

Document Transmittal Form

TO : NRC ATTN:DOC. CONTROL
ONE WHITE FLINT NORTH
WASHINGTON, DC 20555-001

ID : HECG0065

Date : 10/11/2006

Please update your controlled set of documents with the following documents:

Document ID	Revision	Status	Quantity	Format	RecNo
PRC HECG-HECG-TOC-BASIS 000	34	A	1	H	275360
PRC HECG-SECT.06.1 (BASIS) 000	1	A	1	H	275333

ALL PAGES of this acknowledgement receipt must be returned to:

**Records Management
PSEG Nuclear
PO Box 236
Hancocks Bridge, NJ 08038**

MC N64

Your signature below verifies that:

(1) the above documents have been filed and superseded documents have been removed and destroyed or clearly marked as obsolete.

(2) the mailing address and copyholder information are correct or corrections have been identified on this transmittal.

☐ Place checkmark here to be removed from controlled distribution

Signature: _____ Date: _____

A001

**HOPE CREEK GENERATING STATION
EVENT CLASSIFICATION GUIDE TECHNICAL BASIS
October 11, 2006**

**CHANGE PAGES FOR
REVISION #34**

The Table of Contents forms a general guide to the current revision of each section and attachment of the Hope Creek ECG Technical Basis. The changes that are made in this TOC Revision #34 are shown below.

1. Check that your revision packet is complete.
2. Add the revised documents.
3. Remove and recycle the outdated material listed below.

ADD			REMOVE		
Page	Description	Rev.	Page	Description	Rev.
ALL	T.O.C.	34	ALL	T.O.C.	33
ALL	Section 6.1	01	ALL	Section 6.1	00

HOPE CREEK ECG TECHNICAL BASIS

TABLE OF CONTENTS/SIGNATURE PAGE

<u>SECTION</u>	<u>TITLE</u>	<u>REV #</u>	<u>PAGES</u>	<u>DATE</u>
T.O.C.	Table of Contents/Signature Page	34	4	10/11/06
i	Introduction and Usage	00	3	01/21/97
ii	Glossary of Acronyms & Abbreviations	00	5	01/21/97
1.0	Fuel Clad Challenge	02	9	12/15/04
2.0	RCS Challenge	01	8	04/21/04
3.0	Fission Product Barriers (Table)			
	3.1 Fuel Clad Barrier	04	13	12/15/04
	3.2 RCS Barrier	03	18	12/15/04
	3.3 Containment Barrier	05	15	12/15/04
4.0	EC Discretion	01	8	01/20/06
5.0	Failure to SCRAM	03	10	01/20/06
6.0	Radiological Releases/Occurrences			
	6.1 Gaseous Effluent Release	01	42	10/11/06
	6.2 Liquid Effluent Release	00	4	01/21/97
	6.3 In - Plant Radiation Occurrences	00	6	01/21/97
	6.4 Irradiated Fuel Event	03	11	01/20/06
7.0	Electrical Power			
	7.1 Loss of AC Power Capabilities	01	18	05/12/97
	7.2 Loss of DC Power Capabilities	00	5	01/21/97
8.0	System Malfunctions			
	8.1 Loss of Heat Removal Capability	02	10	04/30/03
	8.2 Loss of Overhead Annunciators	00	8	01/21/97
	8.3 Loss of Communications Capability	00	4	01/21/97
	8.4 Control Room Evacuation	01	4	12/15/04
	8.5 Technical Specifications	01	2	08/03/05
9.0	Hazards - Internal/External			
	9.1 Security Threats	07	13	03/31/06
	9.2 Fire	01	6	02/01/01
	9.3 Explosion	01	5	02/01/01
	9.4 Toxic/Flammable Gases	04	13	01/06/05
	9.5 Seismic Event	03	4	04/21/04
	9.6 High Winds	01	7	02/01/01
	9.7 Flooding	01	5	02/01/01
	9.8 Turbine Failure/Vehicle Crash/ Missile Impact	01	7	02/01/01
	9.9 River Level	00	4	01/21/97

**HOPE CREEK ECG TECHNICAL BASIS
TABLE OF CONTENTS/SIGNATURE PAGE**

<u>SECTION</u>	<u>TITLE</u>	<u>REV #</u>	<u>PAGES</u>	<u>DATE</u>
10.0	Reserved for future use			
11.0	Reportable Action Levels (RALs)			
11.1	Technical Specifications	03	9	08/30/06
11.2	Degraded or Unanalyzed Condition	05	8	08/30/06
11.3	System Actuation	06	7	02/23/05
11.4	Personnel Safety/Overexposure	02	8	08/30/06
11.5	Environmental/State Notifications	02	4	10/01/03
11.6	After-the-Fact	02	1	02/28/02
11.7	Security/Emergency Response Capabilities	06	5	03/31/06
11.8	Public Interest	01	3	01/23/01
11.9	Accidental Criticality/ Special Nuclear Material / Rad Material Shipments - Releases	04	8	08/30/06
11.10	Voluntary Notifications	01	2	01/23/01

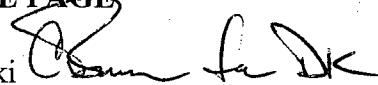
REVISION SUMMARY

Biennial Review Performed: Yes _____ No X

Editorial Revisions (Approved DCP):

- EALs 6.1.1.d and 6.1.2.d being revised per DCP 80042523, which modifies the sampling skids for the North and South Plant Vents. EALs associated with the North and South Plant Vents iodine monitoring are being deleted.

SIGNATURE PAGE

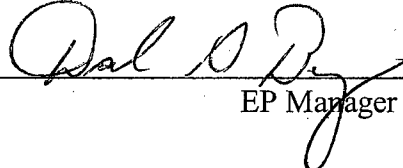
Prepared By: Dennis Kabachinski  09/11/06

Section/Attachments Revised 6.1.1.d and 6.1.2.d
(List Non-Editorial Only - Section/Attachments)

Reviewed By: N/A - DCP 80042523
10CFR50.54q Effectiveness Reviewer Date

Reviewed By: N/A
Hope Creek Operations Shift Manager Date

Reviewed By: N/A
Hope Creek Regulatory Assurance Date
(Reportable Action Level [Section 11] and associated Attachments marked by "L")

Reviewed By:  09/29/06
EP Manager Date

Reviewed By: N/A
Nuclear Oversight Manager Date
(If Applicable)

SORC Review and Station Approvals

<u>N/A</u>	<u>N/A</u>
Mtg. No. <u>Hope Creek Chairman</u>	<u>Hope Creek Plant Manager</u>
<u>Date</u>	<u>Date</u>

Effective Date of this Revision: 10/11/06
Date

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

UNUSUAL EVENT - 6.1.1.a

IC Any **Unplanned** Release of Gaseous Radioactivity to the Environment that Exceeds 2 Times the Radiological Technical Specifications for 60 minutes or longer

EAL

Dose Assessment indicates EITHER one of the following at the MEA or beyond as calculated on the SSCL:

- TEDE 4-Day Dose of $\geq 2.0E-01$ mRem
- Thyroid-CDE Dose of $\geq 6.8E-01$ mRem
based on Plant Vent effluent sample analysis and NOT on a default Noble Gas to Iodine Ratio

AND

Release is ongoing for ≥ 60 minutes

OPERATIONAL CONDITION - All

BASIS

Dose Assessment at or beyond the MEA exceeding the EAL threshold, can result from a Gaseous Radiological Release in excess of 2 times Technical Specifications. This condition results from an uncontrolled release of radioactivity to the environment, resulting in elevated offsite dose rates. The threshold for this EAL is NOT based on a specific offsite dose rate, but rather on the loss of plant control implied by a radiological release of this magnitude that was not isolated within 60 minutes. The final integrated dose is very low and is not the primary concern. Classification is based on an ongoing release that does not comply with a license condition. **Unplanned** is defined as any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

Dose Assessment using actual meteorological data provides an accurate indication of release magnitude. The use of dose assessment based EALs is therefore preferred over the use of Release Rate based EALs which utilize calculations which have built-in inaccuracies because ODCM default meteorological data is used. As long as dose assessment is available, this EAL should be used in place of EAL 6.1.1.d.

