Consumers Power Company

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February 2, 1971

Regulatory File Cy.

Dr. P. A. Morris, Director
Division of Reactor Licensing
United States Atomic Energy Commission
Washington, DC 20545

Re: Docket 50-155
DPR-6 ZEK
Proposed Tech Specification Change 27

Dear Dr. Morris:

Attention: Mr. D. J. Skovholt

Transmitted herewith are three (3) executed and thirty-seven (37) conformed copies of a request for change to the Technical Specifications of License DPR-6, Docket No 50-155, issued to Consumers Power Company on May 1, 1964, for the Big Rock Point Nuclear Plant.

This proposed change (No 27) will enable Consumers Power Company to complete nstallation and place into service at Big Rock Point a modified post-incident spray system designed to provide redundancy with respect to single failure criteria and a vessel jump accident.

The set points associated with the time delay for MO7070 and MO7071 and the valve position switch open limits for MO7051, MO7061 and MO7064 submitted in this proposed change (Section 6.1.4(d)) represent the best engineering estimates available as to proper set points. Testing following installation will be conducted to verify the adequacy of these set points. If a change is necessary, a further request for change to the technical specifications will be submitted.

It is our intention to complete the modifications described in this proposed change during our next refueling outage which is currently scheduled for February 1971. We would, therefore, be most appreciative of an expeditious handling of this Request for a Technical Specifications Change so that we might receive approval before March 1, 1971.

On June 29, 1970, the United States Atomic Energy Commission responded to our letter of February 9, 1970 which stated our intentions with respect to the installation of a Modified Core Spray System. In your letter, you requested further information regarding "small primary

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system breaks." This information is herewith submitted as Appendix 2 to this Request for a Technical Specifications Change.

Yours very truly,

Robert L. Haueter/ajr

RBS/dmb

Robert L. Haueter
Electric Production
Superintendent - Nuclear

CONSUMERS POWER COMPANY

Docket No 50-155

Request for Change to the Technical Specifications

Change No 27

License No DPR-6

For the reasons hereinafter set forth, the following changes to the Technical Specifications of License DPR-6 issued to Consumers Power Company on May 1, 1964, for the Big Rock Point Nuclear Plant, are requested:

I. Changes

A. In Section 3.5.1(d), change to read as follows:

"System Actuation	1 Set Automatic DC Operated, 1 Set Automatic AC Operated"

B. In Section 3.5.2(a), change to read as follows:

"Automatic operation of the containment spray system and backup containment spray system involves a time delay not to exceed five minutes after system actuation to allow the operator to override a possible spurious actuation. This time delay feature may be manually overriden to actuate the spray system prior to the expiration of the five-minute delay period."

C. In Section 4.1.2(a), add a new section between "Core Spray System" and "Core Spray Recirculation" as follows:

"Backup Core Spray System:

Type	Sparger Nozzle Centered Over Core
Capacity of Sparger, Gpm	470
Nozzle Pressure, Psia	115"

D. In Section 4.1.2(b), change to read as follows:

"(b) Operating Requirements

A minimum of one reactor recirculating loop or its equivalent shall be used during all reactor power operations when reactor power level is above 1.0 Mwt. The maximum operating pressure and temperature shall be the same as the reactor vessel. The controlled rate of change of temperature in the reactor vessel shall be limited to 100° F per hour. All other components in the system shall be capable of following this temperature change rate. The safety relief valves shall be set appropriately for all planned reactor operating pressures so that the allowable pressure of 1870 psia (1700 plus 10%) in the nuclear steam supply system is not exceeded. The emergency condenser, core spray and backup core spray systems shall be operable and ready for service at all times during power operation. The core spray system and shutdown cooling system shall be operable and ready for service during refueling operations. The primary coolant shall be sampled and analyzed daily during periods of power operation. The following are absolute limits which if exceeded shall necessitate reactor shutdown. Corrective action will necessarily be taken at more stringent limits to minimize the possibility of these absolute limits ever being reached."

