

# 5.1.5

Emergency RPV  
Depressurization AATWS

REVISIONS  
SUPPLY SYSTEM  
WNIP-8

Version 1  
Controlled Copy

9



# 5.1.6

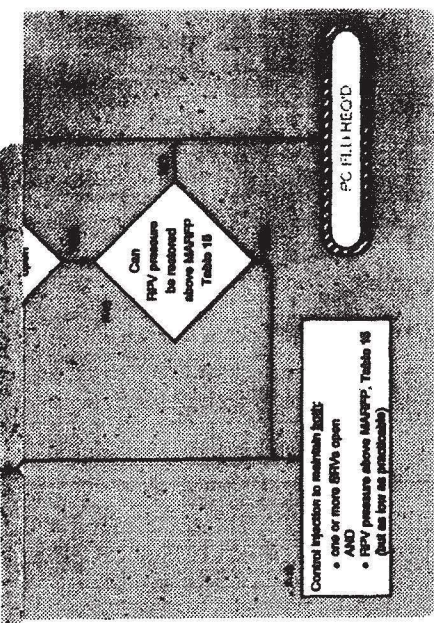
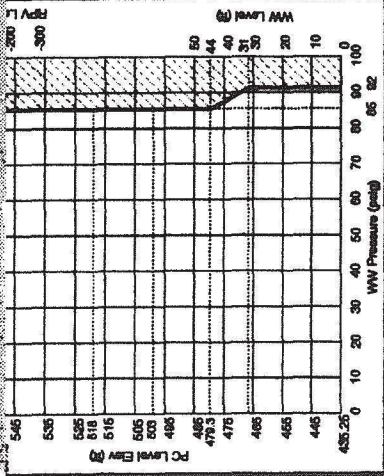
RPV Flooding - AATWS

SUPPLY SYSTEM  
WNIP-8

Version 1  
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Statement # 34

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# 5.1.3

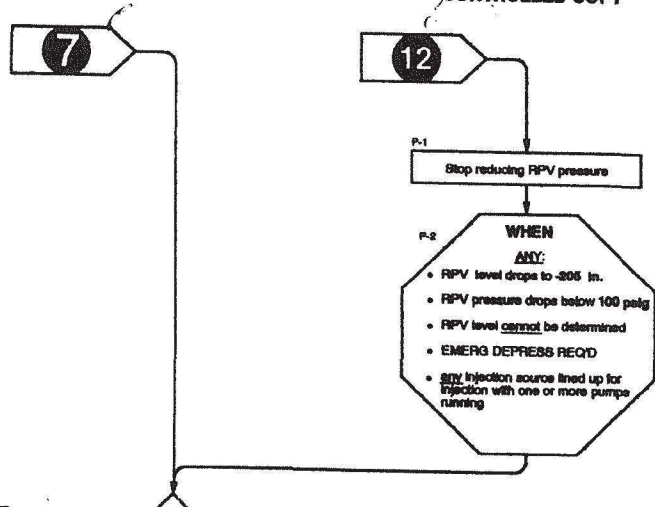
## Emergency RPV Depressurization

EMERGENCY FIELD SUPPLY SYSTEM  
WNP-2

Revision 2.3 Approved

Revision 2.3 Approved

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Statement # 35

# 5.1.4

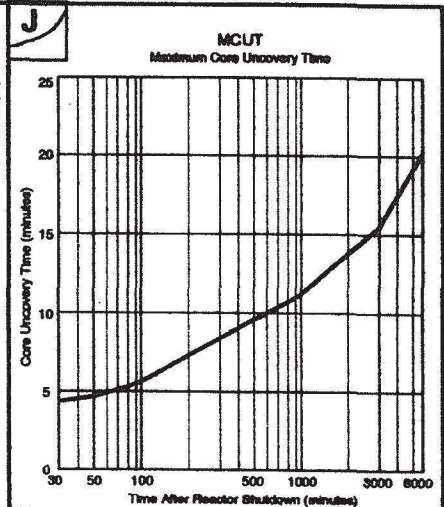
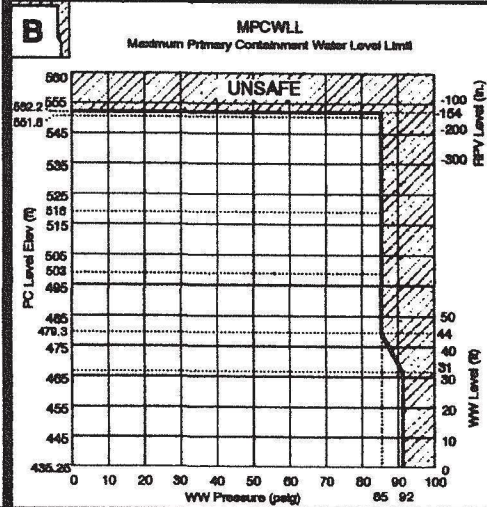
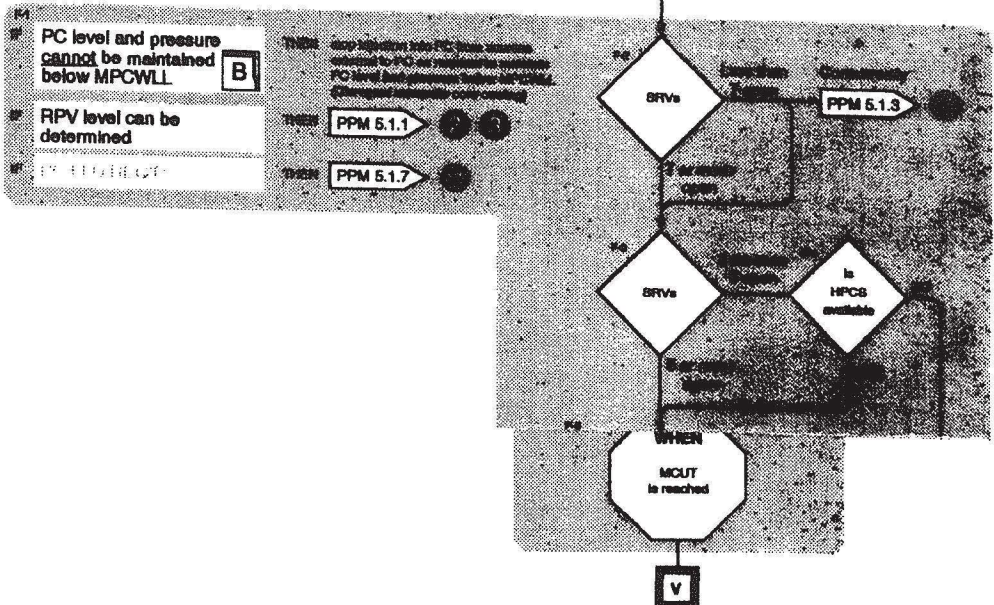
## RPV Flooding

EMERGENCY FIELD SUPPLY SYSTEM  
WNP-2

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#### 4. Other (Site-Specific) Indications

This EAL is to cover other (site-specific) indications that may indicate loss or potential loss of the Fuel Clad barrier, including indications from containment air monitors or any other (site-specific) instrumentation.

#### 5. Emergency Director Judgement

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the Fuel Clad barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Director judgement that the barrier may be considered lost or potentially lost. (See also IC SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power", for additional information.)

#### RCS BARRIER EXAMPLE EALs: (1 or 2 or 3 or 4 or 5 or 6)

The RCS Barrier is the reactor coolant system pressure boundary and includes the reactor vessel and all reactor coolant system piping up to the isolation valves.

