February 28, 1985

Docket Nos. 50-237/249
LS05-85-02-021

Mr. Dennis L. Farrar
Director of Nuclear Licensing
Commonwealth Edison Company
Post Office Box 767
Chicago, Illinois 60690

Dear Mr. Farrar:

SUBJECT: CORRECTED PAGES FOR DRESDEN 2 AMENDMENT 83 AND DRESDEN 3 AMENDMENT 77

Re: Dresden Nuclear Power Station, Unit Nos. 2 and 3

Our letter dated November 16, 1984 transmitted Amendment No. 83 for Dresden 2 and Amendment No. 77 for Dresden 3 which relate to Radiological Effluent Technical Specifications (RETS).

Because these amendments do not become effective until March 15, 1985, we are taking this opportunity to correct a number of typographical and word processing errors that appear in the original issuance.

Please replace the previously issued RETS pages with the enclosed corrected pages.

Sincerely,

Original signed by

John A. Zwolinski, Chief
Operating Reactors Branch No. 5
Division of Licensing

Enclosure:
As stated

cc w/enclosure:
See next page

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U. S. Nuclear Regulatory Commission
Resident Inspectors Office
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TABLE 3.2.1

INSTRUMENTATION THAT INITIATES PRIMARY CONTAINMENT ISOLATION FUNCTIONS

MINIMUM # OF OPERABLE INST. CHANNELS PER TRIP SYSTEM (1)	INSTRUMENTS	TRIP LEVEL SETTING	ACTION (3)
2	Reactor Low Water Level	Greater than 144" above top of active fuel (9)	A
2	Reactor Low Low Water	Greater than or equal to 84" above top of active fuel (9)	A
2	High Drywell Pressure	Less than or equal to 2 psig (4),(5)	A
2 (2)	High Flow Main Steam Line	Less than or equal to 120% of rated steam flow	B
2 of 4 in each of 4 sets	High Temperature Main Steamline Tunnel	Less than or equal to 200°F.	B
2	High Radiation Main Steamline Tunnel	Less than or equal to 3 times full power background (7),(6)	B
2	Low Pressure Main Steamline	Greater than or equal to 850 psig	B
	High Flow Isolation		
1	Condenser Line Steamline Side	Less than or equal to 20 psi diff on steamline side.	C
1	Condensate Return Side	Less than or equal to 32" water diff on condensate return side	C
2	High Flow HPCI Steamline	Less than or equal to 150 inches of water diff. (8)	D
4	High Temperature HPCI Steamline Area	Less than or equal to 200°F.	D

Notes:
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TABLE 3.2.1 (Notes)

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1. When primary containment integrity is required, there shall be two operable or tripped trip systems for each function, except for low pressure main steamline which only need be available in the RUN position.

2. Per each steamline.

3. Action: If the first column cannot be met for each of the trip systems, that trip system shall be tripped.

   If the first column cannot be met for both trip systems, the appropriate action listed below shall be taken:

   A. Initiate an orderly shutdown and have reactor in cold shutdown condition in 24 hours.

   B. Initiate an orderly load reduction and have reactor in hot standby condition in 8 hours.

   C. Close isolation valves in Isolation Condenser System.

   D. Close isolation valves in HPCI subsystem.

4. Need not be operable when primary containment integrity is not required.

5. May be bypassed when necessary during purging for containment inerting and deinerting.

6. An alarm setting of less than or equal to 1.5 times normal background at rated power shall be established to alert the operator to abnormal radiation levels in the primary coolant.

7. Due to addition of hydrogen to the primary coolant, the Main Steam Line Radiation monitor setting will be less than or equal to 3 times full power background without hydrogen addition for all conditions except for greater than 20% power with hydrogen being injected during which the Main Steam Line Radiation trip setting will be less than or equal to 3 times full power background with hydrogen addition. Required changes in Main Steam Line Radiation monitor trip setting will be made within 24 hours except during controlled power descensions at which time the setpoint change will be made prior to going below 20% power. If due to a recirculation pump trip or other unanticipated power reduction event the reactor is below 20% power without the setpoint change, control rod motion will be suspended until the necessary trip setpoint adjustment is made.

8. Verification of time delay setting between 3 and 9 seconds shall be performed during each refueling outage.

9. Top of active fuel is defined as 360" above vessel zero for all water levels used in the LOCA analyses. (See design Bases 3.2)

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TABLE 3.2.3

INSTRUMENTATION THAT INITIATES ROD BLOCK

Minimum No. of Operable Inst. Channels Per Trip System (1)	Instrument	Trip Level Setting
1	APRM upscale (flow bias) (7)	Less than or equal to (0.58 W_D plus 50) (FRP/MFLPD) (See Note 2)
1	APRM upscale (refuel and Startup/Hot Standby mode)	Less than or equal to 12/125 full scale
2	APRM downscale (7)	Greater than or equal to 3/125 full scale
1	Rod block monitor upscale (flow bias) (7)	Less than or equal to (0.65 W_D plus 45) (see Note 2)
1	Rod block monitor downscale (7)	Greater than or equal to 5/125 full scale
3	IRM downscale (3)	Greater than or equal to 5/125 full scale
3	IRM upscale	Less than or equal to 108/125 full scale
3	IRM detector not fully inserted in the core	N/A
2 (5)	SRM detector not in startup position	(4)
2 (5) (6)	SRM upscale	Less than or equal to 10^5 counts/sec.
1	Scram discharge volume water level - high	Less than or equal to 25 gallons

