGRAM

A meeting to discuss Midland's proposed Independent Design Verification Program (IDVP) was held October 25, 1982, between the NRC staff and representatives of Consumers Power Company (CPCo), Management Analysis Corporation (MAC), and TERA Corporation. Representatives of the Government Accountability Project (GAP), a public interest organization, also attended and provided statements. The list of attendees is provided in Enclosure 1. Viewgraph slides used during the meeting are shown in Enclosures 2 and 3.

CPCo, MAC, and TERA representatives reviewed the contents of an October 5, 1982, transmittal which proposes a three part IDVP: (1) an INPO type of construction and design evaluation by MAC, (2) a biennial audit by MAC, and (3) an IDVP of the auxiliary feedwater system by TERA. Overall integration of the program would be performed by MAC.

Following opening remarks by the applicant, the MAC representative described the proposed INPO type of Construction evaluation. This evaluation is intended only to review work in progress. It will investigate past work only as related to present deficiencies found by MAC and as time allows.

TERA representatives briefly addressed their company's participation in the performance of the Independent Design Verification or "vertical slice" of the IDVP. As proposed, TERA would be assessing the design of the Auxiliary Feedwater System (AFWS) of Unit 2 in terms of design adequacy and would review the as-built configuration on a limited basis. TERA would also be performing a sampling of design calculations and component inspections.

Questions were raised by the staff regarding the MAC-TERA interaction. The applicant explained that TERA personnel would be involved with the MAC-sponsored INPO evaluation, but each organization would report independently on its own review. MAC would then coordinate both reports into a single document and include conclusions derived from the overall integration of the two studies. This final report is presently scheduled for completion in late February of 1983.

The staff also asked how construction problems at Midland would be addressed in the IDVP. The staff noted that in its present form, the IDVP would not provide assurance of as-built construction adequacy and considers this to be a significant deficiency in the present proposal.

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The staff requested clarification regarding the manner in which negative findings by TERA would be resolved. TERA representatives indicated that a determination would be made as to whether or not the error was random or systematic. The root cause of the error would then be determined and then recommendations would be made accordingly.

Another question evolved around direct INPO involvement in the INPO type Construction Evaluation. INPO will overview the final report but there will be no INPO personnel involved in the actual performance of the review.

The staff questioned if the probabilistic risk assessment (PRA) results had been utilized in choosing a system for review. The applicant replied that although a PRA had been performed on the AFWS, it had been chosen from the criteria cited in the October 5, 1982, letter. The applicant indicated that the choice was not biased due to previous review of this system.

The GAP representatives summarized selected comments contained in an October 22, 1982, letter (Enclosure 4) to H. R. Denton and J. G. Keppler. They suggested holding two public meetings: one to address "single-point accountability" (Enclosure 4, pgs. 13-15) and a second to address the charters of the independent contractors (Enclosure 4, pgs. 10-12). Discussion resulting from these comments related to the independence of MAC. The GAP representatives stated that because MAC had previously done QA audits at Midland they could not be considered independent contractors. The MAC representative replied that independence is achieved since none of the MAC personnel involved in this review have had any connection with Midland and also added that the review is broader in scope than those performed by MAC in the past. MAC further stated that, while exact figures were not available at this meeting, the income derived from its involvement with CPCo is not a major portion of MAC's overall income. In a letter of September 17, 1982, CPCo described an independent assessment to be performed by Stone and Webster (S&W) regarding underpinning activities for the Midland auxiliary building. The qualifications of S&W for this task were also questioned by GAP. The GAP representatives concluded by stating that they will provide supplementary comments as a result of the October 25 meeting.

At the conclusion of the meeting, the applicant asked for policy guidance from the staff regarding its proposal. The staff indicated that additional consideration regarding the extent of the program would be necessary. The agenda for this meeting did not include review of the independent assessment of the soils remedial work to be performed by S&W. The staff noted that it would consider an additional meeting for this purpose prior to an assessment of the overall independent design verification program.

The staff emphasized the importance of all firms engaged in this program providing copies of all written reports, including raw data, to the NRC at the same time as submitting them to the applicant. The staff discouraged the use of any verbal reports or closed meetings. The staff agreed to provide preliminary feedback to Consumers Power by October 29, 1982, and to arrange for additional meetings as deemed appropriate.

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures: As stated

cc: See next page

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- 2 -

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S. Black
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D. Allison
M. Wilcove
R. Vollmer
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Washington Public Power System

R. Johnson

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J. Cook
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TERA CORP

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L. Kube

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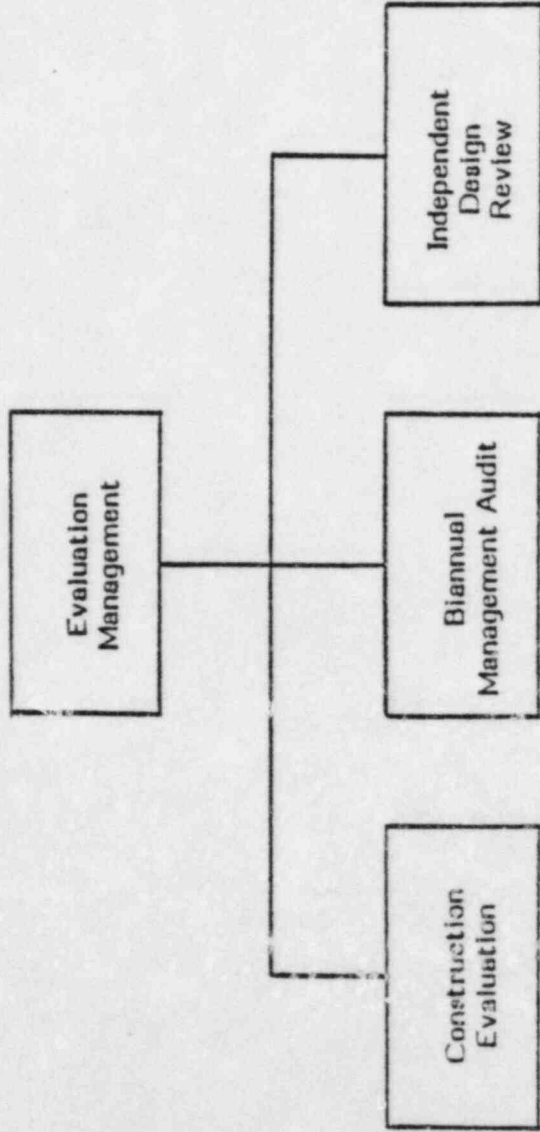
T. Devine
B. Garde

*Part time

ENCLOSURE 2

MAC VIEWGRAPHS

MIDL AND EVALUATIONS



WHAT IS A CONSTRUCTION PROJECT EVALUATION

- TEAM INVESTIGATION
 - MULTI-DISCIPLINE
 - EXPERIENCED IN NUCLEAR INDUSTRY
 - DIVERSE FIELDS AND TALENTS

- DEVELOP FACTS
 - DOCUMENTATION REVIEW
 - OBSERVE WORK IN PROGRESS
 - INTERVIEWING

- ASSESS PERFORMANCE
 - MANAGEMENT INVOLVEMENT AND COMMITMENT TO QUALITY
 - EXECUTION OF WORK
 - QUALIFICATIONS, EXPERIENCE AND TRAINING
 - QUALITY OF PROGRAMS

- MEASURE QUALITY
 - PERFORMANCE OBJECTIVES DEVELOPED BY INPO
 - INDUSTRY PRACTICES

KEY POINTS TO REMEMBER

- HORIZONTAL SLICE
- SNAP SHOT IN TIME
- GUIDELINES ON DEPTH
OF INVESTIGATION

CONSTRUCTION EVALUATION

PROGRAM HISTORY

Late 1981	Industry Problems with Plants under Construction
January 1982	Industry met with Regulatory to Propose Corrective Action Plan
Feb. - June	INPO Chartered with Establishing Performance Objectives and Supporting Criteria
July - Aug.	Pilot Evaluation Conducted
Aug. - Sept.	Performance Objectives and Supporting Criteria Updated
Sept. - Dec.	Self-Initiated Evaluations Conducted

AD HOC COMMITTEE

D. SCHNELL, CHAIRMAN, UNION ELECTRIC COMPANY

J. COOK, ASST. CHAIRMAN, CONSUMERS POWER COMPANY

W. CAHILL, GULF STATES UTILITIES

J. FERGUSON, VIRGINIA ELECTRIC & POWER COMPANY

R. GLASSCOCK, WASHINGTON PUBLIC POWER SUPPLY COMPANY

T. MARTIN, PUBLIC SERVICE ELECTRIC & GAS COMPANY

M. McDUFFIE, CAROLINA POWER & LIGHT COMPANY

D. PATTERSON, TENNESSEE VALLEY AUTHORITY

W. SHEWSKI, COMMONWEALTH EDISON

W. SHIELDS, PUBLIC SERVICE INDIANA

H. TAUBER, DETROIT EDISON COMPANY

E. VAN BRUNT, ARIZONA PUBLIC SERVICE

PILOT EVALUATIONS

GPC - VOGTLE
W - PWR
BECHTEL (LA)
SOUTHERN COMPANY SERVICES

CP&L - SHEARON HARRIS
W - PWR
EBASCO

PSE&G- HOPE CREEK
GE - BWR
BECHTEL (SF)

LESSONS LEARNED

THE FOLLOWING IS A BRIEF SUMMARY OF "LESSONS LEARNED" FROM THE THREE PILOT EVALUATIONS:

A. SCHEDULE FLEXIBILITY

1. EVALUATORS MUST BE ABLE TO ADJUST THEIR SCHEDULE TO ACCOMODATE CHANGE IN PLANNED ACTIVITIES.

B. COMMUNICATIONS

1. THE EVALUATOR MUST TALK TO INDIVIDUALS AT THE WORKING LEVEL (CRAFTSMEN) WITHOUT THE PRESENCE OF SUPERVISION TO ENSURE A FREE FLOW OF INFORMATION.
2. DO MORE LISTENING THAN TALKING.

C. EVALUATION TECHNIQUES

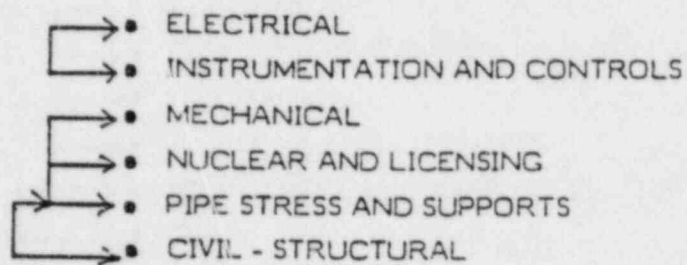
1. UNANNOUNCED OBSERVATIONS OF ACTIVITIES IN PROGRESS ARE SUPERIOR TO THOSE SCHEDULED BY PRIOR NOTICE. THE LATTER TEND TO BE OVERSUPERVISED AND STAGED.
2. AN EFFECTIVE TOTAL EVALUATION INCLUDES OBSERVATIONS OF OTHER ACTIVITIES IN THE AREA AS WELL AS THE SUBJECT EVALUATION WHICH IS IN PROGRESS.
3. WHEN EVALUATING A WORK CONTROL SYSTEM, IT IS BEST TO TRACK A NONCONFORMING WORK ITEM SINCE IT CAN BETTER POINT OUT WEAKNESSES IN THE WORK CONTROL SYSTEM.

D. INTERVIEW TECHNIQUES

1. A PLANNED LINE OF QUESTIONING, WITH AN OBJECTIVE IN MIND, IS ESSENTIAL TO THE FORMULATION OF AN EFFECTIVE SCHEDULE.

E. EVALUATION TEAM COMPOSITION

1. THE MEMBERS OF THE EVALUATION TEAM SHOULD REPRESENT A CROSS SECTION OF VARIOUS DISCIPLINES AND VARIED PROFESSIONAL BACKGROUNDS. A MIXING OF ENGINEERING, CONSTRUCTION, QUALITY ASSURANCE AND QUALITY CONTROL PERSONNEL ENSURES THAT THE PERFORMANCE OBJECTIVES ARE ADEQUATELY ADDRESSED FROM VARIOUS PERSPECTIVES.
2. THE DESIGN TEAM SHOULD BE CAPABLE OF COVERING ALL DISCIPLINES (ARROWS SHOW LOGICAL OVERLAP).



3. IN ADDITION TO DISCIPLINE OVERLAP, TEAM MEMBERS SHOULD HAVE FAMILIARITY WITH QA, PROCUREMENT AND ORGANIZATION AND ADMINISTRATION FUNCTIONS.

EVALUATION CONTENT

OA ORGANIZATIONAL AND ADMINISTRATIVE

OA.1 ORGANIZATIONAL STRUCTURE

OWNER'S CORPORATE ORGANIZATION SHOULD ENSURE EFFECTIVE PROJECT MANAGEMENT CONTROL.

OA.2 MANAGEMENT INVOLVEMENT AND COMMITMENT TO QUALITY

SENIOR AND MIDDLE MANAGERS EXHIBIT INTEREST, AWARENESS AND KNOWLEDGE.

OA.3 THE ROLE OF FIRST-LINE SUPERVISORS AND MIDDLE MANAGERS

QUALIFIED BY VERIFIED BACKGROUND AND EXPERIENCE AND HAVE NECESSARY AUTHORITY.

DC DESIGN CONTROL

DC.1 DESIGN INPUTS

INPUTS SHOULD BE DEFINED AND CONTROLLED.

DC.2 DESIGN INTERFACES

EXTERNAL AND INTERNAL INTERFACES ARE IDENTIFIED AND COORDINATED.

DC.3 DESIGN PROCESS

MANAGEMENT OF THE DESIGN PROCESS IN COMPLIANCE WITH DESIGN REQUIREMENTS.

DC.4 DESIGN OUTPUT

DOCUMENTS SHOULD SPECIFY CONSTRUCTABLE DESIGNS.

DC.5 DESIGN CHANGES

CHANGES CONTROLLED TO ENSURE COMPLY WITH DESIGN REQUIREMENTS.

CC CONSTRUCTION CONTROL

CC.1 CONSTRUCTION ENGINEERING

CONTROLLED TO CONSISTENCY WITH BASIC DESIGN CRITERIA.

EVALUATION CONTENT (Continued)

CC.2 CONSTRUCTION FACILITIES AND EQUIPMENT

PLANNED, ACQUIRED, INSTALLED AND MAINTAINED.

CC.3 MATERIAL CONTROL

INSPECTED, CONTROLLED AND MAINTAINED.

CC.4 CONTROL OF CONSTRUCTION PROCESSES

MONITOR AND CONTROL PROCESSES TO ENSURE COMPLETED TO DESIGN REQUIREMENTS.

CC.5 CONSTRUCTION QUALITY INSPECTIONS

VERIFY AND DOCUMENT THAT PRODUCT MEETS DESIGNS AND QUALITY REQUIREMENTS.

CC.6 CONSTRUCTION CORRECTIVE ACTIONS

EVALUATE AUDITS, INSPECTIONS AND SURVEILLANCES AND TAKE CORRECTIVE ACTION.

CC.7 TEST EQUIPMENT CONTROL

EQUIPMENT SHOULD BE CONTROLLED.

PS PROJECT SUPPORT

PS.1 INDUSTRIAL SAFETY

PROGRAM SHOULD ACHIEVE HIGH DEGREE OF PERSONNEL SAFETY.

PS.2 PROJECT PLANNING

ENSURE IDENTIFYING, INTERRELATING AND SEQUENCING TASKS.

PS.3 PROJECT CONTROL

ENSURE OBJECTIVES OF PROJECT PLANS ARE MET THROUGH USE OF PROJECT RESOURCES.

PS.4 PROJECT PROCUREMENT PROCESS

ENSURE EQUIPMENT, MATERIALS AND SERVICES MEET PROJECT REQUIREMENTS.

EVALUATION CONTENT (Continued)

PS.5 CONTRACT ADMINISTRATION

METHODS FOR ADMINISTERING AND CONTROLLING CONTRACTORS AND MANAGING CHANGES.

PS.6 DOCUMENTATION MANAGEMENT

EFFECTIVE CONTROL AND COORDINATION OF DOCUMENTATION.

TN TRAINING

TN.1 TRAINING MANAGEMENT SUPPORT

EFFECTIVE PROGRAM FOR INDOCTRINATION, TRAINING AND QUALIFICATION.

TN.2 TRAINING ORGANIZATION AND ADMINISTRATION

ENSURE EFFECTIVE CONTROL AND IMPLEMENTATION.

TN.3 GENERAL TRAINING AND QUALIFICATION

EMPLOYEES RECEIVE INDOCTRINATION AND TRAINING REQUIRED TO PERFORM EFFECTIVELY.

TN.4 TRAINING FACILITIES, EQUIPMENT, AND MATERIAL

SUPPORT AND ENHANCE TRAINING ACTIVITIES

QP QUALITY PROGRAMS

QP.1 QUALITY PROGRAMS

PROGRAM APPROPRIATE, DEFINED CLEARLY AND UNDERSTOOD.

QP.2 PROGRAM IMPLEMENTATION

QUALITY ASSURANCE AND QUALITY CONTROL FUNCTIONS SUPPORT AND CONTROL PROJECT ACTIVITIES.

QP.3 INDEPENDENT ASSESSMENTS

EFFECTIVE, INDEPENDENT ASSESSMENT OF PROJECT ACTIVITIES.

QP.4 CORRECTIVE ACTIONS

CORRECTIONS OR IMPROVEMENTS RESOLVED IN EFFECTIVE AND TIMELY MANNER.

EVALUATION CONTENT (Continued)

TC TEST CONTROL

TC.1 TEST PROGRAM

VERIFY THE PLANT'S CAPABILITY TO OPERATE AS INTENDED.

TC.2 TEST GROUP ORGANIZATION AND STAFFING

ENSURE EFFECTIVE IMPLEMENTATION.

TC.3 TEST PLAN

PLAN AND SCHEDULE SUPPORT MAJOR SCHEDULE MILESTONES.

TC.4 SYSTEM TURNOVER FOR TEST

PROCESS CONTROLLED EFFECTIVELY.

TC.5 TEST PROCEDURES AND TEST DOCUMENTS

PROVIDE DIRECTION AND VERIFY OPERATIONAL AND DESIGN FEATURES.

TC.6 SYSTEM STATUS CONTROLS

METHOD TO IDENTIFY STATUS OF SYSTEM OR COMPONENT AND ORGANIZATION HOLDING CONTROL.

EVALUATION PROGRAM

PRE-PLANNING

- REVIEW PROJECT SCHEDULE
- SELECT CANDIDATE REVIEW AREAS:
 - COMPLEXITY
 - STATUS
 - INTERFACES
 - SAFETY SIGNIFICANCE
 - HISTORY OF PROBLEMS (PLANT AND INDUSTRY WIDE)
- REFINE LIST OF CANDIDATES WITH
- DEFINE REVIEW MATERIAL REQUIRED:
 - PROCEDURES
 - PSAR/FSAR COMMITMENTS
 - CRITERIA/SPECIFICATIONS
- DEVELOP TENTATIVE TEAM ASSIGNMENTS
- DEVELOP "HIT LIST" OF QUESTIONS FOR EVALUATION:
 - WHO
 - WHAT
 - WHY
 - WHEN

DETAIL PLANNING

- TOUR PLANT
- VIEW ALL CANDIDATE REVIEW AREAS
- SELECT AREAS:
 - DIVERSITY OF ACTIVITIES
 - MOST REPRESENTATIVE
- FIRM UP TEAM ASSIGNMENTS
- IDENTIFY UTILITY INTERFACE REPRESENTATIVE/S:
 - SENIOR PERSON
 - ACTIVITY INVOLVED
 - REPRESENTS UTILITY

EVALUATION PROGRAM (CONTINUED)

PERFORM EVALUATION OF AREA

- DEVELOP DAILY/HOURLY SCHEDULE
- OBSERVE ACTIVITIES
- INTERVIEW
- REQUEST BACK-UP INFORMATION
- REVIEW MATERIAL
- DISCUSS FINDINGS WITH OTHER TEAM MEMBERS
- REINVESTIGATE CONFLICTING INFORMATION
- DRAFT FINDINGS/OBSERVATIONS
- INFORMALLY REVIEW WITH UTILITY REPRESENTATIVE(S)
- CLOSE-OUT ANY OPEN ISSUES.

SUMMARIZATION

- COLLECT ALL DETAILS ONTO DATA SHEETS
- FINALIZE OBSERVATION INCORPORATING INPUT FROM OTHER TEAM MEMBER
- DRAFT DATA SHEETS
- REVIEW MATERIAL WITH UTILITY REPRESENTATIVE(S)
- CORRECT ANY ERRORS AND CLARIFY ISSUES AS REQUIRED
- FINALIZE DOCUMENTATION

REPRESENTATIVE AREAS FOR OBSERVATIONS

CIVIL

- A. CONTROLLED COMPACTED FILL
- B. SOIL CEMENT INSTALLATION
- C. CONCRETE PLACEMENT
- D. CADWELDING REBAR
- E. EQUIPMENT GROUTING
- F. STRUCTURAL STEEL RIGGING, BOLTING, WELDING
- G. POST TENSIONING STRESSING OF A TENDON
- H. MASONRY SEISMIC WALL INSTALLATION
- I. APPLICATION OF COATINGS
- J. WELDING OF POOL LINERS
- K. INSTALLATION OF SEISMIC RESTRAINTS (SNUBBERS OR RIGID SUPPORTS)
- L. PLACING OF IMBEDS
- M. INSTALLATION OF DRILLED-IN ANCHORS

MECHANICAL

- A. IN PLACE MAINTENANCE OF EQUIPMENT
- B. PINE AND HVAC DUCT SUPPORT INSTALLATION
- C. PIPE FABRICATION AND INSTALLATION
- D. EQUIPMENT RIGGING
- E. FIT-UP AND WELDING
- F. PIPE ERECTION
- G. INSTALLATION OF HVAC DUCTWORK
- H. INSTRUMENTATION SYSTEM INSTALLATION
- I. INSTRUMENTATION CALIBRATION
- J. HYDRO TESTING
- K. EQUIPMENT ALIGNMENT AND LEVELING
- L. REACTOR INTERNALS INSTALLATION
- M. POST WELD HEAT TREATING
- N. VALVE ASSEMBLY AND/OR DISASSEMBLY
- O. BOLTING OF EQUIPMENT OR PIPE FLANGES

ELECTRICAL

- A. EQUIPMENT INSTALLATION AND SETTING
- B. BUS DUCT INSTALLATION
- C. HANGERS AND SUPPORTS INSTALLATION
- D. CABLE PULLING
- E. CABLE TERMINATION
- F. IN-PLACE MAINTENANCE OF EQUIPMENT
- G. CABLE TRAY INSTALLATION
- H. CONDUIT INSTALLATION
- I. EQUIPMENT GROUTING
- J. STORAGE OF EQUIPMENT
- K. GROUDNING INSTALLATION
- L. MAKING STRESS CONES AT SPLICES AND TERMINATIONS
- M. CABLE SPLICING
- N. BOLTING OF EQUIPMENT
- O. EQUIPMENT, CONDUIT AND TRAY IDENTIFICATION
- P. GENERAL
- Q. CALIBRATION OF TOOLS

QUALITY CONTROL

- A. SOIL TESTING
- B. CONCRETE TESTING
- C. NDE TESTING
- D. RECEIVING INSPECTION
- E. IN-PROCESS INSPECTION
- F. FINAL INSPECTION
- G. NONCONFORMANCE PROCESSING
- H. INSPECTION PERSONNEL INTERFACING WITH OTHER PERSONNEL -- CRAFT, CONSTRUCTION, ENGINEERING, ETC.
- I. QC SUPERVISORS PROVIDING DIRECTION TO SUBORDINATES
- J. INSPECTORS PREPARING INSPECTION REPORTS
- K. TRAINING SESSIONS
- L. TREND ANALYSIS MEETING
- M. CERTIFICATION TESTING (NDE PRACTICAL)
- N. INSPECTORS INTERFACING WITH THE AUTHORIZED NUCLEAR INSPECTOR (ANI)

GENERIC PROBLEMS

PROBLEMS WHICH OCCUR ACROSS DISCIPLINES. THE TYPE OF PROBLEMS EVALUATION IS ATTEMPTING TO IDENTIFY.

EXAMPLES:

- TRAINING

MAY BE IDENTIFIED BY OBSERVING QUALITY PROBLEMS CAUSED BY LACK OF TRAINING. SUCH AS:

- WELDING
- RIGGING
- PAINTING/COATING
- INSPECTING
- DOCUMENT REVIEWS

- MANAGEMENT

MAY BE IDENTIFIED BY MANAGEMENT ACTIVITIES WHICH AFFECT QUALITY:

- SCHEDULING
- BUDGETING
- ENFORCEMENT OF QUALITY PROGRAM
- INVOLVEMENT IN CONSTRUCTION QUALITY

- CORRECTIVE ACTION

MAY BE IDENTIFIED BY OBSERVING INEFFECTIVE CORRECTIVE ACTIONS, SUCH AS:

- NONCONFORMANCE DISPOSITION
- DEFICIENCY RESOLUTIONS
- NONCONFORMANCE IDENTIFICATION

- ROOTS CAUSES

MAY BE A GENERIC PROBLEM IF NOT IDENTIFIED AND CORRECTED, MAY BE IDENTIFIED BY:

- REPETITIVE DEFICIENCIES OR NONCONFORMANCES IN AN AREA
- REPETITIVE MATERIAL OR EQUIPMENT DEFICIENCIES
- CONTINUOUS OR FREQUENT DESIGN CHANGES

- PROGRAM DEFICIENCIES

GENERALLY NOT AS FREQUENT A PROBLEM AS PROGRAM IMPLEMENTATION. MAY BE IDENTIFIED BY:

- LACK OF PROCEDURE TO DESCRIBE AN ACTIVITY
- PROBLEMS OCCURRING WITH PROGRAM HAS NOT BEEN IDENTIFIED.

- PEOPLE NON-COMPLIANCE

MAY BE IDENTIFIED BY:

- OBSERVATION OF PROCEDURE NOT BEING FOLLOWED
- DOCUMENTATION INACCURATE
- ACTIVITY NOT PERFORMED

EVALUATION METHODOLOGY

- DOCUMENT REVIEW
- PRESENTATIONS (BY PROJECT STAFF)
- PLANT WALK DOWNS
- OBSERVATIONS
- INTERVIEWS
- DETAIL FACT FINDING
- SUMMARIZATION

PERF. OBJ. NO. _____

EVALUATION/CONTACT REPORT

EVALUATOR/S _____ DATE _____

CONTACTS _____

IDENTIFICATION (AREA, COMPONENT, ACTIVITY, ETC.) _____

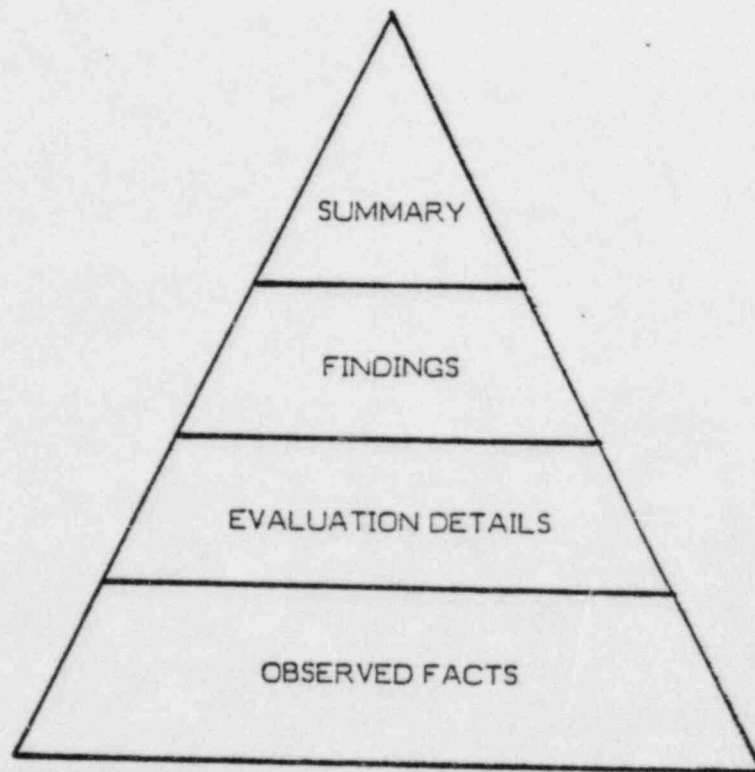
CRITERIA/S IMPACTED _____

REFERENCES _____

COMMENTS

FOLLOW-UP REQUIRED

VERIFICATION OF FOLLOW-UP _____

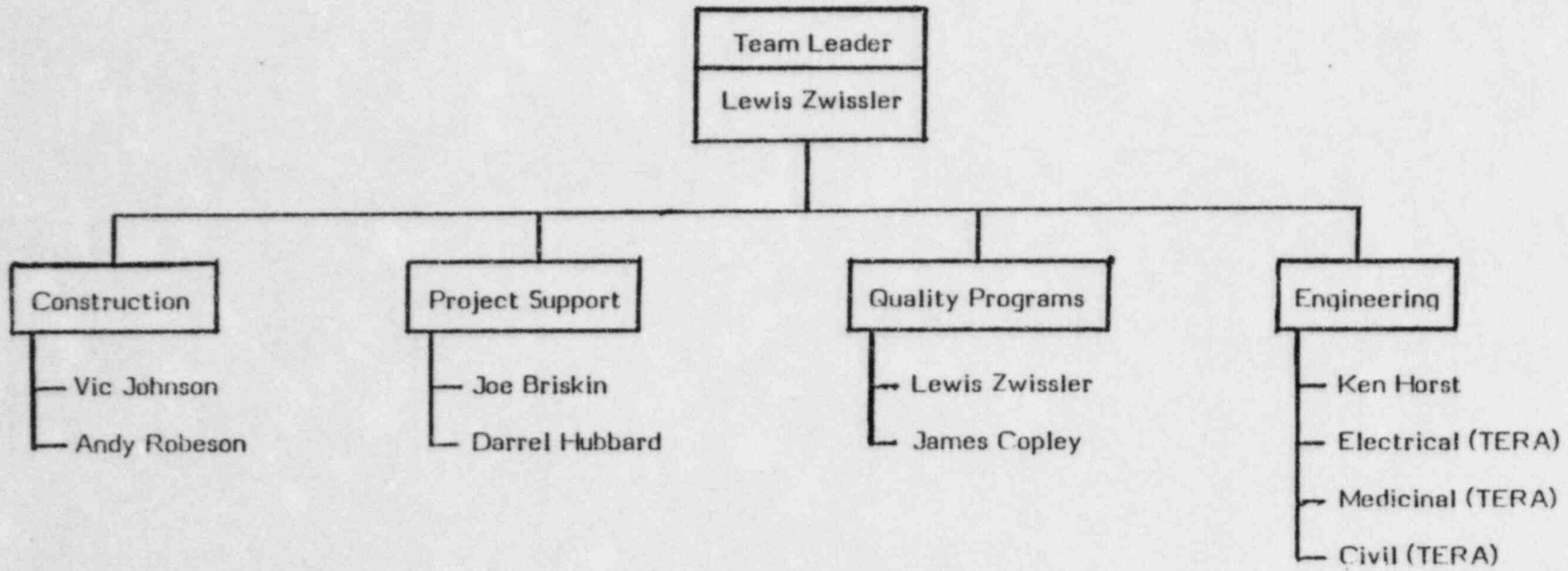


DEVELOPMENT OF AN EVALUATION

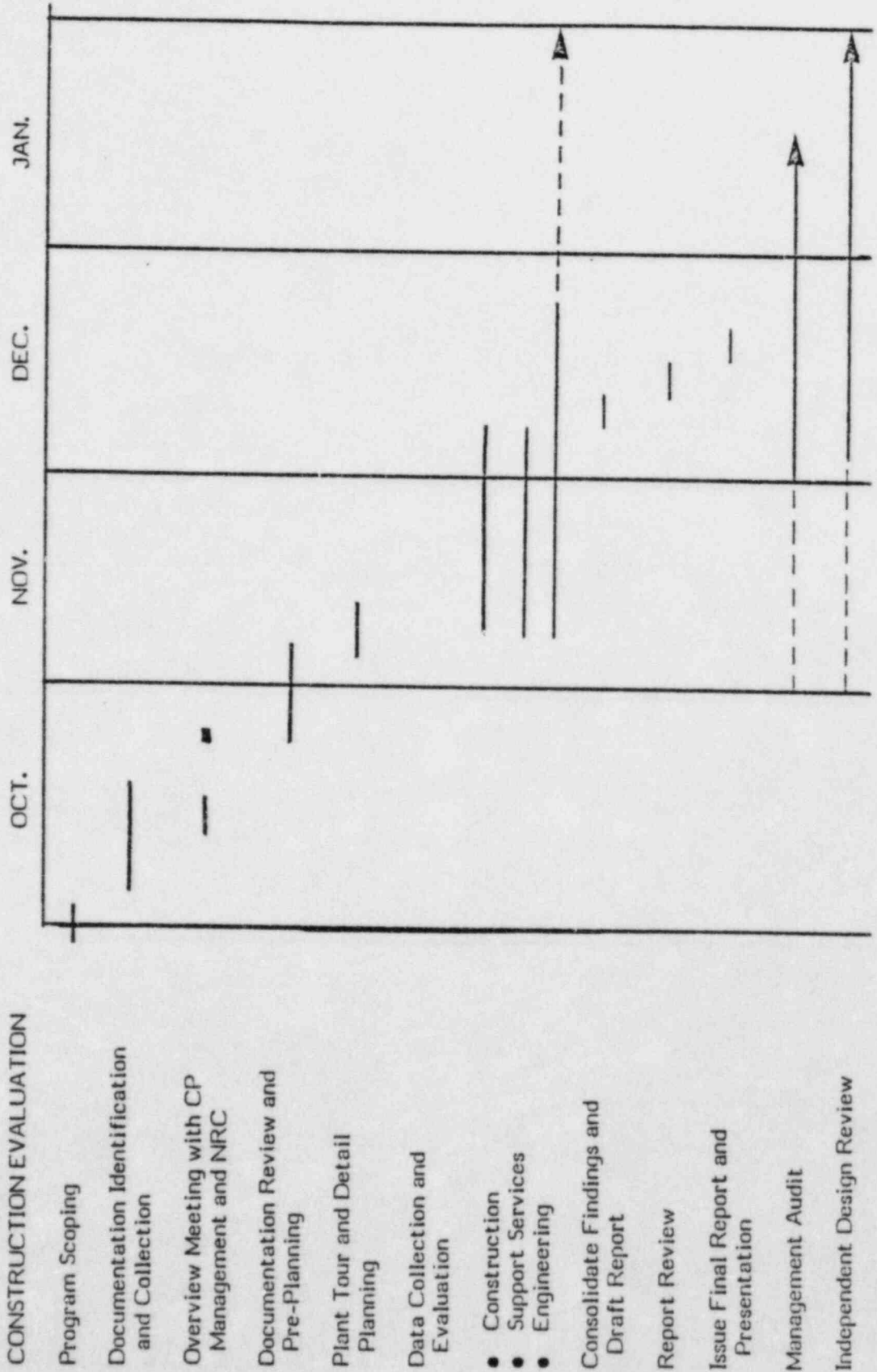
(By Performance Objective)

CONSTRUCTION EVALUATION

KEY TEAM MEMBERS



MIDLAND CONSTRUCTION EVALUATION SCHEDULE

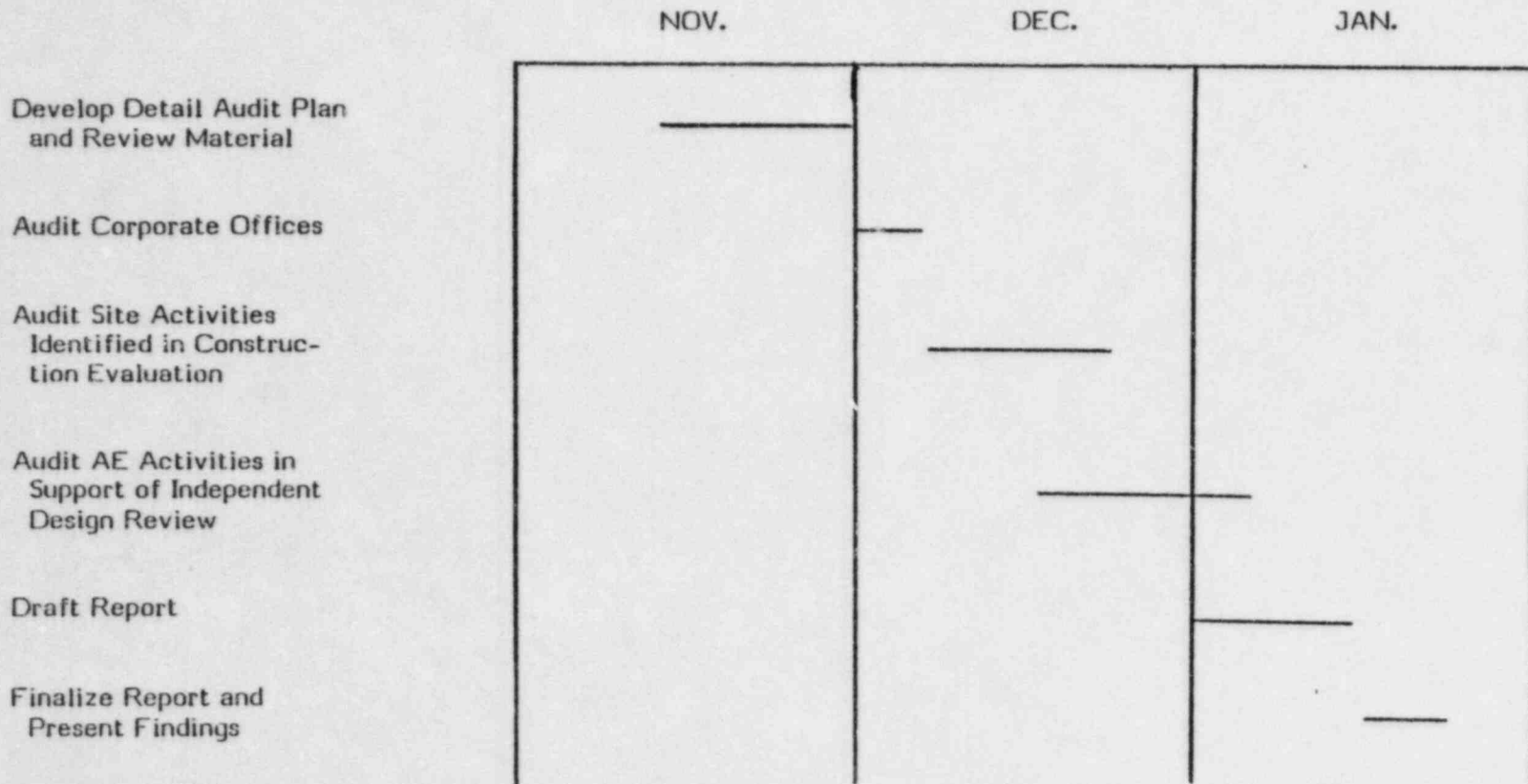


BIENNIAL QUALITY AUDIT

- EVALUATION OF QUALITY ASSURANCE PROGRAM
 - DEVELOP AN AUDIT PLAN
 - AUDIT CORPORATE OFFICES
 - AUDIT SITE ACTIVITIES
 - AUDIT AE ACTIVITIES

- COMPLIANCE WITH
 - REGULATORY GUIDE 1.144 (9/80, REV. 1)
 - REGULATORY GUIDE 1.146 (8/80, REV. 0)

MANAGEMENT AUDIT OF MIDLAND



ENCLOSURE 3

TERA VIEWGRAPHS

MIDLAND INDEPENDENT DESIGN
VERIFICATION PROGRAM

OCTOBER 25, 1982



TERA CORPORATION

MIDLAND INDEPENDENT DESIGN VERIFICATION
PROGRAM GOALS

PRIMARY GOAL

- PROVIDE AN INDEPENDENT EVALUATION OF THE QUALITY OF THE MIDLAND PLANT DESIGN

OBJECTIVES

- EVALUATE QUALITY OF DESIGN BY EVALUATING A SAMPLE (VERTICAL SLICE) OF ENGINEERED SYSTEMS, COMPONENTS AND STRUCTURES SUCH THAT RESULTS MAY BE EXTRAPOLATED TO SIMILARLY DESIGNED FEATURES WITH A HIGH DEGREE OF CONFIDENCE
- ADDRESS DESIGN CONTROL PROGRAMMATIC AREAS (E.G. DESIGN INPUTS/OUTPUTS, INTERFACES, PROCESS, CHANGES, ETC.)
- EVALUATE DESIGN FEATURES BY UTILIZING A COMBINATION OF METHODS SUCH AS:
 - REVIEW OF DESIGN CRITERIA, REGULATORY AND LICENSING COMMITMENTS
 - CHECK OF ANALYSES, CALCULATIONS AND EVALUATIONS
 - CONFIRMATORY ANALYSES, CALCULATIONS AND EVALUATIONS
 - CHECK OF DRAWINGS AND SPECIFICATIONS
- COMPARE INSTALLATION AGAINST AS-BUILT DRAWINGS



SYSTEM SELECTION CRITERIA

- IMPORTANCE TO SAFETY
- INCLUSION OF DESIGN INTERFACES
 - INVOLVES MULTIPLE DESIGN INTERFACES AMONG ENGINEERING DISCIPLINES AND DESIGN ORGANIZATIONS
- ABILITY TO EXTRAPOLATE RESULTS
 - DESIGN CRITERIA, DESIGN CONTROL PROCESS ARE SIMILAR TO OTHER SAFETY SYSTEMS
- DIVERSE IN CONTENT
 - SYSTEM INCLUDES DIVERSE FEATURES, THUS REQUIRING DESIGN INPUT FROM MAJOR ENGINEERING DISCIPLINES
- SENSITIVE TO PREVIOUS EXPERIENCE
 - PREVIOUSLY EXHIBITED PROBLEMS CAN BE TESTED
- ABILITY TO TEST AS-BUILT INSTALLATION



TECHNICAL REVIEW TASKS

- IDENTIFICATION OF DESIGN CHAIN INCLUDING DESIGN ORGANIZATIONS, THEIR INTERFACES AND DESIGN PRACTICES
- REVIEW OF 50.55e REPORTS, NONCONFORMANCE REPORTS, NRC REGION III AND IV INSPECTION REPORTS, CPC DESIGN QA MONITORING REPORTS
- DEVELOPMENT OF DETAILED REVIEW PROGRAM CHECKLIST
- IDENTIFICATION AND COLLECTION OF INFORMATION (PROCEDURES, SPECIFICATIONS, DRAWINGS, CALCULATIONS, ETC.)
- REVIEW OF DESIGN CRITERIA AND COMMITMENTS
 - IDENTIFICATION OF UNIQUE FEATURES, CIRCUMSTANCES, OR DESIGN CHANGES ASSOCIATED WITH EACH DESIGN AREA
 - REFINEMENT OF SCOPE
- DESIGN REVIEW
 - REVIEW OF IMPLEMENTING DOCUMENTS
 - CHECK OF ANALYSES, CALCULATIONS, AND EVALUATIONS
 - CONFIRMATORY CALCULATIONS OR EVALUATIONS
 - CHECK OF DRAWINGS AND SPECIFICATION
 - VERIFICATION OF CONFIGURATION
- IDENTIFICATION OF POTENTIAL FINDINGS



TECHNICAL REVIEW TASKS
(CONTINUED)

- EVALUATION OF SIGNIFICANCE OF FINDINGS
- SENIOR REVIEW TEAM EVALUATION
- FORWARDING OF FINDINGS TO DESIGN ORGANIZATIONS AND EVALUATION OF THEIR RESPONSE
- DOCUMENTATION/REPORTING



SCOPE OF DESIGN REVIEW

- REVIEW OF DESIGN CRITERIA AND COMMITMENTS
 - REGULATIONS
 - LICENSING COMMITMENTS
 - DESIGN OUTPUTS WHICH SERVE AS CRITERIA INPUTS TO OTHER DESIGN AREAS

- REVIEW OF IMPLEMENTING DOCUMENTS
 - EXISTENCE OF IMPLEMENTING DOCUMENT (E.G. PROJECT INSTRUCTIONS, DISCIPLINE DESIGN INSTRUCTIONS, CALCULATIONS/EVALUATIONS ETC.)
 - DESIGN CRITERIA PROPERLY DEFINED AND INTERPRETED
 - CLOSEOUT (CALCULATIONS/EVALUATIONS SIGNED OFF IN ACCORDANCE WITH INSTRUCTIONS)

- CHECK OF ANALYSES, CALCULATIONS AND EVALUATIONS
 - SAMPLING CHECK OF ORIGINAL ANALYSES, CALCULATIONS OR EVALUATIONS; REVIEW OF
 - DESIGN INPUTS (INCORPORATION OF DESIGN CRITERIA, CONFORMANCE WITH COMMITMENTS, TRANSFER OF INFORMATION)
 - ASSUMPTIONS



SCOPE OF DESIGN REVIEW

(continued)

- METHODOLOGY (INCLUDING ANALYTICAL TECHNIQUES, EVALUATION PROCEDURES)
 - VALIDATION AND USE OF COMPUTER CODES
 - REVIEW OF OUTPUTS
 - COMPLIANCE WITH CODES, STANDARDS, NRC GUIDANCE
-
- CONFIRMATORY CALCULATIONS OR EVALUATIONS
 - "BLIND" INDEPENDENT RE-ANALYSIS OR RE-EVALUATION FOR SELECTED DESIGN AREA(S)
 - INDEPENDENT RE-ANALYSIS OR RE-EVALUATION FOR DESIGN AREA THAT MAY BE SUSPECT ON BASIS OF A REVIEW OF ORIGINAL CALCULATIONS OR EVALUATIONS
 - ALTERNATIVE TECHNIQUES, SIMPLE BOUNDING EVALUATIONS OR DETAILED ANALYTICAL TECHNIQUES MAY BE EMPLOYED

 - CHECK OF DRAWINGS AND SPECIFICATIONS
 - VERIFICATION THAT THE DRAWING OR SPECIFICATION REFLECTS DESIGN REQUIREMENTS SPECIFIED IN THE DESIGN CALCULATIONS OR EVALUATIONS



SCOPE OF DESIGN REVIEW
(continued)

- VERIFICATION OF CONFIGURATION
 - INSTALLATION OF SYSTEM IN ACCORDANCE WITH P&IDs
 - INSTALLATION OF COMPONENTS AND PIPING IN ACCORDANCE WITH ARRANGEMENT DRAWINGS AND ISOMETRICS (APPROXIMATE LOCATION AND ORIENTATION)
 - INSPECTION OF SELECTED FEATURES FOR COMPLIANCE WITH DESIGN DETAILS (APPROXIMATE DIMENSIONS)
 - VERIFICATION THAT EQUIPMENT PART NUMBERS AGREE WITH DRAWINGS AND SPECIFICATIONS



**PRELIMINARY MIDLAND INDEPENDENT DESIGN VERIFICATION
REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM**

DESIGN AREA	SCOPE OF REVIEW					
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS	VERIFICATION OF CONFIGURATIONS
I. <u>AFW SYSTEM PERFORMANCE REQUIREMENTS</u>						
SYSTEM OPERATING LIMITS	X	X	X			
ACCIDENT ANALYSIS CONSIDERATIONS	X					
SINGLE FAILURE	X	X	X			
TECHNICAL SPECIFICATIONS	X					
SYSTEM ALIGNMENT/SWITCHOVER	X	X				
REMOTE SHUTDOWN	X					
SYSTEM ISOLATION/INTERLOCKS	X	X				
OVERPRESSURE PROTECTION	X					
COMPONENT FUNCTIONAL REQUIREMENTS	X	X	X		X	
SYSTEM HYDRAULIC DESIGN	X	X	X			
SYSTEM HEAT REMOVAL CAPABILITY	X	X	X			
COOLING REQUIREMENTS	X					
WATER SUPPLIES	X	X				
PRESERVICE TESTING/CAPABILITY FOR OPERATIONAL TESTING	X					
POWER SUPPLIES	X	X				
ELECTRICAL CHARACTERISTICS	X					
PROTECTIVE DEVICES/SETTINGS	X	X			X	
INSTRUMENTATION	X	X	X		X	
CONTROL SYSTEMS	X	X	X			
ACTION SYSTEMS	X					
NDE	X					
MATERIALS SELECTION/TRACEABILITY	X					

**PRELIMINARY MIDLAND INDEPENDENT DESIGN VERIFICATION
REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM (CONTINUED)**

DESIGN AREA	SCOPE OF REVIEW					
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS	VERIFICATION OF CONFIGURATIONS
II. <u>AFW SYSTEM PROTECTION FEATURES</u>						
SEISMIC DESIGN	X					
● PRESSURE BOUNDARY	X	X	X	X	X	
● PIPE/EQUIPMENT SUPPORT	X	X	X	X	X	X
● EQUIPMENT QUALIFICATION	X	X	X		X	X
HIGH ENERGY LINE BREAKS	X					
● PIPE W/ HIP	X	X				
● JET IMPINGEMENT	X					
ENVIRONMENTAL PROTECTION	X					
● ENVIRONMENTAL ENVELOPES	X	X	X	X	X	
● EQUIPMENT QUALIFICATION	X	X	X		X	X
● HVAC DESIGN	X					
FIRE PROTECTION	X	X	X			
MISSILE PROTECTION	X					
SYSTEMS INTERACTION	X					
III. <u>STRUCTURES THAT HOUSE THE AFW SYSTEM</u>						
SEISMIC DESIGN/INPUT TO EQUIPMENT	X	X	X		X	
WIND & TORNADO DESIGN/MISSILE PROTECTION	X					
FLOOR PROTECTION	X					
HELB LOADS	X					
CIVIL/STRUCTURAL DESIGN CONSIDERATIONS	X					
● FOUNDATIONS	X	X	X			
● CONCRETE/STEEL DESIGN	X	X	X			
● TANKS	X	X	X			

CONFIRMATORY ANALYSES, CALCULATIONS
OR EVALUATIONS

PIPE STRESS EVALUATION

- SCOPE
 - PIPING PROBLEM FROM AFW PUMP 6" Ø DISCHARGE LINE
 - MODEL DEVELOPED FROM FIELD VERIFIED DRAWINGS
 - DEADWEIGHT, PRESSURE AND SEISMIC LOADS CONSIDERED
 - HIGHER STRESSED POINTS COMPARED TO DESIGN ANALYSIS

PIPE SUPPORT

- SCOPE
 - SEVERAL SUPPORTS ASSOCIATED WITH PIPING VERIFICATION TO BE SAMPLED (E.G. SNUBBER, RIGID RESTRAINT, SPRING HANGER)
 - FIELD VERIFICATION TO BE PERFORMED
 - STRESS CALCULATION FOR SAMPLED SUPPORTS BASED UPON PIPING VERIFICATION LOADS
 - LOAD COMPARISON TO DESIGN LOADS FOR REMAINDER OF SUPPORTS ASSOCIATED WITH PIPING VERIFICATION



CONFIRMATORY ANALYSES CALCULATIONS
OR EVALUATIONS

(continued)

ENVIRONMENTAL ENVELOPE EVALUATION

- SCOPE
 - TEMPERATURE/PRESSURE/HUMIDITY ENVIRONMENT FOR A SELECTED COMPARTMENT OUTSIDE CONTAINMENT
 - MODEL DEVELOPMENT TO INCLUDE INDEPENDENT VERIFICATION OF INPUT PARAMETERS (E.G. VENT AREAS, COMPARTMENT VOLUMES, ETC.)
 - ENVELOPE COMPARED TO DESIGN ENVELOPE USED FOR THE QUALIFICATION OF EQUIPMENT AND STRUCTURE



TERA CORPORATION

CRITERIA FOR ISSUING A FINDING

- LICENSING CRITERIA OR COMMITMENTS ARE NOT MET
- DESIGN METHODOLOGY DEFICIENCY (E.G. FAILURE TO USE ACCEPTED ANALYTICAL APPROACH, USE OF INCORRECT INPUTS, ETC.)
- QUALITY ASSURANCE PROGRAM AND DESIGN CONTROL IMPLEMENTATION NONCONFORMANCE
- INDEPENDENT CALCULATION RESULTS DIFFER FROM DESIGN ANALYSIS
- DIFFERENCE BETWEEN DESIGN OUTPUT AND THAT WHICH IS CALLED FOR IN A PROCUREMENT SPEC
- DIFFERENCE IN FIELD CONFIGURATION VERSES AS-BUILT DRAWINGS



TREATMENT OF FINDINGS

- CLASSIFICATION OF FINDINGS BY LEAD REVIEWER
 - OPEN - POTENTIAL FOR BECOMING CONFIRMED FINDING
 - CONFIRMED - JUDGED TO BE AN APPARENT ERROR NECESSITATING ADDITIONAL INVESTIGATION (E.G. FURTHER DOCUMENTATION, ANALYSES, DESIGN/CONSTRUCTION CHANGES)
 - RESOLVED - ONGOING REVIEW OF ADDITIONAL INFORMATION LEADS TO CLOSEOUT OF FINDINGS (ROOT CAUSE IDENTIFIED AND IMPACT ASSESSED)
- INTEGRATED REVIEW BY PROJECT TEAM UNDER DIRECTION OF PROJECT MANAGER
 - FURTHER TECHNICAL REVIEW TO CLARIFY, EXPAND OR REASSESS
 - REVIEW OF CLASSIFICATION
- PREPARATION OF ERROR REPORTS
- SENIOR REVIEW TEAM REVIEW
 - POSSIBLE IDENTIFICATION OF NEED FOR CLARIFICATION, EXPANSION OF REVIEW OR REASSESSMENT
 - EVALUATION OF SAFETY SIGNIFICANCE
- FORWARDING OF FINDINGS AND ERRORS TO CPC AND ORIGINAL DESIGN ORGANIZATIONS FOR THEIR REVIEW AND RESPONSE
- REVIEW OF DESIGN ORGANIZATION RESPONSE TO ERROR REPORTS



**ADDITIONAL VERIFICATION AND
SAMPLING**

- UNDERTAKEN FOR FINDINGS CLASSED "OPEN" FOR RECLASSIFICATION TO "CONFIRMED" OR "RESOLVED"

- ROOT-CAUSE IDENTIFICATION
 - RANDOM ERROR

 - SYSTEMATIC ERROR

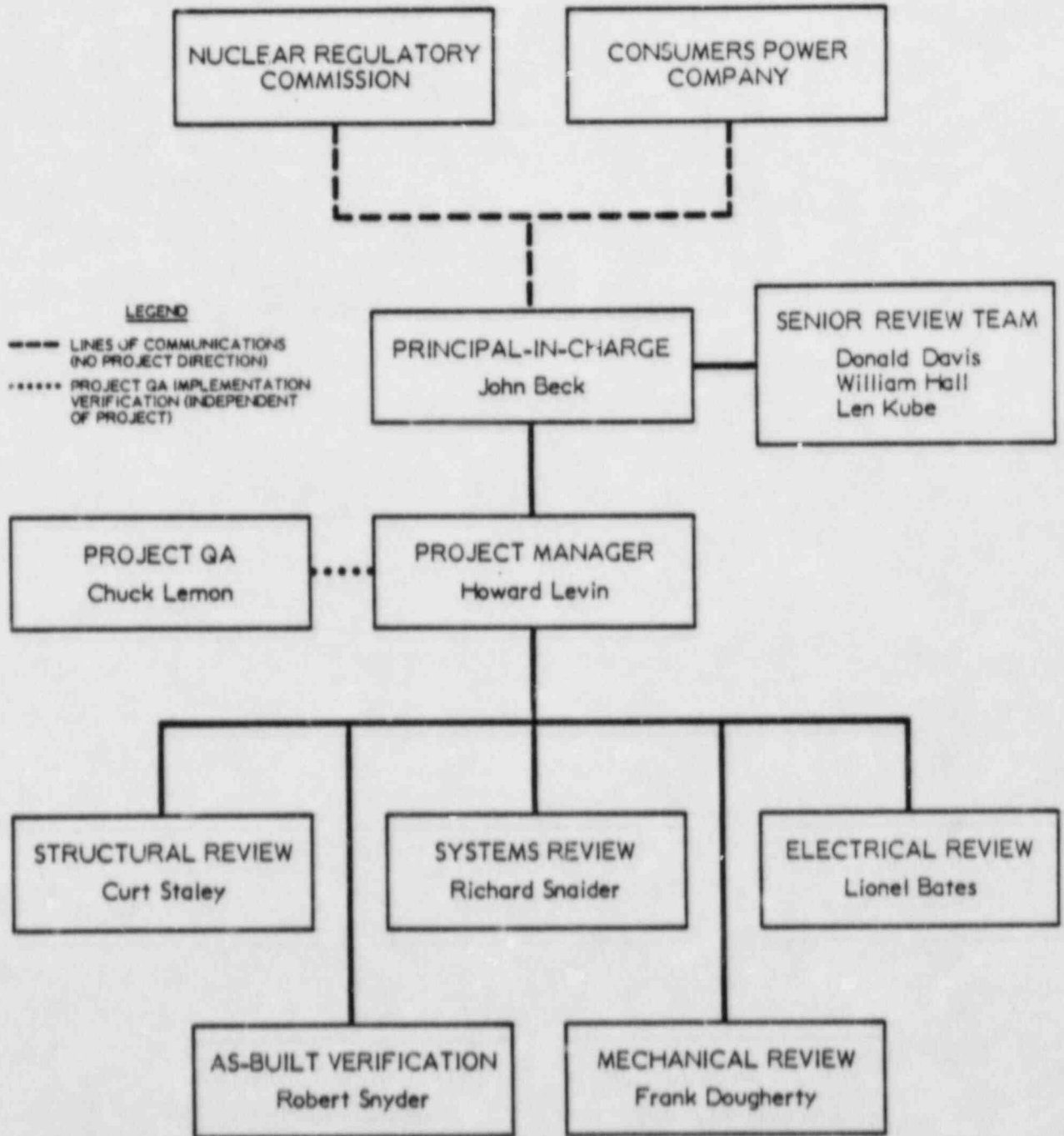
- DETERMINATION OF EXTENT

- IMPROVEMENT OF LEVEL OF CONFIDENCE

- BOTH INPO AND IDV FINDINGS WILL BE CONSIDERED



PROJECT ORGANIZATION
MIDLAND INDEPENDENT DESIGN VERIFICATION



KEY PERSONNEL
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM

- PROJECT DIRECTION

JOHN BECK, PRINCIPAL-IN-CHARGE

NUCLEAR POWER PLANT OPERATIONS AND CORPORATE
MANAGEMENT, LICENSING, ENGINEERING AND PROJECT
MANAGEMENT

HOWARD LEVIN, PROJECT MANAGER

NUCLEAR POWER PLANT STRUCTURAL, MECHANICAL DESIGN
AND CONSTRUCTION, EQUIPMENT QUALIFICATION, OPERATING
REACTOR SAFETY, LICENSING, PROJECT MANAGEMENT

- SENIOR REVIEW TEAM

DONALD DAVIS, TERA

NUCLEAR SAFETY AND LICENSING, PLANT AND REACTOR
SYSTEMS, THERMAL-HYDRAULIC ANALYSIS, ACCIDENT
ANALYSIS

WILLIAM J. HALL, UNIVERSITY OF ILLINOIS

ENGINEERING ANALYSIS AND DESIGN, STRUCTURAL
ENGINEERING, STRUCTURAL MECHANICS AND DYNAMICS, SOIL
MECHANICS, FRACTURE MECHANICS, ENGINEERING CRITERIA
DEVELOPMENT FOR MAJOR PROJECTS

LEONARD KUBE, MAC

NUCLEAR SAFETY AND LICENSING, QUALITY PROGRAMS,
PROJECT MANAGEMENT



KEY PERSONNEL

(continued)

• DESIGN REVIEW TEAM

CURT STALEY, LEAD STRUCTURAL REVIEWER

NUCLEAR POWER PLANT STRUCTURAL, MECHANICAL DESIGN,
CONSTRUCTION PROJECT MANAGEMENT AND CONTROL

FRANK DOUGHERTY, LEAD MECHANICAL REVIEWER

NUCLEAR POWER PLANT MECHANICAL DESIGN, QUALITY
ASSURANCE, SAFETY AND RELIABILITY ANALYSIS, SYSTEM
DESIGN/CRITERIA DEVELOPMENT

RICHARD SNAIDER, LEAD SYSTEMS REVIEWER

NUCLEAR POWER PLANT OPERATIONS, MAINTENANCE AND
DESIGN, SYSTEMS ENGINEERING, LICENSING PROJECT
MANAGEMENT, MECHANICAL ENGINEERING

ROBERT SNYDER, LEAD FIELD VERIFICATION

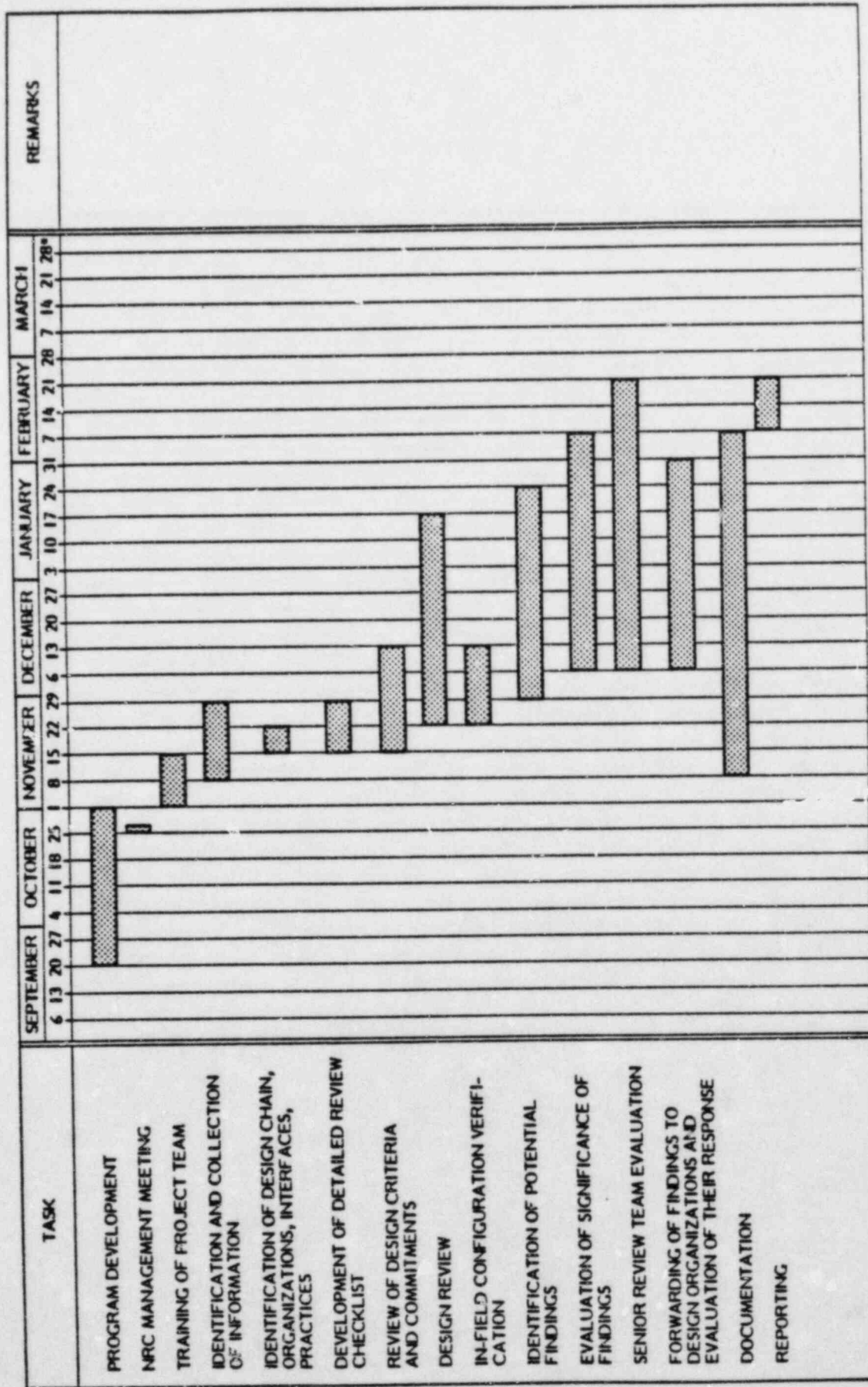
NUCLEAR POWER PLANT DESIGN AND CONSTRUCTION,
PROJECT MANAGEMENT, START-UP AND OPERATIONS

LIONEL BATES, LEAD ELECTRICAL REVIEWER

NUCLEAR POWER PLANT ELECTRICAL, INSTRUMENTATION
AND CONTROL SYSTEMS DESIGN, EQUIPMENT QUALIFICATION,
PLANT OPERATIONS AND MAINTENANCE



SCHEDULE FOR MIDLAND INDEPENDENT DESIGN VERIFICATION



• DATES BEGIN ON MONDAY

ENCLOSURE 4

GAP LETTER TO NRC

GOVERNMENT ACCOUNTABILITY PROJECT

Institute for Policy Studies
1901 Que Street, N.W., Washington, D.C. 20009

(202) 234-9382

October 22, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. J.G. Keppler
Administrator, Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

RE: Midland Nuclear Power Plant, Units I & II
-Consumers Power Company Quality Assurance
Program Implementation for Soils Remedial Work
-Consumers Power Company Midland Plant Independent Review
Program

This letter provides additional comments to the current negotiations between the Nuclear Regulatory Commission ("NRC") and Consumers Power Company ("CPCo") regarding two major areas of concern to local citizens and our own staff:

- 1) soils remedial construction; and
- 2) Independent Review Program.

On behalf of those former employees, local citizens and the Lone Tree Council, the Government Accountability Project ("GAP") reviewed the various proposals submitted by the licensee of an independent review program as well as their description of the independent soils assessment program. Our questions and comments about both programs are outlined below. We appreciate the opportunity to provide this information.

Based on our review of the licensee proposals, we are asking the NRC to not approve the independent audit proposal in its present form. Further, we request on behalf of the local residents that live and work around the plant that the details of the independent contract be finalized in a series of public meetings--one in Jackson, Michigan (the corporate home of CPCo) and one in Midland, Michigan (the plant site). Further, we ask that the public comment offered at these two meetings, as well as this letter, be included in the analysis of CPCo's proposal.

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This request is consistent with Mr. Keppler's stated intention to invite public comment surrounding Midland's problems; and also in line with Region III policy surrounding the Zack controversy at LaSalle, which allowed several public participants to comment and suggest improvements in the independent audit of the Heating, Ventilating and Air Conditioning ("HVAC") equipment imposed on Commonwealth Edison by the NRC.

As you know, it is the position of our project that the only avenue to restore public confidence in a nuclear power plant that has suffered from extreme loss of credibility is to offer the public the opportunity to participate in the decision-making process. This is particularly applicable to the situation at the Midland plant.

Clearly the utility and the regulators are aware of the substantial problems that have occurred in building the Midland plant. Indeed, it is the history of these problems that have led to this meeting in the first place. Yet, apparently there has been little desire to tackle the real issue of corporate negligence in the construction of this plant.

Background

The Government Accountability Project is a project of the Institute for Policy Studies. It is a national public interest organization that assists individuals, often called "whistleblowers," who expose waste, fraud or abuse in the federal workplace; or safety and health hazards within communities through GAP's Citizen's Clinic for Accountable Government. As an organization dedicated to protecting individuals who have the courage to bring information forward on behalf of their fellow citizens GAP has had a close working relation with various Congressional and Senatorial committees, government agencies and other public interest organizations.

In recent years GAP has been approached by a growing number of nuclear witnesses from various nuclear power plants under construction. In keeping with its objectives the GAP Whistleblower Review Panel and the Citizens Clinic Review Panel have directed the staff to pursue aggressively the complaints and problems that nuclear workers bring forward. Our first case involving a nuclear witness began when we were approached by a Mr. Thomas Applegate about serious problems at the William H. Zimmer Nuclear Power Station near Cincinnati Ohio. As you are aware Mr. Applegate's allegations and the subsequent investigations, reinvestigations, Congressional inquiries, and intense public scrutiny have revealed the Mr. Applegate exposed only the tip of the iceberg of problems. Zimmer was recently described in the Cleveland Plain Dealer as "the worst nuclear construction project in the midwest, possibly the country...." (October 3, 1982.)*

*This article also referred to the Midland Plant. Mr. John Sinclair, an NRC inspector, responded to the question of whether there are other "Zimmers" around the country by stating that Zimmer's problems were similar to those found at [Midland]."

Following the GAP staff work at Zimmer we received a request from the Lone Tree Council of the Tri-City Michigan area to pursue worker allegations of major problems at the Midland Nuclear Power Plant in Midland, Michigan. Our preliminary investigation resulted in six affidavits being filed with the Nuclear Regulatory Commission on June 29, 1982. Since then we have filed an additional four affidavits resulting from the HVAC quality assurance breakdown revelations. We are also preparing an expanded affidavit of one of our original witnesses, Mr. E. Earl Kent, of serious welding construction problems at the Midland site. Other worker allegations ranging from security system breakdowns to worker safety problems have come to our attention at an alarming rate.

The Citizens Clinic Review Panel a panel of seven respected individuals, met recently to review the status of Clinic cases. It was their unanimous recommendation to begin a thorough and aggressive probe of Midland's problems. We look forward to beginning that probe shortly. Unfortunately our previous experience at Zimmer and LaSalle has given us a good idea of what to look for and what we will find.

I. SOILS REMEDIAL WORK

The 1980/81 SALP Report, issued April 20, 1982 gave CPCo a Category 3 rating in soils and foundations.

A Category 3 rating, according to the SALP criteria states:

Both NRC and licensee attention should be increased... weaknesses are evident; licensee resources appear to be strained or not effectively used such that minimally satisfactory performance with respect to operational safety or construction is being achieved.

Clearly this rating, the lowest rating that can be given was deserved by the licensee. Although the soils settlement problems have resulted in the most serious construction problems that CPCo has faced, the SALP report points out in its analysis:

In spite of this attention, every inspection involving regional based inspectors and addressing soils settlement issues has resulted in at least one significant item of non-compliance. (p. 9)

This trend continues to the present date. As recently as May 20, 1982, Mr. R.B. Landsman the soils specialist of the Region III Midland Special Team discovered significant differences between the as-built condition of the plant in relation to the soils remedial work and the approved April 30, 1982 ASLB order.

Harold R. Denton
J.G. Keppler

- 4 -

October 22, 1982

Although Mr. Landsman had no quarrel with the technical aspects of the excavation in question he had a significant disagreement with the licensee's failure to notify NRR of their plans. He aptly captured the essence of the problem in his August 24, 1982 memo to Mr. W.D. Shafer, Chief of the Midland Section:

Since the licensee usually does not know what is in the ground or where it is, as usual the 22 foot duct bank was found at approximately 35 feet. It also was not in the right location. . . in addition, . . . they inadvertently drilled into the duct bank. . . .

On August 20, 1982 Mr. Keppler requested the Office of Investigations to investigate two instances of apparent violation of the April 30, 1982 ASLB Order.

This latest experience with the licensee's failure to comply with NRC requirements is indicative of the reasons that the Advisory Committee on Reactor Safeguards, in a letter to NRC Chairman Nunzio Palladino, deferred its approval of full power operation of the Midland plant until an audit of the plant's quality. This QA program audit is to include electrical, control, and mechanical systems as well as underground piping and foundations.

Now CPCo is again asking for "another chance" to get its corporate act together. They offer to institute a series of steps to "enhance the implementation of the quality program with regard to the soils remedial work" (Letter to Mr. Harold Denton from Mr. James Cook, September 17, 1982, p. 2.) Unfortunately, as pointed out below, the program on soils remedial work leaves much to be desired if public confidence is to be restored in the ultimate safety of the Midland plant.

A. Consumers Power Company Retention of Stone & Webster as a Third Party to Independently Assess the Implementation of the Auxillary Building Underpinning Work

Based on a careful investigation of Stone & Webster's ("S&W") performance in the nuclear power industry this decision, already made, may unfortunately for the licensee prove to be as disastrous as the pre-load operation of several years ago.

Our assessment is based on information obtained from the NRC Public Documents Room, private audits of S&W's performance on nuclear projects, legal briefs from intervenors, NRC "Notice of Violation" reports, public source information, and interviews with intervenors, engineers, as well as current and former employees of the NRC familiar with S&W's work.

1. History

S&W has been the chief contractor and architect/engineer at eight plants now operating, and for six plants presently under construction. In reviewing numerous documents concerning two nuclear plants now under construction at which S&W was, or still is, the Project Manager and chief architect/engineer, this investigation has documented S&W's reputation for massive cost overruns at its nuclear construction sites, major problems with Quality Control and construction management, and significant design errors at a number of these plants. The Shoreham plant on Long Island, N.Y., and the Nine Mile 2 plant near Syracuse, N.Y., are both infamous nuclear boondoggles constructed by S&W.

a) Nine Mile 2

The Nine Mile 2 plant has been described as a "disaster area." Cost overruns have gone from an original 360 million to 3.7 billion dollars, and the NRC has cited the plant for numerous violations. According to an article in the Syracuse Post-Standard newspaper (May 17, 1982), "Nearly everything that can go wrong with a major construction project has beset Nine Mile 2."

In 1980 Niagara Mohawk, the utility which is building the plant, hired the firm of Black and Veatch Consulting Engineers to conduct and "independent assessment" of the management systems, costs, and work accomplished at the Nine Mile 2 plant. The final Project Evaluation Report (September 1980) was extremely critical of S&W's performance, describing their work as "poor," "lacking" and "confused." The evaluation found 127 problem areas at the plant. Below is a list of some of the problems S&W were explicitly cited for:

- * Failure to effectively implement the Quality Control program.
- * Significant overruns against budget.
- * Ineffective Project Management Reports.
- * Inadequate management control of engineering work.
- * Engineering Management System was "never properly implemented on the Unit 2 project."
- * "Key components of good cost control are not present.
- * Inadequate "problem identification, impact analysis, and descriptions of corrective action plans."
- * Failure to keep abreast of regulatory changes.

- * Drawings used for construction based on unapproved documents.
- * Inadequate construction pro-planning/constructability review.
- * Inaccuracies in the engineering and procurement status which have diminished user confidence in existing reports.

Many of the conditions cited in this audit have not been improved. According to a May 17, 1982 inspection letter from the NRC, S&W has failed to remedy these identified problems:

There is a significant problem in the timeliness of corrective action resulting from S&W responses to Niagara Mohawk audit findings. Determination of corrective action to be taken is repeatedly delayed due to either belated answers by S&W and/or inadequate responses by S&W. NMPC Quality Assurance Management has been unable to correct the problem.

On top of these problems, the NRC cited S&W, in the May 17, 1982 letter, for "significant" nonconformances with NRC regulations. One major problem was found in S&W's philosophy on QC. Instead of analyzing problems to find their causes, S&W would just put the identified mistake into "technical acceptability." According to the NRC, this caused a repetition of problems:

The lack of identification and correction of the root cause of the nonconformance has led to numerous nonconformances being written in a short period of time involving the same functional area. . . .

The QC program was also cited for its lack of training and its high personnel turnover.

S&W also failed to properly oversee subcontractors at Nine Mile 2. For example, over 300 bad welds were identified as made by one sub-contractor. These faulty welds were discovered after S&W inspectors had certified that they met construction standards. (Post-Standard, May 19, 1982.)

b) Shoreham

S&W was the Project Manager and chief architect/engineer at Shoreham. In September 1977 the Long Island Lighting Company ("LILCo"), the utility which is building the Shoreham plant, removed S&W as Project Manager. Although initially denied, LILCo reports obtained by intervenors in discovery, have documented LILCo's dissatisfaction with S&W--dissatisfaction which led to their termination.

In an April 1977 report (Shoreham Nuclear Power Station Schedule and Construction Management Evaluation), prepared by LILCo's Project Manager and other LILCo engineers, S&W was criticized and the utility was urged to terminate their services. Examples of S&W's unsatisfactory performance outline in this report were:

- * Design problems.
- * Inaccurate monitoring and controlling systems.
- * Unnecessary and redundant procedures.
- * Responsibility for cost overruns.

Other LILCo documents charged:

- * Failure to produce or meet work schedules.
- * Inability to adequately define urgent needs.
- * Poor physical work documents.

Shoreham, described by the New York State Public Service Commission as "seriously deficient," has suffered from cost overruns which will make the electricity produced at the plant the most costly of any nuclear plant in the country. The overrun has been from 265 million to 2.49 billion dollars.

S&W was also at fault with Shoreham's largest design error. The reactor size which was originally planned for Shoreham was increased, but S&W failed to make adjustments and increases in the size of the reactor building. According to Newsday, this error had led to costly design problems and changes, and cramped work space within the reactor building.

Shoreham has also been cited by the NRC for numerous violations. Between 1975 and 1981 the Commission cited Shoreham for 46 violations. For example, S&W was cited for repeatedly failing to have electrical cables installed correctly, and for allowing dirt in sensitive areas.

2. Problems Found in S&W Operating Reactors

Most serious for the Midland plant was our discovery of S&W's work at the North Anna Plant.

a) North Anna

According to a Washington Star article (May 5, 1978), the North Anna plant has suffered from serious design problems regarding soils settlement. A pumphouse, designed to funnel cooling water into the

reactor in event of a nuclear emergency, "settled" into the ground at a much higher rate than planned. In only six years the pump-house sunk more than 79% of the amount planned for its forty year life expectancy. This settlement caused "cracks in nearby walls and forced accordion-like pleats to be added to nearby pipes." According to the Star, this soils problem could lead to the plant's premature closing.

Other mechanical malfunctions have also been reported at North Anna. For example, a malfunction in a steam pump and turbine contributed to a "negligible" overexposure of five plant workers to radiation, and the release of contaminated gas. (Washington Post, September 27, 1979.)

It is incredulous to us that the NRC could allow S&W, a construction firm that has caused untolled amounts in cost overruns, shut-down damaged plants and lengthy lists of NRC violations to be transformed into an independent party, capable of enough internal reform to audit the work of the Bechtel construction of the Midland plant.

Further, S&W committed a serious design error in the vital cooling system's pipe design. This error potentially rendered the pipes exposed to failure in the event of even a minor earthquake, and could have created a major nuclear accident. Upon discovery of the error, the NRC ordered all five plants temporarily closed for investigation and repair. (Excerpt from the Public Meeting Briefing on Seismic Design Capability of Operating Reactors, NRC, June 28 1979.)

When the NRC entered these plants to inspect the pipes, they found additional problems. According to the NRC document Surry I, Beaver Valley and FitzPatrick all suffered from "significant differences between original design and the 'as built' conditions...." For example, Surry I had the following problems: "mislocated supports, wrong support type, and different pipe geometry."

b) Other plants

All of the other operating nuclear plants investigated reported numerous problems. For example, in 1981 a faulty weld at the Beaver Valley plant caused a "minor leakage" of radioactivity into the local environment. Within one year after the Maine Yankee was turned on in 1972, 58 "malfunctions" were reported, including leaks in the cooling water systems. A review of the NRC report--Licensed Operating Reactors Status Report--of May 1982 revealed that all S&W plants were operating at an operating history of below 80% of the industry goal. Beaver Valley, for example, had a lifetime operating history of only 30%.

3. Stone & Webster Corporate Attitude

Our review of S&W's past attempts at constructing nuclear power plants prevents us from being convinced of anything but a future that is a dismal repeat of the past.

This fear was confirmed by an article written by the Chairman and Chief Executive Office of Stone and Webster, Mr. William T. Allen, Jr. in the Public Utilities Fortnightly, May 13, 1982, entitled "Much of the Anxiety about Nuclear Power Is Needless."

In this article Mr. Allen displays a critical disregard and disrespect for the regulatory system that this nation has mandated to protect its citizens from the corporate instincts of profit and survival. His dialogue begins by labeling the public as apathetic about energy needs. He wishfully hypothesizes a 12% boost of electrical demand for a single year when the economy recovers.

Mr. Allen moves quickly to his conclusion that the energy needs of the future can be met with only coal and nuclear power, but his real point is made when he calls for the "necessary institutional adjustments to revitalize the nuclear industry." Mr. Allen's view of the revitalization is a chilling indication of his companies' commitment to safety. This excerpt is most revealing:

[W]e are working, along with others in the industry, in support of those activities which we hope will restore nuclear power to a state of robust health. In that connection, one specific effort we have undertaken within Stone & Webster is the consolidation and analysis of recent data pertaining to the amount of radiation which possibly would be released to the environment in the event of an accident in a nuclear power plant. . . . [B]ased on information our people have assembled it now is becoming clear to the scientific and engineering communities that criteria established years ago, but still in use today, are incredibly and needlessly conservative."

This quoted paragraph captures Mr. Allen's observations although he goes on to attempt to convince his "apathetic public" that the three basic components in the source term (the quantity of radioactivity postulated to be available for leakage from the reactor containment into the environment) are needlessly conservative. The arguments into the size of a "safe dose of radioiodine" contradict all other literature we have reviewed on the subject. Mr. Allen's attempts to allay the fears of the public about nuclear power have only increased the fears that GAP has about its allegedly independent audit of the soils work.

If Mr. Allen's corporation believes the regulations over nuclear power are needlessly conservative, and he is not concerned with the

levels of radioiodine, I find it difficult to believe he will approach the Midland Auxillary Building with the attitude it will take to produce any replica of a safe nuclear facility.

As a result of our investigation, and our well-known support for independent audits of nuclear construction projects, it is impossible for GAP to accept the S&W review of the soils work under the Auxillary Building as anything more than another licensee "rubber stamp."

B. Recommendations

It is the recommendation of the Government Accountability Project that certain minimum requirements be used by the NRC in determining the acceptability of independent audit charters. Further we recommend that the Midland public meeting (infra, at 15) include a presentation of the charters, and the availability of the auditors for public questioning into the understanding of this contract responsibility. These charters should include the following:

- 1) The independent contractor should be responsible directly to the NRC, Submitting all interim and final product simultaneously with CPCo, and the NRC.

This is somewhat different from the proposal explained in the CPCo letters, which suggests that all reports would first be processed through the licensee.

- 2) The independent contractor should do a historical assessment of CPCo's prior work, including a frank report of the causes of the soils settlement problem.

This suggestion from the ACRS July 9, 1982 letter, is particularly appropriate to get on the public record.

- 3) The charter should ensure that, once hired, CPCo cannot dismiss the independent contractor from the project without prior notice to the NRC and a NRC-sponsored public meeting to justify the decision.

Further, the NRC should make it clear that the licensing conditions will not be met for Midland if the NRC does not approve of any such dismissal. Although CPCo is hiring and paying several auditors, their credibility in the eyes of the public will be voided without a truly independent accountability structure. Otherwise the entire exercise is little better than an expensive public relations gimmick.

- 4) The charter should require that each auditor, at least 5 already identified, sub-contract any services for which its

direct personnel are not qualified.

Proof of qualifications should be provided for every task in the Midland contracts.

- 5) The charter should require that the proposed methodology be disclosed; specifically selection criteria and size of the samples for inspections and testing.

This is particularly critical with the proposed audits of the historical quality assurance breakdown. It is impossible to have any confidence in the results of an independent inspection and testing program if the selection criteria and size of the sample are a mystery.

- 6) The charter should require the auditors to provide calculations demonstrating that it is possible to adequately complete its work during the proposed timeframe.

This is particularly important at the Midland site where "rush jobs" are all too common under the pressure of the 1984 deadline.

- 7) The charter should require the auditors to support its proposed methodology through references to established professional codes (ASIM, ASME, ANSI, AWS, etc.).

This will insure that the methodology is a product of professional standards, rather than CPCo's timetable for operations. This is particularly important in the light of recent disclosures putting the Bechtel codes in opposition to the AWS codes.

- 8) The charter's should require all auditors to report all safety-related information directly to the NRC.

CPCo's own judgment in determining when to inform the NRC, and about what, is highly suspect. Only with stringent guidelines for an independent auditor is there any hope for public trust in the work performed on CPCo's payroll.

- 9) The employees and auditors should demonstrate that the personnel assigned to the project are free from conflicts of interest.

In the October 5 letter, CPCo references the conflict of interest points presented in a February 1, 1982 letter from NRC Chairman Nunzio Pallidino to Representative John Dingell. These five points should apply to all employees of the audit teams. It is insufficient for the company to be free of conflicts of interest if the key fact finders and decision-makers are not.

It seems only reasonable that all auditors should guarantee and demonstrate the absence of any conflicts of interest on the organizational and individual levels. Insignificant conflicts should be fully disclosed and explained, subject to the NRC's approval.

- 10) The auditors must recommend corrective action, and then control its implementation.

If the independent auditors are not allowed to develop corrective actions the teams become a highly paid research department for the licensee. The NRC must receive the independent recommendations of the auditor teams prior to the finalizations of any licensee plan on any system. Without this final and critical step there will be no resolution of the key question--can Midland ever operate safely?

II. CONSUMERS POWER COMPANY INTEGRATION OF THE SOILS QA AND QA/QC FUNCTIONS UNDER THE DIRECTION OF MPQAD

This reorganization, putting CPCo in charge of the Quality Assurance/Quality Control program raises serious questions in our analysis. First, CPCo has consistently disregarded the importance of Quality Assurance/Quality Control in the past. Nothing in their historical performance or their recent past indicates that CPCo's MPQAD has the type of serious commitment to QA/QC that will produce meticulous attention to detail. Further, the experience that GAP's witnesses have had with MPQAD have been far from favorable. In fact, all of our witnesses (but one who resigned after refusing to approve faulty equipment) have tried in vain to get their in-house management to do something about their allegations. All of them were dismissed--the result of their efforts to ensure a safe nuclear plant.

Mr. Dean Darty, Mr. Terry Howard, Mrs. Sharon Morella, Mr. Mark Clons and Mr. Charles Grant have attested to the failure of the MPQAD. If the Zack experience has demonstrated nothing else, it has certainly left a clear warning to construction employees that committing the truth is not a virtue at the Midland site.

GAP's previous experience with nuclear construction projects that take total control of a QA program has firmly been negative. At Zimmer the switch from contractor to owner brought with it deliberate coverups instead of corporate bungling. We believe that based on CPCo's previous performance and attitude that it is unacceptable for CPCo to offer their MPQAD to be the new answer to an old problem.

In a September 30, 1982 Midland Daily News article, Mr. Wayne Shafer stated that the new move to put CPCo at the helm will give

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them "first hand knowledge" of the problems with the Midland plant. Mr. Shafer has apparently mistaken Midland for Zimmer on a very serious point.

At Zimmer the owner, Cincinnati Gas and Electric Company, was fined \$200,000.00 in November 1981. They claimed that their main failure was to supervise their contractor, Kaiser, in the construction. At Midland there has never been a question of who is in control of the construction decisions. CPCo has consistently had some degree of involvement--usually substantial--with the history of problems on the site.

III. CONSUMERS POWER COMPANY HAS PROPOSED A SINGLE-POINT ACCOUNTABILITY SYSTEM TO ACCOMPLISH ALL WORK COVERED BY THE ASLB ORDER

Although none of the documentation defines what "single-point accountability" is, there is some hint through other comments from CPCo. In both the September 17, 1982 letter from Mr. Cook to Messrs. Keppler and Denton and several local newspapers, there is a specific reference to "good and dedicated" employees. Even Robert Warnick, acting director of the Office of Special Cases, stated in the September 30, 1982 Midland Daily News article, "Consumers to Take Responsibility for QC":

It'll only work if you've got good, strong people doing the job. I guess the proof of the pudding is in the performance.

We agree whole heartedly with Mr. Warnick. GAP has always maintained that the only way to make any regulatory system work effectively is to have strong, trustworthy individuals of high integrity. As a project GAP has watched many "good, strong people" attempt to do their jobs correctly, only to be scorned, fined and ostracized by corporations or bureaucracies that ignored their responsibility to the public.

Ironically, perhaps the strongest, most credible good person GAP has worked with recently was fired by Bechtel and CPCo from the Midland site--Mr. E. Earl Kent.

Mr. Kent's allegation's were among those submitted on June 29, 1982 to the NRC. After GAP submitted his allegations to the NRC, Mr. Kent prepared his evidence and documentation for the anticipated visit by NRC investigators. Unfortunately the investigators never arrived. In mid-August, at Mr. Kent's own expense, he went to the Regional Office of the NRC to talk to the government officials charged with investigating his allegations. He wanted to insure that the investigators understood completely the detail and specifically of his claims about the problems at Midland. Further he

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wanted to clarify that the NRC was aware of his knowledge about serious hardware problems at the two other sites. Mr. Kent was seriously disappointed in his reception.

Following the mid-August visit, GAP wrote a letter to Mr. James Keppler, Regional Director, emphasizing our concerns about Mr. Kent's visit. In the three months following the submission of Mr. Kent's claims--serious construction flaws--there remained no efforts on the part of the NRC, other than Mr. Kent's own, to begin to untangle the mystery of Bechtels' inadequate welding procedures.

Mr. Kent's personal life has been irrevocably harmed as he has waited patiently for his allegations to be substantiated by the nuclear regulators that he placed his trust in. He has been unemployed for nearly a year. His professional reputation hangs in the balance of an ongoing federal investigation. His financial condition has dropped daily. However, it was not until a few weeks ago that Mr. Kent gave up on the NRC. Like so many other good strong workers before him, Mr. Kent sincerely believed that the regulators would pursue his allegations made in defense of the public health and safety, instead he discovered an agency promoting the industry positions.

Last week WXYZ Television Station, in Detroit, the Los Angeles Times, the Wall Street Journal, the Detroit Free Press, numerous local stations in California and Michigan--both radio and television, and national wire services carried the details of Mr. Earl Kent's allegations.

In the wake of the public revelation of Mr. Kent's claims the NRC has finally acted. The Region III office, in a flurry of "catch-up work," finally sent the affidavit to the Region V office. Region V investigators met with Mr. Kent for a seven and a half hour session on October 15, 1982. . Unfortunately, the intent of their questioning raises extensive concerns among GAP staff who have worked with nuclear witnesses and the NRC before. In fact, one of the first comments made by one of the investigators was to inform Mr. Kent that his allegations were well-known now all over the United States, as "well as Russia."

The direction of the NRC's questioning was obvious to Mr. Kent. He remains unconvinced that there will be an aggressive investigation into the allegations he has been making for the past eighteen months. His concerns over serious structural flaws at three nuclear plants remain as real as when he risked--and lost--his career to bring them to the attention of his industry supervisors.

Mr. Kent is by far one of the most credible and honest individuals with whom GAP has had the opportunity to work. Our investigation

of his qualifications, professional experience, and contributions to the field of welding impressed us even more than his humility and integrity. I urge either or both of you to personally talk to Mr. Kent if there is any doubt about the allegations that he is making, or about the seriousness of the consequences if these problems that he has identified remain unresolved.

Mr. Warnick's statement about the "proof being in the pudding" seems hopelessly blinded as to the experience of nuclear witnesses at the Midland facility.

A single-point accountability system certainly depends on strong individuals, but with CPCo's reputation for swift and cruel disposition of those workers who point out problems, only a fool would allow himself to be placed in a position of single-point accountability ("SPA").

In order for this proposition to have any credibility GAP recommends that this critical QA/QC link be explained fully at the GAP-proposed meeting in Jackson, Michigan. Along with specific details of this SPA system, we would request that the individual or individuals who are to perform this function explain their personal approach to their position.

Along with the above, GAP recommends the following structural elements be included in this ombudsman program:

- 1) Final approval of the individual(s) should rest with the NRC in a courtesy agreement between CPCo and Region III.
- 2) The SPA officials should have at least one meeting with those public nuclear witnesses who do not believe their allegations have been resolved. This visit should include a site tour structured by the witness to satisfy himself/herself whether repairs have been made on the systems he/she raised questions about. No group of individuals is better prepared to or qualified to assist with identifying problems to be corrected than the witnesses themselves.
- 3) These SPA officials should have frequent (weekly) regularly scheduled meetings with the public to discuss the status of the repair work. These meetings should include an honest discussion of all problems encountered in construction. This "good faith" measure on the part of the utility would do much to recapture some of its lost credibility.

IV. UPGRADED TRAINING ACTIVITIES AND THE QUALITY IMPROVEMENT PROGRAM

The concepts incorporated into the proposals on upgraded retraining were largely positive steps forward. GAP's analysis specifically

approves of the extensive training efforts--including the test pit--to provide as much direct training for workers and quality control personnel involved in the massive work involved. Most specifically GAP appreciates the efforts to increase communication between "individual feedback

We would like to have more specific information on the mechanisms within the Quality Improvement Program for feedback. Further, if these steps are deemed appropriate to the soils project it would seem only reasonable to incorporate them throughout the construction project. Our analysis of the QIP was limited by the lack of information and we look forward to receiving more detail before the final assessment.

GAP recommends that the training session that covers Federal Nuclear Regulations, the NRC Quality Programs in general and the Remedial Soils Quality Plan be expanded significantly and that the NRC review and comment on the training materials.

Further, that the NRC provide a summary of its intentions and expectations of workers-in soils remedial work as well as QA in general.

GAP also requests that Mr. Keppler conduct a personal visit to the site, similar to his visit to Zimmer, and talk to all the QA/QC employees as soon as possible.

V. INCREASED MANAGEMENT INVOLVEMENT

Finally we express reservations about the increased senior management involvement. While we recognize the intent of this commitment, we are concerned with the lack of corporate character demonstrated to date. It appears quite clear to us that there has been extensive senior management level direct participation to date. That involvement has been less than complimentary to CPCo. In recent months the "argumentative attitude" of CPCo officials have emerged in many forums:

- An August article in the Detroit News, in which President John Selby said he was tired of "subsidizing the public."
- The June and July public "red-baiting" of GAP for its work on behalf of citizens and former workers.
- The recent distribution of a flyer accusing a Detroit television station of "sensationalist and yellow journalism."
- The continuous attempts to influence and intimidate local reporters, editors and newspapers to print only biased accounts of the Midland story.

Although approving in principal of the weekly in depth reviews of all aspects of the construction project, we remain skeptical of this step doing anything to improve the Midland situation. Certainly it should not be confused with the independent audit recommendation of the ACRS, ASLB, and NRC staff.

VI. INPO EVALUATION

The answer to the mystery of Midland's problems is to be provided by an INPO evaluation conducted by qualified, independent contractors. This results from the June 8, 1982 ACRS report, and the July 9, 1982 NRC staff letter requesting such an assessment.

The proposal offered by CPCo, a replica of INPO criteria for independent evaluations, is divided into three parts:

- 1) Horizontal type review;
- 2) Biennial QA Audit; and
- 3) Independent Design Verification (Vertical slice).

It is particularly distressing to us to note that CPCo received proposals and then selected the Management Analysis Company ("MAC") to perform two of the three audits.

MAC is far from an independent contractor on CPCo construction projects. In fact, MAC has been involved with both the Midland and Palisades projects at various times throughout the past decade. For example:

- In 1981 MAC performed an assessment of the hardware problems on site. They failed to identify Zack's continuing HVAC problems, the bad welds in the control panals, and improper welds and cable tray/hanger discrepancies.
- Further, MAC failed to identify the problems of uncertified and/or unqualified welders on site.

GAP strongly disagrees with the choice of MAC. It is an insult to the NRC and the public to accept MAC's review of its own previous analysis as a new and independent audit. Although Mr. L.J. Keebe appears to be both an experienced and credible individual, it does not remove the connection of MAC to two other CPCo-Bechtel productions. This relationship is simply too close for the comfort of the public.

The MAC INPO review may be extremely valuable to CPCo officials as a self-criticism review, however, it should not be presented to the NRC as "independent" by any stretch of the imagination.

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Further, there was a marked lack of specific methodology and information about the audit to be performed. GAP staff was particularly disappointed with the lack of specificity into the work to be performed by the "experts." [This report read more like a college term paper review than a technical review of a crucial independent audit.]

It confirms GAP's overall reservations about INPO audits as building an effective wall between the public and the true nature of the problems on the site. Our reservations seems confirmed with reference to establishing layers of informal reporting-- including an initial verbal report to the project--before the actual acknowledgement of identified problems. (October 5, 1982 letter, p. 12.)

The selection of the Tera Corporation to perform the Independent Design Verification is more positive. (GAP was unable to determine whether or not the Tera Corporation has been involved previously with the Midland plant.) Tera's work experience, as presented in the October 5, 1982 letter, at the Vermont Yankee Nuclear Power Plant has been determined to be both extremely thorough and of high quality. The Yankee Plant is rated among the best operating nuclear power plants (those with the least problems) according to the Nuclear Power Safety Report: 1981 (Public Citizen). With the acknowledgement of previous reservations and recommendations about independent audit work at Midland, we concur with the selection of the Tera Corporation for the Independent Design Verification.

The October 5 letter referred extensively to the confirmation of installed systems reflecting system design requirements. GAP hopes that, unlike other audits we have seen, the Tera Corporation does not simply confirm the findings.

Additionally GAP requests that the entire record of comments, investigations and additional information will be provided to the NRC, and also placed in the Public Documents Room, as opposed to CPCo's offer to "maintain" the "auditable record."

There was no reference to the percentage of the work that would be audited by a field verification. This is critical to any type of credible independent review of construction, particularly at plants like Midland and Zimmer where every weld and cable is suspect. We believe the percentage of field review should be established.

The discrepancies documented throughout the review ("findings") should be reported to the NRC simultaneously with the referral to senior level review teams. There is little point to delaying the referral of the findings -- only delays the inevitable, taking time that CPCo doesn't have.

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J.G. Keppler

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VII. CONCLUSION

The evidence of noncompliances, improprieties, quality assurance breakdowns, misrepresentations, false statements, waste, corporate imprudence and massive construction failures repeatedly meets the general NRC and Region III criteria for suspension of a construction permit or the denial of an operating license. The NRC's own assessment concludes that Midland's Quality Assurance Program--the backbone of any safe nuclear construction--had generic problems. Mr. Keppler concluded that, next to Zimmer, Midland was the worst plant in his region. Last year William Dircks classified it as one of the worst five plants in the country.

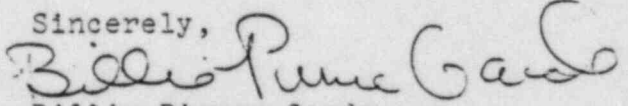
In recent months Midland has been the subject of repeated revelations and accusations of construction flaws, coverups, and negligence. The evidence already on the record is indicative of a significant failure on the part of CPCo to demonstrate respect for the nuclear power it hopes to generate, or the agency which regulates its activities.

CPCo has taken repeated risks with its stockholders' investments, its corporate credibility and its regulatory image. In each of these risks it has lost. It is too much to expect citizens to accept CPCo's arrogant disregard for the public's health and safety.

GAP recognizes the steps forward by the Regional office--establishing a Special Section to monitor Midland's problems and the request for an independent audit. However, this must only be the beginning.

CPCo has numerous problems to worry about, and it is clearly not in their own best interest to put the strictest possible construction on the regulations under which they have agreed to build this nuclear facility. It is for just this reason that the nuclear industry is regulated -- but even regulation, fines, extensive public mistrust, and corporate embarrassment have not humbled Consumers Power Company. If Midland is ever going to be a safe nuclear facility, someone else is going to have to put their professional credibility on the line. This independent auditor, paid by CPCo, must be given strict guidelines for accountability and responsibility in order to justify its hard line recommendations.

GAP hopes that both the Office of Nuclear Reactor Regulation and the Region III office of the NRC will give serious consideration to GAP's concerns and recommendations set forth above and implement a system whereby there is a truly independent system of auditing the extensive problems with the Midland plant.

Sincerely,

Billie Pirner Garde
Director, Citizens Clinic for
Accountable Government



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

Keppler

February 15, 1979

MEMORANDUM FOR: H. D. Thornburg, Director, Division of Reactor
Construction Inspection, IE

FROM: James G. Keppler, Director

SUBJECT: MIDLAND SUMMARY REPORT

The attached report, which represents Region III's overall assessment of the Midland construction project to date from a regulatory standpoint, was discussed with you and representatives from your staff, NRR, and OELD during our meeting at HQ's on February 6, 1979. During that meeting, it was concluded that this report should be provided to OELD for transmittal to the Licensing Board and the various parties to the Hearing. As such, this information is being forwarded for your action.

We believe the meeting was quite useful in receiving feedback from the various NRC people involved relative to our position on the status of this facility.

Please contact me if you have any questions regarding this matter.

James G. Keppler
James G. Keppler
Director

Attachment:
Midland Summary Report

~~8104160335~~

MIDLAND SUMMARY REPORT

Facility Data

Docket Numbers - 50-329 and 50-330
Construction Permits - CPPR-81 and CPPR-82
Permits Issued - December 14, 1972
Type Reactor - PWR; Unit 1, 492 MWe*; Unit 2, 818 MWe
NSSS Supplier - Babcox & Wilcox
Design/Constructor - Bechtel Power Corporation
Fuel Load Dates - Unit 1, 11/81; Unit 2, 11/80
Status of Construction - Unit 1, 52%, Unit 2, 56%; Engineering 80%

*Approximately one-half the steam production for Unit 1 is dedicated, by contract, to be supplied to Dow Chemical Corporation, through appropriate isolation heat exchangers. Capability exists to alternate to Unit 2 for the steam source upon demand.

Chronological Listing of Major Events

July 1970 Start of Construction under exemption
9/29 70 & 10/1 70 Site inspection, four items of noncompliance identified, extensive review during CP hearings
1971 - 1972 Plant in mothballs pending CP
12/1 70 CP issued
9/71 Inspection at Bechtel Ann Arbor offices, five items of noncompliance identified
11/71 Inspection at site, four items of noncompliance identified (cadweld problem) precipitated the Show Cause Order
12/1 72 Licensee answers Show Cause Order commits to improvements on QA program and QA/QC staff
12/3 73 Show Cause Order issued suspending cadwelding operation
12/6-7/73 Special inspection conducted by RIII & HQ personnel
12/17/73 Show Cause order modified to allow cadwelding based on inspection findings of 12/6-7/73

12/5/76 CP reported that rebar spacing out of specification 50
locations in Unit 2 containment

3/5 & 10/75 CP reported that 63 #6 rebar were either missing or
misplaced in Auxiliary Building

3/12/75 RIII held management meeting with CP

8/21/75 CP reported that 42 sets of #6 tie bars were missing in Auxiliary Building

3/22/76 CP reported that 32 #8 rebar were omitted in Auxiliary Building. A stop-work order was issued by CP

3/26/76 RIII inspector requested CP to inform RIII when stop-work order to be lifted and to investigate the cause and the extent of the problem. Additional rebar problems identified during site inspection

3/31/76 CP lifted the stop-work order

4/19 thru 5/14/76 RIII performed in-depth QA inspection at Midland

5/14/76 RIII management discussed inspection findings with site personnel

5/20/76 RIII management meeting with CP President, Vice President, and others.

6/7 & 8/76 RIII follow up meeting with CP management and discussed the CP 21 correction commitments

6/1-7/1/76 Overall rebar omission reviewed by R. E. Shewmaker

7/28/76 CP stops concrete placement work when further rebar placement errors found by their overview program. PN-III-76-52 issued by RIII

8/2/76 RIII recommends HQ notice of violation be issued

8/9 - 9/9/76 Five week full-time RIII inspection conducted

8/13/76 Notice issued

10/29/76 CP responded to HQ Notice of Violations

12/10/76 CP revised Midland QA program accepted by NRR

2/28/77 Unit 2 bulge of containment liner discovered

4/19/77 Tendon sheath omissions of Unit 1 reported

4/29/77 IAL issued relative to tendon sheath placement errors

5/5/77 Management meeting at CP Corporate Office relative to IAL regarding tendon sheath problem

- 5/24-27/77 Special inspection by RIII, RI and HQ personnel to determine adequacy of QA program implementation at Midland site
- 6/75 - 7/77 Series of meetings and letters between CP and NRR on applicability of Regulatory Guides to Midland. Commitments by CP to the guides was responsive
- 7/24/78 Construction resident inspection assigned
- 8/21/78 Measurements by Bechtel indicate excessive settlement of Diesel Generator Building. Officially reported to RIII on September 7, 1978
- 12/78 - 1/79 Special investigation/inspection conducted at Midland sites Bechtel Ann Arbor Engineering offices and at CP corporate offices relative to Midland plant fill and Diesel Generator building settlement problem

Selected Major Events

Past Problems

1. Cadweld Splicing Problem and Show Cause Order

A routine inspection, conducted on November 6-8, 1973, as a result of intervenor information, identified eleven examples of four noncompliance items relative to rebar Cadwelding operations. These items were summarized as: (1) untrained Cadweld inspectors; (2) rejectable Cadwelds accepted by QC inspectors; (3) records inadequate to establish cadwelds met requirements; and (4) inadequate procedures.

As a result, the licensee stopped work on cadweld operations on November 9, 1973 which in turn stopped rebar installation. The licensee agreed not to resume work until the NRC reviewed and accepted their corrective action. However, Show Cause Order was issued on December 3, 1973, suspending Cadwelding operations. On December 6-7, 1973 RIII and HQ personnel conducted a special inspection and determined that construction activity could be resumed in a manner consistent with quality criteria. The show cause order was modified on December 17, 1973, allowing resumption of Cadwelding operations based on the inspection results.

The licensee answered the Show Cause Order on December 29, 1973, committing to revise and improve the QA manuals and procedures and make QA/QC personnel changes.

Prehearing conferences were held on March 28 and May 30, 1974, and the hearing began on July 16, 1974. On September 25, 1974, the Hearing Board found that the licensee was implementing its QA program in compliance with regulations and that construction should not be stopped.

2. Rebar Omission/Placements Errors Leading to IAL

Initial identification and report of rebar nonconformances occurred during an NRC inspection conducted on December 11-13, 1974. The licensee informed the Inspector that an audit had identified rebar spacing problems elevations 642' - 7" to 652' - 9" of Unit 2 containment. This item was subsequently reported per 10 CFR 50.55(e) and was identified as a item of noncompliance in report Nos. 50-329/74-11 and 50-330/74-11.

Additional rebar deviations and omissions were identified in March and August 1975 and in April, May and June 1976. Inspection report Nos. 50-329/76-04 and 50-330/76-04 identified five noncompliance items regarding reinforcement steel deficiencies.

and concrete placement work

Licensee response dated June 18, 1976, listed 21 separate items (commitments) for corrective action. A June 24, 1976 letter provided a plan of action schedule for implementing the 21 items. The licensee committed not to resume concrete placement work until the items addressed in licensee's June 24 letter were resolved or implemented. This commitment was documented in a RIII letter to the licensee dated June 25, 1976. Although not stamped as an IAL, in-house memos referred to it as such.

Rebar installation and concrete placement activities were resumed in early July 1976, following completion of the items and verification by RIII.

Additional action taken is as follows:

a. By the NRC

- (1) Assignment of an inspector full-time on site for five weeks to observe civil work in progress
- (2) IE management meetings with the licensee at their corporate offices
- (3) Inspection and evaluation by Headquarter personnel

b. By the Licensee

- (1) June 18, 1976 letter committing to 21 items of corrective action
- (2) Establishment of an overview inspection program to provide 100% reinspection of embedments by the licensee following acceptance by the contractor QC personnel

c. By the Contractor

- (1) Personnel changes and retraining of personnel
- (2) Prepared technical evaluation for acceptability of each identified construction deficiency
- (3) Improvement in their QA/QC program coverage of civil work (this was imposed by the licensee)

3. Tendon Sheath Placement Errors and Resulting Immediate Action Letter (IAL)

On April 19, 1977, the licensee reported, as a Part 50, Section 50.55(e) item, the inadvertent omission of two hoop tendon sheaths from a Unit 1 containment concrete placement at

elevation 703' - 7". The tendon sheaths were, for the most part, located at an elevation in the next higher concrete placement lift, except that they were diverted to the lower placement lift to pass under a steam line penetration and it was where they were omitted. Failure to rely on the proper source documents by construction and inspection personnel, contributed to the omission.

An IAL was issued to the licensee on April 29, 1977, which spelled out six licensee commitments for correction which included: (1) repairs and cause corrective action; (2) expansion of the licensee's QC over view program; (3) revisions to procedures and training of construction and inspection personnel.

A special QA program inspection was conducted in early May 1977. The inspection team was made up of personnel from RI, RIII, and HQ. Although five items of noncompliance were identified, it was the consensus of the inspectors that the licensee's program was an acceptable program and that the Midland construction activities were comparable to most other construction projects.

The licensee issued its final report on August 12, 1977. Final review on site was conducted and documented in report No. 50-329/77-08.

Current Problems

1. Plant Fill - Diesel Generator Building Settlement

The licensee informed the RIII office on September 8, 1978, of per requirements of 10 CFR 50.55(e) that settlement of the diesel generator foundations and structures were greater than expected.

Fill material in this area was placed between 1975 and 1977, with construction starting on diesel generator building in mid-77. Filling of the cooling pond began in early 1978 with the spring run-off water. Over the year the water level has increased approximately 21 feet and in turn increasing the site ground water level. It is not known at this time what effect (if any) the higher site ground water level has had on the plan fill and excessive settlement of the Diesel Generator Building. It is interesting to note however, that initially the PSAR indicated an underdrain system would be installed to maintain the ground water at its normal (pre pond) level but that it later was deleted.

The NRC activities, to date, include:

- a. Transfer of lead responsibility to NRR from IE by memo dated November 17, 1978
- b. Site meeting on December 3-4, 1978, between NRR, IE, Consumers Power and Bechtel to discuss the plant fill problem and proposed corrective action relative to the Diesel Generator Building settlement
- c. RIII conducted an investigation/inspection relative to the plant fill and Diesel Generator Building settlement

The Constructor/Designer activities include:

- a. Issued NCR-1482 (August 21, 1978)
- b. Issued Management Corrective Action Report (MCAR) No. 24 (September 7, 1978)
- c. Prepared a proposed corrective action option regarding placement of sand overburden surcharge to accelerate and achieve proper compaction of diesel generator building sub soils

Preliminary review of the results of the RIII investigation/inspection into the plant fill/Diesel Generator Building settlement problem indicate many events occurred between late 1973 and early 1978 which should have alerted Bechtel and the licensee to the pending problem. These events included nonconformance reports, audit findings, field memos to engineering and problems with the administration building fill which caused modification and replacement of the already poured footing and replacement of the fill material with lean concrete.

2. Inspection and Quality Documentation to Establish Acceptability of Equipment

This problem consists of two parts and has just recently been identified by RIII inspectors relative to Midland. The scope and depth of the problem has not been determined.

The first part concerns the adequacy of engineering evaluation of quality documentation (test reports, etc.) to determine if the documentation establishes that the equipment meets specification and environmental requirements. The licensee,

by the Licensee's
Review Program

on November 13, 1978, issued a construction deficiency report (10 CFR 50.55(e)) relative to this matter. Whether the report was triggered by RIII inspector inquiries or by IE Circular or Bulletin is not known. An interim report dated November 28, 1978 was received and stated Consumers Power was pursuing this matter not only for Bechtel procured equipment but also for NSS supplied equipment.

The second part of the problem concerns the adequacy of equipment acceptance inspection by Bechtel shop inspectors. Examples of this problem include: (1) Decay Heat Removal Pumps released by the shop inspector and shipped to the site with one pump assembled backwards, (2) electrical penetrations inspected and released by the shop inspector for shipment to the site. Site inspections to date indicate about 25% of the vendor wire terminations were improperly crimped.

Inspection History

The construction inspection program for Midland Units 1 and 2 is approximately 50% complete. This is consistent with status of construction of the two units. (Unit 1 - 52%; Unit 2 - 56%) In terms of required inspection procedures approximately 25 have been completed, 33 are in progress and 36 have not been initiated.

The routine inspection program has not identified an unusual number of enforcement items. Of the selected major events described above, only one is directly attributable to RIII enforcement activity (Cadweld splicing). The other were identified by the licensee and reported through the deficiency report system (50.55(e)). The Midland data for 1976 - 78 is tabulated below

<u>Year</u>	<u>Number of Noncompliances</u>	<u>Number of Inspections</u>	<u>Inspector Hours On Site</u>
1976	14	9	646
1977	5	12	648
1978	11	18	706

A resident inspector was assigned to the Midland site in July 1978. The on site inspection hours shown above does not include his inspection time.

The licensee's QA program has repeatedly been subject to in-depth review by IE inspectors. Included are:

1. July 23-26 and August 8-10, 1973, inspection report Nos. 50-329/73-06 and 50-330/73-06: A detailed review was conducted relative to the implementation of the Consumers Power Company's QA manual and Bechtel Corporation's QA program for design activities at the Bechtel Ann Arbor office. The identified concerns were reported as discrepancies relative to the Part 50, Appendix B, criteria requirements.

2. September 10-11, 1973, report Nos. 50-329/73-08 and 50-330/73-08: A detailed review of the Bechtel Power Corporation QA program for Midland was performed. Noncompliances involving three separate Appendix B criteria with five different examples, were identified.
3. February 6-7, 1974, reports No. 50-329/74-03 and 50-330/74-03: A followup inspection at the licensee's corporate office, relative to the items identified during the September 1973 inspection (above) along with other followup.
4. June 16-17, 1975, report Nos. 50-329/75-05 and 50-330/75-05: Special inspection conducted at the licensee's corporate office to review the new corporate QA program manual.
5. August 9 through September 9, 1976, report Nos. 50-329/76-08 and 50-330/76-08: Special five-week inspection regarding QA program implementation on site primarily for rebar installation and other civil engineering work.
6. May 24-27, 1977, report Nos. 50-329/77-05 and 50-330/77-08: Special inspection conducted at the site by RIII, IE and RI personnel to examine the QA program implementation on site by Consumers Power Company and by Bechtel Corporation. Although five examples of noncompliance to Appendix B, Criterion V, were identified, the consensus of the inspectors involved was that the program and its implementation for Midland was considered to be adequate.

Although the licensee's Quality Assurance program has undergone a number of revisions to strengthen its provisions, no current concern exist regarding its adequacy. Their Topical QA Plan has been reviewed and accepted by NRR through revision. Implementation of the program has been and continues to be subject to further review with the mid-construction program review presently scheduled for March or April 1979.

Consumers Power Company expanded their QA/QC auditing and surveillance coverage to provide extensive overview inspection coverage. This began in 1975 with a commitment early in their experience with rebar installation problems and was further committed by the licensee in his letter of June 18, 1976, responding to reports Nos. 50-329/76-03 and 50-330/76-04. This overview inspection activity by the licensee has been very effective as a supplement to the contractor's own program. Currently, this program is functioning across all significant activities at the site.

Enforcement History

Approximately 6 months after resumption of construction activities (11 months after CP issuance) an inspection identified four noncompliance items regarding cadwelding activities. This resulted in a show cause order being issued on December 3, 1973. This enforcement action was aired publicly during hearings held by the Atomic Safety Licensing Board in May 1974. The hearing board issued its decision in September 1974

that concluded that construction could proceed with adequate assurance of quality.

Identification of reinforcing bar problems began in December of 1974 with the licensee reporting improper spacing of rebar in the Unit 2 containment wall. Further reinforcing bar spacing and/or omission of rebar was identified in August 1975 and again in May 1976 with the citations of 5 noncompliances in an inspection report. An IE:HQ notice of violation was issued regarding the citations in addition to the licensee issuing a stop work order. The licensee issued a response letter dated June 18, 1976 committing to 21 items of corrective action. A Bechtel prepared technical assessment for each instance of rebar deficiency was submitted to and review by IE:HQ who concluded that the structures involved will satisfy the SAR criteria and that the function of these structures will be maintained during all design conditions. The RIII office of NRC performed a special five week inspection to assess the corrective action implementation without further citation.

The licensee reported that two hoop tendon sheaths were omitted in concrete placements of Unit 2 containment wall in April 1977. An Immediate Action Letter was issued to the licensee on April 29, 1977 listing six items of licensee commitments to be completed. A special inspection was performed on May 24-27, 1977 with four NRC inspectors (1-HQ, 1-RI, and 2-RII). Although five items of noncompliance were identified, it was the consensus of the inspectors that the QA/QC program in effect was adequate. The constructors nonconformance report provided an alternate method of installation for the tendon sheaths that was accepted.

The RIII office of inspection and enforcement instituted an augmented on site inspection coverage program during 1974, this program has continued in effect ever since and is still in effect. It is noted that the noncompliance history with this program is essentially the same as the history of other RIII facilities with a comparable status of construction. Further on site inspection augmentations was accomplished with the assignment of a full time resident inspector in August, 1978.

The noncompliance history for the Midland Project is provided in the following table.

ENFORCEMENT ACTIONS

Noncompliances

<u>Year</u>	<u># Total</u>	<u>Criteria (10 CFR 50 Appendix B)</u> <u>() Number of Occurrences</u>
1970	4	V, X, XI, XVI
1971-1972	0	Construction halted pending CP
1973	9	II V(5) XIII, XV, XVII
1974	3	V(2) XI
1975	0	
1976	10	V(4) X, XII, XV, XVI, XVII, XVIII
1977	5	V(5) 10 CFR 50.55(e) item
1978	11	V(4) VI(2), VII, IX(3), XVI

Criteria

II	QA Program
V	Instructions Procedures Drawing Control Work
VI	Document Control
VII	Control of Purchased Material
IX	Control of Special Processes
X	Inspection
XII	Control Measuring - Test Equipment
XIII	Handling - Storage
XV	Nonconforming Parts
XVI	Corrective Actions
XVII	QA Records
XVIII	Audits

Summary and Conclusions

Since the start of construction Midland has experienced some significant problems resulting in enforcement action. In evaluating these problems they have occurred in clumps: (1) in September 1970 relative to improper placement, sampling and testing of concrete and failure of QA/QC to act on identified deficiencies; (2) in September 1973 relative to drawing control and lack of or inadequate procedures for control of design and procurement activities at the Bechtel Engineering offices; (3) in November 1973 relative to inadequate training, procedures and inspection of cadweld activities; (4) in April, May and June 1976 resulting from a series of RIII in-depth QA inspections and meetings to identify underlying causes of weakness in the Midland QA program implementation relative to embedments. (The noncompliance items identified involved inadequate quality inspection, corrective action, procedures and documentation, all primarily concerned with installation of reinforcement steel); (5) in April 1977 relative to tendon sheath omissions; and (6) in August 1978 concerning plant soil foundations and excessive settlement of the Diesel Generator Building.

Following each of these problem periods (excluding the last which is still under investigation), the licensee has been responsive and has taken extensive action to evaluate and correct the problem and to upgrade his QA program and QA/QC staff. The most effective of these licensee actions has been an overview program which has been steadily expanded to cover almost all safety related activities.

The evaluation both by the licensee and IE of the structures and equipment affected by these problems (again except the last) has established that they fully meet design requirements.

Since 1974 these problems have either been identified by the licensee's quality program or provided direction to our inspectors.

Looking at the underlying causes of these problems two common threads emerge: (1) Consumers Power historically has tended to over rely on Bechtel, and (2) insensitivity on the part of both Bechtel and Consumers Power to recognize the significance of isolated events or failure to adequately evaluate possible generic application of these events either of which would have led to early identification and avoidance of the problem including the last on plant fill and diesel generator building settlement.

Notwithstanding the above, it is our conclusion that the problems experienced are not indicative of a broadbreakdown in the overall quality assurance program. Admittedly, deficiencies have occurred which should have been identified earlier by quality control personnel, but the licensee's program has been effective in the ultimate identification and subsequent correction of these deficiencies. While we cannot dismiss the possibility that problems may have gone undetected by the licensee's overall quality assurance program, our inspection program has not identified significant problems overlooked by the licensee --- and this inspection effort has utilized many different inspectors.

The RIII project inspectors believe that continuation of: (1) resident site coverage, (2) the licensee overview program including its recent expansion into engineering design/review activities, and (3) a continuing inspection program by regional inspectors will provide adequate assurance that construction will be performed in accordance with requirements and that any significant errors and deficiencies will be identified and corrected.

U. S. NUCLEAR REGULATORY COMMISSION
REGION III

SUBJECT: BOND RELEASE OF [REDACTED] - [REDACTED] CONTRACT

DATE:

CONTENTS MUST NOT BE REMOVED

RETURN TO: REGION III CENTRAL FILES