It is not intended that the release be averaged over 60 minutes, but exceed 2 times the Technical Specification limit for 60 minutes or longer. In addition, it is intended that the event be declared as soon as it is determined that the release will exceed 2 times the limit for 60 minutes or longer.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to an Alert when the effluent release concentration increases to 200 times the Technical Specification limit.

DISCUSSION

Prorating the 500 mRem/yr criterion for the TEDE 4-day dose: time (8766 hr/yr); the 2 x Tech. Spec. multiplier; and, Artificial Island's Allocation Factor of 0.5 (50% per site), the associated site boundary dose rate would be 0.057 mRem/hr.

$$TEDE\ 4\text{-Day}\ MEA\ Dose\ Rate = \left(\frac{500\ mRem / yr}{8766\ hr / yr} \right) (2)(.5) = 0.057\ mRem/hr$$

This is rounded to .05 mRem/hr.

The TEDE 4-day Dose is based on a 4 hour release duration. Therefore .05 mRem/hr * 4 hours = 0.2 mRem.

Prorating the 1500 mRem/yr criterion for the Thyroid-CDE Dose: time (8766 hr/yr); the 2 x Tech. Spec. multiplier; and, Artificial Island's Allocation Factor of 0.5 (50% per site), the associated site boundary dose rate would be 0.17 mRem/hr.

$$Thyroid\text{-}CDE\ MEA\ Dose\ Rate = \left(\frac{1500\ mRem / yr}{8766\ hr / yr} \right) (2)(.5) = 0.17\ mRem/hr$$

The Thyroid-CDE Dose is based on a 4 hour release duration. Therefore 0.17 mRem/hr * 4 hours = 0.68 mRem.

DEVIATION

None

REFERENCES

NUMARC NESP-007, AU1.4
Off-Site Dose Calculation Manual, Section 2.0 - Gaseous Effluents
NUMARC Draft White Paper, 7-25-94, 9-10-94.
Technical Specification 3.11.2.1

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

UNUSUAL EVENT - 6.1.1.b

IC Any **Unplanned** Release of Gaseous Radioactivity to the Environment that Exceeds 2 Times the Radiological Technical Specifications for 60 minutes or longer

EAL

Dose Rate measured at the Protected Area Boundary or beyond EXCEEDS
.05 mRem/hr above normal background

AND

Release is ongoing for ≥ 60 minutes

OPERATIONAL CONDITION - All

BASIS

Measured Dose Rate at or beyond the Protected Area Boundary exceeding the EAL threshold can result from a Gaseous Radiological Release in excess of 2 times Technical Specifications. This condition results from an uncontrolled release of radioactivity to the environment, resulting in elevated offsite dose rates. The threshold for this EAL is NOT based on a specific offsite dose rate, but rather on the loss of plant control implied by a radiological release of this magnitude that was not isolated within 60 minutes. The final integrated dose is very low and is not the primary concern. Classification is based on an ongoing release that does not comply with a license condition. **Unplanned** is defined as any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

It is not intended that the release be averaged over 60 minutes, but exceed 2 times Tech. Spec. limits for 60 minutes or longer. Further, it is intended that the event be declared as soon as it is determined that the release will exceed 2 times the limit for 60 minutes or longer.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to an Alert when effluent release concentration increases to 200 times the Technical Specification limit.

DISCUSSION

Prorating the 500 mRem/yr criterion for: time (8766 hr/yr); the 2 x Tech. Spec. multiplier; and, Artificial Island's Allocation Factor of 0.5 (50% per site), the associated site boundary (MEA) dose rate would be 0.057 mRem/hr.

$$\text{Protected Area Boundary Dose Rate} = \left(\frac{500 \text{ mRem} / \text{yr}}{8766 \text{ hr} / \text{yr}} \right) (2)(.5) = 0.057 \text{ mRem/hr}$$

This is rounded to .05 mRem/hr

DEVIATION

None

REFERENCES

NUMARC NESP-007, AU1.3
Off-Site Dose Calculation Manual, Section 2.0 - Gaseous Effluents
NUMARC Draft White Paper, 7-25-94, 9-10-94.
Technical Specification 3.11.2.1

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

UNUSUAL EVENT - 6.1.1.c

IC Any **Unplanned** Release of Gaseous Radioactivity to the Environment that Exceeds 2 Times the 10CFR20, Appendix B limits for 60 minutes or longer

EAL

Gaseous effluent release sample analysis for ANY one of the following indicates a concentration of:

- **FRVS:**
 $\geq 1.13\text{E-}03 \mu\text{Ci/cc}$ Total Noble Gas
 $\geq 2.71\text{E-}07 \mu\text{Ci/cc}$ I-131
- **NPV:**
 $\geq 2.43\text{E-}04 \mu\text{Ci/cc}$ Total Noble Gas
 $\geq 5.81\text{E-}08 \mu\text{Ci/cc}$ I-131
- **SPV:**
 $\geq 2.27\text{E-}05 \mu\text{Ci/cc}$ Total Noble Gas
 $\geq 5.44\text{E-}09 \mu\text{Ci/cc}$ I-131

AND

Dose Assessment results NOT available

AND

Release is ongoing for ≥ 60 minutes

OPERATIONAL CONDITION - All

BASIS

Gaseous effluent release sample analysis exceeding the EAL threshold for any of the plant vents listed (FRVS, NPV, SPV), can result from a Gaseous Radiological Release in excess of 2 times 10CFR20, Appendix B limits. This condition results from an uncontrolled release of radioactivity to the environment, resulting in elevated offsite dose rates.

The threshold for this EAL is NOT based on a specific offsite dose rate, but rather on the loss of plant control implied by a radiological release of this magnitude that was not isolated within 60 minutes. The final integrated dose is very low and is not the primary concern. Classification is based on an ongoing release that does not comply with a license condition. The HTV is not included under this EAL since there are no provisions for collecting a HTV grab sample.

Unplanned is defined as any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

It is not intended that the release be averaged over 60 minutes, but exceed 2 times the 10CFR20, Appendix B limit for 60 minutes or longer. In addition, it is intended that the event be declared as soon as it is determined that the release will exceed 2 times the limit for 60 minutes or longer.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to an Alert when the effluent release concentration increases to 200 times the 10CFR20, Appendix B limit.

DISCUSSION

Refer to Basis Section for EAL 6.1.1.d for the 10CFR20, Appendix B Noble Gas and Thyroid Committed Dose release rate calculations.