##### 1. RCS Leak Rate

The "Loss" EAL is based on design basis accident analyses which show that even if MSIV closure occurs within design limits, dose consequences offsite from a "puff" release would be in excess of 10 millirem. Thus, this EAL is included for consistency with the Alert emergency classification. The potential loss of RCS based on leakage is set at a level indicative of a small breach of the RCS but which is well within the makeup capability of normal and emergency high pressure systems. Core uncover is not a significant concern for a 50 gpm leak, however, break propagation leading to significantly larger loss of inventory is possible. Many BWRs may be unable to measure an RCS leak of this size because the leak would likely increase drywell pressure above the drywell isolation set point. The system normally used to monitor leakage is typically isolated as part of the drywell isolation and is therefore unavailable. If primary system leak rate information is unavailable, other indicators of RCS leakage should be used. Potential loss of RCS based on primary system leakage outside the drywell is determined from site-specific alarms in the areas of the main steam line tunnel, main turbine generator, RCIC, HPCI, etc., which indicate a direct path from the RCS to areas outside primary containment.

##### 2. Drywell Pressure

The (site-specific) drywell pressure is based on the drywell high pressure alarm set point and indicates a LOCA. A higher value may be used if supporting documentation is provided which indicates the chosen value is less than the pressure which would be reached for a 50 gpm Reactor Coolant System Leak.

There is no "Potential Loss" EAL corresponding to this item.



4. Does the main steam line break with isolation belong in the Fission Product Barrier Chart? If the isolation occurred, there is no longer a barrier threat and should not be added to other "losses" for entry to a SAE or GE?

*Agreed, this condition should be removed from the FPB chart but must still be classified under system failures due to the probable offsite dose release from the puff release.*

5. Why isn't secondary containment failure considered a barrier loss?

*Secondary containment is not considered a true fission product barrier. Its loss is addressed in Technical Specifications and failure to meet the action statement would result in an Unusual Event.*

6. If Drywell pressure exceeds the isolation setpoint due to a loss of drywell cooling (or inerting error), does this require an Alert declaration?

*No - In general the FPB chart is built around a LOCA or slow developing accidents. The key qualifier is "accidents." Meeting a FPB chart trigger by itself should be handled under the applicable Technical Specification LCO. However, if there is an accident in progress, then an emergency declaration is warranted. Individual plants may clarify the EAL conditions to ensure that non-accident conditions do not require emergency classification.*



## 6.2.1.1.3 Design Evaluation

## 6.2.1.1.3.1 Summary Evaluation

The key design parameters and the maximum calculated accident parameters for the pressure suppression containment are as follows:

<u>Parameter</u>	<u>Design Parameter</u>	<u>Calc. Accident Parameter</u>
a. Drywell pressure	45 psig	34.7 psig
b. Drywell temperature	340°F	328°F
c. Suppression chamber pressure	45 psig	27.6 psig
d. Suppression chamber temperature	275°F	220°F

The foregoing design and maximum calculated accident parameters are not determined from a single accident event but from an envelope of accident conditions. As a result, there is no single design basis accident (DBA) for this containment system.

A maximum drywell and suppression chamber pressure occurs near the end of a blowdown phase of a loss-of-coolant-accident (LOCA). Approximately the same peak pressure occurs for either the break of a recirculation line or a main steam line. Both accidents are evaluated.

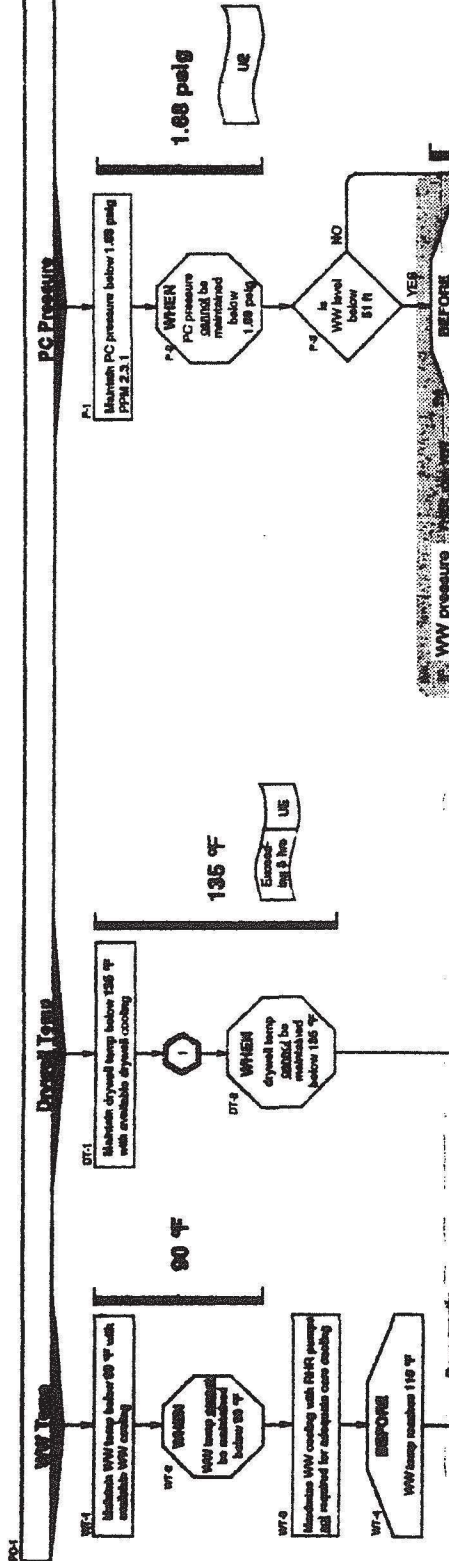
The most severe drywell temperature condition (peak temperature and duration) occurs for a small primary system rupture above the reactor water level that results in the blowdown of reactor steam to the drywell (small steam break). In order to demonstrate that breaks smaller than the rupture of the largest primary system pipe will not exceed the containment design parameters, the containment system responses to an intermediate size liquid break and a small size steam break are evaluated. The results show that the containment design conditions are not exceeded for these smaller break sizes.

Statement # 44, 56

- WW temp above 88 °F
- Drywell temp above 113
- Drywell pressure above
- WW level above +8 in.
- PC hydrogen above 3.1

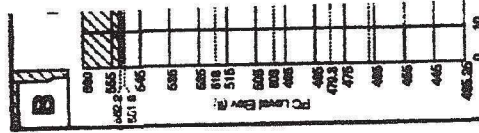
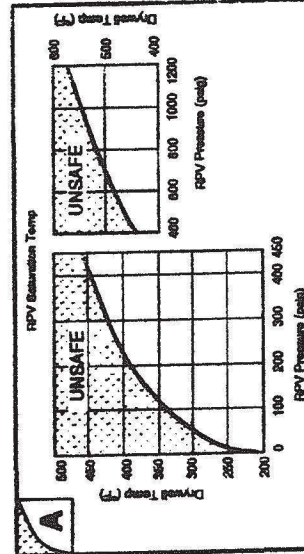
**Perform Concurrently to When**

PC FILED



Instrument	Range (in.)	Dryed Temp Range (°F)	Maximum Usable Load (lb.)
Water Storage	-100 to +60	100-550	+187
Frost Zone Storage	-50 to +10	100-600	-585
Moisture Storage	0 to +60	100-500	+4
Upward Storage	0 to +100	140-145 140-200 191-250 251-300 301-350 351-400	+0 +13 +29 +57 +84 +114 +160
Stacked Box Pneumatic Storage	0 to +600	100-150 151-200 201-250 251-300 301-350 351-400 above 400	+18 +42 +67 +85 +89 +108 +200

San. Airborne infection of a drywall spray loop can kill other PC, 4:20 system may result in exceeding PC that's negative pressure and cause a loss of PC integrity.