Notes:
(See Next Page)

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TABLE 3.2.5

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Minimum No. of Operable Channels (1)	Total No. of Channels	Parameter	Action (2)
1	2	SJAE Radiation Activity Monitor	D
1	3	Main Chimney Noble Gas SPING/GE Low Range Activity Monitor	A
1	1	Main Chimney SPING Noble Gas Monitors Mid, Hi Range	A
1	1	Main Chimney Iodine Sampler	C
1	1	Main Chimney Particulate Sampler	C
1	1	Main Chimney Flow Rate Monitor	B
1	1	Main Chimney Sampler Flow Rate Monitor	B
1	2	Reactor Building Vent Exhaust Duct Radiation Monitor	E
1	1	Reactor Building Vent SPING Noble Gas Monitor Low, Mid, High Range	F
1	1	Reactor Building Vent Flow Rate Monitor	B
1	1	Reactor Building Vent Sampler Flow Rate Monitor	B
1	1	Reactor Building Vent Iodine Sampler	C
1	1	Reactor Building Vent Particulate Sampler	C

Notes:
(See Next Page)

TABLE 4.2.2

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Instrument	Instrument Check (1)(7)	Calibration (1)(7)(3)(4)	Functional Test (1)(2)(7)	Source Check (1)
Liquid Radwaste Effluent Gross Activity Monitor	D	R	Q (6)	(5)
Service Water Effluent Gross Activity Monitor	D	R	Q (6)	R
Tank Level Indicating Device				
a. A Waste Sample Tank	D	R	Q	N/A
b. B Waste Sample Tank	D	R	Q	N/A
c. C Waste Sample Tank	D	R	Q	N/A
d. A Floor Drain Sample Tank	D	R	Q	N/A
e. B Floor Drain Sample Tank	D	R	Q	N/A
f. Waste Surge Tank	D	R	Q	N/A

Notes:
(See Next Page)

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TABLE 4.2.3 (Notes)

1. D = Once per 24 hours
   M = Once per 31 days
   Q = Once per 92 days
   R = Once per refueling outage

2. The Instrument Functional Test shall also demonstrate that control room alarm annunciation occurs, if any of the following conditions exist, where applicable.

   a. Instrument indicates levels above the alarm setpoint.
   b. Circuit Failure.
   c. Instrument indicates a downscale failure.
   d. Instrument controls not set in OPERATE mode.

3. Calibration shall include performance of a functional test.

4. Instrument check to verify operability of sampler; that the sampler is in place and functioning properly.

5. Function Test shall be performed on local switches providing low flow alarm.

6. Function test calibrations and instrument checks are not required when these instruments are not required to be operable or are tripped. Calibration shall be performed once per refueling outage and not more than once every 18 months. Instrument checks shall be performed at least once per day during those periods when the instruments are required to be operable.

3.2 LIMITING CONDITION FOR OPERATION BASES

In addition to reactor protection instrumentation which initiates a reactor scram, protective instrumentation has been provided which initiates action to mitigate the consequences of accidents which are beyond the operator's ability to control, or terminates operator errors before they result in serious consequences. This set of specifications provides the limiting conditions of operation for the primary system isolation function, initiation of the emergency core cooling system, control rod block and standby gas treatment systems. The objectives of the specifications are 1) to assure the effectiveness of the protective instrumentation when required by preserving its capability to tolerate a single failure of any component of such systems even during periods when portions of such systems are out of service for maintenance, and 2) to prescribe the trip settings required to assure adequate performance. When necessary, one channel may be made inoperable for brief intervals to conduct required functional tests and calibrations.

Some of the settings on the instrumentation that initiates or control core and containment cooling have tolerances explicitly stated where the high and low values are both critical and may have a substantial effect on safety. It should be noted that the setpoints of other instrumentation, where only the high or low end of the setting has a direct bearing on safety, are chosen at a level away from the normal operating range to prevent inadvertent actuation of the safety system involved and exposure to abnormal situations.

Isolation valves are installed in those lines that penetrate the primary containment and must be isolated during a loss-of-coolant accident so that the radiation dose limits are not exceeded during an accident condition. Actuation of these valves is initiated by protective instrumentation which serves the condition for which isolation is required (this instrumentation is shown in Table 3.2.1). Such instrumentation must be available whenever primary containment integrity is required. The objective is to isolate the primary containment so that the guidelines of 10 CFR 100 are not exceeded during an accident.

The instrumentation which initiates primary system isolation is connected in a dual bus arrangement. Thus the discussion given in the bases for Specification 3.1 is applicable here.

The low-reactor level instrumentation is set to trip at greater than 8 inches on the level instrument (top of active fuel is defined to be 360 inches above vessel zero) and after allowing for the full power pressure drop across the steam dryer the low level trip is at 504 inches above vessel zero, or 144 inches above the

4.2 SURVEILLANCE REQUIREMENT BASES

The instrumentation listed in Table 4.2.1 will be functionally tested and calibrated at regularly scheduled intervals. Although this instrumentation is not generally considered to be as important to plant safety as the Reactor Protection System, the same design reliability goal of 0.99999 is generally applied for all applications of (1 out of 2) X (2) logic. Therefore, on-off sensors are tested once/3 months, and bi-stable trips associated with analog sensors and amplifiers are tested once/week.