Calculation of the threshold sample concentrations are as follows:

$$FRVS \text{ Noble Gas Sample Concentration} = \frac{4.80E+03 \mu\text{Ci} / \text{sec}}{472 \times 9000 \text{ cfm}} = 1.13E-03 \mu\text{Ci/cc}$$

$$FRVS \text{ I-131 Sample Concentration} = \frac{1.15E+00 \mu\text{Ci} / \text{sec}}{472 \times 9000 \text{ cfm}} = 2.71E-07 \mu\text{Ci/cc}$$

$$NPV \text{ Noble Gas Sample Concentration} = \frac{4.80E+03 \mu\text{Ci} / \text{sec}}{472 \times 4.19E+04 \text{ cfm}} = 2.43E-04 \mu\text{Ci/cc}$$

$$NPV \text{ I-131 Sample Concentration} = \frac{1.15E+00 \mu\text{Ci} / \text{sec}}{472 \times 4.19E+04 \text{ cfm}} = 5.81E-08 \mu\text{Ci/cc}$$

$$SPV \text{ Noble Gas Sample Concentration} = \frac{4.80E+03 \mu\text{Ci} / \text{sec}}{472 \times 4.48E+05 \text{ cfm}} = 2.27E-05 \mu\text{Ci/cc}$$

SPV I-131

$$\text{Sample Concentration} = \frac{1.15E+00 \mu\text{Ci} / \text{sec}}{472 \times 4.48E+05 \text{ cfm}} = 5.44E-09 \mu\text{Ci/cc}$$

Where: 472 = conversion factor (28,317 cc/ft³ x 1 min./60 sec.)
 9000 cfm = FRVS Vent Flow (maximum)
 4.19E+04 cfm = NPV Vent Flow (maximum)
 4.48E+05 cfm = SPV Vent Flow (maximum)

The noble gas release rate of 4.80E+03 $\mu\text{Ci/sec}$ is obtained by multiplying the 10CFR20, Appendix B limit release rate of 2.40E+03 $\mu\text{Ci/sec}$ times 2.

The iodine release rate of 1.15E+00 $\mu\text{Ci/sec}$ is obtained by multiplying the 10CFR20, Appendix B limit release rate of 5.75E-01 $\mu\text{Ci/sec}$ times 2.

DEVIATION

The value for EAL 6.1.1.c is based on one meteorological case and one isotopic mixture found in the ODCM. A radiological release based on this specific release rate could produce a TEDE Dose which would require an Alert classification or not meet the Unusual Event classification, depending on the meteorological conditions and the isotopic mixture. EAL 6.1.1.c would not be used unless EAL 6.1.1.a (Dose Assessment) can not be used to determine the classification, if any, due to the potential uncertainty of this "default" EAL.

Two times the 10CFR20, Appendix B limits for noble gas and Iodine 131 are being used for this EAL, due to concerns that the State of New Jersey have pertaining to this EAL and based on the above mentioned uncertainties.

REFERENCES

NUMARC NESP-007, AU1.2, AU1.1, AU1.4
 Off-Site Dose Calculation Manual, Section 2.0
 NUMARC Draft White Paper, 7-25-94, 9-10-94.
 Technical Specification 3.11.2.1

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

UNUSUAL EVENT - 6.1.1.d

IC Any **Unplanned** Release of Gaseous Radioactivity to the Environment that Exceeds 2 times the 10CFR20, Appendix B limits for 60 minutes or longer

EAL

Valid High Alarm received from ANY one of the following Plant Effluent RMS Channels:

- **FRVS Noble Gas** (Grid 1/3; 9RX680)
- **NPV Noble Gas** (Grid 1/3; 9RX590)
- **SPV Noble Gas** (Grid 1/3; 9RX580)
- **HTV Noble Gas** (Grid 3; 9RX516)

AND

Total Plant Vent release rate EXCEEDS
4.80E+03 μ Ci/sec Total Noble Gas

AND

Dose Assessment results NOT available

AND

Release is ongoing for **≥ 60 minutes**

OPERATIONAL CONDITION - All

BASIS

Valid High alarm and effluent release rate values exceeding the EAL threshold, can result from a Gaseous Radiological Release in excess of 2 times 10CFR20, Appendix B limits. This condition results from an uncontrolled release of radioactivity to the environment, resulting in elevated offsite dose rates. The threshold for this EAL is NOT based on a specific offsite dose rate, but rather on the loss of plant control implied by a radiological release of this magnitude that was not isolated within 60 minutes. The final integrated dose is very low and is not the primary concern.

Valid is defined as the High alarm actuating specifically due to a Gaseous Release exceeding 10 CFR 20, Appendix B limits, thus precluding unwarranted event declaration as the result of

EAL - 6.1.1.d

Rev. 01

spurious actuation. Classification is based on an ongoing release that does not comply with a license condition. **Unplanned** is defined as any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

The EAL value for Total Plant Vent release rate was determined using default X/Q values from the ODCM which provides a less accurate method of evaluation release magnitude than using dose assessment with real time meteorological data. For that reason, this EAL should not be utilized if Dose Assessment is available. Dose Assessment will take in account actual meteorological conditions, plant vent flows and plant vent effluent concentrations to provide a more accurate assessment of a radiological release. If Dose Assessment is available then refer to EAL 6.1.1.a for classification.

It is not intended that the release be averaged over 60 minutes, but exceed 2 times 10 CFR20, Appendix B limits for 60 minutes or longer. In addition, it is intended that the event be declared as soon as it is determined that the release will exceed 2 times the limit for 60 minutes or longer.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will be escalated to an Alert when the effluent release concentration increases to 200 times the 10CFR20, Appendix B limits.

DISCUSSION

The release rate threshold for this EAL is obtained by multiplying the Technical Specification release rate of $2.4E+03 \mu\text{Ci/sec}$ for Noble Gases times 2. Total Noble Gas release rate is the summation of all plant vent release rates.

The 10CFR20, Appendix B limits are based on ODCM calculations.

10CFR20, Appendix B Calculation for Noble Gas

$$\text{uCi/Second} = \frac{(100 \text{ mRem / year}) * (\text{Allocation Factor})}{(\text{ODCM } X / Q) * (\text{ODCM DRCF})}$$

WHERE: **uCi/Second** = Total Noble Gas Release Rate from Salem (Unit 1 & Unit 2)
or Hope Creek (all Vents; NPV, SPV, FRVS, and HTV)
which would result in a TEDE Dose Rate of 50 mRem/year.

ODCM X/Q = Site Specific (Salem or Hope Creek) dispersion factor
at the Site Boundary in sec/m^3 .

ODCM DRCF = Site Specific (Salem or Hope Creek) dose rate
conversion factor in mRem/year/uCi/m³.

$$\text{ODCM X/Q} = 2.67\text{E-}06 \text{ sec/m}^3$$

$$\text{ODCM DRCF} = 7.80\text{E+}03 \text{ mRem/yr/uCi/m}^3$$

$$\text{Allocation Factor} = 5.00\text{E-}01$$

$$2.40\text{E+}03 \text{ uCi/Second} = \frac{(100 \text{ mRem / yr}) * (5.00\text{E} - 01)}{(2.67\text{E} - 06 \text{ sec/ m}^3) * (7.80\text{E} + 03 \text{ mRem / yr / } \mu\text{Ci / m}^3)}$$

$$2.40\text{E+}03 \text{ } \mu\text{Ci/sec} * 2 = \text{EAL value.}$$

$$4.80\text{E+}03 \text{ } \mu\text{Ci/sec} \text{ is the EAL value.}$$

DEVIATION

The value for EAL 6.1.1.d is based on one meteorological case and one isotopic mixture found in the ODCM. A radiological release based on this specific release rate could produce a TEDE Dose which would require an Alert classification or not meet the Unusual Event classification, depending on the meteorological conditions and the isotopic mixture. EAL 6.1.1.d would not be used unless EAL 6.1.1.a (Dose Assessment) can not be used to determine the classification, if any, due to the potential uncertainty of this "default" EAL.

Two times the 10CFR20, Appendix B limits for noble gas is being used for this EAL, due to concerns that the State of New Jersey have pertaining to this EAL and based on the above mentioned uncertainties.

