

Specification 10040-M651

TECHNICAL SPECIFICATION
FOR
CONTRACT FOR
FURNISHING, INSTALLING AND TESTING
HALOGENATED AGENT EXTINGUISHING SYSTEM
FOR THE
MONTICELLO NUCLEAR GENERATING
PLANT - UNIT 1
NORTHERN STATES POWER COMPANY
MINNEAPOLIS, MINNESOTA

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I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.
Charles B. Hogg
 Date 10-26-79 Registration No. 13456

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△	1-10-80	Revised for Bid	AV	JRS	AV	CA	
△	11/28/79	Issued for bid	AV	JRS	AV	CA	
No.	DATE	REVISIONS	FPE	BY	CHK	APPR.	
ORIGIN		 Monticello Nuclear Generating Plant - Unit 1 Monticello, Minnesota	JOB No. 10040				
			Spec. No. M-651				REV. 1
			SHEET 1				OF 21

- 2) The Seller shall submit the results of the bubble tests.
- 3) The Seller shall submit inspection reports.
- 4) The Seller shall submit performance test reports.

3. SERVICE REQUIREMENTS

A. GENERAL

- 1) Halon 1301 systems shall be furnished and installed in the cable spreading room and at concentration densities as specified in Attachment A.

B. PLANT UTILITIES

- 1) Electrical and Control Power

Instrumentation, annunciation and control:

<u>Normal Voltage</u>	<u>Voltage Tolerance</u>
120 V, 1 phase, 60 Hz	108 to 132V

Power Supply:

<u>Nominal Voltage</u>	<u>Voltage Tolerance</u>
480V, 3 phase, 60 Hz	474 to 506V
120V, 1 phase, 60 Hz	108 to 132V

- 2) Instrument Air - Dry and Oil Free

<u>Normal Pressure</u>	<u>Pressure Tolerance</u>
90 psig	±10 psig

C. ENVIRONMENTAL CONDITIONS:

- 1) System components shall be suitable for installation and operation under the following conditions; when applicable:

Inside Buildings

Temperature	60 F, min	104 F, max
Relative Humidity	50 %, min	100 %, max

Outside Buildings

Temperature	-35 F, min	100 F, max
Relative Humidity	0 %, min	100 %, max

4. DESIGN REQUIREMENTS

A. GENERAL

- 1) Each Halon 1301 fire extinguishing system shall be capable of operating, attaining, and maintaining not more than the halogenated agent design concentration required for the cable spreading room under the conditions specified in Attachment C.
- 2) Halon 1301 shall be discharged into the hazard through wide angle nozzles. An adequate number and distribution of nozzles shall be provided to ensure complete coverage of the hazard area.
- 3) The location of hangers and the final routing of the piping shall be subject to the Buyer's acceptance. Piping and hangers 2 inches and smaller may be located in the field with general installation diagrams. All piping shall be shop-fabricated and installed according to the Seller's layout drawings.
- 4) The piping distribution and supply system shall be designed and installed to avoid interference with or encroachment into access required to existing plant systems and equipment. The Seller shall arrange with the Buyer to visit the jobsite for the purposes of making an inspection of the work area and discussing installation requirements. The cost of such a visit or additional visits (if required) shall be included in the Seller's proposal. The submitting of a proposal shall attest that the Seller has visited the site and is familiar with existing conditions affecting installation requirements.
- 5) Piping and nozzles shall be sized on the basis of calculated flow and terminal pressure. Calculations shall be performed in accordance with the requirements of NFPA 12A and established test data. Calculations shall be submitted for review and comment by the Buyer prior to the start of material procurement and fabrication.
- 6) All instrumentation, controls and electrical components shall be suitable for the service intended and shall lend themselves to nuclear power plant service.
- 7) All materials, equipment, and accessories provided shall comply with OSHA, UL, and/or FM requirements, or of demonstrated excellent service and shall bear the listing mark of UL or FM, as appropriate.

B. STORAGE UNITS

- 1) The high pressure Halon 1301 storage units shall consist of pressure cylinders designed to meet the requirements of the U.S. Department of Transportation, the ASME Code, and NFPA No. 12A.
- 2) The storage units shall be superpressurized with dry nitrogen to expel liquid Halon 1301 through a dip tube that terminates near the bottom of the unit.
- 3) A means of determining the pressure in the cylinders shall be provided. Weighing will not be accepted by the Buyer as a method for determining the pressure level.
- 4) Pressure cylinders, attached accessories and local piping shall be mounted in a rack assembly. Rack assembly design shall be suited to final storage unit location. Rack assembly design shall be subject to acceptance by the Buyer.
- 5) Storage units shall be designed for outside installation. The Seller shall submit provisions for weather protection at the permanent location of the storage units to the Buyer for approval.