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**-161 in.**



WNP-2, along with some other BWRs, proposed the use of the HPCS diesel as Alternate AC (Reference 1.5-27) as this third diesel is in excess of the number required to meet the minimum redundancy requirements (i.e., single failure for safe shutdown), (Reference 1.5-23, Appendix I, Q/A 105). While HPCS could provide decay heat removal during a SBO, it could not provide power to an emergency bus. Therefore, it was proposed that coping analyses would also be performed to address instrumentation, battery capacities, air supply and loss of HVAC. This approach has been found to be acceptable to the NRC although they disagreed that it should be classified as Alternate AC (Reference 1.5-24).

#### 1.5.2.2 Evaluation to NUMARC 87-00

Chapters three through seven of NUMARC 87-00 contain guidance which, if implemented, would serve to satisfy the five NUMARC SBO initiatives and obtain compliance with the Station Blackout Rule, with the exception of Quality Assurance and Technical Specification considerations. The following sections address the content of these chapters.

##### 1.5.2.2.1 Required Coping Duration

Using the data listed in Table 1.5-1 and the methodology provided in Chapter 3 of NUMARC 87-00 the coping period for WNP-2 was determined to be four hours.

##### 1.5.2.2.2 Station Blackout Response Procedures

NUMARC 87-00 requires procedure changes to deal with:

1. SBO Response. Changes in this category are to include; requiring priority efforts to restore ac power with site specific instructions on how this is to be accomplished, providing for core cooling and containment isolation, dealing with the loss of HVAC (e.g., the opening of control room cabinet doors), and the need to strip battery loads if necessary to conserve dc power.
2. AC Power Restoration. These changes are to provide guidance to operations and the load dispatcher concerning the course of actions to be taken to restore ac power.
3. Severe Weather Guidelines. These changes are to provide guidance for operators to determine the proper course of action due to the onset of severe weather; in particular hurricanes.

4. As written, EAL 1.b. of SU6 would not allow the plant staff to notify offsite authorities of the declaration of the Unusual Event. It would be better if the EAL dealt with a degradation of offsite communications rather than a total loss. This would permit notification of the state and local authorities that a problem exists.

*The availability of one method of ordinary offsite communication is sufficient to inform state and local authorities of plant problems. This EAL is intended to be used only when extraordinary means (relaying of information from radio transmissions, individuals being sent to offsite locations, etc.) are being utilized to make communications possible. Licensees may choose to adopt more stringent thresholds for entry into the Unusual Event if desired.*

5. For SU7, DC bus voltage may not be an indication available in the control room. Can alternative methods be used to determine the vulnerability of DC loads?

*If control room DC bus voltage indication or low voltage alarm is not available, local indication should be used. The only alternative would be to observe DC-supplied loads for the effects of low voltage. This alternative, however, would defeat the anticipatory nature of the EAL as described in the basis and would therefore not be acceptable.*

- 6a. Consider deleting SA3/EAL 1.a. The statements pertaining to temperature can stand alone to correctly classify the event.

- 6b. If alternate cooling methods not required by Technical Specifications can be used to keep the plant in cold shutdown, is the declaration of an Alert necessary per SA3?

*Separate statements are included to recognize additional plant capability to maintain cooling of the reactor. A loss of Technical Specification components alone is not intended to constitute an Alert. The same is true of a momentary unplanned excursion above 200 °F when the heat removal function is available. Both statements are therefore necessary.*



SYSTEM MALFUNCTION**GENERAL EMERGENCY**

**SG2** Failure of the Reactor Protection System to Complete an Automatic Scram and Manual Scram was NOT Successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core.

**OPERATING MODE APPLICABILITY:** Power Operation

**EXAMPLE EMERGENCY ACTION LEVEL:**

1. (Site-specific) indications exist that automatic and manual scram were not successful.

AND

2. Either of the following:

- a. (Site-specific) indications exists that the core cooling is extremely challenged.

OR

- b. (Site-specific) indication exists that heat removal is extremely challenged.

**BASIS**

Automatic and manual scram are not considered successful if action away from the reactor control console is required to scram the reactor.

Under the conditions of this IC and its associated EALs, the efforts to bring the reactor subcritical have been unsuccessful and, as a result, the reactor is producing more heat than the maximum decay heat load for which the safety systems were designed. Although there are capabilities away from the reactor control console, such as emergency boration in PWRs, or standby liquid control in BWRs, the continuing temperature rise indicates that these capabilities are not effective. This situation could be a precursor for a core melt sequence.

For PWRs, the extreme challenge to the ability to cool the core is intended to mean that the core exit temperatures are at or approaching 1200°F or that the reactor vessel water level is below the top of active fuel. For plants using CSFSTs, this EAL equates to a Core Cooling RED condition. For BWRs, the extreme challenge to the ability to cool the core is intended to mean that the reactor vessel water level is below 2/3 coverage of active fuel.

Another consideration is the inability to initially remove heat during the early stages of this sequence. For PWRs, if emergency feedwater flow is insufficient to remove the amount of heat required by design from at least one steam generator, an extreme challenge should be considered to exist. For plants using CSFSTs, this EAL equates to a Heat Sink RED condition. For BWRs, (site-specific) considerations include inability to remove heat via the main

condenser, or via the suppression pool or torus (e.g., due to high pool water temperature).

In the event either of these challenges exist at a time that the reactor has not been brought below the power associated with the safety system design (typically 3 to 5% power) a core melt sequence exists. In this situation, core degradation can occur rapidly. For this reason, the General Emergency declaration is intended to be anticipatory of the fission product barrier matrix declaration to permit maximum offsite intervention time.



7. Must all control rods be inserted for a scram to be considered successful? If not, what is the threshold for determining a partial scram to be adequate per SS2?

*For PWRs, the scram is considered unsuccessful when enough control rods have not inserted to cause the reactor power to fall below that percent power associated with the ability of the safety systems to remove heat and continue to decrease. This is typically between 3% and 6% rated thermal power. The wording of the EAL should include the concept that reactor power is below [X]% and decreasing under existing plant conditions. Subsequent actions necessary for the reactor to be prepared for a cool down (normal boration to a xenon-free cold shutdown boron concentration) and depressurization are not to be considered. In SA2, the discriminator is whether the automatic reactor protection system functioned. If it did not or if reactor power was not decreased to below X% and decreasing due to insufficient rod insertion, an Alert is declared. Note this assumes that the manual reactor trip function immediately available to the operators was effectively used to complete a successful scram (power < [X]% and decreasing). Failure of the manual reactor trip function from the control room is the discriminator for the Site Area Emergency per SS2. In this situation, wording should be chosen to include the concept of "power not less than [X]% and decreasing and manual reactor trip function has not been effective." If emergency boration is needed to bring the reactor to below X% and decreasing, the scram was unsuccessful.*

*For BWRs, a scram is considered unsuccessful if it does not result in achieving a state in which the reactor will remain shut down under all conditions without boron injection. For SA2, if manual actions result in the reactor being shut down under all conditions without boron injection, an Alert is declared. Escalation to a Site Area Emergency (SS2) is not required. If sufficient control rods are not inserted to reduce reactor power to below the APRM downscale setpoints, an immediate Site Area Emergency (SS2) is declared. If the APRM downscale setpoint is achieved, but suppression pool temperature is greater than Boron Injection Temperature, a precursor exists for a threat to containment and thus a Site Area Emergency is warranted.*

## Instrument Setpoint Change Request

ISCR 1341  
WEA-RIS-14 Setpoint Change

Prepared By/Date APerlin 18/10/99

Reviewed By/Date APerlin 18/10/99  
System Engineer

Reviewed By/Date ORV Seed 19-2-99  
Control System Engineer

Reviewed By/Date R. E Parker 19/15/99

Approved By/Date APerlin 19/15/99  
System Engineer

Implementing Work Order \_\_\_\_\_  
WR # 29005489



## 1.0 FUNCTIONAL DESCRIPTION

The purpose of WEA-RIS-14 is to monitor the release of radioactivity from the Radwaste building ventilation exhaust duct to the environment.