REFERENCES

NUMARC NESP-007, AU1.1, AU1.4
HC.OP-AB.ZZ-126(Q), Abnormal Releases of Gaseous Radioactivity
HC.RP-AR.SP-0001(Q), Radiation Monitoring System Alarm Response
Off-Site Dose Calculation Manual, Section 2.0 - Gaseous Effluents
NUMARC Draft White Paper, 7-25-94, 9-10-94.
Technical Specification 3.11.2.1

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

ALERT - 6.1.2.a

IC Any **Unplanned** Release of Gaseous Radioactivity to the Environment that exceeds 200 Times Radiological Technical Specifications for 15 minutes or longer

EAL

Dose Assessment indicates EITHER of the following at the MEA or beyond as calculated on the SSCL:

- TEDE 4-Day Dose of $\geq 2.0E+01$ mRem
- Thyroid-CDE Dose of $\geq 6.8E+01$ mRem
based on Plant Vent effluent sample analysis and NOT on a default Noble Gas to Iodine Ratio

AND

Release is ongoing for ≥ 15 minutes

OPERATIONAL CONDITION - All

BASIS

Dose Assessment at or beyond the MEA exceeding the EAL threshold, can result from a Gaseous Radiological Release in excess of 200 times Technical Specifications. This condition results from an uncontrolled release of radioactivity to the environment, resulting in significantly elevated offsite dose rates. The threshold for this EAL is NOT based on a specific offsite dose rate, but rather on the loss of plant control implied by a radiological release of this magnitude that was not isolated within 15 minutes. Classification is based on an ongoing release that does not comply with a license condition. **Unplanned** is defined as any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

Dose Assessment using actual meteorological data provides an accurate indication of release magnitude. The use of dose assessment based EALs is therefore preferred over the use of Release Rate based EALs which utilize calculations which have built-in inaccuracies because ODCM default meteorological data is used. As long as dose assessment is available, this EAL should be used in place of EAL 6.1.2.d.

EAL - 6.1.2.a
Rev. 01

It is not intended that the release be averaged over 15 minutes, but exceed 200 times the Technical Specification limit for 15 minutes or longer. In addition, it is intended that the event be declared as soon as it is determined that the release will exceed 200 times the limit for 15 minutes or longer.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to a Site Area Emergency when the effluent release concentration increases to a level that would cause a 100 mRem dose at the Protected Area Boundary.

DISCUSSION

Prorating the 500 mRem/yr criterion for the TEDE 4-day dose: time (8766 hr/yr); the 200 x Tech. Spec. multiplier; and, Artificial Island's Allocation Factor of 0.5 (50% per site), the associated site boundary dose rate would be 5.7 mRem/hr.

$$\text{TEDE 4-Day MEA Dose Rate} = \left(\frac{500 \text{ mRem/yr}}{8766 \text{ hr/yr}} \right) (200)(0.5) = 5.7 \text{ mRem/hr}$$

This is rounded to 5.0 mRem/hr.

The TEDE 4-day Dose is based on a default (assumed) 4 hour release duration. Therefore 5.0 mRem/hr * 4 hours = 20 mRem.

Prorating the 1500 mRem/yr criterion for the Thyroid-CDE Dose: time (8766 hr/yr); the 200 x Tech. Spec. multiplier; and, Artificial Island's Allocation Factor of 0.5 (50% per site), the associated site boundary dose rate would be 17 mRem/hr.

$$\text{Thyroid-CDE MEA Dose Rate} = \left(\frac{1500 \text{ mRem/yr}}{8766 \text{ hr/yr}} \right) (200)(.5) = 0.17 \text{ mRem/hr}$$

The Thyroid-CDE Dose is based on a 4 hour release duration. Therefore 17 mRem/hr * 4 hours = 68 mRem.

DEVIATION

None

REFERENCES

NUMARC NESP-007, AA1.4

Off-Site Dose Calculation Manual, Section 2.0 - Gaseous Effluents

NUMARC Draft White Paper, 7-25-94, 9-10-94.

Technical Specification 3.11.2.1

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

ALERT - 6.1.2.b

IC Any **Unplanned** Release of Gaseous Radioactivity to the Environment that exceeds 200 Times Radiological Technical Specifications for 15 minutes or longer

EAL

Dose Rate measured at the Protected Area Boundary or beyond EXCEEDS 5 mRem/hr

AND

Release is ongoing for ≥ 15 minutes

OPERATIONAL CONDITION - All

BASIS

Measured Dose Rates at or beyond the MEA exceeding the EAL threshold, can result from a Gaseous Radiological Release in excess of 200 times Technical Specifications. This condition results from an uncontrolled release of radioactivity to the environment, resulting in significantly elevated offsite dose rates. The threshold for this EAL is NOT based on a specific offsite dose rate, but rather on the loss of plant control implied by a radiological release of this magnitude that was not isolated within 15 minutes. Classification is based on an ongoing release that does not comply with a license condition. **Unplanned** is defined as any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

It is not intended that the release be averaged over 15 minutes, but exceed 200 times the Technical Specification limit for 15 minutes or longer. In addition, it is intended that the event be declared as soon as it is determined that the release will exceed 200 times the limit for 15 minutes or longer.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to a Site Area Emergency when effluent release concentration increases to a level that would cause a 100 mRem dose at the Protected Area Boundary.

DISCUSSION

Prorating the 500 mRem/yr criterion for: time (8766 hr/yr); the 200 x Tech. Spec. multiplier; and, Artificial Island's Allocation Factor of 0.5 (50% per site), the associated site boundary dose rate would be 5.7 mRem/hr.

$$\text{Protected Area Boundary Dose Rate} = \left(\frac{500 \text{ mRem / yr}}{8766 \text{ hr / yr}} \right) (200) (.5) = 5.7 \text{ mRem/hr}$$

This is rounded to 5.0 mRem/hr

DEVIATION

None

REFERENCES

NUMARC NESP-007, AA1.3
Off-Site Dose Calculation Manual, Section 2.0 - Gaseous Effluents
NUMARC Draft White Paper, 7-25-94, 9-10-94.
Technical Specification 3.11.2.1

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

ALERT - 6.1.2.c

IC Any **Unplanned** Release of Gaseous Radioactivity to the Environment that exceeds 200 Times the 10CFR20, Appendix B limits for 30 minutes or longer

EAL

Gaseous effluent release sample analysis for ANY one of the following indicates a concentration of:

- **FRVS:**
 - $\geq 1.13\text{E-}01 \text{ } \mu\text{Ci/cc}$ Total Noble Gas
 - $\geq 2.71\text{E-}05 \text{ } \mu\text{Ci/cc}$ I-131
- **NPV:**
 - $\geq 2.43\text{E-}02 \text{ } \mu\text{Ci/cc}$ Total Noble Gas
 - $\geq 5.81\text{E-}06 \text{ } \mu\text{Ci/cc}$ I-131
- **SPV:**
 - $\geq 2.27\text{E-}03 \text{ } \mu\text{Ci/cc}$ Total Noble Gas
 - $\geq 5.44\text{E-}07 \text{ } \mu\text{Ci/cc}$ I-131

AND

Dose Assessment results NOT available

AND

Release is ongoing for ≥ 30 minutes

OPERATIONAL CONDITION - All

BASIS

Total gaseous effluent release sample analysis exceeding the EAL threshold for any of the plant vents listed (FRVS, NPV, SPV), can result from a Gaseous Radiological Release in excess of 200 times 10CFR20, Appendix B limits. This condition results from an uncontrolled release of radioactivity to the environment, resulting in elevated offsite dose rates.

EAL - 6.1.2.c
Rev. 01

The threshold for this EAL is NOT based on a specific offsite dose rate, but rather on the loss of plant control implied by a radiological release of this magnitude that was not isolated within 30 minutes. The final integrated dose is very low and is not the primary concern. Classification is based on an ongoing release that does not comply with a license condition. The HTV is not included under this EAL since there are no provisions for collecting a HTV grab sample.

