ATTACHMENT 5

MONTICELLO NUCLEAR GENERATING PLANT

Safety Evaluation for the Replacement of Feedwater Heaters 11A, 11B, 12A and 12B

Prepared by Jim Devine

SAFETY EVALUATION

Portions of this project involving the replacement of the heaters and extraction piping are non-safety and non-QA in nature. The new door into the Tube Pulling Structure will penetrate Fire Area IX 16, and the Safe Shutdown Analysis requires this door to be rated for 3 hours.

The new Turbine Building access door will be a three hour rated, UL approved fire door. The door will be number 111 and will be a left-hand reverse from the TBA side, and will key lock from the same side. During the time the door is being installed a continuous fire watch will be required to satisfy Technical Specification 3.13.G.1. Since a catwalk will not be installed inside the Tube Pull Structure until later, a safety chain will be strung across the door frame on the inside, and a caution sign will be mounted on the outside. The door will be kept locked at all times except when being used during an outage. The keys will be turned over to the Superintendent of Security.

The cable raceways located above the blockouts on the north side of the condenser room wall do not interfere with the installation of the heaters and will not be temporarily removed under an interference package. Enlarging the holes for clearence will be on the bottom and side surfaces of the wall openings. Plant Procedure #8117 "Heavy Load Movement Over Safe Shutdown Equipment on Turbine Floor" does not show safe shutdown equipment located below the area where the heaters will be moved in and out of the Turbine Building.

Hangers and supports for the non-condensible vent lines will be designed to support the pipes in a flooded condition. This is being done so the isolation valves can be eliminated and the condenser can still be hydro tested.

The new non-condensible gases vent lines will closely follow the routing of the existing lines. However, due to the increased size of the lines, some rerouting is expected and will be addressed once engineers can work inside the condenser room. After the pipe layout has been determined, drawings will be issued for construction by Bechtel and the work performed under a modification procedure written by NPD. The vent lines are not classified as High Energy Lines. The HELB Evaluation Procedure has been completed for this Modification Package and is in the Review and Approval section. Prior to the start of the outage construction will remove four of the six wythes of concrete blocks in the blockouts. Nutech Engineers evaluated the effects of removing a portion of the wall and still maintaining the integrity of the wall for HELB considerations. Their letter recommending two wythes be left until the plant is down is reference #3.

This modification was reviewed by the Nuclear Analysis Department (NAD), and they have concluded that it does not have any adverse affects on the Reactor Data Package. In 1986 the plant used the Performance Evaluations of Power System Efficiencies (PEPSE) program to evaluate the feedwater system, and found the maximum feedwater pump runout to be 109.2% at 1020 psia reactor pressure, with 3475 feet total discharge head. Based on this PEPSE data, the Cycle 14 Reload Safety Evaluation used conservative feedwater flow runout values of 115% and 117% of rated feedwater flow (rated feedwater flow is 6747092 lb/hr). These values were also given to General Electric to be used in the OPL-3 report. The new feedwater heaters will have a total pressure drop of 22.8 psi

as apposed to 24.8 psi for the existing heaters. NAD calculated that this would result in a system resistance decrease of 10 feet TDH. By using these new numbers in the PEPSE program and plotting the system resistance and the system pump curve, feedwater pump runout at 1020 psia reactor pressure becomes 109.6% of rated flow capacity. This remains well under the conservative flow rates used in the Cycle 14 Reload Safety Evaluation. NAD's letter addressing their review of the feedwater runout is described in Jeff Olson's letter to Jim Devine dated July 31, 1989 in the Review and Approval section of this Modification Package.

The electrical circuitry for the new level controls will be verified by Electrical Construction Testing, and the equipment will be calibrated and loop checked by the plant's Instrument and Control personnel.

Each heater will be given a hydrostatic test at the factory as required by the code, ASME Section VIII. The code requires the test pressure to be 1 1/2 times the design pressure. The tube side will be tested at 675 psig, and the shell side will be tested at 75 psig.

Operational testing will be addressed by completing the applicable portions of Plant Test #1181, "Feedwater Heater Performance". The results of this test after start up can be compared to test results previous to changing out the heaters. This test will be performed by NPD as part of the modification.

Cutting and repair of rebar will be reviewed by Bechtel Power Corporation prior to start of the work, and drawings will be issued for construction by Bechtel. Rebar will be restored to its original configuration and the concrete repaired after the heaters are installed. A letter will be requested from Bechtel

verifying the repair meets the original integrity of the wall. Receiving this letter is a Hold Point in this Modification Package.

After cutting the attached piping and prior to removing the heaters from the condenser room they will be jacked up on one end to modify the support steel. Tipping the heaters will drain trapped water out. After this, oil dry will be put inside the shells to absorb any remaining water. Once the heaters have been removed from the TBA, all openings on the shells will be seal welded shut in preparation for shipment. NSP will be responsible for preparing the heaters for shipment and preparing all required documentation. This will be done by the Radioactive Material Shipping Coordinator in accordance with 4 AWI-11.1.4, "Radioactive Material Shipping". The heaters will be shipped in boxes to a NRC licensed contractor for disposal. The contractor will dispose of the heaters by a combination of volume reduction, burial, decontamination and free release. Free release will be in accordance with the NRC guidelines and has been approved by NSP's Special Nuclear Programs (reference #4).

The additional weight of the new heaters, roughly 30%, will require new supports inside the condenser. They were designed by Bechtel Power Coporation, and the installation will be coordinated with the erection of the heater installation platforms. Once the weight of the old heaters has been lifted off the steel, the old supports will be removed and the new ones installed. The old heaters are supported by two condenser tube sheets per heater support. The new supports will distribute the weight of the heaters over four tube sheets. After the new supports are installed the old heaters will be skidded out of the condenser and the new heaters installed.

The new level controllers will draw 25 watts as opposed to the 14

watt power requirement of the old contollers. This increase has been incorporated into the Load Study (reference #2). They will use the same 10 amp fuses as the old controllers. This modification has been reviewed for Breaker/Fuse Coordination.

This modification does not create the possiblity for an accident or malfunction of a different type than previously evaluated in the SAR or subsequent submittals. It does not increase the probability of occurance nor increase the consequences of any such previously analyzed accident or malfunction. This modification does not reduce the margin of safety defined in the bases for any technical specification. It is concluded that this modification does not represent an unreviewed safety question as defined in 10CFR50.59.

Prepared by Jim Devine date 8-7-89

Reviewed by Steven B Kirkpatrick date 8-7-89

Form 1-3050 Rev 2 (Front) (N1AWI 5.1.12)

Modification No. 88Z013
~~Addendum/Part~~/Revision No. 0

REVIEW AND APPROVAL FORM

1. Plant Design Change Package Reviews:

   a. Responsible Engineer/Project Engineer Jim Devine Date 5-31-89

   b. Project Coordinator/Plant Contact Steve B Kubiak Date 6-2-89

2. Safety Review required: ☐ No ☒ Yes (If yes, the Operations Committee shall address item 3. below.)

   a. General Superintendent Engineering and Radiation Protection Ken Kuhns Date 6/6/89

3. Operations Committee review: Date OC 1633 6/8/89

   a. SAC review requested by OC: ☐ No ☒ Yes

      1) SAC review completed: Date _____

   b. License Amendment or Unreviewed Safety Question (ref. 10CFR 50.59): ☐ No ☒ Yes (If yes, NRC authorization may be required)

      1) SAC review completed: Date _____

      2) Amendment request transmitted: Date _____

      3) Authorization letter received: Date _____

4. Plant Design Change Approved:

   a. Responsible Engineer/Project Engineer Jim Devine Date 8-7-89

   b. General Superintendent Engineering and Radiation Protection Ken Kuhns Date 8/7/89