ATTACHMENT A

Dresden Station Unit 3

Proposed Changes to Appendix A
Technical Specifications to Operating
License DPR-19

Revised Pages:
23
24
24a (new page)
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*61a (new page)
*62

Note: These pages completely supercede those provided in our October 14, 1980 submittal.

* Denotes pages which have a revision request pending to support operations with Exxon fuel (T. J. Rausch letter to H. R. Denton dated January 11, 1982).

3673N

TABLE 3.1.1

REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION REQUIREMENTS

Minimum Number of Operable Inst. Channels per Trip (1) System	Trip Function	Trip Level Setting	Modes in Which Function Must be Operable			Action*
			Refuel (7)	Startup/Hot Standby	Run	
1	Mode Switch in Shutdown		X	X	X	A
1	Manual Scram		X	X	X	A
	IRM					
3	High Flux	≤120/125 of Full Scale	X	X	X(5)	A
3	Inoperative		X	X	X(5)	A
	APRM					
2	High Flux	Specification 2.1.A.1	X	X(9)	X	A or B
2	Inoperative**		X	X(9)	X	A or B
2	Downscale	≥5/125 of Full Scale	X(12)	X(12)	X(13)	A or B
2	High Flux (15% Scram)	Specification 2.1.A.2	X	X	X(14)	A
2	High Reactor Pressure	≤1060 psig	X(11)	X	X	A
2	High Drywell Pressure	≤2 psig	X(8), X(10)	X(8), (10)	X(10)	A
2	Reactor Low Water Level	≥1 inch***	X	X	X	A
2 (Per Bank)	High Water Level in Scram Discharge Volume (Float and dp Switch)	≤37.25 inches above bottom of the Instrument Volume	X(2)	X	X	A or D

TABLE 3.1.1 (Cont.)

Minimum of Operable Inst. Channels per Trip (1) System	Trip Function	Trip Level Setting	Modes in Which Function Must be Operable			Action*
			Refuel (7)	Startup/Hot Standby	Run	
2	Turbine Condenser Low Vacuum	≥23 in. Hg Vacuum	X(3)	X(3)	X	A or C
2	Main Steam Line High Radiation	≤3 X Normal Full Power Background	X(3)	X(3)	X	A or C
4(6)	Main Steam Line Isolation Valve Closure	≤10% Valve Closure	X(3)	X(3)	X	A or C
2	Generator Load Rejection	****	X(4)	X(4)	X(4)	A or C
2	Turbine Stop Valve Closure	≤10% Valve Closure	X(4)	X(4)	X(4)	A or C
2	Turbine Control - Loss of Control Oil Pressure	≥900 psig	X	X	X	A or C

Notes:

1. There shall be two operable or tripped trip systems for each function.
2. Permissible to bypass, with control rod block, for reactor protection system reset in refuel and shutdown positions of the reactor mode switch.
3. Permissible to bypass when reactor pressure is <100 psig.
4. Permissible to bypass when first stage turbine pressure less than that which corresponds to 45% rated steam flow.
5. IRM's are bypassed when APRM's are onscale and the reactor mode switch is in the run position.
6. The design permits closure of any one valve without a scram being initiated.
7. When the reactor is subcritical and the reactor water temperature is less than 212°F, only the following trip functions need to be operable:
   a. Mode Switch in Shutdown
   b. Manual Scram
   c. High Flux IRM
   d. Scram Discharge Volume High Level
8. Not required to be operable when primary containment integrity is not required.
9. Not required while performing low power physics tests at atmospheric pressure during or after refueling at power levels not to exceed 5 MW(t).

TABLE 3.1.1 (Cont.)

10. May be bypassed when necessary during purging for containment inerting or deinerting.

11. Not required to be operable when the reactor pressure vessel head is not bolted to the vessel.

12. The APRM downscale trip function is automatically bypassed when the reactor mode switch is in the refuel and startup/hot standby positions.

13. The APRM downscale trip function is automatically bypassed when the IRM instrumentation is operable and not high.

14. The APRM 15% scram is bypassed in the run mode.

* If the first column cannot be met for one of the trip systems, that trip system shall be tripped. If the first column cannot be met for both trip systems, the appropriate actions listed below shall be taken:

a. Initiate insertion of operable rods and complete insertion of all operable rods within 4 hours.
b. Reduce power level to IRM range and place mode switch in the Startup/Hot Standby position within 8 hours.
c. Reduce turbine load and close main steam line isolation valves within 5 hours.
d. In the refuel mode, when any control rod is withdrawn, suspend all operations involving core alterations and insert all insertable control rods within one hour.

** An APRM will be considered inoperable if there are less than 2 LPRM inputs per level or there are less than 56% of the normal complement of LPRM's to an APRM.

*** 1 inch on the water level instrumentation is $\geq$504" above vessel zero (see Bases 3.2).

**** Trips upon actuation of the fast closure solenoid which trips the turbine control valves.

TABLE 4.1.1

SCRAM INSTRUMENTATION FUNCTIONAL TESTS

MINIMUM FUNCTIONAL TEST FREQUENCIES FOR SAFETY INSTR. AND CONTROL CIRCUITS

Instrument Channel	Group (3)	Functional Test	Minimum Frequency (4)
Mode Switch in Shutdown	A	Place Mode Switch in Shutdown	Each Refueling Outage
Manual Scram	A	Trip Channel and Alarm	Every 3 Months
IRM			
* High Flux	C	Trip Channel and Alarm (5)	Before Each Startup (6)
* Inoperative	C	Trip Channel and Alarm	Before Each Startup (6)
APRM			
High Flux	B	Trip Output Relays (5)	Once Each Week
Inoperative	B	Trip Output Relays	Once Each Week
Downscale	B	Trip Output Relays (5)	Once Each Week
High Flux (15% scram)	B	Trip Output Relays	Before Each Startup
High Reactor Pressure	A	Trip Channel and Alarm	(1)
High Drywell Pressure	A	Trip Channel and Alarm	(1)
Reactor Low Water Level (2)	A	Trip Channel and Alarm	(1)
High Water Level in Scram Discharge Volumes (Float and dp Switch)	A	Trip Channel and Alarm (7)	Every 3 Months
Turbine Condenser Low Vacuum	A	Trip Channel and Alarm	(1)
Main Steam Line High Radiation (2)	B	Trip Channel and Alarm (5)	Once Each Week
Main Steam Line Isolation Valve Closure	A	Trip Channel and Alarm	(1)
Generator Load Rejection	A	Trip Channel and Alarm	(1)
Turbine Stop Valve Closure	A	Trip Channel and Alarm	(1)
Turbine Control - Loss of Control Oil Pressure	A	Trip Channel and Alarm	(1)

TABLE 4.1.1 (Cont.)