Unplanned is defined as any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

It is not intended that the release be averaged over 30 minutes, but exceed 200 times the 10CFR20, Appendix B limit for 30 minutes or longer. In addition, it is intended that the event be declared as soon as it is determined that the release will exceed 200 times the limit for 30 minutes or longer.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to a Site Area Emergency when effluent release concentration increases to a level that would cause a 100 mRem TEDE dose or Thyroid-CDE of 500 mRem for I-131 at the Protected Area Boundary.

DISCUSSION

Refer to Basis Section for EAL 6.1.2.d for the 10CFR20, Appendix B Noble Gas and Thyroid Committed Dose release Rate Calculations.

Calculation of the threshold sample concentrations are as follows:

$$FRVS \text{ Noble Gas Sample Concentration} = \frac{4.80E + 05 \mu\text{Ci} / \text{sec}}{472 \times 9000 \text{ cfm}} = 1.13E-01 \mu\text{Ci/cc}$$

$$FRVS \text{ I-131 Sample Concentration} = \frac{1.15E + 02 \mu\text{Ci} / \text{sec}}{472 \times 9000 \text{ cfm}} = 2.71E-05 \mu\text{Ci/cc}$$

$$NPV \text{ Noble Gas Sample Concentration} = \frac{4.80E + 05 \mu\text{Ci} / \text{sec}}{472 \times 4.19E + 4 \text{ cfm}} = 2.43E-02 \mu\text{Ci/cc}$$

$$NPV \text{ I-131 Sample Concentration} = \frac{1.15E + 02 \mu\text{Ci} / \text{sec}}{472 \times 4.19E + 04 \text{ cfm}} = 5.81E-06 \mu\text{Ci/cc}$$

$$SPV \text{ Noble Gas Sample Concentration} = \frac{4.80E+05 \mu\text{Ci} / \text{sec}}{472 \times 4.48E+05 \text{ cfm}} = 2.27E-03 \mu\text{Ci/cc}$$

$$SPV \text{ I-131 Sample Concentration} = \frac{1.15E+02 \mu\text{Ci} / \text{sec}}{472 \times 4.48E+05 \text{ cfm}} = 5.44E-07 \mu\text{Ci/cc}$$

Where: 472 = conversion factor (28,317 cc/ft³ x 1 min./60 sec.)
 9000 cfm = FRVS Vent Flow (maximum)
 4.19E+04 cfm = NPV Vent Flow (maximum)
 4.48E+05 cfm = SPV Vent Flow (maximum)

The noble gas release rate of 4.80E+05 $\mu\text{Ci/sec}$ is obtained by multiplying the 10CFR20, Appendix B limit release rate of 2.40E+03 $\mu\text{Ci/sec}$ times 200.

The iodine release rate of 1.15E+02 $\mu\text{Ci/sec}$ is obtained by multiplying the 10CFR20, Appendix B limit release rate of 5.75E-01 $\mu\text{Ci/sec}$ times 200.

DEVIATION

The value for EAL 6.1.2.c is based on one meteorological case and one isotopic mixture found in the ODCM. A radiological release based on this specific release rate could produce a TEDE Dose which would require a General Emergency classification or not meet the Alert classification, depending on the meteorological conditions and isotopic mixture. EAL 6.1.2.c would not be used unless EAL 6.1.2.a (Dose Assessment) can not be used to determine the classification, if any, due to the potential uncertainty of this "default" EAL.

Two hundred times the 10CFR20, Appendix B limit noble gas and Iodine 131 are being used for this EAL, due to concerns that the State of New Jersey had pertaining to this EAL and based on the above mentioned uncertainties.

The time limit has been increased from 15 minutes to 30 minutes, to allow additional time to perform dose assessment, since the threshold for this EAL is only 20% of the value allowed per NESP-007 and we do not wish to use this "default" EAL, unless absolutely necessary.

REFERENCES

NUMARC NESP-007, AA1.2, AA1.1, AA1.4
 Off-Site Dose Calculation Manual, Section 2.0
 NUMARC Draft White Paper, 7-25-94, 9-10-94.
 Technical Specification 3.11.2.1

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

ALERT - 6.1.2.d

IC Any **Unplanned** Release of Gaseous Radioactivity to the Environment that exceeds 200 Times 10 CFR20, Appendix B Limits for 30 minutes or longer

EAL

Valid High Alarm received from ANY one of the following Plant Effluent RMS Channels:

- FRVS Noble Gas (Grid 1/3; 9RX680)
- NPV Noble Gas (Grid 1/3; 9RX590)
- SPV Noble Gas (Grid 1/3; 9RX580)
- HTV Noble Gas (Grid 3; 9RX516)

AND

Total Plant Vent release rate EXCEEDS
4.80E+05 μ Ci/sec Total Noble Gas

AND

Dose Assessment results NOT available

AND

Release is ongoing for ≥ 30 minutes

OPERATIONAL CONDITION - All

BASIS

Valid High alarm and effluent release rate values exceeding the EAL threshold, can result from a Gaseous Radiological Release in excess of 200 times 10CFR20, Appendix B limits. This condition results from an uncontrolled release of radioactivity to the environment, resulting in elevated offsite dose rates. The threshold for this EAL is NOT based on a specific offsite dose rate, but rather on the loss of plant control implied by a radiological release of this magnitude that was not isolated within 30 minutes. The final integrated dose is very low and is not the primary concern. Valid is defined as the High alarm actuating specifically due to a Gaseous

EAL - 6.1.2.d
Rev. 01

Release exceeding Technical Specification limits, thus precluding unwarranted event declaration as the result of spurious actuation. Classification is based on an ongoing release that does not comply with a license condition. **Unplanned** is defined as any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

The EAL value for Total Plant Vent release rate was determined using default X/Q values from the ODCM which provides a less accurate method of evaluation release magnitude then using dose assessment with real time meteorological data. For that reason, this EAL should not be utilized if Dose Assessment is available. Dose Assessment will take in account actual meteorological conditions, plant vent flows and plant vent effluent concentrations to provide a more accurate assessment of a radiological release. If Dose Assessment is available than refer to EAL 6.1.2.a for classification.

The Total Plant Vent release rate can be obtained from SPDS or by adding up NPV, SPV, FRVS and HTV noble gas readings.

It is not intended that the release be averaged over 30 minutes, but exceed 200 times 10CFR20, Appendix B limits for 30 minutes or longer. In addition, it is intended that the event be declared as soon as it is determined that the release will exceed 200 times the limit for 30 minutes or longer.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to a Site Area Emergency when effluent release concentration increases to a level that would cause a 100 mRem dose at the Protected Area Boundary

DISCUSSION

The release rate threshold for this EAL is obtained by multiplying the 10CFR20, Appendix B Limit release rates of $2.4E+03 \mu\text{Ci/sec}$ for Noble Gases times 200. Total Noble Gas release rate is the summation of all plant vent release rates.

10CFR20, Appendix B Limit Calculation for Noble Gas

$$\mu\text{Ci/Second} = \frac{100 \text{ mRem/year} * (\text{Allocation Factor})}{(\text{ODCM X/Q}) * (\text{ODCM DRCF})}$$

WHERE: $\mu\text{Ci/Second}$ = Total Noble Gas Release Rate from Salem (Unit 1 & Unit 2) or Hope Creek (all Vents; NPV, SPV, FRVS, and HTV) which would result in a TEDE Dose Rate of 50 mRem/year.

ODCM X/Q = Site Specific (Salem or Hope Creek) dispersion factor at the Site Boundary in sec/m^3 .