Those instruments which, when tripped, result in a rod block have their contacts arranged in a 1 out of n logic, and all are capable of being bypassed. For such a tripping arrangement with bypass capability provided, there is an optimum test interval that should be maintained in order to maximize the reliability of a given channel (see note 7). This takes account of the fact that testing degrades reliability and the optimum interval between tests is approximately given by:

$$i = (2t/r)^{1/2}$$

Where:

i = optimum interval between tests

t = the time the trip contacts are disabled from performing their function while the test is in progress

r = The expected failure rate of the relays

To test the trip relays requires that the channel be bypassed, the test made, and the system returned to its initial state. It is assumed this task requires an estimated 30 minutes to complete in a thorough and workmanlike manner and that the relays have a failure rate of 10^{-6} failures per hour. Using this data and the above operation, the optimum test interval is:

$$i = [2(0.5)/10^{-6}]^{1/2} = 1 \times 10^3 \text{ hours}$$

$$= \text{approximately 40 days}$$

<u>For additional margin a test</u> interval of once per month will be used initially.

Note:
(7) UCRL-50451, Improving Availability and Readiness of Field Equipment Through Periodic Inspection, Benjamin Epstein, Albert Shiff, July 16, 1968, page 10, Equation (24), Lawrence Radiation Laboratory.

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4.2 SURVEILLANCE REQUIREMENT BASES (Cont'd.)

A more usual case is that the testing is done independently. If both channels are bypassed and tested at the same time, the result is shown in Curve No. 3. Note that the minimum occurs at about 40,000 hours, much longer than for cases 1 and 2. Also, the minimum is not nearly as low as Case 2 which indicates that this method of testing does not take full advantage of the redundant channel. Bypassing both channels for simultaneous testing should be avoided.

The most likely case would be to stipulate that one channel be bypassed, tested and restored. Then immediately following, the second channel be bypassed, tested and restored. This is shown by Curve No. 4. Note that there is no true minimum. The curve does have a definite knee and very little reduction in system unavailability is achieved by testing at a shorter interval than computed by the equation for a single channel.

The best test procedure of all those examined is to perfectly stagger the tests. That is, if the test interval is four months, test one or the other channel every two months. This is shown in Curve No. 5. The difference between Cases 4 and 5 is negligible. There may be other arguments, however, that more strongly support the perfectly staggered tests, including reductions in human error.

The conclusions to be drawn are these:

1. A 1 out of n system may be treated the same as a single channel in terms of choosing a test interval; and
2. More than one channel should not be bypassed for testing at any one time.

The radiation monitors in the ventilation duct and on the refueling floor which initiate building isolation and standby gas treatment operation are arranged in two 1 out of 2 logic systems. The bases given above for the rod blocks applies here also and were used to arrive at the functional testing frequency.

Based on experience at Dresden Unit 1 with instruments of similar design, a testing interval of once every three months has been found to be adequate.

The automatic pressure relief instrumentation can be considered to be a 1 out of 2 logic system and the discussion above applies also.

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3.8 LIMITING CONDITION FOR OPERATION (Cont'd.)

of radioactive materials shall be operated.

b. The above specifications shall not apply for the Off-Gas Charcoal Adsorber Beds below 30 percent of rated thermal power.

c. The recombiner shall be operable whenever the reactor is operating at a pressure greater than 900 psig.

d. The recombiner may be inoperable for 48 hours.

5. Explosive Gas Mixture

a. During power operation there will be an operable hydrogen monitor in the off-gas hold-up system. If this is inoperable, operation shall be limited according to Specification 3.8.A.5.b.

b. The concentration of hydrogen in the off-gas hold-up system, downstream of the recombiner shall be limited by verification every 8 hours that the recombiner is operating within the allowable band of the baseline plot of recombiner outlet temperature vs. reactor power.

4.8 SURVEILLANCE REQUIREMENTS (Cont'd.)

in accordance with the ODCM.

5. Explosive Gas Mixture

The instrument response of the hydrogen monitor shall be tested once per day.

3.8 LIMITING CONDITION FOR OPERATION (Cont'd.)

released from the site to unrestricted areas (at or beyond the site boundary, Figures 4.8.1 and 4.8.2) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 with the Table 4.8.2 values representing the MPC's for noble gases.

With the concentration of radioactive material released from the site to unrestricted areas exceeding the above limits, without delay decrease the release rate of radioactive materials and/or increase the dilution flow rate to restore the concentration to within the above limits.

2. The dose or dose commitment above background to a member of the public from radioactive materials in liquid effluents released to unrestricted areas (at or beyond the site boundary) from the site shall be limited to the following:

   a. During Any Calendar Quarter:
      (1) Less than or equal to 3 mrem to the whole body.

      (2) Less than or equal to 10 mrem to any organ.

4.8 SURVEILLANCE REQUIREMENTS (Cont'd.)

unrestricted areas shall be determined to be within the prescribed limits by obtaining representative samples in accordance with the sampling and analysis program specified in Table 4.8.3. The sample analysis results will be used with the calculational methods in the ODCM to determine that the concentrations are within the limits of Specification 3.8.B.1.