C. CYLINDER CONNECTORS AND DISCHARGE HEADS

- 1) Each discharge cylinder valve shall be connected to the discharge manifold by a cylinder connector consisting of metal tubing, pipe or metal braid reinforced flexible Teflon hose.
- 2) Cylinder connectors shall be the same nominal size as the cylinder discharge valve or larger in order not to restrict flow. Each cylinder connector shall be fitted with a check valve to prevent the loss of Halon 1301 if a cylinder is disconnected.
- 3) Bleeder valves shall be installed to prevent the reserve bank from discharging accidentally after the main bank is operated.

D. MANIFOLDS AND DISTRIBUTION PIPING

- 1) Pilot manifold sections serving main and reserve banks shall be separated. Each section provided with check valves shall also include means for venting leakage that might set off the idle bank. The vents shall close automatically when a section of manifold is discharging from system release.
- 2) Distribution supply piping (including manifolds adjacent to the storage units) shall be furnished as follows:

<u>PIPE:</u>	4-inch and smaller	ASTM A53, Grade E, Schedule 40 seamless, galvanized per ASTM A153, Galvanized after welding .	⚠
	Larger than 4-inch	ASTM A53, Grade E, Schedule 80, seamless, galvanized per ASTM A-153 galvanized after welding.	⚠
<u>FITTINGS:</u>	2-1/2 inch and larger	ASTM A234, Grade WPB, seamless, butt welded, wall thickness to match pipe, galvanized after welding.	
	2 - inch and smaller	ASTM A197, ductile iron 300 lb, class only, galvanized threaded and banded, UL approved only.	
<u>FLANGES:</u>	2-1/2 inch and larger	ASTM A105, weld neck or slip on, 1/16" raised face, galvanized after welding.	
<u>GASKETS:</u>	2-1/2 inch and larger	ASTM D1330, "neoprene," 1/16-inch.	
<u>BOLTING:</u>	All sizes	ASTM A307, Grade B, standard hexagon head bolts and nuts.	
<u>JOINTS:</u>	2-1/2 inch and larger	All shop joints welded, galvanized after welding. All field joints flanged.	
	2 - inch and smaller	Threaded.	

- 3) The Seller shall furnish and install all supports (includes hangers) required for distribution and supply piping. Pipe supports shall be attached to existing steel or concrete structure with clamps or hangers designed in accordance with NFPA 13. Tapping or drilling of load-bearing members shall not be permitted. No field welding shall be permitted in the hazard area.
- 4) Pipe supports shall not be attached to existing pipe or electrical raceway supports.

- 5) Pipe supports for indoor and outdoor piping and equipment shall be types normally used for fire protection services. Outdoor supports shall be galvanized.
- 6) Pipe supports for portions of the supply and distribution system listed in Appendix C shall be designed and installed as specified herein.

The design, spacing and installation of pipe supports for all other portions of the supply and distribution system shall be in accordance with NFPA 13 and shall include sway bracing as specified in Section 3-10.4 of NFPA 13.

- 7) All materials, equipment, and appliances provided shall comply with OSHA, UL and/or FM requirements and shall bear the listing mark of the UL or FM approval or of demonstrated excellent service approved by Buyer.

E. DISCHARGE NOZZLES

- 1) Discharge nozzles shall be furnished in accordance with the requirements of NFPA No. 12A.
- 2) Discharge nozzles in which the horn, or shell and orifice piece are separate elements shall be designed so that the orifice piece is connected directly to the supply pipe. Separate orifice plates shall not be used.

F. AUTOMATIC CONTROLS

- 1) Each system shall be provided with means for the manual and automatic release of Halon 1301. Automatic release shall be initiated by electric thermal detectors as indicated in Attachment C.
- 2) An ac-powered control cabinet shall be provided to monitor the system, provide power to the detectors, and actuate the cylinder discharge valves.
- 3) Electric thermal detectors shall be of approved rate-compensated design, consisting of a hermetically sealed assembly with self-restoring stainless steel sensing element. The detector shall be factory-set to actuate the system at a temperature suitable for the ceiling ambient temperatures in the hazard.
- 4) Actuation of the system shall cause opening of a normally de-energized, normally closed solenoid valve on a pilot control cabinet or energize the circuit to an electroexplosive or electromechanical initiator assembly.