NOTES:

1. Initially once per month until exposure hours (M as defined on Figure 4.1.1) is 2.0×10^5; thereafter, according to Figure 4.1.1 with an interval not less than one month nor more than three months. The compilation of instrument failure rate data may include data obtained from other Boiling Water Reactors for which the same design instrument operates in an environment similar to that of Dresden Unit 3.

2. An instrument check shall be performed on low reactor water level once per day and on high steam line radiation once per shift.

3. A description of the three groups is included in the Bases of this Specification.

4. Functional tests are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.

5. This instrumentation is excepted from the Instrument Functional Test Definition (1.F). This Instrument Function Test will consist of injecting a simulated electrical signal into the measurement channels.

6. If reactor start-ups occur more frequently than once per week, the functional test need not be performed; i.e., the maximum functional test frequency shall be once per week.

7. The Functional Test of the Scram Discharge Volume float switch shall include actuation of the switch using a water column.

TABLE [illegible]1.2

SCRAM INSTRUMENT CALIBRATION

MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group (1)	Calibration Test	Minimum Frequency (2)
*High Flux IRM	C	Comparison to APRM after Heat Balance	Every Shutdown (4)
High Flux APRM			
Output Signal	B	Heat Balance	Once Every 7 Days
Flow Bias	B	Standard Pressure and Voltage Source	Refueling Outage
High Reactor Pressure	A	Standard Pressure Source	Every 3 Months
High Drywell Pressure	A	Standard Pressure Source	Every 3 Months
Reactor Low Water Level	A	Water Level	Every 3 Months
Turbine Condenser Low Vacuum	A	Standard Vacuum Source	Every 3 Months
Main Steam Line High Radiation	B	Standard Current Source (3)	Every 3 Months
Turbine Control - Loss of Control Oil Pressure	A	Pressure Source	Every 3 Months
High Water Level in Scram Discharge Volume (dp only)	A	Water Level	Once per Refueling Outage

Notes:

1. A description of the three groups is included in the bases of this Specification.
2. Calibration tests are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.
3. The current source provides an instrument channel alignment. Calibration using a radiation source shall be made during each refueling outage.
4. If reactor startups occur more frequently than once per week, the functional test need not be performed; i.e., the maximum functional test frequency shall be once per week.

The control rod drive scram system is designed so that all of the water which is discharged from the reactor by a scram can be accommodated in the discharge piping. A part of this system is an individual instrument volume for each of the east and west CRD accumulators. These two volumes and their piping can hold in excess of 90 gallons of water and is the low point in the piping. No credit was taken for these volumes in the design of the discharge piping relative to the amount of water which must be accommodated during a scram. During normal operations, the discharge volumes are empty; however, should either volume fill with water, the water discharged to the piping from the reactor may not be accommodated which could result in slow scram times or partial or no control rod insertion. To preclude this occurrence, level switches have been installed in both volumes which will alarm and scram the reactor when the volume remaining in either instrument volume is approximately 41 gallons. For diversity of level sensing methods that will ensure and provide a scram, both differential pressure switches and float switches have been incorporated into the design and logic of the system. The setpoint for the scram signal has been chosen on the basis of providing sufficient volume remaining to accommodate a scram even with 5 gpm leakage per drive into the SDV. As indicated above, there is sufficient volume in the piping to accommodate the scram without impairment of the scram times or the amount of insertion of the control rods. This function shuts the reactor down while sufficient volume remains to accommodate the discharged water and precludes the situation in which a scram would be required but not be able to perform its function properly.

Loss of condenser vacuum occurs when the condenser can no longer handle the heat input. Loss of condenser vacuum initiates a closure of the turbine stop valves and turbine bypass valves which eliminates the heat input to the condenser. Closure of the turbine stop and bypass valves causes a pressure transient, neutron flux rise, and an increase in surface heat flux. To prevent the clad safety limit from being exceeded if this occurs, a reactor scram occurs on turbine stop valve closure. The turbine stop valve closure scram function alone is adequate to prevent the clad safety limit from being exceeded in the event of a turbine trip transient with bypass closure. The condenser low vacuum scram is a backup to the stop valve closure scram and causes a scram before the stop valves are closed and thus the resulting transient is less severe. Scram occurs at 23" Hg vacuum, stop valve closure occurs at 20" Hg vacuum, and bypass closure at 7" Hg vacuum.

High radiation levels in the main steam line tunnel above that due to the normal nitrogen and oxygen radioactivity is an indication of leaking fuel. A scram is initiated whenever such radiation level exceeds three times normal background. The purpose of this scram is to reduce the source of such radiation to the extent necessary to prevent excessive turbine contamination. Discharge of excessive amounts of radioactivity to the site environs is prevented by the air ejector offgas monitors which cause an isolation of the main condenser offgas line provided the limit specified in Specification 3.8 is exceeded.

The main steam line isolation valve closure scram is set to scram when the isolation valves are 10% closed from full open. This scram anticipates the pressure and flux transient, which would occur when the valves close. By scramming at this setting, the resultant transient is insignificant.

A reactor mode switch is provided which actuates or bypasses the various scram functions appropriate to the particular plant operating status. Ref. Section 7.7.1.2 SAR.

The manual scram function is active in all modes, thus providing for a manual means of rapidly inserting control rods during all modes of reactor operation.

The IRM system provides protection against excessive power levels and short reactor periods in the startup and intermediate power ranges. Ref.

a half scram and rod block condition. Thus, if the calibration was performed during operation, flux shaping would not be possible. Based on experience at other generating stations, drift of instruments, such as those in the Flow Biasing Nework, is not significant and therefore, to avoid spurious scrams, a calibration frequency of each refueling outage is established.

Group (C) devices are active only during a given portion of the operational cycle. For example, the IRM is active during startup and inactive during full-power operation. Thus, the only test that is meaningful is the one performed just prior to shutdown or startup; i.e., the tests that are performed just prior to use of the instrument.

Calibration frequency of the instrument channel is divided into two groups. These are as follows:

1. Passive type indicating devices that can be compared with like units on a continuous basis.

2. Vacuum tube or semiconductor devices and detectors that drift or lose sensitivity.

Experience with passive type instruments in Commonwealth Edison generating stations and substations indicates that the specified calibrations are adequate. For those devices which employ amplifiers, etc., drift specifications call for drift to be less than 0.19/month; i.e., in the period of a month, a drift of .19 would occur and thus provide for adequate margin.

For the APRM system drift of electronic apparatus is not the only consideration in determining a calibration frequency. Change in power distribution and loss of chamber sensitivity dictate a calibration every seven days. Calibration on this frequency assures plant operation at or below thermal limits.

A comparison of Tables 4.1.1 and 4.1.2 indicates that six instrument channels have not been included in the latter Table. These are: Mode Switch in Shutdown, Manual Scram, High Water Level in Scram Discharge Volume Float Switches, Main Steam Line Isolation Valve Closure, Generator Load Rejection, and Turbine Stop Valve Closure. All of the devices or sensors associated with these scram functions are simple on-off switches and, hence, calibration is not applicable; i.e., the switch is either on or off. Further, these switches are mounted solidly to the device and have a very low probability of moving; e.g., the switches in the scram discharge volume tank. Based on the above, no calibration is required for these six instrument channels.

B. The MFLPD shall be checked once per day to determine if the APRM scram requires adjustment. This may normally be done by checking the LPRM readings, TIP traces, or process computer calculations. Only a small number of control rods are moved daily and thus the peaking factors are not expected to change significantly and thus a daily check of the MFLPD is adequate.

INSTRUMENTATION THAT INITIATES ROD BLOCK

Table 3.2.3

Minimum No. of Operable Inst. Channels Per Trip System (1)	Instrument	Trip Level Setting
1	APRM upscale (flow bias) (7)	$\leq(.65W + 43)\left(\frac{LTPF}{TPF}\right)$ (2)
1	APRM upscale (refuel and Startup/Hot Standby mode)	$\leq$12/125 full scale
2	APRM downscale (7)	$\geq$3/125 full scale
1	Rod block monitor upscale (flow bias) (7)	$\leq$(.65W + 42) (2)
1	Rod block monitor downscale (7)	$\geq$5/125 full scale
3	IRM downscale (3)	$\geq$5/125 full scale
3	IRM upscale	$\leq$108/125 full scale
3	IRM detector not fully inserted in the core	
2 (5)	SRM detector not in startup position	(4)
2 (5) (6)	SRM upscale	$\leq 10^5$ counts/sec.
1	Scram discharge volume water level - high	$\leq$20 inches above the bottom of the instrument volume

TABLE 3.2.3 (Cont.)

NOTES:

1. For the Startup/Hot Standby and Run positions of the Reactor Mode Selector Switch, there shall be two operable or tripped trip systems for each function, except the SRM rod blocks, IRM upscale, IRM downscale and IRM detector not fully inserted in the core need not be operable in the "Run" position and APRM downscale, APRM upscale (flow bias), and RBM downscale need not be operable in the Startup/Hot Standby mode. The RBM upscale need not be operable at less than 30% rated thermal power. One channel may be bypassed above 30% rated thermal power provided that a limiting control rod pattern does not exist. For systems with more than one channel per trip system, if the first column cannot be met for both trip systems, the systems shall be tripped. For the Scram Discharge Volume water level high rod block, there is one instrument per bank.

2. W_D percent of drive flow required to produce a rated core flow of 98 Mlb/m.

3. IRM downscale may be bypassed when it is on its lowest range.

4. This function may be bypassed when the count rate is $\geq$100 cps.

5. One of the four SRM inputs may be bypassed.

6. This SRM function may be bypassed in the higher IRM ranges when the IRM upscale rod block is operable.

7. Not required while performing low power physics tests at atmospheric pressure during or after refueling at power levels not to exceed 5 MW(t).

TABLE [illegible].2.1

MINIMUM TEST AND CALIBRATION FREQUENCY FOR CORE AND CONTAINMENT COOLING SYSTEMS INSTRUMENTATION, ROD BLOCKS, AND ISOLATIONS

Instrument Channel	Instrument Functional Test (2)	Calibration (2)	Instrument Check (2)
ECCS INSTRUMENTATION			
1. Reactor Low-Low Water Level	(1)	Once/3 Months	Once/Day
2. Drywell High Pressure	(1)	Once/3 Months	None
3. Reactor Low Pressure	(1)	Once/3 Months	None
4. Containment Spray Interlock			
a. 2/3 Core Height	(1)	Once/3 Months	None
b. Containment High Pressure	(1)	Once/3 Months	None
5. Low Pressure Core Cooling Pump Discharge	(1)	Once/3 Months	None
6. Undervoltage Emergency Bus	Refueling Outage	Refueling Outage	None
7. Sustained High Reactor Pressure	(1)	Once/3 Months	None
ROD BLOCKS			
1. APRM Downscale	(1) (3)	Once/3 Months	None
2. APRM Flow Variable	(1) (3)	Refueling Outage	None
3. APRM Upscale (Startup/Hot Standby)	(2) (3)	(2) (3)	(2)
4. IRM Upscale	(2) (3)	(2) (3)	(2)
5. IRM Downscale	(2) (3)	(2) (3)	(2)
6. IRM detector not fully inserted in the core	(2)	N/A	None
7. RBM Upscale	(1) (3)	Refueling Outage	None
8. RBM Downscale	(1) (3)	Once/3 Months	None
9. SRM Upscale	(2) (3)	(2) (3)	(2)
10. SRM Detector Not in Startup Position	(2) (3)	(2) (3)	(2)
11. Scram Instrument Volume Level - High	Once/3 Months (9)	None	None
MAIN STEAM LINE ISOLATION			
1. Steam Tunnel High Temperature	Refueling Outage	Refueling Outage	None
2. Steam Line High Flow	(1)	Once/3 Months	Once/Day
3. Steam Line Low Pressure	(1)	Once/3 Months	None
4. Steam Line High Radiation	(1) (3)	Once/3 Months (4)	Once/Day

NOTES:

7. Functional tests will be conducted before startup at the end of each refueling outage or after maintenance is performed on a particular Safety/Relief Valve.