2a. The dose contribution from measured quantities of radioactive material shall be determined by calculation at least once per 31 days and cumulative summation of these total body and organ doses shall be maintained for each calendar quarter.

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3.8 LIMITING CONDITION FOR OPERATION (Cont'd.)

the reasons for not conducting the program as required and the plans for preventing a recurrence. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, contractor omission which is corrected as soon as discovered, malfunction of sampling equipment, or if a person who participates in the program goes out of business. If the equipment malfunctions, corrective actions shall be completed as soon as practical. If a person supplying samples goes out of business, a replacement supplier will be found as soon as possible. All deviations from the sampling schedule shall be described in the Annual Report.

3. When the level of radioactivity in an environmental sampling medium at one or more of the locations specified in the ODCM exceeds the limits of Table 4.8.5 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days from the end of the affected calendar quarter, a Special Report which

4.8 SURVEILLANCE REQUIREMENTS (Cont'd.)

3. The land use census shall be conducted at least once per twelve months between the dates of June 1 and October 1 by a door-to-door survey, aerial survey, road survey, or by consulting local agriculture authorities.

3.8 LIMITING CONDITION FOR OPERATION (Cont'd.)

A complete inventory of radioactive materials in the licensee's possession shall be maintained current at all times.

H. In the event a limiting condition for operation and/or associated action requirements identified in Sections 3.8.A through 3.8.E and 4.8.A through 4.8.E cannot be satisfied because of circumstances in excess of those addressed in the Specifications, no changes are required in the operational condition of the plant, and this does not prevent the plant from entry into an operational mode.

4.8 SURVEILLANCE REQUIREMENTS (Cont'd.)

b. In any form other than gas.

2. Stored sources not in use - Each sealed source shall be tested prior to the use or transfer to another licensee unless tested within the previous 6 months. Sealed sources transferred without a certificate indicating the last test case shall be tested prior to being placed into use.

A Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.6.B. if source leakage tests reveal the presence of greater than or equal to 0.005 microcuries of removable contamination.

TABLE 4.8.5
REPORTING LEVELS FOR RADIOACTIVITY
CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Reporting Levels

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m3)	FISH (pCi/Kg, wet)	MILK (pCi/l)	FOOD PRODUCTS (pCi/Kg, wet)
H-3	2×10^4 (see note 1)				
Mn-54	1×10^3		3×10^4		
Fe-59	4×10^2		1×10^4		
Co-58	1×10^3		3×10^4		
Co-60	3×10^2		2×10^4		
Zn-65	3×10^2		2×10^4		
Zr-Nb-95	4×10^2				
I-131	2	0.9		3	1×10^2
Cs-134	30	10	1×10^3	60	2×10^3
Cs-137	50	20	1×10^3	70	2×10^3
Ba-La-140	2×10^2			3×10^2	

Notes: 1) For drinking water samples. This is 40 CFR Part 141 value.

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TABLE 4.8.6 NOTES (Continued)
TABLE NOTATION

D. The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95 percent probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation)

$$LLD = \frac{4.66 \cdot (S_b)}{(A) \cdot (E) \cdot (V) \cdot (2.22) \cdot (Y) \cdot (\exp(-\lambda \Delta t)) \cdot (t)}$$

Where:

LLD is the "A priori" lower limit of detection for a blank sample or background analysis as defined above (as pCi per unit mass or volume).

S_b is the square root of the background count or of a blank sample count; is the estimated standard error of a background count or a blank sample count as appropriate (in units of counts).

E is the counting efficiency (as counts per disintegration).

A is the number of gamma-rays emitted per disintegration for gamma-ray radio-nuclide analysis (A = 1.0 for gross alpha and tritium measurements).

V is the sample size (in units of mass or volume).

2.22 is the number of disintegrations per minute per picocurie.

Y is the fractional radio-chemical yield when applicable (otherwise Y=1.0).

Lambda is the radioactive decay constant for the particular radionuclide (in units of reciprocal minutes).

Delta t is the elapsed time between the midpoint of sample collection and the start time of counting. (t = 0.0 for environmental samples and for gross alpha measurements).

t is the duration of the count (in units of minutes).

The value of "S_b" used in the calculation of the LLD for a detection system shall be based on an actual observed background count or a blank sample count (as appropriate) rather than on an unverified theoretically predicted value. Typical values of "E", "V", "Y", "t", and "delta t" shall be used in the calculation.

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3.8 LIMITING CONDITION FOR OPERATION BASES (Cont'd.)

F. Deleted

G. Miscellaneous Radioactive Materials Sources

The objective of this specification is to assure that leakage from by-product, source and special nuclear material sources does not exceed allowable limits. The limitations on removable contamination for sources requiring leak testing, including alpha emitters, is based on 10 CFR 70.39 (c) limits for plutonium.

4.8 SURVEILLANCE REQUIREMENT BASES

None

(Table of Contents, Cont'd.)

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TABLE 3.2.1

INSTRUMENTATION THAT INITIATES PRIMARY CONTAINMENT ISOLATION FUNCTIONS

MINIMUM # OF OPERABLE INST. CHANNELS PER TRIP SYSTEM (1)	INSTRUMENTS	TRIP LEVEL SETTING	ACTION (3)
2	Reactor Low Water Level	Greater than 144" above top of active fuel (8)	A
2	Reactor Low Low Water	Greater than or equal to 84" above top of active fuel (8)	A
2	High Drywell Pressure	Less than or equal to 2 psig (4),(5)	A
2 (2)	High Flow Main Steam Line	Less than or equal to 120% of rated steam flow	B
2 of 4 in each of 4 sets	High Temperature Main Steamline Tunnel	Less than or equal to 200°F.	B
2	High Radiation Main Steamline Tunnel	Less than or equal to 3 times full power background (6)	B
2	Low Pressure Main Steamline	Greater than or equal to 850 psig	B
	High Flow Isolation		
1	Condenser Line Steamline Side	Less than or equal to 20 psi diff on steamline side.	C
1	Condensate Return Side	Less than or equal to 32" water diff on condensate return side	C
2	High Flow HPCI Steamline	Less than or equal to 150 inches of water diff. (7)	D
4	High Temperature HPCI Steamline Area	Less than or equal to 200°F.	D

Notes:
(See Next Page)

TABLE 3.2.1 (Notes)

1. When primary containment integrity is required, there shall be two operable or tripped trip systems for each function, except for low pressure main steamline which only need be available in the RUN position.

2. Per each steamline.

3. Action: If the first column cannot be met for each of the trip systems, that trip system shall be tripped.

   If the first column cannot be met for both trip systems, the appropriate action listed below shall be taken:

   A. Initiate an orderly shutdown and have reactor in cold shutdown condition in 24 hours.

   B. Initiate an orderly load reduction and have reactor in hot standby condition in 8 hours.

   C. Close isolation valves in Isolation Condenser System.

   D. Close isolation valves in HPCI subsystem.

4. Need not be operable when primary containment integrity is not required.

5. May be bypassed when necessary during purging for containment inerting and deinerting.

6. An alarm setting of less than or equal to 1.5 times normal background at rated power shall be established to alert the operator to abnormal radiation levels in the primary coolant.

7. Verification of time delay setting between 3 and 9 seconds shall be performed during each refueling outage.

8. Top of active fuel is defined as 360" above vessel zero for all water levels used in the LOCA analyses. (See design Bases 3.2)

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TABLE 3.2.3

INSTRUMENTATION THAT INITIATES ROD BLOCK

Minimum No. of Operable Inst. Channels Per Trip System (1)	Instrument	Trip Level Setting
1	APRM upscale (flow bias) (7)	Less than or equal to (0.58 W_D plus 50) (FRP/MFLPD) (See Note 2)
1	APRM upscale (refuel and Startup/Hot Standby mode)	Less than or equal to 12/125 full scale
2	APRM downscale (7)	Greater than or equal to 3/125 full scale
1	Rod block monitor upscale (flow bias) (7)	Less than or equal to (0.65 W_D plus 45) (See Note 2)
1	Rod block monitor downscale (7)	Greater than or equal to 5/125 full scale
3	IRM downscale (3)	Greater than or equal to 5/125 full scale
3	IRM upscale	Less than or equal to 108/125 full scale
3	IRM detector not fully inserted in the core	N/A
2 (5)	SRM detector not in startup position	(See Note 4)
2 (5) (6)	SRM upscale	Less than or equal to 10^5 counts/sec.
1	Scram discharge volume water level - high	Less than or equal to 25 gallons

Notes:
(See Next Page)

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TABLE 3.2.3 (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. A 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 channel per bank.

2. W_D percent of drive flow required to produce a rated core flow of 98 Mlb/hr. MFLPD = highest value of FLPD for G.E. fuel.

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

4. This function may be bypassed when the count rate is greater than or equal to 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 test at atmospheric pressure during or after refueling at power levels not to exceed 5 MW(t).

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TABLE 3.2.5

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Minimum No. of Operable Channels (1)	Total No. of Channels	Parameter	Action (2)
1	2	SJAE Radiation Activity Monitor	D
1	3	Main Chimney Noble Gas SPING/GE Low Range Activity Monitor	A
1	1	Main Chimney SPING Noble Gas Monitors Mid, Hi Range	A
1	1	Main Chimney Iodine Sampler	C
1	1	Main Chimney Particulate Sampler	C
1	1	Main Chimney Flow Rate Monitor	B
1	1	Main Chimney Sampler Flow Rate Monitor	B
1	2	Reactor Building Vent Exhaust Duct Radiation Monitor	E
1	1	Reactor Building Vent SPING Noble Gas Monitor Low, Mid, High Range	F
1	1	Reactor Building Vent Flow Rate Monitor	B
1	1	Reactor Building Vent Sampler Flow Rate Monitor	B
1	1	Reactor Building Vent Iodine Sampler	C
1	1	Reactor Building Vent Particulate Sampler	C

Notes:
(See Next Page)

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TABLE 4.2.2

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Instrument	Instrument Check (1)(7)	Calibration (1)(7)(3)(4)	Functional Test (1)(2)(7)	Source Check (1)
Liquid Radwaste Effluent Gross Activity Monitor	D	R	Q (6)	(5)
Service Water Effluent Gross Activity Monitor	D	R	Q (6)	R
Tank Level Indicating Device				
a. A Waste Sample Tank	D	R	Q	N/A
b. B Waste Sample Tank	D	R	Q	N/A
c. C Waste Sample Tank	D	R	Q	N/A
d. A Floor Drain Sample Tank	D	R	Q	N/A
e. B Floor Drain Sample Tank	D	R	Q	N/A
f. Waste Surge Tank	D	R	Q	N/A

Notes:
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1. D = Once per 24 hours
   M = Once per 31 days
   Q = Once per 92 days
   R = Once per refueling outage

2. The Instrument Functional Test shall also demonstrate that control room alarm annunciation occurs, if any of the following conditions exist, where applicable.

   a. Instrument indicates levels above the alarm setpoint.
   b. Circuit Failure.
   c. Instrument indicates a downscale failure.
   d. Instrument controls not set in OPERATE mode.

3. Calibration shall include performance of a functional test.

4. Instrument check to verify operability of sampler; that the sampler is in place and functioning properly.

5. Function Test shall be performed on local switches providing low flow alarm.

6. Function test calibrations and instrument checks are not required when these instruments are not required to be operable or are tripped. Calibration shall be performed once per refueling outage and not more than once every 18 months. Instrument checks shall be performed at least once per day during those periods when the instruments are required to be operable.

3.2 LIMITING CONDITION FOR OPERATION BASES

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In addition to reactor protection instrumentation which initiates a reactor scram, protective instrumentation has been provided which initiates action to mitigate the consequences of accidents which are beyond the operator's ability to control, or terminates operator errors before they result in serious consequences. This set of specifications provides the limiting conditions of operation for the primary system isolation function, initiation of the emergency core cooling system, control rod block and standby gas treatment systems. The objectives of the specifications are 1) to assure the effectiveness of the protective instrumentation when required by preserving its capability to tolerate a single failure of any component of such systems even during periods when portions of such systems are out of service for maintenance, and 2) to prescribe the trip settings required to assure adequate performance. When necessary, one channel may be made inoperable for brief intervals to conduct required functional tests and calibrations.

Some of the settings on the instrumentation that initiates or control core and containment cooling have tolerances explicitly stated where the high and low values are both critical and may have a substantial effect on safety. It should be noted that the setpoints of other instrumentation, where only the high or low end of the setting has a direct bearing on safety, are chosen at a level away from the normal operating range to prevent inadvertent actuation of the safety system involved and exposure to abnormal situations.

Isolation valves are installed in those lines that penetrate the primary containment and must be isolated during a loss-of-coolant accident so that the radiation dose limits are not exceeded during an accident condition. Actuation of these valves is initiated by protective instrumentation which serves the condition for which isolation is required (this instrumentation is shown in Table 3.2.1). Such instrumentation must be available whenever primary containment integrity is required. The objective is to isolate the primary containment so that the guidelines of 10 CFR 100 are not exceeded during an accident.

The instrumentation which initiates primary system isolation is connected in a dual bus arrangement. Thus the discussion given in the bases for Specification 3.1 is applicable here.

The low-reactor level instrumentation is set to trip at greater than 8 inches on the level instrument (top of active fuel is defined to be 360 inches above vessel zero) and after allowing for the full power pressure drop across the steam dryer the low level trip is at 504 inches above vessel zero, or 144 inches above the

4.2 SURVEILLANCE REQUIREMENT BASES

The instrumentation listed in Table 4.2.1 will be functionally tested and calibrated at regularly scheduled intervals. Although this instrumentation is not generally considered to be as important to plant safety as the Reactor Protection System, the same design reliability goal of 0.99999 is generally applied for all applications of (1 out of 2) X (2) logic. Therefore, on-off sensors are tested once/3 months, and bi-stable trips associated with analog sensors and amplifiers are tested once/week.

Those instruments which, when tripped, result in a rod block have their contacts arranged in a 1 out of n logic, and all are capable of being bypassed. For such a tripping arrangement with bypass capability provided, there is an optimum test interval that should be maintained in order to maximize the reliability of a given channel (see note 7). This takes account of the fact that testing degrades reliability and the optimum interval between tests is approximately given by:

$$i = (2t/r)^{1/2}$$

Where:

i = optimum interval between tests

t = the time the trip contacts are disabled from performing their function while the test is in progress

r = The expected failure rate of the relays

To test the trip relays requires that the channel be bypassed, the test made, and the system returned to its initial state. It is assumed this task requires an estimated 30 minutes to complete in a thorough and workmanlike manner and that the relays have a failure rate of 10^{-6} failures per hour. Using this data and the above operation, the optimum test interval is:

$$i = [2(0.5)/10^{-6}]^{1/2} = 1 \times 10^3 \text{ hours}$$

$$= \text{approximately 40 days}$$

For additional margin a test interval of once per month will be used initially.

Note:
(7) UCRL-50451, Improving Availability and Readiness of Field Equipment Through Periodic Inspection, Benjamin Epstein, Albert Shiff, July 16, 1968, page 10, Equation (24), Lawrence Radiation Laboratory.

4.2 SURVEILLANCE REQUIREMENT BASES (Cont'd.)

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A more usual case is that the testing is done independently. If both channels are bypassed and tested at the same time, the result is shown in Curve No. 3. Note that the minimum occurs at about 40,000 hours, much longer than for cases 1 and 2. Also, the minimum is not nearly as low as Case 2 which indicates that this method of testing does not take full advantage of the redundant channel. Bypassing both channels for simultaneous testing should be avoided.