This instrument provides input to the plant process computer, recorder PRM-RR-3 and annunciators. These alarms are as follows: a failure alarm on ANN 4.851.S1-6.5 (low counts), a Hi alarm on ANN 4.602.A5-6.4, and a Hi Hi local alarm.

Changing the setpoints will require a revision of the IMDS as well as the channel calibration procedure PPM16.3.1 and the channel functional procedure 16.3.3. Operations should review this change as the Hi alarm point triggers operations to enter the emergency operating procedures.

## 2.0 SETPOINT AND ALLOWABLE VALUES

WEA-RIS-14 has two setpoint values which will be changed, a HI alarm setpoint which will be changed to 200cps and a HI HI alarm setpoint which will be changed to 8000cps. Both alarms have tolerances determined by the procedure being performed, channel functional or channel calibration. The channel calibration, PPM 16.3.1, is the most restrictive the HI HI and the HI alarm point tolerances are  $\pm 3\%$ . The channel functional, PPM 16.3.3 places the admin setpoint tolerances at  $+20\%$   $-17\%$ .

Current setpoints for WEA-RIS-14 are;

HI HI 12000 CPM  
HI 6000 CPM

New setpoints will be; (determined by the performance of PPM 12.11.5

HI HI 8000 CPM  
HI 200 CPM

## 3.0 DESIGN INPUTS AND BASIS REQUIREMENTS

ODCM ;

3.2.2

3.3

Table 6.1.2.1-1.5

## 4.0 REFERENCES

FSAR section 11.5 PROCESS AND EFFLUENT RADIOLOGICAL MONITORING  
AND SAMPLING SYSTEMS

PPM 12.11.5

PPM 16.3.1

PPM 16.3.3

5.0 AFFECTED DOCUMENTS

IMDS for WEA-RIS-14

PPM's 16.3.1, 16.3.3

Calculations:





WASHINGTON PUBLIC POWER  
SUPPLY SYSTEM

USE CURRENT REVISION

AA

WNP-2  
PLANT PROCEDURES MANUAL

PROCEDURE NUMBER *12.11.5	APPROVED BY GOS - Revision 2	DATE 10/01/97
VOLUME NAME CHEMISTRY PROCEDURES		
SECTION SPECIAL CALCULATIONS		
TITLE RADIATION MONITOR SETPOINT CALCULATIONS		

WFA - R15 - 14

PROCEDURE NUMBER 12.11.5	REVISION 2	PAGE 1 of 21
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## 1.0 PURPOSE

To provide instructions for determining the setpoint(s) for radiation monitors.

## 2.0 PREREQUISITES

None

## 3.0 REFERENCES

3.1 Offsite Dose Calculation Manual

3.2 Setpoint Calculation E/I-02-92-1050

3.3 Setpoint Calculation E/I-02-92-1051

3.4 Setpoint Calculation E/I-02-94-1309

## 4.0 PRECAUTIONS AND LIMITATIONS

None

PROCEDURE NUMBER	REVISION	PAGE
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## 5.0 PROCEDURE

5.1 Due to the repetitious nature of these calculations, use of a spreadsheet is recommended. If one is used, the data may be transferred to the corresponding tables in this procedure, or a hard copy of the spreadsheet may be printed and attached. If a hardcopy is attached, mark the corresponding tables N/A, and reference the appropriate hardcopy.

5.2 For liquid effluent monitor setpoint calculations, go to Step 5.19.

5.3 Based on the following, determine the appropriate gas mixture to be used for this radiation monitor:

5.3.1 For the Reactor Building:

- a. The values from ODCM Table 3-15 are recommended, but a different mixture may be selected based on operational conditions or expected effluent activity.
- b. The ODCM Table 3-15 values are for a design base mixture at 30 minutes decay, and produce a setpoint which is appropriate for operation of the offgas system in the charcoal bypass mode. The setpoint resulting from the use of these values is lower than the value obtained by using a gas mixture appropriate for offgas system operation with the charcoal beds in service.
- c. If a gas mixture other than ODCM Table 3-15 is used, it may be necessary to limit the operation of the offgas system to require the use of the charcoal beds.
- d. If a mixture other than ODCM Table 3-15 is used, document this fact, and the reasoning for its use, and attach to this procedure.
- e. The setpoint for the Reactor Building effluent is on the Low Range Monitor, PRM-RE-1A.
- f.  $X/Q_j$  for the Reactor Building release pathway is  $1.6E-06 \text{ sec/m}^3$ , from ODCM Table 3-3.
- g. Forty percent (40%) of the site boundary dose rate limit is allocated to the Reactor building,  $F_j$  is 0.4.
- h. The maximum exhaust flow rate ( $R_j$ ) is  $4.48E+07 \text{ cc/sec}$  (95,000 cfm).

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5.3.2 For the Turbine Building:

- a. The values from FSAR Table 11.3-7 are recommended, but a different mixture may be selected based on operational conditions or expected effluent activity.
- b. If a mixture other than FSAR Table 11.3-7 is used, document this fact, and the reasoning for its use, and attach to this procedure.
- c. The setpoint for the Turbine Building effluent is on the Low Range Monitor, TEA-RIS-13.
- d.  $X/Q_j$  for the Turbine Building release pathway is  $1.4E-05 \text{ sec/m}^3$ , from ODCM Table 3-3.
- e. Forty percent (40%) of the site boundary dose rate limit is allocated to the Turbine building.  $F_j$  is 0.4.
- f. The maximum exhaust flow rate ( $R_j$ ) is  $1.79E+08 \text{ cc/sec}$  (380,000 cfm).

5.3.3 For the Radwaste Building:

- a. The values from FSAR Table 11.3-7 are recommended, but a different mixture may be selected based on operational conditions or expected effluent activity.
- b. If a mixture other than FSAR Table 11.3-7 is used, document this fact, and the reasoning for its use, and attach to this procedure.
- c. The setpoint for the Radwaste Building effluent is on the Low Range Monitor, WEA-RIS-14.
- d.  $X/Q_j$  for the Radwaste Building release pathway is  $1.4E-05 \text{ sec/m}^3$ , from ODCM Table 3-3.
- e. Twenty percent (20%) of the site boundary dose rate limit is allocated to the Radwaste building.  $F_j$  is 0.2.
- f. The maximum exhaust flow rate ( $R_j$ ) is  $3.91E+07 \text{ cc/sec}$  (83,000 cfm).