ODCM DRCF = Site Specific (Salem or Hope Creek) dose rate conversion factor in $\text{mRem/year}/\mu\text{Ci/m}^3$.

$$\text{ODCM X/Q} = 2.67\text{E-}06 \text{ sec/m}^3$$

$$\text{ODCM DRCF} = 7.80\text{E+}03 \text{ mRem/yr}/\mu\text{Ci/m}^3$$

$$\text{Allocation Factor} = 5.00\text{E-}01$$

$$2.40\text{E+}03 \mu\text{Ci/Second} = \frac{(100 \text{ mRem/year}) * (5.00\text{E-}01)}{(2.67\text{E-}06 \text{ sec/m}^3) * (7.80\text{E+}03 \text{ mRem/yr}/\mu\text{Ci/m}^3)}$$

$$2.40\text{E+}03 \mu\text{Ci/sec} * 200 = \text{EAL value.}$$

$$4.80\text{E+}05 \mu\text{Ci/sec} = \text{EAL value}$$

DEVIATION

The value for EAL 6.1.2.d is based on one meteorological case and one isotopic mixture found in the ODCM. A radiological release based on this specific release rate could produce a TEDE Dose which would require a General Emergency classification or not meet the Alert classification, depending on the meteorological conditions and the isotopic mixture. EAL 6.1.2.d would not be used unless EAL 6.1.2.a (Dose Assessment) can not be used to determine the classification, if any, due to the potential uncertainty of this "default" EAL.

Two hundred times the 10CFR20, Appendix B limits of noble gas is being used for this EAL, due to concerns that the State of New Jersey had pertaining to this EAL and based on the above mentioned uncertainties.

The time limit has been increased from 15 minutes to 30 minutes, to allow additional time to perform dose assessment, since the threshold for this EAL is only 20% of the value allowed per NESP-007 and we do not wish to use this "default" EAL, unless absolutely necessary.

REFERENCES

NUMARC NESP-007, AA1.1, AA1.4
 OP-AB.ZZ-126(Q), Abnormal Releases of Gaseous Radioactivity
 Off-Site Dose Calculation Manual, Section 2.0 - Gaseous Effluents
 NUMARC Draft White Paper, 7-25-94, 9-10-94.
 Technical Specification 3.11.2.1

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

SITE AREA EMERGENCY-- 6.1.3.a

IC Boundary Dose Resulting from an Actual or **Imminent** Release of Gaseous Radioactivity Exceeds 100 mRem Total Effective Dose Equivalent (TEDE) or 500 mRem Thyroid CDE Dose for the actual or projected duration of the release.

EAL

Dose Assessment indicates EITHER one of the following at the MEA or beyond as calculated on the SSCL:

- TEDE 4-Day Dose of $\geq 1.0E+02$ mRem
- Thyroid-CDE Dose of $\geq 5.0E+02$ mRem
based on Plant Vent effluent sample analysis and NOT on a default Noble Gas to Iodine Ratio

OPERATIONAL CONDITION - All

BASIS

The TEDE 4-Day Dose of $\geq 1.0E+02$ mRem corresponds directly to the NUMARC dose of 100 mRem.

The Thyroid-CDE Dose of $\geq 5.0E+02$ mRem corresponds directly to the NUMARC dose of 500 mRem.

Dose Assessment using actual meteorological data provides an accurate indication of release magnitude. The use of dose assessment based EALs is therefore preferred over the use of Release Rate based EALs which utilize calculations which have built-in inaccuracies because ODCM default Meteorological data is used. **Imminent** is defined as expected to occur within 2 hours.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification escalates to a General Emergency when actual or projected doses exceed EPA Protective Action Guidelines.

DISCUSSION

This value provides a desirable gradient (one order of magnitude) between the Site Area Emergency and General Emergency classifications. No site allocation factor (.5) is used in this calculation due to the assumption that releases of this magnitude will be from one site.

The dose projection code assumes a 4 hour release utilizing current 15 minute average release rate data. For the TEDE 4-Day Dose, $100 \text{ mRem/hr} * 4 \text{ hr} = 400 \text{ mRem}$. For the Thyroid-CDE Dose, $500 \text{ mRem/hr} * 4 \text{ hr} = 2000 \text{ mRem}$.

DEVIATION

None

REFERENCES

NUMARC NESP-007, AS1.3

EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

NUMARC Draft White Paper, 7-25-94, 9-10-94

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

SITE AREA EMERGENCY - 6.1.3.b

IC Boundary Dose Resulting from an Actual or **Imminent** Release of Gaseous Radioactivity Exceeds 100 mRem Total Effective Dose Equivalent (TEDE) or 500 mRem Thyroid CDE Dose for the actual or projected duration of the release

EAL

Dose Rate measured at the Protected Area Boundary or beyond EXCEEDS
100 mRem/hr

AND

Release is expected to continue for ≥ 15 minutes

OPERATIONAL CONDITION - All

BASIS

An actual dose rate of 100 mRem/hr which is expected to continue for ≥ 15 minutes indicates a substantial radiological release which could exceed the 10CFR20 annual average population exposure limit of 100 mRem TEDE, using the assumption of a one hour release duration.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to a General Emergency when actual or projected doses exceed EPA Protective Action Guidelines.

DISCUSSION

An actual dose of 100 mRem Total Effective Dose Equivalent (TEDE) is based on the 10CFR20 annual average population exposure limit. Unless otherwise indicated, the conversion from whole body dose to TEDE is 1:1. Measured dose rates will be taken at the Protected Area Boundary, and a ≥ 15 minute release duration threshold will be applied to be conservative.

EAL - 6.1.3.b
Rev. 01

DEVIATION

None

REFERENCES

NUMARC NESP-007, AS1.4

EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

NUMARC Draft White Paper, 7-25-94, 9-10-94

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

SITE AREA EMERGENCY - 6.1.3.c

IC Boundary Dose Resulting from an Actual or **Imminent** Release of Gaseous Radioactivity Exceeds 100 mRem Total Effective Dose Equivalent (TEDE) or 500 mRem Thyroid CDE Dose for the actual or projected duration of the release

EAL

Analysis of field survey samples at the Protected Area Boundary indicates EITHER one of the following:

- $\geq 4.36\text{E}+02$ CCPM
- $\geq 3.85\text{E}-07$ $\mu\text{Ci/cc}$ I-131

OPERATIONAL CONDITION - All

BASIS

The Corrected Counts per Minute (CCPM) value is based on reading(s) obtained using a radiation count rate meter such as a RM-14 or E-140N with an HP260 probe attached. The Iodine-131 field survey sample concentration threshold is based on I-131 dose conversion factors from EPA-400. The thresholds are based on a Thyroid-CDE dose rate of 500 mRem/hr for I-131.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to a General Emergency when actual or projected doses exceed EPA Protective Action Guidelines.

DISCUSSION

The release sample concentration calculations are as follows.

The sample concentration is calculated using the I-131 Dose Conversion Factor from EPA-400:

Solving the following equation for $\mu\text{Ci/cc}$:

$$\text{mRem/hr} = (\mu\text{Ci/cc}) (\text{Dose Conversion Factor})$$

Then;

$$\text{I-131 Sample Concentration} = \left(\frac{500 \text{ mRem / hr}}{1.30 \text{E} + 09 \text{ mRem / } \mu\text{Ci / cc / hr}} \right) = 3.85\text{E-}07 \mu\text{Ci/cc}$$

Where $1.30\text{E}+09 \text{ mRem}/\mu\text{Ci/cc/hr}$ is the Dose Conversion Factor from EPA-400, Table 5-4 and includes the EPA-400 breathing rate .

The Corrected Counts per Minute reading is calculated using the I-131 Sample concentration, and factors for using an RM-14 or E-140N with an HP260 probe.