The most likely case would be to stipulate that one channel be bypassed tested and restored. Then immediately following, the second channel will be bypassed, tested, and restored. This is shown by Curve No. 4. Note that there is no true minimum. The curve does have a definite knee and very little reduction in system unavailability is achieved by testing at a shorter interval than computed by the equation for a single channel.

The best test procedure of all those examined is to perfectly stagger the tests. That is, if the test interval is four months, test one or the other channel every two months. This is shown in Curve No. 5. The difference between Cases 4 and 5 is negligible. There may be other arguments, however, that more strongly support the perfectly staggered tests, including reductions in human error.

The conclusions to be drawn are these:

1. A 1 out of n system may be treated the same as a single channel in terms of choosing a test interval; and
2. More than one channel should not be bypassed for testing at any one time.

The radiation monitors in the ventilation duct and on the refueling floor which initiate building isolation and standby gas treatment operation are arranged in two 1 out of 2 logic systems. The bases given above for the rod blocks applies here also and were used to arrive at the functional testing frequency.

Based on experience at Dresden Unit 1 with instruments of similar design, a testing interval of once every three months has been found to be adequate.

The automatic pressure relief instrumentation can be considered to be a 1 out of 2 logic system and the discussion above applies also.

3.8 LIMITING CONDITION FOR OPERATION (Cont'd.)

released from the site to unrestricted areas (at or beyond the site boundary, Figures 4.8.1 and 4.8.2) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 with the Table 4.8.2 values representing the MPC's for noble gases.

With the concentration of radioactive material released from the site to unrestricted areas exceeding the above limits, without delay decrease the release rate of radioactive materials and/or increase the dilution flow rate to restore the concentration to within the above limits.

2. The dose or dose commitment above background to a member of the public from radioactive materials in liquid effluents released to unrestricted areas (at or beyond the site boundary) from the site shall be limited to the following:

a. During Any Calendar Quarter:
   (1) Less than or equal to 3 mrem to the whole body.

   (2) Less than or equal to 10 mrem to any organ.

4.8 SURVEILLANCE REQUIREMENTS (Cont'd.)

unrestricted areas shall be determined to be within the prescribed limits by obtaining representative samples in accordance with the sampling and analysis program specified in Table 4.8.3. The sampling analysis results will be used with the calculational methods in the ODCM to determine that the concentrations are within the limits of Specification 3.8.B.1.

2a. The dose contribution from measured quantities of radioactive material shall be determined by calculation at least once per 31 days and cumulative summation of these total body and organ doses shall be maintained for each calendar quarter.

3.8 LIMITING CONDITION FOR OPERATION (Cont'd.)

whenever the main steam isolation valves are open.

D. Radioactive Waste Storage

The maximum amount of radioactivity in liquid storage in the Waste Sample Tanks, the Floor Drain Sample Tanks and the Waste Surge Tank shall not exceed 3.0 curies and the maximum amount of radioactivity in any tank shall not exceed 0.7 curies. If these conditions cannot be met, the stored liquid shall be recycled within 24 hours to the Waste Collector Tanks or the Waste Neutralizer Tanks until the condition is met.

E. Radiological Environmental Monitoring Program

1. The radiological environmental monitoring program given in Table 4.8.4 shall be conducted except as specified below:

2. With the radiological environmental monitoring program not being conducted as specified in Table 4.8.4, prepare and submit to the Commission, in the Annual Radiological Operating Report, a description of

4.8 SURVEILLANCE REQUIREMENTS (Cont'd.)

D. Radioactive Waste Storage

A sample from each of the Waste Sample Tanks, Floor Drain Tanks, and Waste Surge Tank shall be taken, analyzed and recorded every 72 hours. If no additions to a tank have occurred since the last sample, the tank need not be sampled until the next addition.

E. Radiological Environmental Monitoring Program

1. The radiological environmental monitoring samples shall be collected pursuant to Table 4.8.4 from the locations specified in the ODCM, and shall be analyzed pursuant to the requirements of Table 4.8.6.

2. The results of analyses performed on radiological environmental monitoring samples shall be summarized in the Annual Radiological Environmental Operating Report.

3.8 LIMITING CONDITION FOR OPERATION (Cont'd.)

the reasons for not conducting the program as required and the plans for preventing a recurrence. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, contractor omission which is corrected as soon as discovered, malfunction of sampling equipment, or if a person who participates in the program goes out of business. If the equipment malfunctions, corrective actions shall be completed as soon as practical. If a person supplying samples goes out of business, a replacement supplier will be found as soon as possible. All deviations from the sampling schedule shall be described in the Annual Report.

3. When the level of radioactivity in an environmental sampling medium at one or more of the locations specified in the ODCM exceeds the limits of Table 4.8.5 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days from the end of the affected calendar quarter, a Special Report which

4.8 SURVEILLANCE REQUIREMENTS (Cont'd.)

3. The land use census shall be conducted at least once per twelve months between the dates of June 1 and October 1 by a door-to-door survey, aerial survey, road survey, or by consulting local agriculture authorities.