E. In Section 4.2.1(a), add the following items to the list of equipment which receive their power supply from the 125-volt d-c battery system:

"Post-Incident Enclosure Spray Valves
Core Spray Valves"

F. In Section 4.2.6, change to read as follows:

"<u>Fire Protection System</u>

In addition to furnishing water for conventional plant fire-fighting equipment, the fire protection system shall furnish water as follows:

Core Spray Cooling System
Backup Core Spray Cooling System
Containment Sphere Post-Incident Spray System
Backup Service Water System to the Containment Sphere

One electric fire pump and one diesel fire pump, each rated at 1000 gpm, 254-foot head shall be provided.

The fire protection system shall be operable and ready for service during power operation and refueling operation."

G. In Section 6.1.2, "Reactor Safety System During Power Operation," the tabulation has been changed as indicated by a double dash (--) in front of the item.

6.1.2 Reactor Safety System During Power Operation

The following tabulation gives the arrangement of the reactor safety system that shall be effective during power operation:

Sensor and Trip Device	Trip Contacts in Each Channel	Coincidence in Each Channel	Scram Setting and Tolerance	Special Features	Instrument Ranges	Warning Annunciation Trip Set Point
High reactor pressure (4 pressure switches)	2	1 out of 2	50 ± 5 psi above reactor operating pressure		100-1700 psig	25 ± 5 psi above reactor operating pressure
Low reactor water level (4 level switches)	2	1 out of 2	Elevation 610' 6" ± 1 inch	Closes containment sphere isolation valves. If reactor pressure is less than 200 psig, actuates core spray system. (Note: Spray water will not enter reactor vessel until reactor pressure drops below fire header pressure.)	Fixed level trip point no range	
Low steam drum water level (4 level switches)	2	1 out of 2	8.0 ± 0.5 inches below operating level		-30" to +30" water	-4" below operating level
Main steam line backup isolation valve closure (4 position switches)	2	1 out of 2	50 ± 5 percent of full closure		Position switch trains adjustable full valve travel	
High condenser pressure (4 pressure switches)	2	1 out of 2	8.0 ± 0.5 inches of Hg absolute pressure	Bypassed by pressure interlock as described in Section 6.1.3.	0 - 30" Hg vac	

6.1.2 (Contd)

Sensor and Trip Device	Trip Contacts in Each Channel	Coincidence in Each Channel	Scram Setting and Tolerance	Special Features	Instrument Ranges	Warning Annunciation Trip Set Point
(--)High enclosure pressure (4 pressure switches)	2	1 out of 2	1.5 ± 0.2 psi above atmospheric	Closes containment sphere isolation valves. (Two independent pressure switches actuate a time mechanism that initiates containment spray system within 5 minutes unless the control is manually overridden.)	0 - 20 psig	
High scram dump tank level (4 level switches)	2	1 out of 2	5/16 ± 1/2 inch below tank center line	Alarms at level of 10 inches below tank center line.	Fixed level at trip point (no range)	-10" ± 1/2" below tank center line
Recirculation line valves closed (two sets of 6 position switches in each of 2 channels)	12	1 set out of 2	Approximately 10 percent of full simultaneous closure of both discharge or both suction valves or simultaneous closure of the butterfly valves to the positions comparable to a 55 percent decrease in flow from full flow or any combination of two of these valves, one in each loop.		Position switch adjustable for full valve travel	
Loss of auxiliary power supply (voltage relay)	1	1 out of 1	52 ± 20 volts	Closes all automatically actuated containment sphere isolation valves.		

6.1.2 (Contd)

Sensor and Trip Device	Trip Contacts in Each Channel	Coincidence in Each Channel	Scram Setting and Tolerance	Special Features	Instrument Ranges	Warning Annunciation Trip Set Point
High neutron flux (each of 3 power range flux monitors has a trip contact in each channel)	3	2 out of 3	120 $\pm$ 5 percent of the 0 to 125 percent scale, or 38 $\pm$ 2 percent of the 0 to 40 percent scale (any range)	Interlocks prevent control rod withdrawal as described in Section 6.2.1.	0 to 125%	
Protection against picoammeter circuit failure	3	1 downscale 1 upscale	5 percent low trip and 1 additional instrument at 120% high trip	Except that the three downscale trips may be simultaneously bypassed when the picoammeter range switches are simultaneously set to operate below 40×10^{-5}% power. The bypass becomes ineffective when the range for any of the detectors is set above the 40×10^{-5}% power.		
Short period (each of intermediate range Log-N period monitors has a trip contact in each channel)	2	1 out of 2	10 $\pm$ 2 second period	Placement of any 2 out of 3 range switches of the high level neutron flux channels in the power range position will bypass this period trip feature.	-100 sec to infinity to +10 seconds	15 sec intermediate range. (There is also an annunciator operated by the start-up channel period contacts.)
Manual scram (1 switch)	1	1 out of 1				

H. In Section 6.1.4:

1. Renumber present Section "6.1.4(b), Emergency Condenser Control," to "6.1.4(d), Emergency Condenser Control."

2. Insert new paragraph 6.1.4(b) as follows:

"(b) Backup Core Spray System Control

The backup core spray system shall be automatically actuated by simultaneous tripping of the reactor safety system sensor 'low reactor water level' along with the 'low reactor pressure device' if the core spray system has not actuated (actuation being determined by both core spray system admission valves being in the full open position). The 'low reactor pressure trip device' consists of a pressure switch interlock which prevents backup core spray system admission valves opening while reactor pressure is above 150 psig."

3. Insert new Table 6.1.4(c) as follows:

"(c) Core Spray, Backup Core Spray, Containment Spray and Backup Containment Spray System Set Points

The following tabulation gives the actuation set points for devices associated with the core spray, backup core spray, containment spray and backup containment spray systems:

Sensor	Actuation Contacts	Setting and Tolerance	Function
Low reactor water level (4 level switches)	2 switches/valve 1 out of 2 coincidence	Elevation 610' 6" ± 1 inch	Actuates M07051 and 7061 in conjunction with reactor pressure.
Low reactor water level (4 level switches)	2 switches/valve 1 out of 2 coincidence	Elevation 610' 6" ± 1 inch	Actuates M07070 and 7071 in conjunction with reactor pressure.
Low reactor pressure switches (4 pressure switches)	2 switches/valve 1 out of 2 coincidence	200 psig ± 20 psi	Actuates M07051 and 7061 in conjunction with low reactor water level.

Sensor	Actuation Contacts	Setting and Tolerance	Function
Low reactor pressure switches	2 switches/valve 1 out of 2 coincidence	150 psig ± 20 psi	Actuates MO7070 and 7071 in conjunction with low reactor level, valve position of MO7051 and 7061 and time delay.
Valve position switches MO7051 and 7061 (2 switches, one per valve)	2 - 2 of 2 required	75 - 100% of full open	Blocks automatically actuation of MO7070 and 7071 when MO7051 and 7061 are full open.
Time delay (2 switches)	1 per valve	40 ± 5 sec	Block opening of MO7070 and 7071 until time delay elapses.
High enclosure pressure switches (2 pressure switches)	2 - 1 of 2 required	1.5 ± 0.2 psig	Actuates a time-delay mechanism that initiates MO7064 (containment spray system) within 5 minutes unless the control is manually overridden.
High enclosure pressure switches	2 - 1 of 2 required	2.0 ± 0.2 psig	Actuates a time delay mechanism that initiates MO7068 (backup containment spray system)within five minutes unless MO7064 is open as the control is manually overridden.
Valve position switch MO7064	1	75 - 100% of full open	Blocks automatic actuation of MO7068 when MO7064 is full open."

I. In Section 6.1.5(b), change to read as follows:

"(b) The core spray system, backup core spray system and emergency condenser system control initiation sensors shall be functionally tested not less frequently than once every 12 months."

J. In Section 6.1.6, change to read as follows:

"The automatic actuation of the containment spray system and the backup containment spray system shall occur within five minutes of the receipt of a high containment pressure signal if more than one-half of the fuel bundles in the core are zirconium-clad."

K. In Section 8.2.1, delete Item 8.2.1(d).

II. Discussion

A. System Description

1. General

The original Big Rock Point Plant post-incident cooling and core spray cooling systems each consisted of essentially single systems with initial water supply from the plant fire protection system followed by water supply from the core spray recirculation system. Each water-supply system had two full-capacity pumps which were arranged to supply water through an automatic and/or remote-manual controlled pair of motor-operated valves, in series (MO7051 and MO7061), to the core spray or through an automatic and/or remote-manual controlled motor-operated single valve (MO7064) to the enclosure spray nozzles. The backup enclosure spray was provided with a ormally closed manual-operated valve.

New criteria requiring that safety related systems be designed with redundancy to meet the single failure criteria for active components have resulted in required modifications of the two systems. The modifications are covered below and as shown on attached Drawing M-123, Rev 15.

2. Core Spray System

a. A second core spray system (called the backup core spray system) has been added and is in parallel with and redundant to the original core spray system. The water supply to the backup core spray system can be remote manually or automatically selected from either of the two existing 4" and 6" fire system supply headers or from the core spray recirculation system. (See Paragraph b.) Selection of the supply source can be accomplished by operating a new a-c motor-operated valve (MO7069) cross connecting the two fire system supply headers. MO7069 is actuated by remote-manual controller RMC-5526 located on the control board.

The backup core spray system valves (MO7070 and MO7071) are a-c motor operated and are, therefore, redundant to the existing d-c operated valves (MO7051 and MO7061). Operation of the backup core spray system valves is automatically initiated by primary system level switch upon water level falling below 610'-6", and concurrent permissive pressure switch action at less than 150 psig. Automatic operation of the backup core spray system valves will be blocked if both MO7051 and MO7061 are open. In addition, to prevent automatic initiation from opening both core spray system valves and both backup core spray system valves at the same time, a time delay is installed in the backup core spray system valves circuitry. Primary system level switches LS-RE09E,F,G,&H and pressure switches PS-1G11E,F,G,&H have been added and are separate and redundant to the control switches for the existing core spray valves.

b. Another source of water from the fire protection system can be remote manually routed from the core spray heat exchanger shell inlet to the channel outlet which supplies either of the two core spray systems. Heat exchanger bypassing is accomplished through a d-c motor-operated valve (MO7072) actuated by remote-manual controller RMC-5529.

c. All piping and valves added for the core spray and backup core spray systems are manufactured in accordance with appropriate sections of USAS B31.1, USAS B31.7 and the ASME Draft Code for Pumps and Valves for Nuclear Service.

d. All electrical wiring for actuation of the backup core spray system is routed in metal conduit or raceways physically and electrically separate from the existing core spray system electrical system. Electrical and instrumentation modifications have been designed to meet IEEE 279 "Proposed IEEE Criteria for Nuclear Power Plant Protection Systems."

e. All piping sections in the enclosure spray system, spray recirculation system and core spray system have been missile-protected where required to prevent a single failure from causing total loss of function of the affected system. Missiles considered are those originating from the high-pressure reactor system.

f. The backup core spray system utilizes a single spray nozzle mounted on a "bayonet" type pipe fixture extending through the center 10-inch port in the reactor vessel head. The nozzle will be centered over the core and would spray down from about 7 fee bove the top of the core. Details of this spray nozzle are shown on General Electric Drawings 1117C4323, 117C4594, 117C4595, 158B7986, 761E293 and 921D739 (attached). The design and construction of the nozzle is in accordance with USAS B31.1. A vibration analysis was performed on the core spray nozzle. The results of this analysis showed that no significant vibration will occur in the nozzle. This analysis is contained in Attachment I.

g. A flow orifice will be installed to insure that at least one gallon per minute per bundle is delivered by the backup core spray nozzle when the system is aligned for all normal flow paths. The design of this orifice based on the criteria established by Attachment I, General Electric ibution to Big Rock Point Redundant Core Spray Sparger Design and llation. Only one flow path exists that does not meet the one gallon per minute criteria. This is the flow path that can be established through MO7072, MO7069, MO7070 and MO7071. This flow path is considered abnormal and is not required to meet the single failure criteria established for design of the system.

It will be adminstratively controlled such that it will not be used except as a last resort. The orifice will be installed between FE2812 and MO7070 as shown on Bechtel Drawing M-123, Rev 15 (attached).

h. No heavily sensitized stainless steel will be incorporated into facility systems during these modifications to the core spray system and backup core spray systems.

3. Post-Incident Cooling

a. The existing post-incident cooling system consists of one automatic actuated spray, through Valve MO7064, and a backup enclosure spray which is actuated by manual opening of a normally closed gate valve outside of the containment. The post-incident cooling system has been modified by the addition of an automatic a-c motor-operated valve (MO7068) in the backup containment spray header. This new valve is automatically opened within five minutes of receipt of an actuation signal from one of two containment high-pressure switches (PS-636 and PS-637 set at 2 psig).

The containment spray d-c operated valve (MO7064) opens and by interlock Valve MO7068 (a-c) remains closed unless the d-c valve fails to open. Water supply to either of the two full-capacity spray systems can now be aligned from either of the two fire system headers or from the spray recirculation system.

b. The existing enclosure spray valve (MO7064) has been modified from a-c motor to d-c motor operated. This arrangement now insures that one enclosure spray system and one core spray system will remain operative in the event of either a-c or d-c power failure and the operative systems can be supplied from either the fire system or the spray recirculation system. This valve is opened automatically within five minutes of receipt of an actuation signal from one of two containment high-pressure switches (PS-7064A and PS-7064B set at 1.5 psig).

4. Miscellaneous Modifications

a. Interconnection of the existing systems has required that containment isolation check valves be added in the spray recirculation return line and the fire header which initially supplied only the backup enclosure sprays. Thus, a total of two 4-inch check valves were added.

b. A flow indicator and switch for annunciation on high flow has been added to the existing core spray system and to each enclosure spray as well as the new backup core spray system. The indicators and alarms are located in the main control room.

c. Two duplex type basket strainers (BS-5760 and BS-5761) have been added to the fire protection system. These strainers are located to insure that all fire system water into the containment sprays and reactor sprays does not contain solids that could plug any spray equipment. Each strainer, including existing Strainer BS-5759, is equipped with a local differential pressure indicator and high differential and normal alarms located in the main control room.

5. Summary of Modifications

a. Addition of a 4-inch core spray header originating from the existing backup enclosure spray line within the containment. This line contains two 4-inch a-c motor-operated valves (MO7070 and MO7071) and one 4-inch check valve similar to the existing core spray valving.

b. Addition of a 4-inch a-c motor-operated valve (MO7069) cross connecting the existing core spray line to the new core spray line.

c. Addition of a 4-inch d-c motor-operated valve (MO7068) in the existing backup enclosure spray line.

d. Addition of a 4-inch d-c motor-operated valve (MO7072) cross connecting the fire system supply to the shell side of core spray heat exchanger to the spray recirculation line.

e. Addition of two 4-inch containment isolation check valves in the existing backup enclosure spray line and the spray recirculation line.

f. Addition of a bypass with a 4-inch manual valve around the existing valve (MO7066) in the fire system cooling water-supply line in the core spray heat exchanger.

g. Addition of two duplex strainers (BS-5761 and BS-5760) in the fire protection system; one in the alternate flow path off the outside fire loop, the other in the fire system supply line to the core spray heat exchanger with three pressure differential indicating switches (PDIS); one across each duplex strainer and the existing strainer, plus separate annunciators for each strainer, to indicate a plugged strainer condition.

h. Addition of four flow indicators and high flow alarms, one in each of the two core spray lines, and one on each of the enclosure spray lines.

i. Addition of four reactor pressure and eight yarway level switches to control the backup core spray valves and replace the existing Reactor Safeguard Post-Incident Cooling System level switches.

j. Addition of two containment high-pressure switches to control the new backup enclosure spray valve.

k. Addition of a single spray nozzle mounted on a "bayonet" type pipe fixture. This nozzle is mounted through the center 10-inch port on the reactor vessel head.