Solving the following equation for CCPM:

$$\mu\text{Ci/cc} = \frac{\text{CCPM}}{(\text{Detector Efficiency})(\text{Collection Efficiency})(\text{Conversion Factor - DPM to } \mu\text{Ci})(\text{Volume - ft}^3)(\text{Conversion Factor - cc to ft}^3)}$$

Then;

$$\text{CCPM} = (3.85\text{E-}07 \mu\text{Ci/cc}) (2.00\text{E-}03 \text{ CCPM/DPM}) (0.9) (2.22\text{E+}06 \text{ DPM}/\mu\text{Ci}) * (10 \text{ ft}^3) (2.832\text{E+}04 \text{ cc/ft}^3) = 4.36\text{E+}02 \text{ CCPM}$$

Where:

$2.00\text{E-}03 =$	Detector Efficiency - CCPM/DPM
$0.9 \text{ (or } 90\%) =$	Collection Efficiency
$2.22\text{E+}06 =$	Conversion factor - DPM/ μCi
$10 \text{ ft}^3 =$	Volume
$2.832\text{E+}04 =$	Conversion factor - cc to ft^3
CCPM =	Corrected Counts per Minute using an RM-14 or E-140N with an HP260 probe.

DEVIATION

None

REFERENCES

NUMARC NESP-007, AS1.4

EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

FEMA REP-2, Rev. 1, 7/87, Guidance on Offsite Emergency Radiation Measurement Systems, Phase-1 Airborne Release

SORC Summary 07/10/89

RPCS Thyroid Dose Commitment Factor Paper (NRP-94-0557), 11/22/94

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

SITE AREA EMERGENCY - 6.1.3.d

IC Boundary Dose Resulting from an Actual or **Imminent** Release of Gaseous Radioactivity Exceeds 100 mRem Total Effective Dose Equivalent (TEDE) or 500 mRem Thyroid CDE Dose for the actual or projected duration of the release

EAL

Valid High Alarm received from ANY of the following Effluent RMS Channels:

- **FRVS Noble Gas** (Grid 1/3; 9RX680)
- **NPV Noble Gas** (Grid 1/3; 9RX590)
- **SPV Noble Gas** (Grid 1/3; 9RX580)
- **HTV Noble Gas** (Grid 3; 9RX516)

AND

Total Plant Vent release rate **EXCEEDS** **7.6E+07 μ Ci/sec Total Noble Gas**

AND

Dose Assessment results **NOT** available

AND

Release is ongoing for **≥ 15 minutes**

OPERATIONAL CONDITION - All

BASIS

Valid High alarm and effluent release rate values exceeding the EAL threshold, indicates a substantial Gaseous Radiological Release which could exceed the 10CFR20 average annual population exposure limit of 100 mRem TEDE, using the assumption of a one hour release duration.

The EAL value for Total Plant Vent release rate was determined using default X/Q values from the ODCM which provides a less accurate method of evaluation release magnitude then using

EAL - 6.1.3.d
Rev. 01

dose assessment with real time meteorological data. For that reason, this EAL should not be utilized if Dose Assessment is available. Dose Assessment will take in account actual meteorological conditions, plant vent flows and plant vent effluent concentrations to provide a more accurate assessment of a radiological release. If Dose Assessment is available then refer to EAL 6.1.3.a for classification.

The Total Plant Vent release rate can be obtained from SPDS or by adding up NPV, SPV, FRVS and HTV noble gas readings.

It is not intended that the release be averaged over 15 minutes, but that the Release Rate exceed the EAL value for >15 minutes.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to a General Emergency when effluent release concentration increases to a level that would cause a 1000 mRem dose at the Protected Area Boundary.

DISCUSSION

To obtain a site specific value to trigger the performance of dose assessment is not necessary, since this will be done when the UE value is reached. This value will supply a set point to classify a Site Area Emergency (SAE), if dose assessment has not been performed within 15 minutes.

A release rate of $7.6\text{E}+07$ $\mu\text{Ci/sec}$ was back calculated from a TEDE Dose of 100 mRem/hour at the Site MEA. The assumptions that went into this calculation were as follows:

Release Point: FRVS

Release Rate: 9000cfm

ODCM $X/Q = 2.67\text{E}-06$ sec/m^3

Isotopic mixture: FSAR isotopic mixture for a design basis LOCA

Dose Rate Conversion Factors: EPA 400-R-92-001 (Manual of Protective Actions for Nuclear Incidents) Dose Rate Conversion Factors.

DEVIATION

The NUMARC basis states that the FSAR source term assumptions should be used in determining the indications for monitors. The NUMARC Draft White Paper states the FSAR source term should not be used unmodified.

This NUMARC EAL is calculated using the FSAR Isotopic Mixture for a Design Basis LOCA and the Dose Rate Conversion Factors found in EPA 400-R-001. The combination of using the FSAR Isotopic mixture and the EPA 400 dose Rate Conversion Factors calculate an accurate accident source term.

REFERENCES

NUMARC NESP-007, AS1.1, AS1.4
OP-AB.ZZ-126(Q), Abnormal Releases of Gaseous Radioactivity
Off-Site Dose Calculation Manual, Section 2.0 - Gaseous Effluents
NUMARC Draft White Paper, 7-25-94, 9-10-94.
ODCM3.11.2.1
FSAR Section 15
EPA 400-R-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

GENERAL EMERGENCY - 6.1.4.a

IC Boundary Dose Resulting from an Actual or **Imminent** Release of Gaseous Radioactivity Exceeds 1000 mRem Total Effective Dose Equivalent (TEDE) or 5000 mRem Thyroid CDE Dose for the actual or projected duration of the release

EAL

Dose Assessment indicates EITHER one of the following at the MEA or beyond as calculated on the SSCL:

- TEDE 4-Day Dose of $\geq 1.0E+03$ mRem
- Thyroid-CDE Dose of $\geq 5.0E+03$ mRem
based on Plant Vent effluent sample analysis and NOT on a default Noble Gas to Iodine Ratio

OPERATIONAL CONDITION - All

BASIS

The TEDE 4-Day Dose of $\geq 1.0E+03$ mRem corresponds directly to the NUMARC dose of 1000 mRem which exceeds EPA Protective Action Guideline criteria for a General Emergency.

The Thyroid-CDE Dose of $\geq 5.0E+03$ mRem corresponds directly to the NUMARC dose of 5000 mRem which exceeds EPA Protective Action Guideline criteria for a General Emergency.

Imminent is defined as expected to occur within 2 hours.

Barrier Analysis

N/A

ESCALATION CRITERIA

N/A

DISCUSSION

No site allocation factor (.5) is used in this calculation due to the assumption that releases of this magnitude will be from one site.

DEVIATION

None

REFERENCES

NUMARC NESP-007, AG1.3

EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

NUMARC Draft White Paper 7-25-94, 9-10-94

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

GENERAL EMERGENCY - 6.1.4.b

IC Boundary Dose Resulting from an Actual or **Imminent** Release of Gaseous Radioactivity Exceeds 1000 mRem Total Effective Dose Equivalent (TEDE) or 5000 mRem Thyroid CDE Dose for the actual or projected duration of the release

EAL

Dose Rate measured at the Protected Area Boundary or beyond EXCEEDS 1000 mRem/hr

AND

Release is expected to continue for ≥ 15 minutes

OPERATIONAL CONDITION - All

BASIS

An actual dose rate of 1000 mRem/hr indicates the EPA Protective Action Guide may be exceeded for the general public.

Barrier Analysis

N/A

ESCALATION CRITERIA

N/A

DISCUSSION

An actual projected dose of 1000 mRem Total Effective Dose Equivalent (TEDE) is based on the EPA protective action guidance which indicates that public protective actions are indicated if the dose exceeds 1 Rem whole body. This is consistent with the emergency class description for a General Emergency. A release rate equivalent to 1000 mRem/hr boundary dose rate may also be used if TEDE projections are not available. Unless otherwise indicated, the conversion from whole body dose to TEDE is 1:1.