8. If the number of position indicators is reduced to one indication on one or more valves, continued operation is permissible; however, if the reactor is in a shutdown condition, it may not be started up until all position indication is restored. In the event that all position indication is lost on one or more valves and such indication cannot be returned in thirty days, an orderly shutdown shall be initiated, and the reactor shall be depressurized to less than 90 psig in 24 hours.

9. The Functional Test of the Scram Discharge Volume float switch shall include actuation of the switch using a water column.

3.3 LIMITING CONDITION FOR OPERATION

b. The control rod directional control valves for inoperable control rods shall be disarmed electrically and the control rods shall be in such positions that Specification 3.3.A.1 is met.

c. Control rod drives which are fully inserted and electrically disarmed shall not be considered inoperable.

d. Control rods with scram times greater than those permitted by Specification 3.3.C are inoperable, but if they can be moved with control rod drive pressure, they need not be disarmed electrically if Specification 3.3.A.1 is met for each position of these rods.

e. During reactor power operation, the number of inoperable control rods shall not exceed eight.

4.3 SURVEILLANCE REQUIREMENT

3. The scram discharge volume vent and drain valves shall be verified open at least once per 31 days. These valves may be closed intermittently for testing under administrative control and at least once per 92 days, each valve shall be cycled through at least one complete cycle of full travel. At least once each Refueling Outage, the scram discharge volume vent and drain valves will be demonstrated to:

   a. Close within 30 seconds after receipt of a signal for control rods to scram, and

   b. Open when the scram signal is reset.

indicative of a generic control rod drive problem and the reactor will be shutdown. Also, if damage within the control rod drive mechanism and, in particular, cracks in drive internal housings, cannot be ruled out, then a generic problem affecting a number of drives cannot be ruled out. Circumferential cracks resulting from stress assisted intergranular corrosion have occurred in the collet housing of drives at several BWR's. This type of cracking could occur in a number of drives and if the cracks propagated until severance of the collet housing occurred, scram could be prevented in the affected rods. Limiting the period of operation with a potentially severed collet housing and requiring increased surveillance after detecting one stuck rod will assure that the reactor will not be operated with a large number of rods with failed collet housings.

3. The operability of the scram discharge volume vent and drain valves assures the proper venting and draining of the volume. This ensures that water accumulation does not occur which would cause an early termination of control rod movement during a full core scram. These specifications provide for the periodic verification that the valves are open and for testing of these valves under reactor scram conditions during each Refueling Outage.

B. Control Rod Withdrawal

1. Control rod dropout accidents as discussed in Reference 6 can lead to significant core damage. If coupling integrity is maintained, the possibility of a rod dropout accident is eliminated. The overtravel position feature provides a positive check as only uncoupled drives may reach this position. Neutron instrumentation response to rod movement provides a verification that the rod is following its drive. Absence of such response to drive movement would provide cause for suspecting a rod to be uncoupled and stuck. Restricting recoupling verifications to power levels above 20% provides assurance that a rod drop during a recoupling verification would not result in a rod drop accident.

2. The control rod housing support restricts the outward movement of a control rod to less than 3 inches in the extremely remote event of a housing failure. The amount of reactivity which could be added by this small amount of rod withdrawal, which is less than a normal single withdrawal increment, will not contribute to any damage to the primary coolant system. The design basis is given in Section 6.6.1 of the SAR, and the design evaluation is given in Section 6.6.3. This support is not required if the reactor coolant system is at atmospheric pressure since there would then be no driving force to rapidly eject a drive housing. Additionally, the support is not required if all control rods are fully inserted and if an adequate shutdown margin with one control rod withdrawn has been demonstrated since the reactor would remain subcritical even in the event of complete ejection of the strongest control rod.

3. Control rod withdrawal and insertion sequences are established to assure that the maximum in-sequence individual control rod or control rod sequences which are withdrawn could not be worth enough to cause the rod drop accident design limit of 280 cal/gm to be exceeded if they were to drop out of the core in the manner defined for the Rod Drop Accident.(3) These sequences are developed prior to initial operation

of the unit following any refueling outage and the requirement that an operator follow these sequences is backed up by the operaation of the RWM or a second qualified station employe. These sequences are developed to limit reactivity worths of control rods and, together with the integral rod velocity limiters and the action of the control rod drive system, limit potential reactivity insertion such that the results of a control rod drop accident will not exceed a maximum fuel energy content of 280 cal/gm. The peak fuel enthalpy of 280 cal/gm is below the energy content, 425 cal/gm, at which rapid fuel dispersal and primary system damage have been found to occur based on experimental data as is discussed in Reference 1.

The analysis of the control rod drop accident was originally presented in Sections 7.9.3, 14.2.1.2 and 14.2,1.4 of the Safety Analysis Report. Improvements in analytical capability have allowed a more refined analysis of the control rod drop accident.

Design Specification

for the

Control Rod Drive

Scram Discharge System Modification

Dresden Station, Unit 3

Commonwealth Edison Company

March 18, 1982

Attachment B

4.2.1 Functional Criteria

4.2.1.1 Functional Criterion 1

The scram discharge volume shall have sufficient capacity to receive and contain water exhausted by a full reactor scram without adversely affecting control-rod-drive scram performance.

Response

The scram discharge volume at Dresden Station, Unit 3 has the capability of receiving a maximum scram discharge of approximately 800 gallons of water or 4.5 gallons per drive. This volume includes all 4", 6", and 8" header piping as well as the 20" instrument volume piping. Each scram discharge volume header is hydraulically coupled to a 20" instrument volume with 6" pipe. The calculated free volume does not include any 1" vent line piping or 2" instrument volume drain line piping.

The scram discharge volume sizing requirement of 3.34 gallons per control rod drive (stated in GE letter OER 54 dated March 14, 1972) is based on the following:

1. control rod drive stroke
2. ten (10) seconds of scram leakage flow of 10 GPM (= 10 GPM x 10 sec./60 sec/m=1.667 gal/drive)
3. added volume in the SDV to limit the pressure rise to 50 psig during a scram.

The Dresden technical specification limit for the slowest allowable control rod insertion time is 7 seconds. Therefore, control rod drive seal leakage during a scram at Dresden Station would only last for 7 seconds rather than 10 seconds as calculated above (10 GPM x 7 sec./60 sec/m=1.167 gal/drive). Using this criteria, the maximum expected scram discharge during normal operation would be 2.84 gallons per drive. The current scram discharge volume size of 4.5 gallons per drive far exceeds the 3.34 gallon per drive GE design criteria and 2.84 gallon per drive operating criteria.

4.2.2 Safety Criteria

4.2.2.1 Safety Criterion 1

No single active failure of a component or service function shall prevent a reactor scram, under the most degraded conditions that are operationally acceptable.

Response

The scram discharge system at Dresden Station, Unit 3 has been designed in such a manner that no single active failure of a component or service function shall prevent a reactor scram, under the most degraded conditions that are operationally acceptable. All vent and drain line valves are air operated and will fail closed on loss of air. All water level instrumentation will fail into the scram condition.

4.2.2.2 Safety Criterion 2

No single active failure shall prevent uncontrolled loss of reactor coolant.

Response

Two air-operated isolation valves have been installed in series on each scram discharge volume vent line and instrument volume drain line at Dresden Station, Unit 3. Each valve will fail closed on loss of control air.

4.2.2.3 Safety Criterion 3

The scram discharge system instrumentation shall be designed to provide redundancy, to operate reliably under all conditions, and shall not be adversely affected by hydrodynamic forces or flow characteristics.

Response

The scram discharge system at Dresden Station, Unit 3 incorporates a diverse and redundant instrumentation design utilizing safety related Magnetrol float type water level switches and ITT Barton differential pressure water level transmitters used in conjunction with Rochester Instrument Systems current/voltage alarms. The modified scram discharge system has two scram discharge volume piping headers, each header having its own instrument volume. Each instrument volume has six water level sensing instruments. One float type instrument notifies the reactor operator that water is present in the instrument volume; one float type instrument prevents further withdrawal of the control rods as the instrument volume water level rises; and two safety related float type water level switches and two safety related differential pressure water level transmitters automatically scram the reactor while sufficient volume still exists in the scram discharge volume to ensure safe shutdown.

The new instrumentation design incorporates a 1 out of 2 twice logic scheme with each instrument volume having the ability to independently scram the reactor. See figure 1 for the scram signal initiation logic. Single failure of any one instrument on each instrument volume will not impair the ability to safely shutdown the reactor.

The new system has been designed in such a manner as to ensure that all instruments will operate reliably under all conditions and shall not be adversely affected by hydrodynamic forces or flow characteristics.

4.2.2.4 Safety Criterion 4

System operating conditions which are required for scram shall be continuously monitored.

Response

Diverse and redundant instrumentation installed on each instrument volume will continuously monitor system operating conditions required for scram. The instrumentation on each instrument volume has been designed and installed in such a manner that rapid water leakage (5 gpm per drive simultaneously) into the scram discharge volume will be detected and an automatic scram initiated while sufficient volume still exists in the scram discharge volume.

4.2.2.5 Safety Criterion 5

Repair, replacement, adjustment, or surveillance of any system component shall not require the scram function to be bypassed.

Response

The scram discharge system instrumentation has been designed in such a manner that a half-scram (1 out of 2) will be implemented in accordance with existing technical specifications during repair, replacement, adjustment, or surveillance of any system instrument.

4.2.3 Operational Criteria

These criteria are treated here as a group since they deal with operational convenience and not safety:

1. Level instrumentation shall be designed to be maintained, tested, or calibrated during plant operation without causing a scram;

2. The system shall include sufficient supervisory instrumentation and alarms to permit surveillance of system operation;

3. The system shall be designed to minimize the exposure of operating personnel to radiation;

4. Vent paths shall be provided to assure adequate drainage in preparation for scram reset.

5. Vent and drain functions shall not be adversely affected by other system interfaces. The objective of this requirement is to preclude water backup in the scram instrument volume which could cause spurious scram.

Response

1. The 1 out of 2 twice instrumentation scram logic on the SDV system permits maintenance, testing, and calibration of all safety related instrumentation without causing a scram.

2. The modified SDV instrumentation system has been designed in such a manner that an alarm will warn the operator of a half scram initiated during a calibration or surveillance. Also, calibration procedures require notification of the reactor operator prior to the initiation of surveillance work. Annunciator alarms warn the operator of water accumulation in the instrument volume and of a control rod block prior to initiation of a scram signal. Control and position indication for all vent and drain valves has been installed on the 903-5 panel to inform the operator when vent and drain valves are open or closed.

3. The instrument volumes for both scram discharge volume headers are located in isolated locked up rooms near each header. The instrument volume instrumentation is located outside each room. The intent of this piping design has been to minimize occupational exposure during operation and calibration. Flanged connections have been installed at several locations on the SDV piping to facilitate hydro-laize water flushing of all piping during shutdown to reduce radiation contamination levels that have accumulated in the piping after prolonged operation of the system.

4. The SDV header piping and each instrument volume has been positively vented to assure adequate drainage in preparation for scram reset.

5. Each scram discharge volume header has its own independent vent line positively routed to floor drains in isolated areas on the floor elevation above the scram discharge volume. Each instrument volume has its own independent drain line. Both drain lines feed to the reactor building equipment drain tank located approximately 15 feet below the instrument volume elevation. The reactor building equipment drain tank hatch is open to atmosphere. Any tank overflow would empty into the surrounding room rather than feedback to each instrument volume.

4.2.4 Design Criteria

4.2.4.1 Design Criterion 1

The scram discharge headers shall be sized in accordance with GE OER-54 (Reference 20) and shall be hydraulically coupled to the instrumented volume(s) in a manner to permit operability of the scram level instrumentation prior to loss of system function. Each system shall be analyzed based on a plant-specific maximum inleakage to ensure that the system function is not lost prior to initiation of automatic scram. Maximum inleakage is the maximum flow rate through the scram discharge line without control rod motion summed over all control rods. The analysis should show no need for vents or drains.

Response

The scram discharge headers have been sized to receive approximately 4.5 gallons per drive which is in excess of the GE OER-54 criteria. Each instrument volume is hydraulically coupled to the low point of the SDV piping. See figure 2. Each 20" diameter instrument volume is attached to the 4" SDV header piping with 6" schedule 80 pipe. The system has been designed to automatically scram without the need for vents or drains while a maximum inleakage of 5 gpm per drive occurs from each control rod simultaneously. The system will automatically scram before sufficient volume is lost in the SDV and IV piping. An analysis verifying this performance has been made.

4.2.4.2 Design Criterion 2

Level instrumentation shall be provided for automatic scram initiation while sufficient volume exists in the scram discharge volume.

Response

As stated in the response to design criterion 2, level instrumentation shall be provided for automatic scram initiation while sufficient volume exists in the scram discharge volume.

4.2.4.3 Design Criterion 3

Instrumentation taps shall be provided on the vertical instrument volume and not on the connected piping.

Response

All instruments installed on each instrument volume are attached to 2" instrument line piping rather than the body of the instrument volume itself. The 2" instrument lines are connected to the IV body and are independent of the instrument volume drain and fill lines. See figure 3. This type of installation protects the instruments from water hammer forces produced during the scram discharge and venturi effects that might be caused by the IV drain and fill lines. Because of the new instrumentation design, functional testing of water level instrumentation will not be made after every scram.

4.2.4.4 Design Criterion 4

The scram instrumentation shall be capable of detecting water accumulation in the instrumented volume(s) assuming a single active failure in the instrumentation system or the plugging of an instrument line.

Response

Each instrument volume has two instrument lines (see figure 3) with sufficient instrumentation on each line to automatically scram the reactor. Single failure of any safety related instrument or the plugging of an instrument line will not prevent detection of water accumulation and a resulting scram when necessary.

4.2.4.5 Design Criterion 5

Structural and component design shall consider loads and conditions including those due to fluid dynamics, thermal expansion, internal pressure, seismic considerations, and adverse environments.

Response

All safety related piping components on the modified SDV system have been designed to consider seismic, fluid dynamic, (water hammer), thermal expansion, and internal pressure effects. Environmental qualification has been required for the scram level instrumentation, the vent and drain valve position indication, and solenoid valves which actuate the vent and drain valves. Environmental conditions, process conditions, loading combinations, material and fabrication requirements, and examination and testing requirements for the modified system are all listed in specification 0590-008-S-01. This document is attached for review.

Half of the required safety related scram instrumentation is comprised of ITT Barton differential pressure water level transmitters used in conjunction with Rochester Instrument Systems current/voltage alarms. The ITT Barton transmitters and the Rochester Instrument Systems current/voltage alarms are currently undergoing environmental and seismic qualification testing. Due to equipment availability, it was impossible to obtain environmentally and seismically qualified equipment in the required time frame. Pending test results, any installed equipment failing the required qualification testing will be replaced with qualified equipment.

4.2.4.5 Design Criterion 6

The power-operated vent and drain valves shall close under loss of air and/or electric power. Valve position indication shall be provided in the control room.

Response

All vent and drain valves are air operated that will fail closed on loss of air. Each valve has control and position indication in the control room located on the 903-5 panel.

4.2.4.7 Design Criterion 7

Any reductions in the system piping flow path shall be analyzed to assure system reliability and operability under all modes of operation.

Response

There is no reduction in the available flow area of pipe diameter in the SDV and SDV to IV piping.

4.2.4.8 Design Criterion 8

System piping geometry (i.e., pitch, line size, orientation) shall be such that the system drains continuously during normal plant operation.

Response

The scram discharge volume header piping is pitched in such a manner as to continuously gravity drain water to the instrument volume. All vent and drain lines have been installed free of any loop seals to ensure venting and drainage. However, as required in design criteria 1, the SDV system piping has been designed so that SDV to IV drainage will occur without ventillation.

4.2.4.9 Design Criterion 9

Instrumentation shall be provided to aid the operator in the detection of water accumulation in the instrumented volume(s) prior to scram initiation.

Response

Each hydraulically coupled instrument volume has two non-safety related Magnetrol water level switches installed to detect water prior to scram initiation. One instrument notifies the reactor operator when water is present in the instrument volume. The second instrument prevents further withdrawal of the control rods and warns the reactor operator as the instrument volume water level rises.

4.2.4.10 Design Criterion 10

Vent and drain line valves shall be provided to contain the scram discharge water, with a single active failure and to minimize operational exposure.

Response

As stated in the response to safety criteria 2, two air operated isolation valves have been installed in series on each scram discharge volume vent line and instrument volume drain line. Any single active valve failure will not impair the ability of the system to contain the scram discharge water.

4.2.5 Surveillance Criteria

4.2.5.1 Surveillance Criterion 1

Vent and drain valves shall be periodically tested.

4.2.5.2 Surveillance Criterion 2

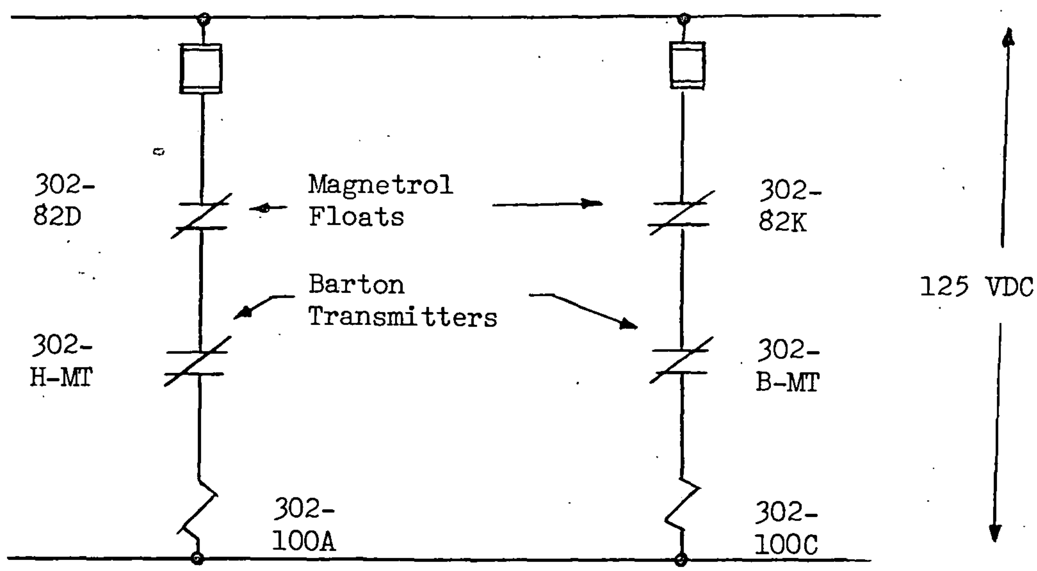
Verifying and level detection instrumentation shall be periodically tested in place.

4.2.5.3 Surveillance Criterion 3

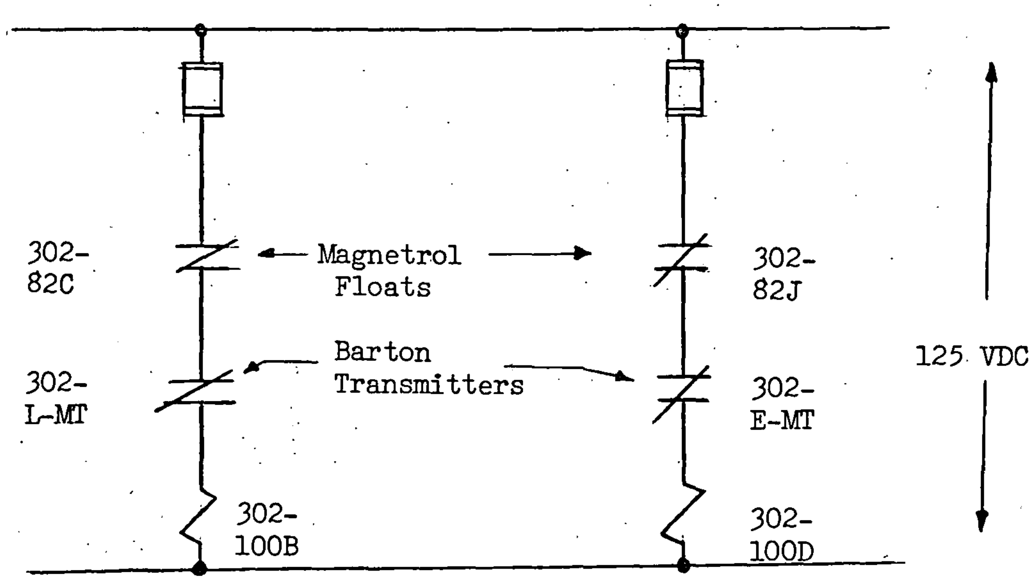
The operability of the entire system as an integrated whole shall be demonstrated periodically and during each operating cycle, by demonstrating scram instrument response and valve function at pressure and temperature at approximately 50% control-rod density.

Response

The attached Technical Specification changes require periodic testing of (1) the vent and drain valves (including demonstration of 30 second closure time following reset of the scram signal) and (2) the scram and rod block level detector instrumentation. A system preoperational test will be performed prior to unit startup. This will involve filling the instrument volume with water, thereby demonstrating proper actuation of level instrumentation under conditions very similar to a scram. System operability will be adequately demonstrated by any reactor scram that may occur during each operating cycle.



Chanel A



Chanel B

Note: 1) Instruments 302 - 82C, 82D, B-MT, and E-MT are all located on the east bank instrument volume.

2) Instruments 302 - 82J, 82K, L-MT, and H-MT are all located on the west bank instrument volume.

3) One relay from each chanel must de-energize to scram the reactor

Figure I

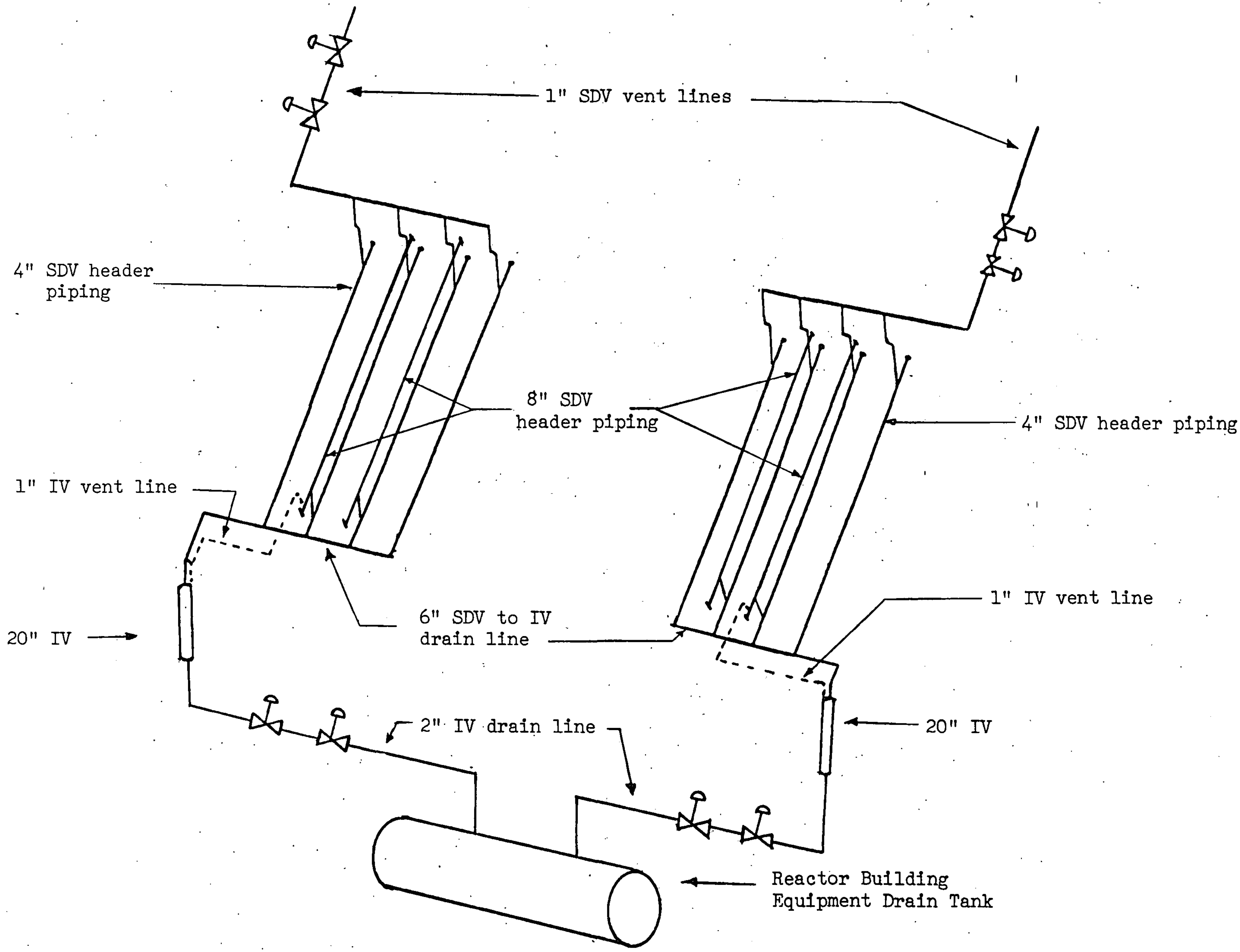
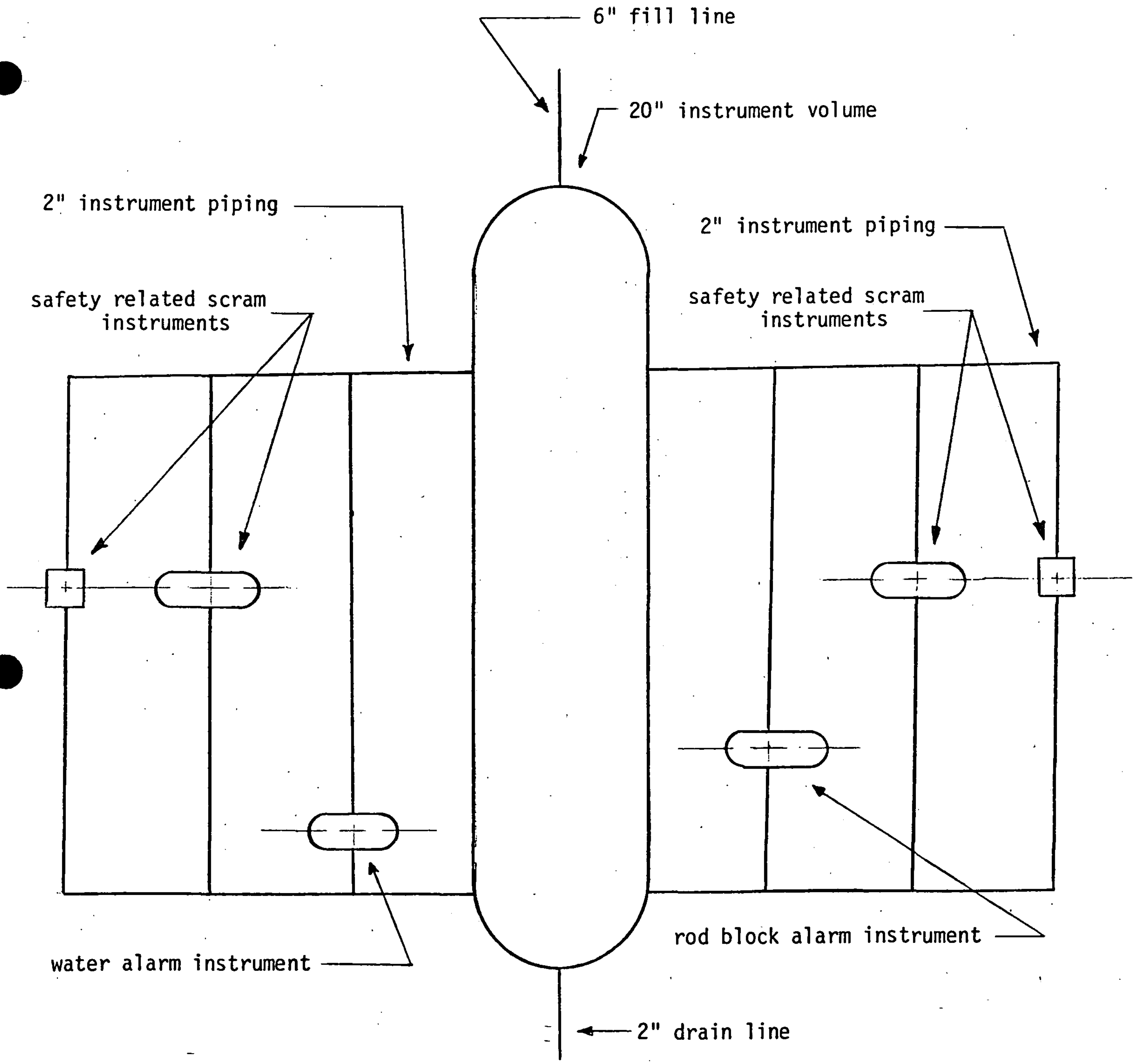

1" SDV vent lines
4" SDV header piping
8" SDV header piping
4" SDV header piping
1" IV vent line
1" IV vent line
6" SDV to IV drain line
20" IV
20" IV
2" IV drain line
Reactor Building Equipment Drain Tank

Figure 2



Note: This sketch is a simplification of the actual instrument volume instrumentation piping. Instrument isolation valves and calibration taps are not shown.

Figure 3