6. Failure Analysis

The modified core spray and post-incident cooling systems' failure analysis is summarized on the following Table 1:

TABLE 1

Big Rock Point Plant
Core Spray System - Failure Analysis

Component	Malfunction	Comments and Consequences
1. Diesel fire pump	Fails to start	Electric-driven fire pump from emergency diesel generator will deliver required flow.
2. Electric fire pump	Fails to start	Diesel-driven fire pump will deliver required flow.
3. Strainer BS-5759	Plugged	Alternate flow path to spray system from yard outside loop through Strainer BS-5761 will provide required flow.
4. Core spray Valve M07051 or M07061 (d-c motor operated)	Fails to open or d-c power failure	Required flow is available through the redundant core spray system.
5. Core spray Valve M07070 or M07071 (a-c motor operated)	Fails to open or a-c power failure	Required flow is available through the redundant core spray system.
6. Containment penetration check valve in either fire system supply header	Sticks closed	Required flow is available through the second fire supply line or by the cross connection from the recirculation piping by opening M07072 manually.
7. Core spray line check valve in either spray system	Sticks closed	Required flow is available through the second core spray line.
8. Core spray ring or core spray nozzle	Plugged	Either core spray system provides 100% of required flow.
9. Recirculation suction strainers	Plugged	Sufficient capacity is available to insure adequate flow in the event that 3 of the 5 strainers become plugged.
10. Core spray heat exchanger cooling water-supply Valve M07066 (a-c motor operated)	Fails to open or a-c power failure	1. Manually operated bypass valve will allow full rated flow through the core spray HX. 2. Bypass around the HX (M07072) will allow required flow to enclosure spray or core spray ring directly from the fire main.

TABLE 1

Big Rock Point Plant
Core Spray System - Failure Analysis (Contd)

Component	Malfunction	Comments and Consequences
11. Cross-connecting valve between fire system supply Headers M07069 (a-c motor operated)	Fails to open on a-c power failure	1. Required flow is available through either core spray system and either containment spray header from the fire system. 2. Required flow is available through the enclosure spray headers or the core spray ring from the spray recirculation system.
12. Valve cross connecting the fire system to the recirculation Piping M07072 (d-c motor operated)	Fails to open on d-c power failure	Required flow is available through the new core spray or backup enclosure spray.
13. Containment isolation check valve in recirculation line	Sticks closed	Required flow is available through the existing core spray or containment spray headers. The spray recirculation system is provided with a test tank and piping arrangement to permit periodic system testing. Recirculation through the check valve during testing will insure valve operability.
14. Reactor level pressure control circuit to either core spray system	Electrical failure	Required capacity flow is available through the second spray system controlled by redundant level pressure switches.
15. Containment pressure control circuit to either enclosure spray system	Electrical failure	Required capacity flow is available through the second spray system controlled by redundant pressure switches.
16. A-c power supply	Failure	D-c power supply available from emergency generator through inverter. Required flow is available through the enclosure spray and through the core spray ring.
17. D-c power supply	Failure	A-c power supply available from station power Transformer 11. Required flow is available through the redundant core spray nozzle and through the backup enclosure sprays.

B. Preoperational Test Procedures

Preoperational test procedures are being developed to demonstrate the proper functioning of the backup core spray system equipment additions and the proper functioning of the existing core and enclosure spray systems which have been modified as described in Section II-A above. These test procedures shall include but not be limited to:

1. All systems added or in which valve or piping modifications have occurred will be flushed with water following installation with the exception of the backup core spray nozzle and the backup enclosure spray system. The backup core spray nozzle will be flushed prior to installation. The acceptance criteria are that the existing flush water be free from particulate matter.