- 5) Each pilot control cabinet of pressure-operated systems shall be constantly monitored. A low pressure switch shall give an audible alarm if the control pressure drops below 300 psig. Systems employing electroexplosive or electromechanical actuating devices shall be provided with a supervised control for monitoring conditions of the actuating device and firing circuit wiring at all times.

G. MANUAL ACTUATION CONTROLS

- 1) Provisions for remote-manual releases shall be provided and furnished in accordance with the requirements of NFPA No. 12A.
- 2) Release for pressure-operated systems shall be accomplished by a mechanism consisting of a small carbon dioxide cylinder with a siphon tube and manual valve. When operated, the valve shall admit carbon dioxide through a check valve to the main pilot cylinder in the discharge heads.
- 3) For electroexplosive or electromechanical actuated systems, release shall be accomplished by a pull type mechanical mechanism, requiring exertion of not less than 25 lb. of force for operation or an electrical toggle type, protected by a mechanical guard, and wire to preclude inadvertent operation.

H. RESERVE BANK

- 1) Reserve bank actuation shall be provided by a transfer valve or switch that shall transfer the actuation to the pilot cylinders of the reserve bank after discharge of the main bank.

I. ELECTRICAL

- 1) Electrical components shall be designed, furnished and installed in accordance with the applicable codes and standards listed in Paragraph 1E of this specification and indicated below.
- 2) Electrical components shall be selected and suitable for service with the power supplies listed in paragraph 3B of this specification.
- 3) Wire, Cable and Insulation:

All power and control wiring shall be stranded 600-volt wire or equivalent as permitted by Buyer. Wire insulation shall be Ethylene Propylene Rubber (EPR) with Hypalon outer jacket, in accordance with applicable sections of IPCEA S-19 81 and IPCEA S-69-516. Wiring for prewired "off shelf" items shall utilize the Seller's standard wire size and insulation.

Interconnecting power and control cables shall pass the vertical flame test specified in Section 2.5 of IEEE 383, using a ribbon gas burner. Internal panel wiring, backplane wiring, instrument cables, and single conductors from a multiconductor assembly shall meet the vertical flame test described in Section 2.5.6 of IEEE 383. Documentation shall be provided by the Contractor as evidence of compliance.

Number 16 AWG wire shall be used for low level instrument signals. Control circuits with a continuous current duty of less than 10 amps shall use No. 14 AWG. Control circuits with a continuous current duty between 10-20 amps shall use No. 12 AWG wire. Minimum size of wire for power circuit shall be No. 12 AWG. Circuits having a continuous duty rating above 20 amperes shall use a wire size larger than No. 12 and shall require Buyer's written authorization.

Wiring over door hinges or other locations where leads may be subject to flexing shall use No. 14, 41-strand extra flexible copper conductors. Such wiring shall be arranged so that swiveling of the door shall twist, rather than flex or bend, the conductor assembly.

4) Control Units and Control Panels:

Control units, control panels, and component spacing shall be in accordance with NEMA Industrial Control Standards (ICS). The enclosed units and panels shall be NEMA Type 12. Door hinges and latches shall be stainless steel. Door locks shall be keyed alike: Master Key No. M8012" manufactured by: Corbin Cabinet Lock Division, Emhart Corporation, New Britain, Connecticut. External connections for Buyer's wiring shall be terminated on conveniently located screw type terminal blocks. Wire terminations shall be made with insulated solderless ring-tongue compression type connectors.

All instrument cases shall be grounded effectively through the cases and the steel structures.

The units or panels shall be equipped with a 1/4" x 1" copper ground bus running the length of the units or panels, with the steel structure connected to the bus so as to effectively ground the entire structure. A bolted compression type terminal (Burndy YA 28-2N or AMP) suitable for taking the Buyers 4/0 copper ground cable shall be provided at each end of the ground bus.

When the diagram indicates a definite ground at a panel for circuits, a single wire for each circuit thus grounded shall be run independently to the ground bus and fastened thereon with a bolted connection using ring lugs.

Suitably engraved nameplates, in accordance with Standard Drawing 5828-M488 (NL36486) Name Plate Standards, shall be furnished for each panel, instrument or device mounted on the face of the control panel. 

- 5) The Seller shall utilize electrical breakers, provided by the Buyer (from existing plant spares), for electrical and control power supply. One 480V and one 120V breaker shall be available for use by the Seller.

The Seller shall furnish and install power cable from the breakers(s) to a suitable point(s) of distribution provided by the Seller.

- 6) The Seller shall include in his proposal the conduit/tray and supports required for electrical and control cable. Should it be necessary or advantageous to utilize portions of the existing plant electrical raceway systems, the Seller shall request and obtain the Buyer's approval on a case-by-case basis. The Seller shall provide cost deductions, accounting for material and labor, for each case.
- 7) Supports for Seller-furnished conduit/tray shall be attached to the building structure. Use of the existing plant raceway support system shall not be permitted.

J. ACCESSORIES

- 1) Discharge Delay Timer: Each system shall include an adjustable timing device to delay discharge after initiation of the automatic actuation sequence. The timer shall not delay discharge following manual actuation.
- 2) Predischarge Alarm: Each system shall include an alarm of outstanding sound level and distinctive tone to announce imminent discharge of Halon 1301 in the hazard area. The alarm shall be actuated by a pressure switch in the pneumatic discharge delay piping or by the timer actuating circuit of electroexplosive or electromechanical systems. The alarm shall sound without delay upon manual actuation of the system.
- 3) Additional Contacts: In addition to the predischarge alarm, contacts shall be provided to perform the following functions without delay:
- a) Shut down heating and air conditioning fan motors
 - b) Shut down ventilation fan motors
 - c) Turn on emergency lighting system
 - d) Close dampers and louvers in the area affected
 - e) Annunciate fire alarm in the control room
- 4) Pressure Switch: A pressure switch shall be provided in the discharge piping. The pressure switch shall be of heavy duty construction with a manual operator for reset

and test. Contacts shall be provided to perform the following functions:

- a) Annunciate system actuated in the control room
 - b) Close the pilot control solenoid valve to prevent unnecessary loss of control pressure.
- 5) Pressure Release Devices: Pressure-actuated release devices consisting of stainless steel cylinders and pistons with spring clips arranged for perpendicular pull shall be provided for releasing doors, gravity dampers, and louvers.
- 6) Trouble Alarms: System trouble conditions shall be registered with individual visual alarms and a common audible alarm. Contacts shall be provided for annunciation of the common trouble alarm in the control room. The trouble condition shall include the following:
- a) Low pilot control pressure
 - b) Failure in the electroexplosive or electromechanical firing circuit
 - c) Failure in the detector circuit
 - d) Any other trouble condition peculiar to the operation of the Halon 1301 system proposed.

K. OPERATING SEQUENCE

- 1) The response of the thermal detectors to elevated ambient temperature shall be to initiate the release of pilot control pressure to a pneumatic timing device or to initiate a discharge delay timing circuit.
- 2) The pilot pressure release or initiation of the delay timing circuit shall actuate the electric interlocks to shut down fan motors, actuate electric louver and damper releases, and sound the predischage alarm. A signal shall be transmitted to the control room for fire alarm registry. A signal shall release the lock on the door of the cable spreading room if this method is chosen to relieve internal pressure. △
- 3) Following the discharge delay time interval, the pilot control pressure shall actuate the cylinder discharge control heads, or the electric circuit shall actuate the electroexplosive or electromechanical discharge heads, discharging the Halon 1301 into the hazard area. A pressure switch in the distribution piping shall transmit a signal to the control room to register system actuated and shall cause the pilot control pressure solenoid valve to close. The discharged Halon 1301 pressure shall actuate the pressure release devices to close the damper, louvers, and doors; if required.
- 4) The response to remove manual actuation shall follow the same sequence of operation as automatic thermal

actuation except for the omission of the time-delayed actuation.

- 5) Upon completion of the discharge cycle, the controls shall return to normal.
- 6) The system actuated alarm condition shall be maintained until the relay is reset manually.
- 7) Transfer to reserve bank standby shall be by manual selector valve or manual transfer switch.

