

(PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

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EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

PHONE: 919-457-9521

Facility: Unit No. 1

Event Date: January 23, 1983

Initial Conditions:

BSEP Unit No. 1 was in an extended refueling outage for condenser tube replacement, Mark I torus modifications, and a major AOG modification. Due to limited storage capacity in the spent fuel pool, 88 fuel bundles remained in scattered locations within the core. Control rod drive maintenance was in progress and control rods 22-19, 30-43, 38-23, and 38-27, which each had one fuel bundle in their cell, were the last rods scheduled to be rebuilt.

Event Description:

The control rod drive units for rods 22-19, 30-43, 38-23, and 38-27 were scheduled to be rebuilt following the completion of all other drive rebuilds when the fuel bundle in each cell would be moved to cells with fully inserted rods. Due to a problem encountered with uncoupling several drive units to be rebuilt, it was decided to work the four drives with fuel bundles. A fuel shuffle sequence had been prepared for relocating those four fuel bundles based on the remaining rod being inserted. At approximately 0300 on January 23, 1983, the fuel bundles were relocated in the core around withdrawn control rods 22-15, 26-43, 34-23, and 34-27. While performing surveillance requirements to assure that all withdrawn control rods had no fuel in the cell (4.9.10.2.1e) at 1245 on January 23, 1983, the fuel shuffle error was identified.

Cause:

The fuel handling procedure being used (FH-11) did not clearly define responsibility to ensure that control rods were inserted prior to fuel movement. The Brunswick Technical Specifications allow fuel movement with rods withdrawn in certain conditions (3.9.10.1 and 3.9.10.2). The Nuclear Engineer believed that the prerequisite Operations group sign-offs on Section K of GP-01 provided the required controls while the Operations personnel believed the fuel movement sheets generated by the Nuclear Engineer provided the controls.

An Engineering Supervisor and an Operations Engineer had discussed the significance of the proposed evolution and the need to provide special instructions during the week prior to the event, but the fuel shuffle was planned to occur on Monday, January 24, 1983. Due to unexpected CRD work constraints, the work was rescheduled on Saturday evening to be performed on Sunday morning. These personnel rescheduling the event did not contact the Engineering Supervisor or Operations Engineer who had discussed the move nor did these two persons leave written instructions, as they knew they would be on-site during the planned Monday shuffle.

Corrective Actions:

The inserted control rods around which the four fuel bundles were placed were inserted within one hour. The delay in inserting these rods occurred because they were under clearance when the problem was identified. A verification was also performed on core fuel location and that all control rods with fuel in their cells were inserted.

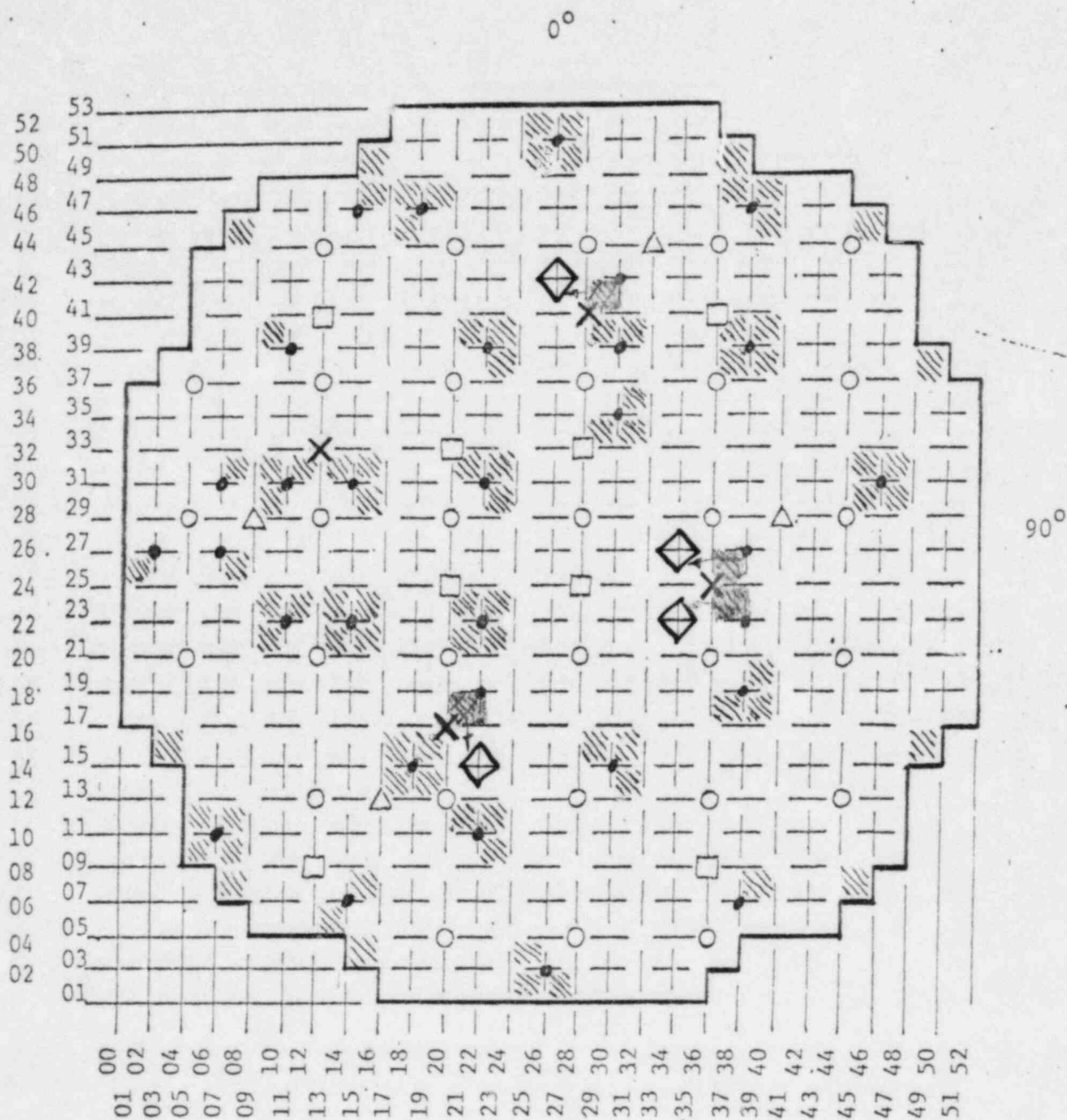
A shutdown margin check was performed for the core configuration immediately following the fuel shuffle and the results were compared with the shutdown margin calculated prior to the fuel moves. In both cases, K_{eff} was determined to be 0.89733, or a 8.698% $\Delta K/K$ shutdown margin. The technical specification requirement is $\geq 0.38\% \Delta K/K$.

FH-11 has been revised to include the following:

1. Fuel will not be moved with any control rod withdrawn.
2. Require positive verification of control rod insertion prior to loading fuel into a cell.
3. Require the core status board not only reflect fuel location status, but also control rod blade status.
4. Require that the movement sheets specify all core alterations and require SRO concurrence.
5. Provide specific instructions on the preparation of fuel movement sheets to ensure technical specification requirements and independent verification requirements are met.

This event has also been reviewed by licensed operators and Nuclear Engineers.

NOTE: Arrows denote locations where fuel assemblies were moved to cells with control rods withdrawn.



No. of Fuel Assemblies 560
 No. of Control Elements 137
 Circumscribed Core Dia. 170.5
 Equiv. Core Diameter 160.5

○ No. of In-Core Assemblies 31
 □ No. of Intermed. Chamb. (IRM) 8
 X No. of Startup Chamb. (SRM) 4
 Total No. of Instr. Tubes 43
 △ No. of Neutron Sources 5
 Removed after initial fuel cycle

▨ Installed Fuel Assemblies 87

◆ Inserted Control Rod

● Inserted Control Elements/Rods

Figure 1 Core Arrangement (Top View) on 1-23-83