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5.4 Determine the fraction for each nuclide of total activity released as follows:

$$\text{Fraction} = \pi_{ij} = \frac{M_{ij}}{M_{Tj}}$$

where:

$M_{ij}$  = Measured or estimated concentration of nuclide i in release path j ( $\mu\text{Ci/cc}$ )

$M_{Tj}$  = Measured or estimated total concentration of all gases in release path j ( $\mu\text{Ci/cc}$ )

5.4.1 Enter the selected nuclide concentration or activity for each nuclide in the  $M_{ij}$  column. Mark nuclides not present in the mixture N/A.

5.4.2 Enter the selected total concentration or activity for each nuclide in the  $M_{Tj}$  column.

5.4.3 Calculate the fraction for each applicable nuclide and record in the  $\pi_{ij}$  column.

Table 5.4a			
Nuclide	$M_{ij}$	$M_{Tj}$	$\pi_{ij}$
Kr83m	0	0	0
Kr85m	0	0	0
Kr87	0	0	0
Kr88	0	0	0
Kr89	0	0	0
Xe131m	0	0	0
Xe133m	0	0	0
Xe133	1.00E1	5.50E1	1.82E-1
Xe135m	0	0	0
Xe135	4.50E1	5.50E1	8.18E-1
Xe137	0	0	0
Xe138	0	0	0

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5.5 Determine the maximum release rate based on whole body dose as follows:

$$\text{Max release rate} = Q_{Tj} = \frac{F_j 500}{\frac{X}{Q_j} \sum_{i=1}^m (K_i) (\pi_{ij})} (\mu\text{Ci/sec})$$

where:

$F_j$  = Fraction of total dose allocated to this release pathway (Dimensionless)

500 = Whole body dose rate limit

$X/Q_i$  = Maximum normalized diffusion coefficient for this pathway at and beyond the site boundary. (sec/m<sup>3</sup>)

$K_i$  = Total whole body dose factor due to gamma emission from nuclide i, as listed in the ODCM or Reg Guide 1.109, revision 1 (mrem/year per  $\mu\text{Ci/m}^3$ )

$\pi_{ij}$  = Is the fraction of the total activity for nuclide i (Dimensionless)

$m$  = Total number of nuclides in the gaseous effluent

$j$  = Release pathway

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- 5.5.1 Enter the  $\pi_{ij}$  values from Table 5.4a. Mark nuclides not present in the mixture N/A.
- 5.5.2 Multiply the  $\pi_{ij}$  value by its corresponding  $K_i$ , and record the result in the  $K_i\pi_{ij}$  column.
- 5.5.3 Sum the values in the  $(\pi_{ij})(K_i)$  column.

Table 5.5a			
Maximum Release Rate			
Nuclide	$\pi_{ij}$	$K_i$	$(\pi_{ij})(K_i)$
Kr83m	0	0.0756	0
Kr85m	0	1170	0
Kr87	0	5920	0
Kr88	0	14700	0
Kr89	0	16600	0
Xe131m	0	91.5	0
Xe133m	0	251	0
Xe133	$1.82E-1$	294	$5.35E1$
Xe135m	0	3120	0
Xe135	$8.18E-1$	1810	$1.48E3$
Xe137	0	1420	0
Xe138	0	8830	0
		$\sum \pi_{ij} * K_i =$	$1.53E3$

- 5.5.4 Determine  $Q_{Tj}$  by entering the appropriate values for the applicable effluent pathway in the spaces provided below and completing the indicated calculation:

$$Q_{Tj} = \frac{F_j 500}{\sum_{i=1}^m (K_i) (\pi_{ij})} \quad (\mu Ci/sec)$$

$$Q_{Tj} = \frac{(0.2) 500}{(1.4E-5) (1.53E3)} = \underline{466E3} \quad (\mu Ci/sec)$$

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5.6 Determine the maximum release rate based on skin dose as follows:

$$\text{Max release rate} = Q_{Tj} = \frac{F_j 3000}{\frac{X}{Q_j} \sum_{i=1}^m (L_i + 1.1 M_i) (\pi_{ij})} \quad (\mu\text{Ci/sec})$$

where:

$F_j$  = Fraction of total dose allocated to this release pathway (Dimensionless)

3000 = Skin dose limit

$X/Q_i$  = Maximum normalized diffusion coefficient for this pathway at and beyond the site boundary (sec/m<sup>3</sup>)

$L_i$  = Skin dose factor due to beta emission from nuclide i, as listed in the ODCM or Reg Guide 1.109, revision 1 (mrem/year per  $\mu\text{Ci/m}^3$ )

$M_i$  = Air dose factor due to gamma emission from nuclide i, as listed in the ODCM or Reg Guide 1.109, revision 1 (mrem/year per  $\mu\text{Ci/m}^3$ )

$\pi_{ij}$  = Is the fraction of the total activity for nuclide i (Dimensionless)

$m$  = Total number of nuclides in the gaseous effluent

$j$  = Release pathway

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- 5.6.1 Enter the  $\pi_{ij}$  values from Table 5.4a. Mark nuclides not present in the mixture N/A.
- 5.6.2 Multiply the  $\pi_{ij}$  value by its corresponding  $L_i + 1.1M_i$ , and record the result in the  $(L_i + 1.1M_i)\pi_{ij}$  column.
- 5.6.3 Sum the values in the  $(\pi_{ij})(L_i + 1.1M_i)$  column.

Table 5.6a			
Maximum Release Rate			
Nuclide	$\pi_{ij}$	$L_i + 1.1M_i$	$(\pi_{ij})(L_i + 1.1M_i)$
Kr83m	0	0	0
Kr85m	0	2.81E+03	0
Kr87	0	1.65E+04	0
Kr88	0	1.91E+04	0
Kr89	0	2.91E+04	0
Xe131m	0	6.48E+02	0
Xe133m	0	1.35E+03	0
Xe133	1.82E-1	6.94E+02	1.26E2
Xe135m	0	4.41E+03	0
Xe135	8.18E-1	2.30E+03	3.25E3
Xe137	0	1.39E+04	0
Xe138	0	1.43E+04	0
		$\sum(\pi_{ij})(L_i + 1.1M_i) =$	3.38E3

- 5.6.4 Determine  $Q_{Tj}$  by entering the appropriate values for the applicable effluent pathway in the spaces provided below, and completing the indicated calculation:

$$Q_{Tj} = \frac{F_j 3000}{\sum_{i=1}^m (L_i + 1.1M_i) (\pi_{ij})} \quad (\mu Ci/sec)$$

$$Q_{Tj} = \frac{(0.2) 3000}{(1.4E-5) (3.38E3)} = 1.27E4 \quad (\mu Ci/sec)$$

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- 5.7 Compare the whole body and skin  $Q_{Tj}$  values calculated above and select the lower of the two values. Record the selected value below:

$$Q_{Tj} = \underline{466E3}$$

- 5.8 Determine the maximum allowable concentration as follows:

$$\text{Max concentration} = C_{Tj} = \frac{Q_{Tj}}{R_j} (\mu\text{Ci/cc})$$

where:

$C_{Tj}$  = Total allowed concentration of all noble gases ( $\mu\text{Ci/cc}$ )

$Q_{Tj}$  = Maximum acceptable release rate for all noble gases ( $\mu\text{Ci/sec}$ )

$R_j$  = Effluent release rate ( $\text{cc/sec}$ )

$$C_{Tj} = \frac{Q_{Tj}}{R_j} = \frac{(466E3)}{(3.91E7)} = \underline{119E-4} (\mu\text{Ci/cc})$$

- 5.9 Determine the maximum allowable concentration for each nuclide as follows:

$$\text{Max concentration}_i = C_{ij} = \pi_{ij} C_{Tj} (\mu\text{Ci/cc})$$

where:

$\pi_{ij}$  = As defined in Section 5.4

$C_{Tj}$  = As defined above

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- 5.9.1 Enter the  $\pi_{ij}$  values from Table 5.4a. Mark nuclides not present N/A.
- 5.9.2 Enter the  $C_{Tj}$  value from Step 5.9.
- 5.9.3 Multiply the applicable  $\pi_{ij}$  values by the  $C_{Tj}$  value, and record the result in the  $C_{ij}$  column.

