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SUBJECT: Forwards response to NRC 791210 request for info required for evaluation of licensee response to Lessons Learned Task Force recommendations. Oversize drawings to Central Files.

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December 20, 1979
AEP:NRC:00300A

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74

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

Dear Mr. Denton:

The attachment to this letter provides the responses to the information requested in a document, received by telecopy on December 10, 1979, entitled "Licensee Information Required for Staff Evaluation of Licensee Response of Lessons Learned Recommendations 2.1.7.a and b." Please be advised that our letter of December 11, 1979 (AEP:NRC:00300) provided responses to the recommendations contained in Mr. D. G. Eisenhut's letter of October 30, 1979 that were identified during the NRR Bulletin and Orders Task Force review of operating reactors. Much of the descriptive information your staff is now requesting is already contained in Enclosure 1 to Mr. Eisenhut's letter and is referenced herein, where applicable.

Very truly yours,

John E. Dolan
Vice President

cc: R. C. Callen
G. Charnoff
R. S. Hunter
R. W. Jurgensen
D. V. Shaller - Bridgman

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ATTACHMENT TO AEP:NRC:00268
DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2
DOCKET NOS. 50-135 and 50-136
LICENSE NOS. DPR-58 and DPR-74

The description of the Auxiliary Feedwater System (AFS) at Cook Plant is contained in Mr. D. G. Eisenhut's letter dated October 30, 1979. The modifications we are planning to make to the AFS were described in our letter of August 9, 1979 (AEP:NRC:00168 and 00176) and further supplemented by our letters of December 7, 1979 (AEP:NRC:00307) and December 11, 1979 (AEP:NRC:00300). Table 1 provides a listing of the AEPSC drawings which are attached to this letter and applicable to the responses provided below. Please be advised that these drawings are proprietary information of AEPSC and observe the statements printed on the drawing (in the title block). The NRC positions in the NUREG-0578 items are addressed below as requested in Mr. Schwencer's letter:

ACTION ITEM 2.1.7.a

RESPONSE TO POSITION 1: The present design provides for automatic initiation of the AFS and includes the AC to DC changeover of the TDAFP train of Unit 2.

There are two motor driven auxiliary feedwater pumps (MDAFP) shared by both Units 1 and 2. These are designated as the Unit 1 MDAFP and the Unit 2 MDAFP. Each pump provides feedwater to 2 of the steam generators of its own unit and 2 of the steam generators of the opposite unit. The MDAFP's may be started manually from either Units control room or by the following automatic initiating signals generated by the safety grade safeguards actuation system:

1. Lo-Lo Steam Generator Water Level in any one of the four steam generators.

2. Undervoltage of RCP Bus (2/4 Logic).

3. Safety Injection Actuation.

4. Blackout safeguards sequence (either Unit).

Closure of the stopvalves of both main feed pump turbines of either Unit (loss of main feedwater pumps) will also cause an automatic auxiliary feedwater pump start.

The TDAFP in each Unit provides feedwater to the four steam generators of its own unit. The pump may be started manually from the Unit control room or automatically by any of the following initiating signals generated by the safety grade safeguards actuation system:

1. Lo-Lo Steam Generator Water Level in any two out of four steam generators.

2. Reactor Coolant Pump Bus Undervoltage (2/4 Logic).

Further descriptive information is contained in section X.2.1.4.3 of Enclosure 1 of Mr. Eisenhut's October 30, 1979 letter.

RESPONSE TO POSITION 2: The automatic initiation signals and circuits are designed so that a single failure will not result in the loss of auxiliary feedwater function.

The auxiliary feedwater pump automatic starting signals originating in the safeguards actuation system are safety grade and are generated by redundant measurements of each input variable by separate instrument channels. The output of the bistable elements sensing an off-normal condition are fed into a logic matrix associated with each of the 2 safety trains. The output signal to initiate the required safeguards action is generated in each of the two safeguards actuation safety train systems, of each unit.

The automatic initiating signals and circuits are separate for each of the auxiliary feedwater pumps and are generated by diverse and independent circuitry. Loss of one initiating signal, assuming none of the other diverse signals are generated, can only result in the failure of one auxiliary feedwater pump to start automatically from that signal. However, the AFS is a three train system and as such this does not result in a loss of auxiliary feedwater function.

Further descriptive information is contained in sections X.2.1.3, X.2.1.4 and X.2.2.1 of Enclosure 1 to Mr. Eisenhut's October 30, 1979 letter.