2. Hydrostatic tests will be performed on all newly installed and modified piping systems with the exception of the backup core spray nozzle and the backup enclosure sprays. The pressure boundary portions of the backup core spray nozzle will be hydrostatically tested prior to installation. Acceptance criteria are no visual leakage at a pressure equal to 2550 psi for portions of the system subject to reactor pressure, and 210 psi for systems subject to fire header pressure.

3. All flow elements, level sensors and pressure switches will be calibrated and trip points tested prior to preoperational testing. Flow will be established through basket strainers to insure flow alarms annunciate normal flow. Differential pressure switches will be tested under these flow conditions to insure they do not annunciate high differential pressure.

4. MO7069 and MO7072 shall be test operated to verify the following:

Command	Acceptance Criteria
a. Remote-manual open.	Valve travels from full shut to full open. Indication agrees with actual position.
b. Remote-manual shut.	Valve travels from full open to full shut. Indication agrees with valve position.

No flow will be established during these tests.

5. M07051, M07061, M07070 and M07071 shall be test operated to verify the following:

Command	Acceptance Criteria
a. Simulate low reactor level and pressure sensor contact closure to both sets of valves.	M07051 and M07061 open; M07070 and M07071 remain shut.
b. Maintain signal's Step "a" and remote manually shut M07051 and M07061.	M07051 and M07061 shut; M07070 and M07071 open.
c. Maintain signal's Step "a" and remote manually shut M07070 and M07071.	M07051 and M07061 remain shut; M07070 and M07071 shut.
d. Remove signal's Step "a."	M07051, M07061, M07070 and M07071 remain shut.
e. Block operation of both sets of valves in the control room. Repeat Step "a."	M07051, M07061, M07070 and M07071 remain shut.
f. Maintain signal's Step "a" and remove block signal on M07070 and M07071.	M07051 and M07061 remain shut; M07070 and M07071 open.
g. Remove signal's Step "a."	M07051 and M07061 remain shut; M07070 and M07071 remain open.
h. Remote manually shut M07070 and M07071.	M07070 and M07071 shut.
i. Block operation of M07051 and M07061. Repeat Step "a."	M07070 and M07071 open after proper time delay; M07051 and M07061 remain shut.

Note: During the above testing, all position indication will be checked to verify that it indicates actual valve position. No flow will be established during these tests.

6. M07064 and M07068 shall be test operated to verify the following:

Command	Acceptance Criteria
a. Simulate high-containment pressure to both valves.	M07064 opens after proper time delay; M07068 remains shut.

Command	Acceptance Criteria
b. Maintain signal's Step "a" and remote manually shut MO7064.	MO7064 shuts; MO7068 opens.
c. Maintain signal's Step "a" and remote manually shut MO7068.	MO7064 remains shut; MO7068 shuts.
d. Remove signal's Step "a."	MO7064 and MO7068 remain shut.
e. Block operation of MO7064 and repeat Step "a."	MO7064 remains shut; MO7068 opens after proper time delay.
f. Maintain signal's Step "a" and remote manually shut MO7068.	MO7064 remains shut; MO7068 shuts.
g. Block operation of both valves from the control room. Remove and reinsert signal from Step "a."	MO7064 and MO7068 remain closed.
h. Maintain signal's Step "a" and remote manually open MO7064.	MO7064 opens; MO7068 remains shut.
i. Maintain signal's "Step "a" and remote manually shut MO7064.	MO7064 shuts; MO7068 remains shut.
j. Maintain signal's Step "a" and remote manually open MO7068.	MO7064 remains shut; MO7068 opens.

Note: During the above testing, all position indication will be checked to verify that it indicates actual valve position. No flow will be established during these tests.

C. Design, Engineering, Construction and Quality Assurance

1. Design

The modifications discussed in Section A resulted from the new criteria requiring that safety related systems be designed with redundancy with respect to single failure criteria for active components. The design concept has been to provide an automatic backup core spray system that will withstand a six-inch vessel jump accident and is redundant to the original core spray system. The backup enclosure spray system has been modified to allow automatic and remote-manual operation instead of manual operation. In addition, two piping cross connections controlled by remote manually operated valves and two basket strainers have been incorporated in the design to provide added flexibility and reliability. These changes to the core spray, backup core spray, enclosure spray and backup enclosure spray system are further described in Section II-A and Bechtel Drawing M-123, Rev 15.

2. Engineering

The General Electric Company designed the backup core spray sparger and supplied flow data required to insure proper system design to insure adequate core cooling. The Bechtel Corporation provided engineering and procurement services for all modifications with the exception of the backup core spray sparger. The efforts of these two companies were reviewed and monitored by Consumers Power Company personnel.

3. Construction

The Bechtel Corporation has been engaged as the contractor for the construction portion of these modifications. During the February-March 1970 refueling outage, modifications affecting the low-pressure portions of the systems were installed. During the February 1971 refueling outage, the remainder of the piping modifications will be installed, the backup core spray sparger installed and electrical and instrumentation wiring connected. The backup core spray sparger is being fabricated by the General Electric Company.

4. Quality Assurance

Quality control and quality assurance requirements were specified in the mechanical bid specifications. These requirements in general covered radiography, magnetic particle testing, materials certification, hydrostatic testing, cleaning, shipping and welding procedures. Bechtel Corporation was engaged to insure that vendors met the requirements of the specifications. The electrical cable installed was tested in a timed water immersion high-voltage and insulation-resistance tests. In addition, each type of cable is certified to be of a construction that passes a vertical flame-resisting test in accordance with IPCEA S-61-402, Part 6.5.

During construction activities in February and March 1970, the contractor implemented a quality assurance program as follows:

a. Piping and Valves

(1) Receiving Reports - Prepared for materials requiring QA documentation.

(2) Final Inspection Report - Prepared upon completion of pipeline installation.

(3) Hydrostatic Test Reports

b. Welding

(1) Receiving Report - Prepared for welding rod.

(2) Field Weld Checkoff List - Prepared for each field weld.

(3) Filler Metal Withdrawal Authorizations - Prepared for each field weld.

(4) P..ping Inspection Record - Prepared for each iso-..etric drawing and showing the complete record for each field weld.

(5) Installed Inspection Report - Prepared for each line.

In addition to the above, welder performance qualification te t records and material certifications for welding rod were obtain..d. Consumers Power Company developed a program to monitor construction. This program was used to monitor welding, electrical, site s ·age and housekeeping and radiography construction activities. Audi..s were made of the contractors quality assurance in each activity.

Documentation covering the manufacture and testing of procured materials, and construction activities were obtained and are filed.

A similar program will be conducted during the remainder of construction activities in February 1971.

III. Hazard's Considerations

Based upon the above description and systems' comparison, the following conclusions may be drawn:

1. Operation and control of the original core spray system will remain essentially as it was originally installed.
2. The backup core spray system is redundant to the original core spray with respect to single failure criteria and will operate to prevent fuel-clad melting in the event of a failure in the original core spray system.
3. The backup core spray system is designed to withstand a six-inch vessel jump.
4. The single core spray recirculation line has been missile shielded to provide added reliability.

5. The backup containment spray system has been modified to provide for automatic or remote-manual operation in the event of a failure in the containment spray system.
6. No heavily sensitized stainless steel components will be installed within the primary coolant system pressure boundaries as a result of these modifications.
7. Instrumentation and alarms have been added to the post-incident cooling systems to provide the operator with more system status in_ormation.

Based upon the above considerations, we have concluded that the use of these modified post-incident cooling systems do not present a significant change in the hazard's considerations described or implicit in the Final Hazards Summary Report.

CONSUMERS POWER COMPANY

By HRWall
Senior Vice President

Date: February 2, 1971

Sworn and subscribed to before me this second day of February 1971.

Grace P. Warner
Notary Public, Jackson County, Michigan
My commission expires January 15, 1972