Table 5.9a			
Maximum Nuclide Concentration			
Nuclide	$\pi_{ij}$	$C_{Tj}$	$C_{ij}$
Kr83m	0	$1.19E-4$	0
Kr85m	0		0
Kr87	0		0
Kr88	0		0
Kr89	0		0
Xe131m	0		0
Xe133m	0		0
Xe133	$1.82E-1$		$2.16E-5$
Xe135m	0		0
Xe135	$8.18E-1$		$9.74E-5$
Xe137	0		0
Xe138	0		0

5.10 For gamma radiation detectors, (REA), determine the efficiency for the applicable nuclides as follows:

5.10.1 Enter the  $\text{Xe}^{133}$  efficiency in column for  $E_{\text{Xe-133}}$ .

5.10.2 Multiply the Relative Abundance for nuclides present in the mixture times the  $E_{\text{Xe-133}}$ , and record the result in the  $E_{ij}$  column. Mark nuclides not present in the mixture N/A.

Table 5.10a				
Relative Efficiency				
Nuclide	Gamma Abundance	Relative Abundance	$E_{\text{Xe-133}}$	$E_{ij}$
Kr83m	0.09	0.245	N/A	
Kr85m	0.74	2.016		
Kr87	0.837	2.281		
Kr88	1.372	3.738		
Kr89	1.6	4.360		
Xe131m	0.0196	0.053		
Xe133m	0.14	0.381		
Xe133	0.367	1.000		
Xe135m	0.81	2.207		
Xe135	0.939	2.559		
Xe137	0.33	0.899		
Xe138	1.222	3.330		

5.11 For beta radiation detectors, (TEA, WEA), determine the efficiency for the applicable nuclides as follows:

5.11.1 Enter the  $\text{Xe}^{133}$  efficiency in column for  $E_{\text{Xe-133}}$ .

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- 5.11.2 Multiply the Relative Efficiency for nuclides present in the mixture times the  $E_{Xe-133}$ , and record the result in the  $E_{ij}$  column. Mark nuclides not present in the mixture N/A.

NOTE: Some nuclides may be present in the mixture that do not decay via beta emission. These nuclides are listed in the table below, but have a relative efficiency of zero.

Table 5.11a			
Relative Efficiency			
Nuclide	Relative Efficiency <sup>(1)</sup>	$E_{Xe-133}$	$E_{ij}$
Kr83m	0.00233	4.30 E 7	N/A <sup>N</sup>
Kr85m	1.88		
Kr87	4.19		
Kr88	2.05		
Kr89	2.56		
Xe131m	0.456		
Xe133m	0.674		▽
Xe133	1.00		4.30 E 7
Xe135m	0.233		N/A <sup>A2</sup>
Xe135	1.93		8.30 E 7
Xe137	2.56		N/A <sup>A3</sup>
Xe138	2.40	▽	▽

(1) Setpoint Calculation E/I-02-94-1309

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5.12 Determine the count rate above background as follows:

$$\text{Count Rate above Background} = C.R_j = \sum_{i=1}^m C_{ij} E_{ij} \text{ (cpm)}$$

where:

$C.R_j$  = Count rate above background (cpm)

$C_{ij}$  = Maximum acceptable concentration of noble gas i ( $\mu\text{Ci/cc}$ )

$E_{ij}$  = Effluent monitor detection efficiency for nuclide i (cpm/ $\mu\text{Ci/cc}$ )

5.12.1 Enter the applicable  $C_{ij}$  values from Table 5.9a. Mark nuclides not present in the mixture N/A.

5.12.2 Enter the applicable  $E_{ij}$  values from Table 5.10a. Mark nuclides not present in the mixture N/A.

5.12.3 Multiply the applicable values in the  $C_{ij}$  column times the values in the  $E_{ij}$  column, and record in the  $C.R_{ij}$  column. Mark nuclides not present in the mixture N/A.

5.13 Determine the  $C.R_j$  value by summing the values in the  $C.R_{ij}$  column. This is the setpoint count rate above background.

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Table 5.12a			
Counts above Background			
Nuclide	$C_{ij}$	$E_{ij}$	$C.R_{ij}$
Kr83m	$N/A^{A4}$	$N/A^{A2}$	$N/A^{A2}$
Kr85m			
Kr87			
Kr88			
Kr89			
Xe131m			
Xe133m	↓	↓	↓
Xe133	$2.10E-5$	$4.30E7$	$9.31E2$
Xe135m	$N/A^{A2}$	$N/A^{A2}$	$N/A^{A1}$
Xe135	$9.74E-5$	$8.30E7$	$8.07E3$
Xe137	$N/A^{A2}$	$N/A^{A2}$	$A4 \frac{7.10E7}{8.07E3} N/A^{A2}$
Xe138	↓	↓	↓
		$C.R_j =$	$9.02E3$

- 5.14 Based on available instrument data, select an operating background. Record the value below:

Background = 40

- 5.15 Calculate the instrument setpoint as follows:

Setpoint = Background +  $C.R_j = (40) + (9.02E3) = 9.06E3$

- 5.16 Based on instrument range, accuracy, and the ability to accurately read instrument values, select a setpoint that is less than or equal to the setpoint value determined in Step 5.15.

Selected Setpoint = 8790

- 5.17 If the selected setpoint is less than 80% of the calculated value, document the rationale for this selection, and attach to this procedure.

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5.18 Assign the selected setpoint to a specific alarm as follows:

5.18.1 For TEA-RIS-13 and WEA-RIS-14:

- a. Assign the selected setpoint to the High-High alarm.
- b. Determine the nominal, upper level and lower level values for the High-High alarm as follows:

NOTE: Since the High-High alarm setpoint is based on a regulatory limit, the upper level value must be LE than the selected setpoint.

$$\text{Upper level (UL)} = \text{Selected Value} = \underline{8790}$$

$$\text{Nominal value} = (\text{Selected Value}) * 0.91 = \underline{8000}$$

$$\text{Lower Level (LL)} = (\text{Selected Value}) * 0.82 = \underline{7210}$$

- c. Determine the normal background value of the monitor based on instrument operating history.

$$\text{Background} = \underline{40}$$

- d. Multiply the background value by 4.66.

$$\text{High Alarm} = (\text{Background})(4.66) = (\underline{40})(4.66) = \underline{186}$$

- e. Round the High Alarm up to the nearest interger value.

$$\text{High Alarm} = \underline{200}$$

- f. Assign this value to the High alarm setpoint, or if is desirable to assign a different value, document the justification for the different High alarm setpoint and attach to this procedure.

- g. Determine the nominal, upper level and lower level values for the High as follows:

NOTE: The High alarm is not based on a regulatory limit, therefore it is acceptable to have values that are greater, or less than the selected value.

$$\text{Upper level (UL)} = (\text{Selected Value}) * 1.2 = \underline{240}$$

$$\text{Nominal value} = \text{Selected Value} = \underline{200}$$

$$\text{Lower Level (LL)} = (\text{Selected Value}) * 0.80 = \underline{160}$$

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5.18.2 For PRM-RE-1B (REA):

- a. There is only one alarm on this system. Assign the selected value from Step 5.16 to the alarm setpoint.
- b. Determine the nominal, upper level and lower level values as follows:

NOTE: Since this alarm setpoint is based on a regulatory limit, the upper level value must be LE than the selected setpoint.

$$\text{Upper level (UL)} = \text{Selected Value} = \frac{\text{AL}}{\text{AL}}$$

$$\text{Nominal value} = (\text{Selected Value}) * 0.91 = \underline{\hspace{2cm}}$$

$$\text{Lower Level (LL)} = (\text{Selected Value}) * 0.82 = \underline{\hspace{2cm}}$$

5.19 For liquid effluent monitor setpoint determinations, perform the following:

- 5.19.1 From the instrument master data sheet or instrument calibration records, determine the Cs<sup>137</sup> efficiency for the monitor. Record value below:

$$\text{Efficiency} = \underline{\hspace{2cm}} \text{ cpm}/\mu\text{Ci/cc or cps}/\mu\text{Ci/cc}$$

- 5.19.2 From instrument performance data, determine the instrument background. Record below:

$$\text{Background} = \underline{\hspace{2cm}} \text{ cpm or cps}$$

- 5.19.3 Calculate the maximum count rate above background as follows:

$$C_{\text{max}} = (2.0E-05 \mu\text{Ci/ml}) (\text{Efficiency})$$

$$C_{\text{max}} = = (2.0E-05) (\underline{\hspace{2cm}}) = \underline{\hspace{2cm}}$$

- 5.19.4 Calculate the maximum setpoint as follows:

NOTE: An additional factor of 0.8 is included to reduce the maximum setpoint to 80 percent of 1 MPC. This is in accordance with ODCM Section 2.9.

$$S_{\text{max}} = (C_{\text{max}} + \text{Background})(0.8)$$

$$S_{\text{max}} = (\underline{\hspace{2cm}} + \underline{\hspace{2cm}})(0.8)$$

$$S_{\text{max}} = \underline{\hspace{2cm}}$$

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- 5.19.5 Based on instrument operating parameters and accuracy, select a monitor setpoint that is less than or equal to the maximum value  $S_{\max}$  determined above. If this value is less than 80% of the  $S_{\max}$  value, attach a justification to this procedure. Record the selected value below:

Setpoint =  $\frac{N}{A}$

NOTE: The adjustment to the service water radiation monitor setpoints is due the Reg Guide 1.97, post accident, requirement to remain operable during and after an accident. This results in a substantial reduction in these setpoints that is not required for other effluent monitors.

- 5.19.6 For SW-RIS-604 and SW-RIS-605, adjust the setpoint for potential instrument error as follows:

- a. Convert the calculated setpoint to a voltage value as follows:

$$\text{Setpoint Voltage} = \frac{10}{7}[\log(\text{Setpoint}+1)]$$

$$\text{Setpoint Voltage} = (10/7) * (\log(\text{Setpoint} + 1))$$

$$\text{Setpoint Voltage} = \underline{\hspace{2cm}}$$

Table 5.19.6a	
EPN	Correction Voltage <sup>(1)</sup>
SW-RIS-604	1.07
SW-RIS-605	1.07

(1) Voltages determined by calculations  
E/I-02-91-1050 and E/I-02-91-1051.

- b. Subtract the Correction Voltage, from Table 5.19.6a above

$$\text{Corrected Voltage} = \text{Setpoint Voltage} - \text{Correction Voltage}$$

$$\text{Corrected Voltage} = \underline{\hspace{2cm}} - \text{Correction Voltage}$$

$$\text{Corrected Voltage} = \underline{\hspace{2cm}}$$

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- c. Convert the corrected voltage back into cps as follows:

$$\text{Corrected cps} = \left(10^{\left[\left(\text{Corrected Voltage}\right) * \left(\frac{7}{10}\right)\right]}\right) - 1$$

$$\text{Corrected cps} = \frac{N/A}{AC}$$

- d. Select a value less than or equal to the corrected cps.

$$\text{Selected value} = \underline{\hspace{2cm}}$$

- e. Determine the nominal, upper level and lower level values as follows:

NOTE: Since this alarm setpoint is based on a regulatory limit, the upper level value must be LE than the selected setpoint.

$$\text{Upper level (UL)} = \text{Selected Value} = \underline{\hspace{2cm}}$$

$$\text{Nominal value} = (\text{Selected Value}) * 0.91 = \underline{\hspace{2cm}}$$

$$\text{Lower Level (LL)} = (\text{Selected Value}) * 0.82 = \underline{27}$$

- f. Assign the above determined values to the High-High alarm.
- g. Select a value for the High setpoint at a point above the normal background variation, and below the High-High alarm setpoint. This value should be set reasonably close to the normal operating value, but far enough above it to minimize spurious alarms. The selected value should be assigned to the Lower level point. The Nominal and Upper Level values should be 111% and 122% of the LL, respectively.

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5.19.7 For TSW-RIS-5:

- a. Determine the nominal, upper level and lower level values as follows:

NOTE: Since this alarm setpoint is based on a regulatory limit, the upper level value must be LE than the selected setpoint.

Upper level (UL) = Selected Value =  $\frac{N}{V}^{AL}$

Nominal value = (Selected Value) \* 0.91 = \_\_\_\_\_

Lower Level (LL) = (Selected Value) \* 0.82 = \_\_\_\_\_

- b. Assign the above determined values to the High-High alarm.
- c. Determine the normal background value of the monitor based on instrument operating history.

Background = \_\_\_\_\_

- d. Multiply the background value by 4.66.

High Alarm = (Background)(4.66) = (\_\_\_\_)(4.66) = \_\_\_\_\_

- e. Round the High Alarm up to the nearest interger value.

High Alarm = \_\_\_\_\_

- f. Assign this value to the High alarm setpoint, or if is desirable to assign a different value, document the justification for the different High alarm setpoint and attach to this procedure.

- g. Determine the nominal, upper level and lower level values for the High as follows:

NOTE: The High alarm is not based on a regulatory limit, therefore it is acceptable to have values that are greater, or less than the selected value.

Upper level (UL) = (Selected Value) \* 1.2 = \_\_\_\_\_

Nominal value = Selected Value = \_\_\_\_\_

Lower Level (LL) = (Selected Value) \* 0.80 =  $\checkmark$  \_\_\_\_\_

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6.0 DOCUMENTATION

Maintain the completed procedure in the permanent plant file in accordance with the appropriate record procedure(s).