RESPONSE TO POSITION 3: Testability of the initiating signals and circuits is a feature of the design.

The automatic initiating signals for the auxiliary feedwater pumps originating in the safeguards actuation system are fully testable by the online test system installed as part of the safeguards actuation system. Further descriptive information is contained in sections X.2.1.5 and X.2.1.6 of Enclosure 1 to Mr. Eisenhut's October 30, 1979 letter.

RESPONSE TO POSITION 4: The initiating signals and circuits are powered from the emergency buses.

The automatic starting signals originating in the safeguards actuation system are powered from the four vital instrumentation buses. Each of the four vital instrumentation buses is supplied from a static inverter. Each static inverter is fed from a safety grade station battery and from a 600 volt AC safety grade power bus of the same safety train.

The control power for the circuit breakers for the MDAFP's is supplied from a safety grade station battery of the same train as the AC power source to the auxiliary feedwater pump motor.

The control power for the turbine driven pump train of Unit 2 is supplied by the safety grade train "N" battery which is independent of either of the two safety grade station batteries installed in the Unit. FSAR amendment 84 transmitted in our August 9, 1979 letter (AEP:NRC:00176) and supplemented by our December 7, 1979 letter (AEP:NRC:00307), provides further descriptive information concerning the train "N" power system for the TDAFP train.

Figures 1 and 2 show the green and red train power distribution systems for Unit 1. Unit 2 power distribution system is identical to Unit 1 except for the independent train "N" power system to supply the required control and valve motive power of the TDAFP train of Unit 2.

The control power for the turbine driven pump of Unit 1 is derived from the Train "B" 600 volt safety grade power bus. The control power for this TDAFP train is scheduled for conversion to DC power during the next refueling outage of Unit 1. This is an identical modification to that of Unit 2 as described in the above referenced letters.

The MDAFP's are fed from the 4 kV safety bus T11D for the Unit 1 pump and T21D for the Unit 2 pump through circuit breakers T11D11 and T21D11 respectively. The control power for circuit breaker T11D11 is from the Unit 1 250 volt battery bus 1CD and the control power for T21D11 is from the Unit 2 battery bus 2CD.

The motor operated feedwater discharge valves which supply feedwater from the Unit 1 MDAFP receive their power and control from the 600 volt bus 11D through Motor Control Centers MCC-1-BHT-D and MCC-1-EZC-D. 600 volt bus 11D is fed from 4 kV bus T11D through transformer T11D.

Unit 2, steam generator #1, valve FMO-212 is fed from MCC-1-BHT-D.

Unit 2, steam generator #4 valve FMO-242 is fed from MCC-1-BHT-D.

Unit 1, steam generator #2 valve FMO-222 is fed from MCC-1-EZC-D.

Unit 1, steam generator #3 valve FMO-232 is fed from MCC-1-EZC-D.

The motor operated feedwater discharge valves which supply feedwater from the Unit 2 MDAFP receive their power and control from the 600 volt bus 21D through Motor Control Centers MCC-2-EZC-D, MCC-2-ABD and VCC-2-ABV-D. 600 volt bus 21D is fed from 4 kV but T21D through transformer T21D.

Unit 1, steam generator #1, valve FMO-212 is fed from VCC-2-ABV-D.

Unit 1, steam generator #4, valve FMO-242 is fed from MCC-2-ABD.

Unit 2, steam generator #2, valve FMO-222 is fed from MCC-2-EZC-D.

Unit 2, steam generator #3, valve FMO-232 is fed from MCC-2-EZC-D.

The Unit 1 turbine driven auxiliary feedwater pump control bus and discharge valve power is supplied from motor control center MCC-AZ-BC which is normally supplied from the 600 volt safety bus 11B through 600 volt circuit breaker 11B4. This source of power is of the opposite train as the power source to the Unit 1 motor driven pumps. The operator may disconnect this motor control center from bus 11B and connect it to bus 11C in the event of a complete loss of power to bus 11B from all sources. The DC power required for the turbine control bus is derived from the 250 volt AB station battery.

The Unit 2 turbine driven feed pump control bus, steam admission valve and feedwater discharge valves receive their power from a separate 250 volt battery which is independent of either the A or B safety trains as described in the above referenced letters.

The instruments used in developing the control signals which initiate auxiliary feedwater are powered from the four vital instrument inverters. Each inverter is powered from a 600 volt safety bus and a 250 bolt battery of the same safety train and is capable of continued operation from either power source in the event of failure of the other power source.

The instruments which measure system parameters use redundant independent measurements powered from different vital instrument buses. The output devices are combined in multiple logic system to produce output signals from each train logic system.

Further information is contained in section X.2.1.3 of Enclosure 1 to Mr. Eisenhut's letter.

RESPONSE TO POSITION 5: Manual capability to initiate the auxiliary feedwater system from the control room is retained and implemented so that a single failure in the manual circuits will not result in the loss of system function.

Each of the three auxiliary feedwater pumps that may be called on to function are provided with separate manual starting switches. No common manual starting switch is provided. The control switch for each auxiliary feedwater pump is separated from the control switches for the other pumps. A failure of a manual starting control switch or circuit can only affect one of the pumps and as such will not result in the loss of auxiliary feedwater function. Further descriptive information is contained is sections X.2.1.3 and X.2.1.4 of Enclosure 1 to Mr. Eisenhut's October 30, 1979 letter.

RESPONSE TO POSITION 6: The MDAFP train is fed from the safety buses of their respective Unit. In the event of a blackout of the safety bus serving the pump motor, the loads will be shed from the safety bus, the diesel generator serving the bus will be started and connected to the safety buses and the safety loads for a blackout will be connected with initial block of load. The MDAFP is sequenced on the bus with the

remaining safety loads. These pump trains are currently included in the diesel engine load and do not result in excessive diesel generator loading. Further information is contained in Section X.2.1.3 of Enclosure 1 to Mr. Eisenhut's letter.

RESPONSE TO POSITION 7: The automatic initiating signals and circuits are designed so that their failure will not result in the loss of manual capability to initiate the AFS function from the control room.

The automatic signals which start the auxiliary feedwater pumps are generated by the safeguards actuation systems of two different trains. In the unlikely event that the safeguards systems of both trains failed to initiate a starting signal, the control room operator may initiate a starting signal for any of the auxiliary feedwater pumps capable of serving his unit. The failure of an automatic starting signal will not inhibit a manual start.

RESPONSE TO ACTION ITEM 2.1.7b:

The AFW System flow indication for D. C. Cook Plant consists of individual sensors, current loop circuitry and individual meters for each of the four auxiliary feedwater lines, one to each steam generator. The major equipment used in the indication system is individual differential pressure transmitters, individual DC power supply and individual DC ammeters. The diversity is provided by the four (4) steam generator water level indicators on each steam generator, thereby meeting the NUREG-0578 criteria.

The indication error for each AFW system instrumentation channel, is no greater than $\pm$ 5.5%. The indication error for the steam generator water level was submitted by Westinghouse letter NS-TMA-1835 dated June 21, 1978.

Testability of the auxiliary feedwater system indication is provided in accordance with the D. C. Cook Plant Technical Specification 3/4.7.1.2.

TABLE 1

DONALD C. COOK NUCLEAR PLANT UNITS NOS. 1 AND 2

AUXILIARY FEEDWATER SYSTEM

DRAWING LIST

ESK - 103079 "Simplified Offsite Sources One - Line"
FSAR Figure 8.3.3 (revised per our letter of 12/7/79-AEP:NRC:00307)
FIGURE 1:TRAIN A GREEN POWER TRAIN
FIGURE 2:TRAIN B RED POWER TRAIN

UNIT 1	UNIT 2
1 - 1200A - 19	2 - 1200A - 4
1 - 1200G - 32	2 - 1200G - 20
1 - 98053 - 11	2 - 98053 - 7
1 - 98054 - 10	2 - 98054 - 9
1 - 98077 - 2	2 - 98077 - 4
1 - 98078 - 2	2 - 98078 - 1
1 - 98079 - 1	2 - 98079 - 0
1 - 98081 - 2	2 - 98081 - 3
1 - 98082 - 2	2 - 98082 - 2
1 - 98083 - 1	2 - 98083 - 0
1 - 98085 - 3	2 - 98085 - 3
1 - 98086 - 1	2 - 98086 - 1
1 - 98087 - 1	2 - 98087 - 0
1 - 98089 - 2	2 - 98089 - 3
1 - 98090 - 2	2 - 98090 - 1
1 - 98091 - 1	2 - 98091 - 0
1 - 98214 - 14	2 - 98214 - 11
1 - 98215 - 12	2 - 98215 - 12
1 - 98217 - 5	2 - 98219 - 4