L. SEISMIC REQUIREMENTS

- 1) Selected components of the Halogenated Agent Extinguishing System shall be seismically qualified to prevent spurious system actuation, when not in use, as result of a seismic event. The system need not remain operable after a seismic event. Seller shall determine which additional components require seismic qualification to meet these criteria. A complete list of components to be seismically qualified shall be submitted with Seller's proposal.
- 2) Seismic qualification requirements for line-mounted valves are specified in Appendix D.

M. SPECIAL TOOLS

- 1) The Seller shall furnish one set of any special tools required for the operation and/or maintenance of the equipment and systems provided under this specification. Such tools shall be new, of quality as approved by Buyer, shipped to the work site separately from other material, and shall be marked as to their intended use. The Seller shall provide a detailed complete list of all special tools furnished. Tools shall be marked "For Operation and Maintenance Only. Not to be Used for Erection."

5. MATERIALS

A. GENERAL

- 1) The Seller's standard materials are acceptable to Buyer if they are suitable for the service and conditions stated elsewhere in this specification.

Appendix A to Specification 10040-M-651 Rev. 1

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purpose use permitted by any written consent given by the lender to the borrower.

PLANT Monticello Generating Sta.		LOCATION Monticello, Minn.		ELEVATION	ITEM NO.
BUILDING				REQ. NO./P.O.	
LOCATION <input checked="" type="checkbox"/> INDOORS <input checked="" type="checkbox"/> OUTDOORS		RADIOACTIVE AREA <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		COST CODE	
RATINGS AND CONDITIONS OF SERVICE					
SERVICE		SYSTEM TYPE		SYSTEM NO.	
AREA SERVED Cable Spreading Room					
HAZARD OBSERVATION:					
LENGTH 48 FT.	WIDTH 48 FT.	HEIGHT 12 FT.	DIAMETER	VOLUME (GROSS) 27648 CU.FT.	AMBIENT AIR TEMP. 104° F
SYSTEM REQUIREMENTS					
CONCENTRATION 5 to 6		HALDN 1301 BP. VDL. (by Seller)		TOTAL QTY. (by Seller)	
AUTOMATIC RELEASE <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		THERMAL DETECTORS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		CROSS-ZONED SMOKE DETECTORS <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
AUTOMATIC RELEASE TYPE (by Seller)		ANNUNCIATOR TYPE Audio/Visual			
PRESSURE <input type="checkbox"/> YES <input type="checkbox"/> NO		ELECTRO-EXPLOSIVE <input type="checkbox"/> YES <input type="checkbox"/> NO		LOCATION: LOCAL <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
DISCHARGE DELAY TIMER <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		TIME DELAY 30 SECONDS		DISCHARGE NOZZLES SIZE (by Seller)	
MANUAL RELEASE PUSH BUTTON		QUANTITY (by Seller)			
MOMENTARY <input type="checkbox"/> YES <input type="checkbox"/> NO		MAINTAINED <input type="checkbox"/> YES <input type="checkbox"/> NO		LOCAL <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
PRESSURE OPERATED RELEASE DEVICES		REMOTE <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
QUANTITY _____		FIRE DAMPERS <input type="checkbox"/> YES <input type="checkbox"/> NO			
A/C SUPPLY AIR DAMPERS <input type="checkbox"/> YES <input type="checkbox"/> NO		GRAVITY DAMPERS <input type="checkbox"/> YES <input type="checkbox"/> NO			
VENT AIR DAMPERS <input type="checkbox"/> YES <input type="checkbox"/> NO		DOORS <input type="checkbox"/> YES <input type="checkbox"/> NO			
POWER SUPPLY _____ V AC/DC _____ Hz _____ PHASE		FAN MOTORS <input type="checkbox"/> YES <input type="checkbox"/> NO			
QUALITY CONTROL REQ'D. PER QAR 4-3		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		MFG. STD. <input type="checkbox"/> YES <input type="checkbox"/> NO	
SEISMIC Yes		<input checked="" type="checkbox"/> CATEGORY 1 (selected components)		<input type="checkbox"/> UBC per spec. section J <input type="checkbox"/> NONE	
REMARKS					
1) Halon discharge time to be 10 seconds to full concentration.					
2) Desired concentration to be maintained 10 minutes minimum.					
Δ					
X	1-10-80	Revised for bid			
A		Issued for bid			
NO Δ	DATE	REVISIONS	BY	CHK'D	ENG'R
ORIGIN	HALOGENATED AGENT EXTINGUISHING SYSTEM			CHIEF ENG'R	
	Monticello Generating Station Monticello, Minn.			JOB NO. 10040	
				DATA SHEET NUMBER	
				M-651	
			REV.		
			1		