DEVIATION

None

REFERENCES

NUMARC NESP-007, AG1.4

EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

GENERAL EMERGENCY - 6.1.4.c

IC Boundary Dose Resulting from an Actual or **Imminent** Release of Gaseous Radioactivity Exceeds 1000 mRem Total Effective Dose Equivalent (TEDE) or 5000 mRem Thyroid CDE Dose for the actual or projected duration of the release

EAL

Analysis of field survey samples at the Protected Area Boundary indicates EITHER one of the following:

$\geq 4.36\text{E}+03$ CCPM
 $\geq 3.85\text{E}-06$ $\mu\text{Ci/cc}$ I-131

OPERATIONAL CONDITION - All

BASIS

The Corrected Counts per Minute (CCPM) value is based on reading(s) obtained using a radiation count rate meter such as a RM-14 or E-140N with an HP260 probe attached. The Iodine-131 field survey sample concentration threshold is based on I-131 dose factors from EPA-400. The thresholds are based on a dose rate of 5000 mRem/hr Thyroid-CDE for I-131.

Barrier Analysis

N/A

ESCALATION CRITERIA

N/A

DISCUSSION

The release sample concentration calculations are as follows.

The sample concentration is calculated using the I-131 Dose Conversion Factor from EPA-400:

Solving the following equation for $\mu\text{Ci/cc}$:

$$\text{mRem/hr} = (\mu\text{Ci/cc}) (\text{Dose Conversion Factor})$$

Then;

$$\text{I-131 Sample Concentration} = \left(\frac{5000 \text{ mRem/hr}}{1.30 \text{E} + 09 \text{ mRem} / \mu\text{Ci} / \text{cc} / \text{hr}} \right) = 3.85\text{E}-06 \mu\text{Ci/cc}$$

Where $1.30\text{E}+09 \text{ mRem}/\mu\text{Ci/cc/hr}$ is the Dose Conversion Factor from EPA-400, Table 5-4 and includes the EPA-400 breathing factor.

The Corrected Counts per Minute reading is calculated using the I-131 Sample concentration, and factors for using an RM-14 or E-140N with an HP260 probe.

Solving the following equation for CCPM:

$$\mu\text{Ci/cc} = \frac{\text{CCPM}}{(\text{Detector Efficiency}) (\text{Collection Efficiency}) (\text{Conversion Factor - DPM to } \mu\text{Ci}) (\text{Volume - ft}^3) (\text{Conversion Factor - cc to ft}^3)}$$

Then;

$$\text{CCPM} = (3.85\text{E}-06 \mu\text{Ci/cc}) (2.00\text{E}-03 \text{ CCPM/DPM}) (0.9) (2.22\text{E}+06 \text{ DPM}/\mu\text{Ci}) (10 \text{ ft}^3) * (2.832\text{E}+04 \text{ cc/ft}^3) = 4.36\text{E}+03 \text{ CCPM}$$

Where:

$2.00\text{E}-03 =$	Detector Efficiency - CCPM/DPM
$0.9 \text{ (or } 90\%) =$	Collection Efficiency
$2.22\text{E}+06 =$	Conversion factor - DPM/ μCi
$10 \text{ ft}^3 =$	Volume
$2.832\text{E}+04 =$	Conversion factor - cc to ft^3
CCPM =	Corrected Counts per Minute using an RM-14 or E-140N with an HP260 probe.

DEVIATION

None

REFERENCES

NUMARC NESP-007, AG1.4

EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

FEMA REP-2, Rev. 1/July 1987, Guidance on Offsite Emergency Radiation Measurement Systems, Phase-1 Airborne Release

SORC Summary 07/10/89

RPCS Thyroid Dose Commitment Factor paper NRP-94-0557, 11-22-94

6.0 Radiological Releases/Occurrences

6.1 Gaseous Effluent Release

GENERAL EMERGENCY - 6.1.4.d

IC Boundary Dose Resulting from an Actual or **Imminent** Release of Gaseous Radioactivity Exceeds 1000 mRem Total Effective Dose Equivalent (TEDE) or 5000 mRem Thyroid CDE Dose for the actual or projected duration of the release

EAL

Valid High Alarm received from ANY one of the following Plant Effluent RMS Channels:

- **FRVS Noble Gas** (Grid 1/3; 9RX680)
- **NPV Noble Gas** (Grid 1/3; 9RX590)
- **SPV Noble Gas** (Grid 1/3; 9RX580)
- **HTV Noble Gas** (Grid 3; 9RX516)

AND

Total Plant Vent release rate EXCEEDS **7.6E+08 μ Ci/sec Total Noble Gas**

AND

Dose Assessment results NOT available

AND

Release is ongoing for **≥ 15 minutes**

OPERATIONAL CONDITION - All

BASIS

Valid High alarm and effluent release rate values exceeding the EAL threshold, indicates a substantial Gaseous Radiological Release which could exceed the EPA Protective Action Guide exposure of 1000 mRem TEDE, using the assumption of a one hour release duration.

The EAL value for Total Plant Vent release rate was determined using default X/Q values from the ODCM which provides a less accurate method of evaluation release magnitude then using dose assessment with real time meteorological data. For that reason, this EAL should not be

EAL - 6.1.4.d
Rev. 01

utilized if Dose Assessment is available. Dose Assessment will take into account actual meteorological conditions, plant vent flows and plant vent effluent concentrations to provide a more accurate assessment of a radiological release. If Dose Assessment is available then refer to EAL 6.1.4.a for classification.

The Total Plant Vent release rate can be obtained from SPDS or by adding up NPV, SPV, FRVS and HTV noble gas readings.

It is not intended that the release be averaged over 15 minutes, but that the Release Rate exceed the EAL value for >15 minutes.

Barrier Analysis

N/A

ESCALATION CRITERIA

None

DISCUSSION

To obtain a site specific value to trigger the performance of dose assessment is not necessary, since this will be done when the UE value is reached. This value will supply a set point to classify a General Emergency (GE), if dose assessment has not been performed within 15 minutes.

A release rate of $7.6\text{E}+08$ $\mu\text{Ci/sec}$ was backcalculated from a TEDE Dose of 1000mRem/hour at the Site MEA. The assumptions that went into this calculation were as follows:

Release Point: FRVS

Release Rate: 9000cfm

ODCM $X/Q = 2.67\text{E}-06$ sec/m^3

Isotopic mixture: FSAR isotopic mixture for a design basis LOCA

Dose Rate Conversion Factors: EPA 400-R-92-001 (Manual of Protective Actions for Nuclear Incidents) Dose Rate Conversion Factors.

DEVIATION

The NUMARC basis states that the FSAR source term assumptions should be used in determining the indications for monitors. The NUMARC Draft White Paper states the FSAR source term should not be used unmodified.

This NUMARC EAL is calculated using the FSAR Isotopic Mixture for a Design Basis LOCA and the Dose Rate Conversion Factors found in EPA 400-R-001. The combination of using the FSAR Isotopic mixture and the EPA 400 dose Rate Conversion Factors calculate an accurate accident-source term.

REFERENCES

NUMARC NESP-007, AG1.1, AG1.4

OP-AB.ZZ-126(Q), Abnormal Releases of Gaseous Radioactivity

Off-Site Dose Calculation Manual, Section 2.0 - Gaseous Effluents

NUMARC Draft White Paper, 7-25-94, 9-10-94.

Technical Specification 3.11.2.1

FSAR Section 15

EPA 400-R-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents