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Docket Nos. 50-329
and 50-330

MEMORANDUM FOR: Elinor G. Adensam, Chief
Licensing Branch #4, DL

FROM: Darl S. Hood, Project Manager
Licensing Branch #4, DL

SUBJECT: NOTICE OF MEETING - MIDLAND PLANT, UNITS 1 & 2
INSTRUMENTATION AND CONTROL SYSTEMS

DATE & TIME: November 17 - 20, 1981
8:30 am (except on 11/17, 10:30 am)

LOCATION: 777 Eisenhower Parkway
Ann Arbor, Michigan

PURPOSE: To discuss instrumentation and control systems for Midland Plant and to conduct detailed drawing review.

PARTICIPANTS*:

NRC

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H. Li
S. Halverson (ANL)

Bechtel

R. Hamm, et al.

Consumers Power Company

B. Harshe, et al.

Babcock & Wilcox

J. Agar, et al.

/S/

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

Enclosure:
Agenda

cc w/encl: See next page

*Meetings between NRC technical staff and applicants for licenses are open for interested members of the public, petitioners, intervenors, or other parties to attend as observers pursuant to "Open Meeting and Statement of NRC Staff Policy" 43 Federal Register 28058, 06/28/78.

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MIDLAND

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ENCLOSURE

# QUESTIONS FOR MEETING(S) WITH CONSUMERS POWER ON MIDLAND INSTRUMENTATION AND CONTROLS

Following is a list of items for discussion at meetings with the applicant to provide the NRC staff with information required to understand the design bases and design implementation for the instrumentation and control systems for Midland. The applicant should be prepared to use detailed instrument, control, and fluid system schematics at the meetings in explaining system designs and to provide verification that design bases and regulatory criteria are met.

1. Indicate the final resolution of those instrumentation and control items discussed in the Safety Evaluation Report (and supplements) issued for the construction permit which required resolution during the operating license review.

2. Identify any plant safety related system or portion thereof, for which the design is incomplete. (Due to Regulatory Guide 1.97, NUREG-0737, etc.).

3. Your responses to questions 30.56 through 30.59 on control system failure concerns are incomplete. We requested that you identify any power sources, sensors, or sensor impulse lines which provide power or signals to two or more control systems and demonstrate that failures of the power sources, sensors, or sensor impulse lines will not result in consequences outside the bounds of the Chapter 15 analyses or beyond the capability of operators or safety systems.

   The evaluation required to answer the above concerns should consist of postulating failures which affect the major control systems (both in NSSS scope and BOP scope) and demonstrating that for each failure the resulting event is within the bounds of the accident analyses. The events considered should include but not necessarily be limited to the following:

(a) Loss of any single instrument

(b) Break of any common instrument line

(c) Loss of power to any systems or equipment such as to any inverter, to any control group, or to any process rack.

The initial conditions for the analysis should be within the full operating power range of the plant (i.e., 0 - 100%).

The response to Questions 30.56 through 30.59 should be revised to specifically identify non-safety grade control systems and the impact of their failure with reference to Chapter 15 analyses that insure that these events are bounded by the plant safety analysis.

4. Operating reactor licensees were informed by IE Information Notice 79-22, issued September 19, 1979, that certain non-safety grade or control equipment, if subjected to the adverse environment of a high energy line break, could impact the safety analyses and the adequacy of the protection functions performed by the safety grade equipment.

   We are concerned that a similar potential may exist at light water facilities now under construction. You are, therefore, requested to perform a review to determine what, if any, design changes or operator actions would be necessary to assure that high energy line breaks will not cause control system failures and consequences beyond your FSAR analysis. Provide the results of your review including all identified problems and the manner in which you have resolved them.

5. Describe design criteria and tests performed on the isolation devices in the NSSS and Balance of Plant. Address results of analysis or tests performed to demonstrate proper isolation between separation groups and between safety and non-safety systems.

6. Describe the separation criteria for protection channel circuits, protection logic circuits, and non-safety related circuits.

7. Describe design compliance with Regulatory Guide 1.22 (Periodic Testing of Protection System Functions). Identify equipment not tested at full power with basis for each. Address items listed in Table 7.3-6.

8. Using detailed system schematics, describe the sequence for automatic initiation, operation, reset, and control of the auxiliary feedwater system. The following should be included in the discussion:

   a) the effects of all switch positions on system operation.

   b) the effects of single power supply failures including the effect of a power supply failure on auxiliary feedwater control after automatic initiation circuits have been reset in a post ident sequence.

   c) any bypasses within the system including the means by which it is insured that the bypasses are removed.

   d) initiation and annunciation of any interlocks or automatic isolations that could degrade system capability.

   e) the safety classification and design criteria for any air systems required by the auxiliary feedwater system. This should include the design bases for the capacity of air reservoirs required for system operation.

   f) design features provided to terminate auxiliary feedwater flow to a steam generator affected by either a steam line or feed line break.

   g) system features associated with shutdown from outside the control room.

h) logic circuits used to transfer pump suction from the Condensate Storage Tank to the safety grade service Water System including verification that all equipment used for this function is seismically qualified and protected from failure of near-by structures which may not be seismically qualified.

i) design features to insure that no single failure can result in an open flow path from the service Water System to the Condensate Storage Tank.

9. Describe the electrical power supply arrangement, air supply design features, and any interlocks associated with control and operation of the steam generator power operated relief valves.

10. Using the detailed system schematics, describe the sequence for periodic testing of the

a) main steam line isolation valves.

b) main feedwater isolation valves.

c) main feedwater control valves (safety features).

d) auxiliary feedwater system.

The discussion should include features used to insure the availability of the safety function during test and measures taken to insure that equipment cannot be left in a bypassed condition after test completion.

11. Identify any sensors or circuits used to provide input signals to the protection system which are located or routed through non-seismically qualified structures. This should include sensors or circuits providing input for reactor trip, emergency safeguards equipment such as

the auxiliary feedwater system, and safety grade interlocks. Verification should be provided that the sensors and circuits meet IEEE-279 and are seismically and environmentally qualified. Testing or analyses performed to insure that failures of nonseismic structures, mountings, etc. will not cause failures which could interfere with the operation of any other portion of the protection system should be discussed.

12. Provide, or provide a reference to, the detailed procedures used for pre-operational and periodic time response testing of the reactor protection and engineered safety feature actuation systems including sensors. Describe conformance to Regulatory Guide 1.118 and IEEE Std. 338-1975.

13. Using detailed system schematics, discuss the bypass, bypass interlock, and test provisions for containment ventilation isolation, control room ventilation isolation and fuel building isolation. The discussion should indicate those design features which insure that the safety function is not defeated during system test and that portions of the system are not inadvertently left in a bypassed condition after test.

14. Using detailed schematics and other drawings as necessary, describe the main steam and feedwater isolation valve hydraulic operators including the interfaces with the safety system electrical circuits.

15. Using detailed schematics describe the logic circuits used to accomplish automatic switchover from the injection phase of emergency core cooling to the recirculation phase after a LOCA. The discussion should include design features which insure that a single failure will neither cause premature switchover nor prevent switchover when required. Can the reset of Safety Injection Actuation prior to the automatic switchover from injection to recirculation defeat the automatic switchover?

16. Discuss design features which insure that the blocking of the operation of selected protection function actuator circuits is returned to normal operation after testing. Is reliance placed upon the operator doing this and then observing test lights in the safeguards test racks, or are there more positive means to insure that systems are returned to normal operation?

17. Section 7.4. Augment the discussion of capability of achieving hot and cold shutdown from outside the control room with specific description of Midland capability, including:

    a) list of qualified displays, location and basis for selection.

    b) description and location of auxiliary shutdown panel or equivalent.

    c) description of required controls.

    d) description of isolation, separation, and transfer/override provisions.

    e) description of any communications system required to coordinate operator actions, including redundancy, separation, and environmental qualification for local environment.

    f) description of control room annunciation of remote control or overriden status of devices under local control.

    g) description of control of access to the displays and controls located outside the control room.

    h) testing during reactor operation.

    i) means for ensuring that cold shutdown can be accomplished before Technical Specification limits on hot shutdown are exceeded.

j) discuss the separation arrangement between safety related and non-safety related instrumentation on the auxiliary shutdown panel.

18. Section 7.4, safe shutdown from outside control room. Discuss the likelihood that the Auxiliary Feedwater System will be automatically initiated on low steam generator level following a manual reactor trip initiated during a temporary evacuation of the control room. Analyses and operating experience from plants similar to Midland should be presented during the discussion. If the Auxiliary Feedwater System has a high probability of being automatically initiated as a consequence of a manual reactor trip, the capability of resetting the initiating logic from outside the control room will be needed.

19. Section 7.4, safe shutdown from outside the control room. Discuss the likelihood that emergency core cooling will be automatically initiated following a manual reactor trip initiated during a temporary evacuation of the control room. For example, is it possible for the reactor coolant system to be cooled to the point that the pressurizer empties during the time interval between manual reactor trip and the time an operator can take control of auxiliary feedwater outside the control room? Analyses and operating experience from plants similar to Midland should be presented during the discussion. Based upon the likelihood of emergency core cooling actuation following a manual reactor trip, should the capability for resetting the equipment be provided outside the control room?

20. Discuss the desirability of performing a plant test to verify the capability of maintaining the plant in a safe shutdown condition from outside the control room. Describe design compliance with Regulatory Guide 1.68.2.

21. Discuss the plans and schedule for complying with Regulatory Guide 1.97, Revision 2. Describe the conformance of the present design.

22. Using detailed system schematics, describe the sequence of operation for the Decay Heat Removal System Isolation Valves. The discussion should include the effect of various single failures in power supplies for the valves and the valve controls. Are there any single instrument bus failures which could cause inadvertent closure of RHR suction valves in both trains during a time when the system is in use for decay heat removal? Are the interlocks to prevent opening in compliance with Branch Technical Position ICSB-3?

23. Using detailed system schematics, describe the power distribution for the core flood tank valves and associated interlocks and controls, power lockout provision and the conformance with Branch Technical Position ICSB-4.

24. Using detailed system schematics, discuss the degree of redundancy in the logic for the Low Temperature Interlocks for RCS Pressure Control.

25. Describe the operation of the interlocks used for isolation of the seismic qualified portion of the component cooling water system. This discussion should include reference to the fluid system schematics in indicating which specific valves are used for the isolation function. Is there redundancy of instrumentation within each component cooling water train or is the redundancy accomplished by having one interlock for each train?

26. Describe the design features used in the rod control system which

    1) Limit reactivity insertion rates resulting from single failures within the system.

    2) Limit incorrect sequencing or positioning of control rods.

this discussion should cover the assumptions for determining the maximum control rod withdrawal speed used in the analyses of reactivity insertion transients.

27. Will automatic equipment be provided to terminate an inadvertent boron dilution?

28. Discuss use of microprocessors, telemetry systems, multiplexers or computer systems which interface directly or indirectly with safety related instrumentation and control systems.

29. Identify all remotely controlled valves in the Engineered Safety Features Systems which require power lockout during a certain mode of operation, and discuss how the design meets Branch Technical Position EICSB-18.

30. In your "design review presentation on cold shutdown" document dated March 5, 1981, which stated that necessary supporting systems and equipment such as power and control systems, cooling water, and diesel generators are not addressed in this document. Please provide brief description for these supporting systems and their design basis.

31. Using detailed schematics describe the design of Boric Acid addition control and the volume control tank level control.

32. Using detailed schematics describe the design of pressurizer PORV control and the block valves control. Also discuss procedures used during the low temperature mode of operation.

33. Provide the status of response to I&E Bulletin 79-27.

34. Provide the status of response to I&E Bulletin 80-06.

35. Describe the level measurement errors due to environmental temperature effects on level instruments including reference legs.

36. Describe the testing procedures for reactor trip system, and Engineered safety feature systems, including all the interlock, bypass, override circuits.

37. Our review of facility operating experience indicates the need for additional information regarding the proper selection of instrumentation trip setpoint values. This conclusion is supported by the large number of Licensing Event Reports (LERs) received by the Commission related to instrument setpoint drift beyond the limits permitted by facility technical specifications.

In view of the above, we require explicit information concerning each Reactor Protection System (RPS) and Engineered Safeguards Features (ESF) trip setpoint value as part of the documentation to be provided in order to complete licensing action on your facility.

Since your FSAR does not contain sufficient information necessary for our evaluation, you should provide the following values for each RPS and ESF instrumentation channel:

(a) The technical specification trip setpoint value,
(b) The technical specification allowable value (i.e., the technical specification trip setpoint plus the instrument drift assumed in the accident analysis),
(c) The instrument drift assumed to occur during the interval between technical specification surveillance tests,
(d) The components of the cumulative instrument errors (e.g., instrument calibration error, instrument drift, instrument error under environmental qualification tests and base starting margin).
(e) The minimum margin between the technical specification trip setpoint and the trip value assumed in the accident analysis.

38. Describe the steam generator level instrumentation. Identify the channels for protection functions, for control functions and for post-accident monitoring.

39. Describe the interface between the radiation monitoring system (RMS) and the ESFAS for containment ventilation and fuel building isolation to include the use of non-safety grade equipment in the RMS and ESFAS.

40. Describe features of the environmental control systems which insure that instrumentation sensing and sampling lines for systems important to safety are protected from freezing during extremely cold weather. Discuss use of environmental monitoring and alarm systems to prevent loss of, or damage to, systems important to safety upon failure of the environmental control system. Discuss electrical independence of these systems.

41. In order for staff to review the completeness and accuracy of Q-List (quality assurance items) for Instrumentation and Control Systems, the information listed in Table 3.2.1 is inadequate. Identify the specific I&C components that are in the Q-List scope.

42. Using detailed schematics and other drawings as necessary, describe the Anticipatory Reactor Trip System and its interface with Reactor Trip System and Engineered Safety Feature Actuation System.

43. Using detailed schematics describe the shutdown bypass switch development. Also describe the high flux trip setpoint changes in relation with shutdown bypass procedures.

44. Using detailed schematics, describe the parallel control arrangement between main control room control and the remote shutdown panel control functions.

45. Describe the procedures to borate the primary coolant from outside the control room when the main control room is unaccessible. How much time is there to do it?

46. The signal which initiates auxiliary feedwater when the main feedwater pumps are tripped is manually blocked by the shutdown bypass. The block is not automatically removed when the plant is returned to an operating mode where auxiliary feedwater initiation on loss of main feedwater is needed. The staff position is that the block should be automatically removed when the plant is returned to an operating mode where auxiliary feedwater initiation on loss of main feedwater is needed.

47. Using detailed schematics describe the logic and power source arrangement of feed only good steam generator (FOGG) interlock system.

48. Using detailed schematics and cabinet layout drawings, describe the Foxboro process instrument systems. Identify the scope and interface arrangement of these Foxboro cabinets with the safety related systems.

49. The letdown cooler valve interlocks have "blind" flow switches used to isolate the lines following a break. Also, blind pressure switches are used on the component cooling water side of heat exchangers. Identify other safety related I&C systems which use blind switches.

50. Using P&I diagrams and control diagrams describe the process steam system load demand transfer control from Unit 1 to Unit 2, or vice versa, and also the flow control to the process steam system.

51. Describe your equipment qualification programs for Class 1E instrumentation inside the containment. The NSSS scope of supply for I&C equipments were qualified to the LOCA environment (BAW-10003), what is the current status with

respect to qualify the Class 1E I&C equipment to the Main steam line break environment.

52. Using detailed schematics describe the protection for locked rotor or sheared shaft for the reactor coolant pumps.

53. Describe the scram time response testing.

54. Since there is only one safety grade main steam isolation valve per loop, describe the backup main steam isolation devices downstream of the MSIV.

55. It is not clear from Talbe 6.2-28, Isolation Barriers for containment penetrations, which containment isolation valves are provided with valve position indication in the control room, or whether there are safety grade position indications available. Provide the above information in FSAR Section 6.2 or 7.5.

56. FSAR Section 7.4.1.1.3.2, Auxiliary Feedwater Control, states that Dual level setpoints are used for steam generator level control. A low level setpoint is utilized when more than one RCPs is operating, and a high level setpoint is used when 3/4 RCPs are tripped. The setpoint switchover is achieved by a safety grade auctioneering device. Describe the auctioneering device.