SEISMICALLY DESIGNED PIPE SUPPORTS

PIPE SUPPORT TYPE:

Guides (either U-bolt type or other clamp type that allows pipe to slide along axial directions; no lateral movements allowed)

MAXIMUM DISTANCE BETWEEN SUPPORTS:

<u>Pipe Size, In.</u>	<u>Max. Distance Between Supports, Ft.</u>
1	7.0
1-1/4	8.0
1-1/2	9.0
2	10.0
2-1/2	11.0
3	12.0
4	13.75
6	17.0
8	18.75

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		Issued for bid			<i>CA</i>
No.	DATE	REVISIONS	BY	CHK	APPR
ORIGIN		 Monticello Nuclear Generating Plant - Unit 1 Monticello, Minnesota	JOB No. 10040		
			Data Sheet	REV. 0	
			Appendix "C"		
		SHEET C-1 OF 1			

APPENDIX D

SEISMIC QUALIFICATION OF LINE-MOUNTED VALVES

1. This appendix covers the seismic qualification requirements for valves, including actuators and all other appurtenances, that are supported by the piping in which they are mounted.
2. Valves and actuators shall be demonstrated capable of withstanding the simultaneous application of the following loads:
 - a. All normal operating loads, including pressure and the weight of the valve topworks; and,
 - b. a horizontally applied inertial load equivalent to a seismic acceleration of 4.5g; and,
 - c. a vertically applied inertial load equivalent to a seismic acceleration of 4.5g.

The valve shall be assumed to be mounted in that orientation in which the above loads give rise to the highest stresses in the valve pressure boundary. The seismic inertial loads shall be assumed to be applied at the center of mass of the valve topworks.

Valves and actuators shall withstand the loads noted in a, b, and c without activating and changing the position of the valve.

3. The topworks of the valve assembly, i.e., everything above the body-to-bonnet joint, shall have a fundamental frequency of vibration greater than 33 Hertz.
 4. Fulfillment of the above requirements shall be demonstrated by tests and/or calculations. Copies of the test data and/or calculations shall be prepared
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Enclosure (2)

Fire Protection Safety Evaluation Item 3.1.2 (2)
Diesel Generator Room Fire Suppression System

A pre-action sprinkler fire extinguishing system will be installed in both diesel generator rooms and both day tank rooms. A fire detection subsystem will be included for fire detection, local alarm, annunciation in the control room, and actuation of the extinguishing system. A thermal detector in the area will open the deluge valve at 140°F, admitting water to the system. The sprinkler heads will not release the water until the temperature in the head area reaches the fusing temperature of the head.

The fusing temperature is 165°F except as necessary in local hot spots such as near D-G exhaust pipes. Thermal releasing devices for deluge valves will be the electric heat-actuated rate compensated type that responds to abnormal rate-of-rise of the ambient temperature and to attainment of a fixed temperature within the protected area. Each deluge valve release will be supervised so that any failure of the detection system will initiate local audible and remote audible/visual alarms in the control room but will not cause the deluge valve to open.

The deluge valves will have a local electrically operated audible alarm to signal water flow in the system, a break-glass control station for manual actuation, and a control unit. The control unit will contain a normally energized solenoid device. Each deluge valve control unit will have alarms which visually indicate that the system is ready; that the detector circuit is in the fire alarm condition; that there is water flow through the deluge valve; and that shutoff valves are not fully open. Each control unit will have terminals for local audible alarm to signal water flow in the system and remote annunciation of the signals in the control room. Test push buttons will be provided to simulate water flow and to interrupt the detection-actuation circuit to simulate a fire alarm. A single control panel will incorporate the control units for each of the grouped water spray subsystems.

The sprinkler system will provide a water density designed for Ordinary Hazard. Spray nozzles will be placed to provide direct impingement of the spray on burning surfaces and/or surfaces to be cooled. Spray nozzles will produce a solid cone fine spray in a directional pattern. Water for fire protection will be available from the yard fire protection loop. Drains will be added, where necessary, to pipe discharges to the exterior building wall.

Refer to the attached specification document for this modification. The design specification was prepared by the Bechtel Corporation for Northern States Power Company. Written permission has been received to forward this document for NRC Staff review.