3.8 LIMITING CONDITION FOR OPERATION
(Cont'd.)

A complete inventory of radioactive materials in the licensee's possession shall be maintained current at all times.

H. In the event a limiting condition for operation and/or associated action requirements identified in Sections 3.8.A through 3.8.E and 4.8.A through 4.8.E cannot be satisfied because of circumstances in excess of those addressed in the Specifications, no changes are required in the operational condition of the plant, and this does not prevent the plant from entry into an operational mode.

4.8 SURVEILLANCE REQUIREMENTS
(Cont'd.)

b. In any form other than gas.

2. Stored sources not in use - Each sealed source shall be tested prior to the use or transfer to another licensee unless tested within the previous 6 months. Sealed sources transferred without a certificate indicating the last test case shall be tested prior to being placed into use.

A Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.6.B. if source leakage tests reveal the presence of greater than or equal to 0.005 microcuries of removable contamination.

TABLE 4.8.5
REPORTING LEVELS FOR RADIOACTIVITY
CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Reporting Levels

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m3)	FISH (pCi/Kg, wet)	MILK (pCi/l)	FOOD PRODUCTS (pCi/Kg, wet)
H-3	2×10^4 (see note 1)				
Mn-54	1×10^3		3×10^4		
Fe-59	4×10^2		1×10^4		
Co-58	1×10^3		3×10^4		
Co-60	3×10^2		2×10^4		
Zn-65	3×10^2		2×10^4		
Zr-Nb-95	4×10^2				
I-131	2	0.9		3	1×10^2
Cs-134	30	10	1×10^3	60	2×10^3
Cs-137	50	20	1×10^3	70	2×10^3
Ba-La-140	2×10^2			3×10^2	

Notes: 1) For drinking water samples. This is 40 CFR Part 141 value.

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TABLE 4.8.6 NOTES (Continued)
<u>TABLE NOTATION</u>

D. The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95 percent probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation)

$$LLD = \frac{4.66 \cdot (S_b)}{(A) \cdot (E) \cdot (V) \cdot (2.22) \cdot (Y) \cdot (\exp(-\lambda \Delta t)) \cdot (t)}$$

Where:

LLD is the "A priori" lower limit of detection for a blank sample or background analysis as defined above (as pCi per unit mass or volume).

S_b is the square root of the background count or of a blank sample count; is the estimated standard error of a background count or a blank sample count as appropriate (in units of counts).

E is the counting efficiency (as counts per disintegration).

A is the number of gamma-rays emitted per disintegration for gamma-ray radio-nuclide analysis (A = 1.0 for gross alpha and tritium measurements).

V is the sample size (in units of mass or volume).

2.22 is the number of disintegrations per minute per picocurie.

Y is the fractional radio-chemical yield when applicable (otherwise Y=1.0).

Lambda is the radioactive decay constant for the particular radionuclide (in units of reciprocal minutes).

Delta t is the elapsed time between the midpoint of sample collection and the start time of counting. (t = 0.0 for environmental samples and for gross alpha measurements).

t is the duration of the count (in units of minutes).

The value of "S_b" used in the calculation of the LLD for a detection system shall be based on an actual observed background count or a blank sample count (as appropriate) rather than on an unverified theoretically predicted value. Typical values of "E", "V", "Y", "t", and "delta t" shall be used in the calculation.

3.8 LIMITING CONDITION FOR OPERATION BASES (Cont'd.)

F. Deleted

G. Miscellaneous Radioactive Materials Sources

The objective of this specification is to assure that leakage from by-product, source and special nuclear material sources does not exceed allowable limits. The limitations on removable contamination for sources requiring leak testing, including alpha emitters, is based on 10 CFR 70.39 (c) limits for plutonium.

4.8 SURVEILLANCE REQUIREMENT BASES

None

6.0 ADMINISTRATIVE CONTROLS (Cont'd.)

(7) Audit onsite and offsite reviews.

(8) Audit of Facility Fire Protection Program and implementing procedures at least once per 24 months.

(9) The radiological environmental monitoring program and the results thereof at least once per 12 months.

(10) The ODCM and implementing procedures at least once per 24 months.

(11) The PCP and implementing procedures for solidification of radioactive waste at least once per 24 months.

(12) Report all findings of noncompliance with NRC requirements and recommendations and results of each audit to the Station Superintendent, the Division Manager-Nuclear Stations, Manager of Quality Assurance, the General Superintendent of Production Systems Analysis, and to the Vice President of Construction, Production, Licensing and Environmental Affairs.

c. Authority

The Manager of Quality Assurance reports to the Executive Vice-President and the Supervisor of the Offsite Review and Investigative Function reports to the General Superintendent of Production Systems Analysis. Either the Manager of Quality Assurance or the Supervisor of the Offsite Review and Investigative Function has the authority to order unit shutdown or request any other action which he deems necessary to avoid unsafe plant conditions.

d. Records

(1) Reviews, audits and recommendations shall be documented and distributed as covered in 6.1.G.1.a and 6.1.G.1.b.

(2) Copies of documentation, reports, and correspondence shall be kept on file at the station.

e. Procedures

Written administrative procedures shall be prepared and maintained for the off-site reviews and investigative functions described in Specifications 6.1.G.1.a. These procedures shall cover the following: