

PROPOSED CHANGE RTS-157B
TO THE
DUANE ARNOLD ENERGY CENTER
TECHNICAL SPECIFICATIONS

The holders of license DPR-49 for the Duane Arnold Energy Center propose to amend Appendix A (Technical Specifications) to said license by deleting the current pages and replacing them with the attached, new pages. A list of the affected pages is provided below.

The proposed amendment incorporates appropriate limiting conditions for operation and surveillance requirements for accident monitoring instrumentation required by NUREG-0737 and the guidance set forth in Generic Letter 83-36.

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SURVEILLANCE INSTRUMENTATION

Total Number of Channels Provided	Minimum No. Channels Required	Instrument	Type Indication and Range	Action
3	2	Reactor Water Level	Recorder, Indicator 158"-218"*	(1) (2) (3)
3	2	Reactor Pressure	Recorder, Indicator 0-1200 psig	(1) (2) (3)
2	1	Drywell Pressure	Recorder -10 to +90 psig	(1) (2) (3)
8	2	Drywell Temperature	Recorder 0-350°F	(1) (2) (3)
2	2	Torus Water Temperature	Recorder 0-350°F	(1) (2) (3)
2	1	Torus Water Level	Recorder -10"/0/+10" H ₂ O	(1) (2) (3)
2	1	Control Rod Position	Process Computer, Full Core Display, Four Rod Group Display	
4	3	Neutron Monitoring	SRM*** (10 ⁻¹ to 10 ⁶ CPS)	(1) (2) (3) (4)
3(per Trip System)	2(per Trip System)	Neutron Monitoring	IRM,*** APRM 0 to 125% power	(1) (2) (3) (4)
1	1	Drywell/Torus ΔP	Alarm Indicator 0-10 psid	
1	1	Drywell Pressure	Local Indicator,** 0-100 psia	(5)
1	1	Torus Pressure	Local Indicator, ** 1-100 psia	(5)

*Indicator scale is referenced to the Top of Active Fuel (TAF), defined as 344.5 inches above vessel zero.

**Capable of ±0.1 psi

***Not required when in the Run mode.

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NOTES FOR TABLE 3.2-F

1. From and after the date that one of these parameters is reduced to one indication, when required, continued operation is permissible during the succeeding thirty days unless such instrumentation is sooner made operable.
2. From and after the date that one of these parameters is not indicated in the control room, continued operation is permissible during the succeeding seven days unless such instrumentation is sooner made operable.
3. If the requirements of notes (1) and (2) cannot be met, an orderly shutdown shall be initiated and the reactor shall be in a Cold Condition within 24 hours.
4. These surveillance instruments are considered redundant to each other.
5. From and after the date that one of these parameters is not indicated, continued operation is permissible provided control room drywell pressure indication is available.

TABLE 3.2-H

ACCIDENT MONITORING INSTRUMENTATION

Instrument	Total Number of Channels Provided	Type Indication and Range	Minimum No. Channels Required	Action
Safety/Relief Valve Position Indicator (Primary Detector)	1/Valve(1)	N/A	1/Valve	(2)
Safety/Relief Valve Position Indicator (Backup-Thermocouple)	1/Valve	N/A	0	
Safety Valve Position Indicator (Primary Detector)	1/Valve(1)	N/A	1/Valve	(2)
Safety Valve Position Indicator (Backup-Thermocouple)	1/Valve	N/A	0	
Reactor Coolant, Containment Atmosphere, and Torus Water Post-Accident Sampling	2(each)	N/A	1(each)	(4)(5)
Extended Range Effluent Radiation Monitors:				
a) Reactor Building Exhaust Stack	3	Recorder, Indicator 5×10^{-2} to $10^5 \mu\text{Ci/cc}$	1	(6)
b) Turbine Building Exhaust Stack	1	Recorder, Indicator 5×10^{-2} to $10^5 \mu\text{Ci/cc}$	1	(6)
c) Offgas Stack	1	Recorder, Indicator 5×10^{-2} to $10^5 \mu\text{Ci/cc}$	1	(6)
Drywell/Torus Radiation Monitor	4	Recorder, Indicator 1 to 10^7 R/hr	2	(6)
Drywell Pressure Monitor	2	Recorder, Indicator 0-250 psig	2	(7)(8)
Drywell Pressure Monitor	2	Recorder, Indicator -5 to +5 psig	2	(7)(8)
Torus Water Level Monitor	2	Recorder, Indicator 0-30 feet	2	(7)(8)
Containment Hydrogen/Oxygen Concentration (3)	2	Recorder, Indicator 0-10% or 0-25% O_2 0-10% or 0-20% H_2 Volume oxygen/hydrogen	2	(9)(10)

NOTES FOR TABLE 3.2-H

NOTES FOR TABLE 3.2-H

- (1) Each channel is comprised of three instruments (pressure switches) which are arranged in a "two out of three" logic connected to a relay.
- (2) From and after the date that a channel is inoperable, the torus temperature will be monitored at least once per shift to observe any unexplained temperature increase which might be indicative of an open SRV; continued reactor operation is permissible only during the succeeding 30 days, unless such channel is sooner made operable.
- (3) Normal condition is with monitor in standby mode.
- (4) When the ability to obtain a sample has been lost:
 - a. Within 7 days confirm a sample can be obtained within 24 hours of the time a decision is made to sample; and
 - b. Within 90 days, restore the sampling capability.
 - c. If the requirements of notes 5(a) and 5(b) cannot be met, be in at least a HOT SHUTDOWN Condition within the next 24 hours.
- (5) When the ability to analyze a sample has been lost:
 - a. Within 7 days, confirm that alternative sample analytical support services can be initiated within 24 hours of the time a decision is made to sample; and
 - b. Within 90 days, restore sample analysis capability.
 - c. If the requirements of notes 6(a) and 6(b) cannot be met, be in at least a HOT SHUTDOWN Condition within the next 24 hours.
- (6) With the number of OPERABLE channels (both indicator and recorder inoperable) less than the Minimum Number Channels Required, initiate the preplanned alternate method of monitoring the appropriate parameter(s) within 72 hours, and:
 - a. either restore the inoperable channel(s) to OPERABLE status within seven (7) days following the event, or
 - b. prepare and submit a Special Report to the Commission within 14 days following the event describing the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

NOTES FOR TABLE 3.2-H (cont.)

- (7) If the number of OPERABLE channels (both indicator and recorder inoperable) is reduced to less than the Minimum Number Channels Required (e.g., reduced to one channel) perform either step (a) or (b) below.
 - a. Operation may continue for the next thirty (30) days provided at least one (1) channel of instrumentation specified in Table 3.2-F for the identical parameter is OPERABLE or perform step (c) below.
 - b. Restore the inoperable channel to OPERABLE status within 7 days or perform step (c) below.
 - c. Within the following 12 hours be in at least HOT STANDBY and within the next 24 hours be in at least COLD SHUTDOWN.
- (8) If the number of OPERABLE channels (both indicator and recorder inoperable) is reduced to zero (e.g., no channels available) restore the inoperable channel(s) to OPERABLE status within 48 hours or within the following 12 hours be in at least HOT STANDBY and within the next 24 hours be in at least COLD SHUTDOWN.
- (9) If the number of OPERABLE channels (both indicator and recorder inoperable) is less than the Minimum Number Channels Required (e.g., reduced to one channel) perform either step (a) or (b) below.
 - a. Increase the number of OPERABLE channels to the Minimum Number Channels Required within 30 days or perform step (c) below.
 - b. Within 30 days, and at least once every 7 days thereafter, either demonstrate the ability to obtain and analyze containment samples for hydrogen and oxygen or perform step (c) below. If this sampling is done, but the number of OPERABLE channels is not increased to the Minimum Number Channels Required within 60 days, perform step (c) below.
 - c. Within the following 12 hours have the reactor in at least HOT STANDBY and within the next 24 hours have the reactor in COLD SHUTDOWN.
- (10) If the number of OPERABLE channels (both indicator and recorder inoperable) is reduced to zero (e.g., no channels available) perform either step (a) or step (b) below.
 - a. Increase the number of OPERABLE channels to the Minimum Number Channels Required within 7 days or perform step (c) below.
 - b. At least every other day demonstrate the ability to obtain and analyze containment samples for hydrogen and oxygen or perform step (c) below. If this sampling is done, but the number of OPERABLE channels is not increased to the Minimum Number Channels Required within 14 days, perform step (c) below.
 - c. Within the following 12 hours be in at least HOT STANDBY and within the next 24 hours be in at least COLD SHUTDOWN.

TABLE 4.2-F

MINIMUM TEST AND CALIBRATION FREQUENCY FOR SURVEILLANCE INSTRUMENTATION

	<u>Instrument Channel</u>	<u>Calibration Frequency</u>	<u>Instrument Check</u>
	1) Reactor Level	Once/6 months	Once Each Shift
	2) Reactor Pressure	Once/6 months	Once Each Shift
	3) Drywell Pressure	Once/6 months	Once Each Shift
	4) Drywell Temperature	Once/6 months	Once Each Shift
	5) Torus Temperature	Once/6 months	Once Each Shift
3.2-31	6) Torus Water Level	Once/6 months	Once Each Shift
	7) Control Rod Position	NA	Once Each Shift
	8) Neutron Monitoring	Prior to Reaching 20% Power and once per day when in Run Mode (APRM Gain Adjust when in Run Mode)	Once Each Shift (when in Startup or Run Mode)
	9) Drywell/Torus ΔP Alarm	Once/6 months	Once Each Shift
	10) Drywell/Torus ΔP Indicator	Once/6 months	Once Each Shift
	11) Drywell Pressure	Once/Operating Cycle	Once Each Shift
	12) Torus Pressure	Once/Operating Cycle	Once Each Shift

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TABLE 4.2-H

ACCIDENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>Instrument</u>	<u>Calibration Frequency</u>	<u>Instrument Check (2)</u>
Safety/Relief Valve Position Indicator (Primary) (1)(2)	Once/operating cycle	Once/month
Safety/Relief Valve Position Indicator (Backup-Thermocouple)	Once/operating cycle	Once/month
Safety Valve Position Indicator (Primary) (1)(2)	Once/operating cycle	Once/month
Safety Valve Position Indicator (Backup-Thermocouple)	Once/operating cycle	Once/month
Drywell/Torus Radiation Monitor	Once/refueling (3)	Once/month
Extended Range Effluent Radiation Monitors		
a) Reactor Building Exhaust Stacks	Once/operating cycle (4)	Once/week
b) Turbine Building Exhaust Stack	Once/operating cycle (4)	Once/week
c) Offgas Stack	Once/operating cycle (4)	Once/week
Reactor Coolant, Containment Atmosphere, and Torus Water Post-Accident Sampling	Once/operating cycle (5)	N/A
Drywell Pressure Monitors	Once/operating cycle	Once/month
Torus Water Level Monitor	Once/operating cycle	Once/month
Containment Hydrogen/Oxygen Concentration	Once/6 months (6)	Once/month (6)

NOTES FOR TABLE 4.2-H

1. Functional test of the relay is done once/3 months.
2. Instrument check shall consist of the qualitative assessment of channel behavior during operation by observation. This determination shall include, where possible, comparison of the channel indication and/or status with other indications and/or status derived from independent instrument channels (e.g. backup thermocouple) measuring the same parameter.
3. Channel calibration shall consist of an electronic calibration of the channel for ranges above 10 R/hr and a one point calibration check of the detector below 10 R/hr with a portable gamma source.
4. Accident range effluent monitors shall be calibrated by means of a built-in check source or a known radioactive source.
5. Not a calibration, but demonstration of system operability.
6. Monitors shall be tested for operability using standard bottled H₂ and O₂.

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LIMITING CONDITION FOR OPERATION

SURVEILLANCE REQUIREMENT

6. Containment Atmosphere Dilution

- a. Whenever the reactor is in power operation, the Post-LOCA Containment Atmosphere Dilution System must be operable and capable of supplying nitrogen to the containment for atmosphere dilution if required by post-LOCA conditions. If this specification cannot be met, the system must be restored to an operable condition within 7 days or the reactor must be taken out of power operation.
- b. Whenever the reactor is in power operation, the post-LOCA Containment Atmosphere Dilution System shall contain a minimum of 50,000 scf of N₂ as determined by pressure and temperature measurements. If this specification cannot be met, the minimum volume will be restored within 7 days or the reactor must be taken out of power operation.
- c. The limiting conditions for operation for the CAD system H₂ and O₂ analyzers serving the drywell and the suppression chamber are specified in Table 3.2-H.

6. Containment Atmosphere Dilution

- a. The post-LOCA containment atmosphere dilution system shall be functionally tested once per operating cycle.
- b. The volume in the N₂ storage bank shall be recorded weekly.
- c. Surveillance requirements for the CAD system H₂ and O₂ analyzers are specified in Table 4.2-H. The atmosphere analyzing system shall be functionally tested once per operating cycle in conjunction with specification 4.7.A.6.a.

LIMITING CONDITION FOR OPERATIONSURVEILLANCE REQUIREMENT7. Drywell-Suppression Chamber
Differential Pressure7. Drywell-Suppression Chamber
Differential Pressure

- a. Differential pressure between the drywell and suppression chamber shall be maintained at equal to or greater than 1.10 psid except as specified in (1) and (2) below:

- a. The pressure differential between the drywell and suppression chamber shall be recorded at least once each shift.

- (1) Within the 24-hour period subsequent to placing the reactor in the Run Mode following a shutdown, the differential pressure shall be established. The differential pressure may be decreased to less than 1.10 psid 24 hours prior to a scheduled shutdown.

- (2) This differential pressure may be decreased to less than 1.10 psid for a maximum of four hours during required operability testing of the HPCI system pump, the RCIC system pump, the drywell-pressure suppression chamber vacuum breakers, the suppression chamber to reactor building vacuum breakers, and to perform leak rate testing required by specification 4.7.A.2.d.4, and to allow for inerting operations to satisfy specification 3.7.A.5 requirements.

- b. If the differential pressure of specification 3.7.A.7.a cannot be maintained, and the differential pressure cannot be restored within the subsequent six (6) hour period, an orderly shutdown shall be initiated and the reactor shall be in a Cold Shutdown condition within the following 24 hours.

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
<p data-bbox="245 214 727 278">3.10 ADDITIONAL SAFETY RELATED PLANT CAPABILITIES</p> <p data-bbox="326 310 548 346"><u>Applicability:</u></p> <p data-bbox="326 378 769 540">Applies to the operating status of the main control room ventilation system and the emergency shutdown local control panel.</p> <p data-bbox="326 668 483 704"><u>Objective:</u></p> <p data-bbox="326 736 805 991">To assure the availability of the main control room ventilation system, and emergency shutdown control panels under the conditions for which the capability is an essential response to station abnormalities.</p> <p data-bbox="245 1023 792 1059">A. <u>MAIN CONTROL ROOM VENTILATION</u></p> <p data-bbox="245 1091 805 1378">1. Except as specified in Specification 3.10.A.3 below, the control room air treatment system and the diesel generators required for operation of this system shall be operable at all times when containment integrity is required.</p> <p data-bbox="245 1410 805 1698">2.a The results of the in-place cold DOP and halogenated hydrocarbon tests at design flows on HEPA filters and charcoal adsorber banks, respectively, shall show <u>>99%</u> DOP removal and <u>>99%</u> halogenated hydrocarbon removal.</p>	<p data-bbox="852 214 1425 278">4.10 ADDITIONAL SAFETY RELATED PLANT CAPABILITIES</p> <p data-bbox="933 310 1156 346"><u>Applicability:</u></p> <p data-bbox="933 378 1396 634">Applies to the surveillance requirements for the main control room ventilation system, and the emergency shutdown control panels which are required by the corresponding Limiting Conditions for Operation.</p> <p data-bbox="933 668 1091 704"><u>Objective:</u></p> <p data-bbox="933 736 1396 889">To verify that operability or availability under conditions for which these capabilities are an essential response to station abnormalities.</p> <p data-bbox="852 1023 1399 1059">A. <u>MAIN CONTROL ROOM VENTILATION</u></p> <p data-bbox="852 1091 1425 1315">1. At least once per operating cycle, the pressure drop across the combined HEPA filters and charcoal adsorber banks shall be demonstrated to be less than 6 inches of water at system design flow rate.</p> <p data-bbox="852 1410 1425 1730">2.a. The tests and sample analysis of Specification 3.10.A.2 shall be performed initially and at least once per operating cycle or after every 720 hours of system operation and following significant painting, fire or chemical release in any ventilation zone communicating with the system.</p>

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
<p>b. The results of laboratory carbon sample analysis shall show >90% radioactive methyl iodide removal at a face velocity of 40 fpm, 0.05 to 0.15 mg/m³ inlet iodide concentration, <u>≥</u> 95% R.H. and <u>≥</u> 125°F.</p>	<p>b. Each control room emergency filtration subsystem shall be demonstrated OPERABLE after each complete or partial replacement of a charcoal adsorber bank by verifying that the charcoal adsorbers remove 99% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place while operating the subsystem at the design flow rate.</p>
<p>c. System flow shall be 1000 cfm <u>±</u> 100 cfm.</p>	<p>c. Each control room emergency filtration subsystem shall be demonstrated OPERABLE after each complete or partial replacement of a HEPA filter bank by verifying that the HEPA filter banks remove >99% of the DOP when they are tested in-place while operating the subsystem at the design flow rate.</p>
<p>3. During POWER OPERATION, Reactor Startup, or HOT SHUTDOWN, from and after the date that one of the control room air treatment systems is made or found to be inoperable, restore the inoperable subsystem to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 24 hours and in COLD SHUTDOWN within the following 24 hours.</p>	<p>d. Monthly, each control room emergency filtration subsystem shall be demonstrated OPERABLE by initiating flow through the HEPA filters and charcoal adsorbers and verifying that the subsystem operates for at least 10 hours.</p>
	<p>3. At least once per operating cycle automatic initiation of the control room air treatment system shall be demonstrated.</p>

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
<p>a. In the COLD SHUTDOWN or REFUELING mode, with one control room emergency filtration subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 7 days or initiate and maintain operation of the OPERABLE subsystem in the isolation mode of operation or suspend fuel handling operations.</p> <p>b. With both control room emergency filtration subsystems inoperable, suspend CORE ALTERATIONS, handling of irradiated fuel in the secondary containment and operations with a potential for draining the reactor vessel.</p> <p>4. If these conditions cannot be met, reactor shutdown shall be initiated and the reactor shall be in COLD SHUTDOWN within 24 hours for reactor operations and refueling operations shall be suspended in a safe manner.</p>	<p>B. <u>EMERGENCY SHUTDOWN LOCAL CONTROL PANEL</u></p> <p>1. The emergency shutdown local control panel shall be visually checked once per week to verify it is secured.</p> <p>2. Operability of the switches on the emergency shutdown local control panel shall be functional tested once per refueling outage.</p>
<p>B. <u>EMERGENCY SHUTDOWN CONTROL PANEL</u></p> <p>1. At all times when not in use or being maintained the emergency shutdown local control panel shall be secured.</p>	