7.0 ATTACHMENTS

None

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# WEA-RIS-14 SET POINTS

## PPM 12.11.5 CALCULATIONS

$H_1, H_i$       NOMINAL       $8.00E3$        $+10\% - .8\%$   
                     UPPER       $8.79E3$   
                     LOWER       $7.219$

$H_i$       NOMINAL       $2.00E2$        $\pm 20\%$   
                     UPPER       $2.40E2$   
                     LOWER       $1.60E2$

IMDS CALIBRATION SET POINTS = NOMINAL  $\pm 3\%$

$H_1, H_i$       NOMINAL =  $8.00E3 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{133.33 \text{ Hz}}$   
                     UPPER =  $8.00E3 + .03 \cdot 8.00E3 = 8.24E3 \frac{\text{cm}}{\text{m}}$   
                                   $8.24E3 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{137.33 \text{ Hz}}$   
                     LOWER =  $8.00E3 - .03 \cdot 8.00E3 = 7.76E3 \frac{\text{cm}}{\text{m}}$   
                                   $7.76E3 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{129.33 \text{ Hz}}$

$H_i$       NOMINAL =  $200 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{3.33 \text{ Hz}}$   
                     UPPER =  $200 + .03 \cdot 200 = 206 \frac{\text{cm}}{\text{m}}$   
                                   $206 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{3.43 \text{ Hz}}$   
                     LOWER =  $200 - .03 \cdot 200 = 194 \frac{\text{cm}}{\text{m}}$   
                                   $194 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{3.23 \text{ Hz}}$

IMDS ADMIN SET POINTS = NOMINAL  $+20\% - 17\%$

$H_1, H_i$       NOMINAL =  $8.00E3 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{133.33 \text{ Hz}}$   
                     UPPER =  $8.00E3 + .2(8.00E3) = 9.60E3 \frac{\text{cm}}{\text{m}}$   
                                   $9.60E3 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{160 \text{ Hz}}$   
                     LOWER =  $8.00E3 - .17(8.00E3) = 6.64E3 \frac{\text{cm}}{\text{m}}$   
                                   $6.64E3 \frac{\text{cm}}{\text{m}} \cdot \frac{\text{m}}{60\text{s}} = \underline{110.67 \text{ Hz}}$

## WEA-RIS-14 SET POINTS

IMDS ADMIN SET POINTS = NOMINAL +20% -17%

H<sub>1</sub>

$$\text{NOMINAL} = 200 \text{ } \frac{\text{cm}}{\text{s}} = \underline{\underline{3.33 \text{ Hz}}}$$

$$\text{UPPER} = 200 + .2(200) = 240 \text{ } \frac{\text{cm}}{\text{s}}$$

$$240 \text{ } \frac{\text{cm}}{\text{s}} \cdot \frac{\text{m}}{60 \text{ s}} = \underline{\underline{4 \text{ Hz}}}$$

$$\text{LOWER} = 200 - .17(200) = 166 \text{ } \frac{\text{cm}}{\text{s}}$$

$$166 \text{ } \frac{\text{cm}}{\text{s}} \cdot \frac{\text{m}}{60 \text{ s}} = \underline{\underline{2.77 \text{ Hz}}}$$

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System Engineer

*PLS*

EPN: WEA-RIS-14	SERVICE: Radwaste Bldg. Ventilation Monitor
Loop: WEA-RIS-14	Rev. #28      Date: 9/16/99
Work Order:	Input From : WEA-RE-14
Cal Procedure: CC: 16.2.1 RC: 16.2.2 CFT: 16.2.3	Output To: PRM-RR-3, Alarms

## INSTRUMENT CALIBRATION PARAMETERS

Process Input	Desired Output and Tolerance	Loop Check Data	
CPS	Meter CPM $\pm 10\%$ (.9 to 1.1)	PMR-RR-3 CHAN. 3 & TDAS x408 CPM $\pm 10\%$ (.9 to 1.1)	Plant Computer (A0834) mv $\pm 6.5$ mv
.167	10	$1 \pm .2$	32
1.67	100	$10 \pm 2$	53.3
167	10K	$.1K \pm 20$	96
16.7K	$10^6$	$1K \pm 200$	138.7
167K	$10^7$	$100K \pm 20K$	160

## Bi- Stable Parameters - Limits

Switch ID	Setoint/ Tolerance	Action at Setpoint	Reset	Tolerance	Logic Affected
K1	See Addenda	Close	Record	See Addenda	High-High Alarm
K2	See Addenda	Close	Record	See Addenda	High Alarm
K3	See Addenda	Open	Record	See Addenda	Failure Alarm

## Notes:

Power Supply: PP-7A-Z Ckt. 20 VIA BD-RAD-24 Fuse 2TB110-4

Setpoint reference in ODCM Section 3.6

ISCR #106, 128, 173, 318, 394, 515, 706, 717, 973

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EPN: WEA-RIS-14	SERVICE: Radwaste Bldg. Ventilation Monitor
Loop: WEA-RIS-14	Rev. #28      Date: 9/16/99

## Addenda:

1. ODCM Table 6.1.2.1.1-1.5a1 Radioactive Gaseous Effluent Monitoring Instrumentation, Radwaste Building Ventilation Exhaust Noble Gas Activity monitor, Low Range
2. Failure alarm (switch K3) activates on any one of the following:
  - a) High Voltage INOP
  - b) Loss of Instrument Power
  - c) Low Detector Counts. NOTE: Due to low background levels, this portion of the failure alarm has been INHIBITED until a live zero is provided. "FAIL TRIP ADJUST" potentiometer R69 should be adjusted to provide a voltage = -10 to -15 VDC at TP-10
  - d) Contact change of state detected by PRM-RR-3 which in turn causes ann. Drop 4.851.S1-6.5
3. Annunciator, 4.602.A5-6.4, (RW Bldg. Vent Rad High), actuated by this switch (K2) is used by Operations personnel to signify required entry into Emergency Operating Procedures. If change to alarm setpoints are made, an evaluation must be made by operations to determine if changes to Emergency Operating Procedures are required.
4. Settings controlled by POC approval of PPM 16.3.2



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EPN: WEA-RIS-14	SERVICE: Radwaste Bldg. Ventilation Monitor
Loop: WEA-RIS-14	Rev. #28      Date: 9/16/99

#### OPERATING PARAMETERS

	TOL	OPERATING PARAMETERS (VOLTS DC) PREV COMPLETION date: <u>04-20-95</u>	NEW VALUES PER PPM 16.2.2 COMP. DATE: _____ INITIAL: _____
HIGH VOLTAGE	± 5V DVM Only	1025      UL: 1030 LL: 1020	UL: _____ _____ VDC LL: _____
HV INOP (Inputs to K3)	± 15V DVM Only	975      UL: 990 LL: 960	UL: _____ _____ VDC LL: _____
LOWER LEVEL DISC	± 5 %	-0.6      UL: -0.63 LL: -0.57	UL: _____ _____ VDC LL: _____
UPPER LEVEL DISC	± 5 %	-12.6      UL: -13.2 LL: -12.0	UL: _____ _____ VDC LL: _____

#### CALIBRATION SETPOINT PARAMETERS

SWITCH NO.	CC TOL	METER (CPM) info only	OPERATING PARAMETERS (VOLTS DC)	NEW VALUES PER PPM 16.2.2 COMP. DATE: _____ INITIAL: _____
HIGH VOLTAGE	± 3 %	8000	(I) 133.33      UL: 137.33 LL: 129.33	UL: _____ _____ VDC LL: _____
HV INOP (Inputs to K3)	± 3 %	200	(I) 3.33      UL: 3.43 LL: 3.23	UL: _____ _____ VDC LL: _____
UPPER LEVEL DISC		Requires live zero	(D) See Note 2	** See Note 3

#### CFT/ADMIN SETPOINT PARAMETERS

SWITCH NO.	CFT TOL	METER (CPM) info only	TRIP SETPOINT (HZ)
K1 HI-HI Alarm	+20% -17%	8000	(I) 133.33      UL: 160.00 LL: 110.67
K2 HI Alarm	+20% -17%	200	(I) 3.33      UL: 4.00 LL: 2.77
K3 DWNSCL		Requires live zero	(D) See Note 2