FORM 1/2-ADM-1611.F28, Rev. 2 RTL# A9.621A

Beaver Valley Power Station

Radiation Protection Technical Position/Evaluation/Calculation

Subject	No.	PAGE 1 OF
Containment Radiation Monitor Readings Following Clad Damage (FC2 Loss, FC7 Loss, RC2 Loss and CT2 Potential Loss)	**ERS-SMM-11-002**	**15**

Reference

HPP_____ EPP _____ T/S _____ CR _____ DCP_____

Category

☐ Technical Position ☒ Technical Evaluation ☐ Calculation

Unit 1 ☒ Unit 2 ☒

Purpose

This Technical Evaluation determines and documents:
>>> The percent of fuel clad failure release equivalent to an RCS concentration of 300 uCi/g,
>>> Containment high range area monitor response to a release to containment atmosphere of RCS containing activity associated with 20% clad damage, RCS with 300 uCi/g dose equivalent I-131, and RCS at the technical specification maximum instantaneous concentration of 21 uCi/g dose equivalent I-131.
Values are provided for both Beaver Valley Unit 1 and Unit 2.

☒ **ORIGINAL ISSUE**

☐ **REVISION # _____**

Revision description:

N/A - Original Issue

by		checker/reviewer		independent review (calculation only)	
Scott McCain	08/07/11 date	John Lebda / Michael Unfried 8/8/11	date	N/A - Not a Calculation	date

Checklist		Attachments
☒ Purpose	☒ Results	☒ Data Sheets
☒ Methodology	☒ References	☒ Illustrations
☒ Input Data		☐ Printouts
		☐ Code Listings

☒ Transmittal to BVRC	☐ Supt, Rad Ops	☒ Author: Scott McCain
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Table of Contents

1 PURPOSE/OBJECTIVES

1.1 Documentation of the correlation of 300 µCi/gm DEI-131 (dose equivalent iodine – 131) to a percent fuel clad damage for the Fission Product Barrier (FPB) FC7.1(L) basis.

1.2 Documentation of the derivation of the containment radiation monitor (CRM) FPB threshold values used to represent FC2.1(L), RC2.1(L) and CT2.1(PL).

1.3 The following calculations define the objectives of this document:

1.3.1 FC7.1(L) – % fuel clad damage associated with an RCS activity of 300 µCi/gm dose equivalent I-131.

1.3.2 CT2.1(PL) – CRM readings associated with 20% fuel clad damage for various times after reactor shutdown (1-48 hours).

1.3.3 FC2.1(L) – CRM readings associated with the fuel clad damage equivalent of 300 µCi/gm dose equivalent I-131 for various times after reactor shutdown (1-48 hours).

1.3.4 RC2.1(L) – CRM reading associated with the equivalent of TS RCS activity being released instantaneously into containment.

2 METHODOLOGY

2.1 The Beaver Valley U1 and U2 EAL Technical Basis Manuals contain the bases and references for the site specific EAL threshold values used to implement the NEI 99-01 Rev. 5 guidance methodology. This calculation has been developed to provide additional detailed technical documentation on how the containment radiation monitor values used to indicate a loss of the fuel clad and potential loss of containment fission product barriers were derived.

2.2 The bases for the development of site specific EALs are provided in NEI 99-01 Rev 5. The guidance in the NEI document is generic in nature and is therefore not intended to be entirely used "as is." It is intended to give the logic for developing site specific EAL threshold values (Section 5.3 of NEI 99-01).

2.3 NEI 99-01 Rev. 5 basis information for PWR EAL table 5-F-3 fuel clad barrier threshold #2 provides the following guidance for FPB FC7.1(L):

The site specific value corresponds to 300 µCi/gm I-131 equivalent. Assessment by the EAL Task Force indicates that this amount of coolant activity is well above that expected for iodine spikes and corresponds to less than 5% fuel clad damage. This amount of radioactivity indicates significant clad damage and thus the Fuel Clad Barrier is considered lost.

The value can be expressed either in mR/hr observed on the sample or as µCi/gm results from analysis.

2.4 NEI 99-01 Rev. 5 basis information for PWR EAL table 5-F-3 containment barrier threshold #6 provides the following guidance for FPB CT2.1(PL):

The site specific reading is a value which indicates significant fuel damage well in excess of the thresholds associated with both loss of Fuel Clad and loss of RCS barriers. As stated in Section 3.8 [of NEI 99-01], *a major release of radioactivity requiring off-site protective actions from core damage is not possible unless a major failure of fuel cladding allows radioactive material to be released from the core into the reactor coolant.*

Regardless of whether containment is challenged, this amount of activity in containment, if released, could have such severe consequences that it is prudent to treat this as a potential loss of containment, such that a General Emergency declaration is warranted.

NUREG-1228, "Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents," indicates that such conditions do not exist when the amount of clad damage is less than 20%. Unless there is a site specific analysis justifying a higher value, it is recommended that a radiation monitor reading corresponding to 20% fuel clad damage be specified here.

2.5 NEI 99-01 Rev. 5 basis information for PWR EAL table 5-F-3 fuel clad barrier threshold #6 provides the following guidance for FPB FC2.1(L):

The site specific reading is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment.

The reading should be calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of 300 µCi/gm dose equivalent I-131 into the containment atmosphere.

Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within technical specifications and are therefore indicative of fuel damage.

Caution: it is important to recognize that in the event the radiation monitor is sensitive to shine from the reactor vessel or piping, spurious readings will be present and another indicator of fuel clad damage is necessary or compensated for in the threshold value.

2.6 NEI 99-01 Rev. 5 basis information for PWR EAL table 5-F-3 reactor coolant barrier threshold #6 provides the following guidance for FPB RC2.1(L):

The site specific reading is a value which indicates the release of reactor coolant to the containment.

The reading should be calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i.e., within T/S) into the containment atmosphere.

This reading will be less than that specified for FC2(L)1. Thus, this threshold would be indicative of a RCS leak only. If the radiation monitor reading increased to that specified by Fuel Clad barrier threshold, fuel damage would also be indicated.

However, if the site specific physical location of the containment radiation monitor is such that radiation from a cloud of released RCS gases could not be distinguished from radiation from adjacent piping and components containing elevated reactor coolant activity, this threshold should be omitted and other site specific indications of RCS leakage substituted.

2.7 FC7 Loss: The methodology used to determine the equivalent amount of fuel clad damage associated with an RCS activity of 300 µCi/gm is a simple mathematical relationship between the total DEI-131 activity in the fuel clad and the target DEI-131 activity for the given % clad damage.

2.8 CT2 Potential Loss: The methodology used to develop the containment radiation monitor reading graph for 20% clad damage is by curve fit from table data provided in calculation 10080-UR(B)-507.

2.9 FC2 Loss: The methodology used to develop the containment radiation monitor reading graph for the 300 µCi/gm DEI-131 is by ratio of the 20% clad damage monitor readings to 300 µCi/gm DEI-131 equivalent % clad damage monitor readings. This differs from the monitor response calculated in UR(B)-507, which uses an operational equilibrium mix of 0.35 µCi/g as the basis. The isotopic ratios associated with 20% clad failure is representative of fuel failure event while the operational equilibrium isotopic ratios are not. This provides better alignment with the NEI basis for the FC2 Loss threshold.

2.10 RC2 Loss: The methodology used to develop the containment radiation monitor reading values for the high TS DEI-131 is by ratio of the 0.35 µCi/gm DEI-131 monitor readings to 21 µCi/gm DEI-131 monitor readings. This methodology is acceptable because if RCS activity exceeds the 0.35 µCi/gm DEI-131 value, then Technical Specification Figure 3.4.16-1 requires that it remain below the high setpoint of 21 µCi/gm DEI-131 for full power operation.

3 DESIGN INPUTS

3.1 Mass conversion – 453.6 gm/lbm

3.2 0.05 (5%) halogen core release fraction (RF) for a minor fuel clad damage scenario (NUREG-1465 Table 3.13).

3.3 RCS Inputs (10080-UR(B)-484)

- RCS Volume ..... 8.332E+03 ft^3
- Pressurizer Volume ..... 7.08E+02 ft^3
- RCS Average Density ..... 45.46 lbm/ft^3

3.4 Iodine Source Term Information

3.4.1 Iodine core activity values are taken from 10080-UR(B)-483 Table 1.

3.4.2 DEI isotopic conversion factors are taken from 10080-UR(B)-484 table 12.

	Core Activity (Ci)	DEI-131 ICF
I-131	7.78E+07	1.00E+00
I-132	1.14E+08	5.88E-03
I-133	1.60E+08	1.67E-01
I-134	1.77E+08	1.00E-03
I-135	1.52E+08	2.94E-02

3.5 Containment Radiation Monitor (CRM) Reading for 20% Clad Failure

CRM readings for 20% clad failure are taken from 10080-UR(B)-507.

Time (Hours)	Unit 1 (R/Hr)		Unit 2 (R/Hr)	
	Table 14 219A	Table 15 219B	Table 28 206	Table 29 207
0.00833	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.083	3.08E+03	2.71E+03	3.66E+03	3.82E+03
0.1	3.68E+03	3.24E+03	4.37E+03	4.57E+03
0.50833	1.52E+04	1.34E+04	1.81E+04	1.89E+04
1	1.17E+04	1.03E+04	1.40E+04	1.46E+04
1.80833	8.55E+03	7.54E+03	1.02E+04	1.06E+04
2	8.05E+03	7.09E+03	9.57E+03	1.00E+04
8	3.32E+03	2.93E+03	3.95E+03	4.13E+03
24	1.55E+03	1.37E+03	1.85E+03	1.93E+03
96	7.21E+02	6.36E+02	8.58E+02	8.98E+02

3.6 Containment Radiation Monitor (CRM) Reading for RCS at 0.35 µCi/gm DEI-131

CRM readings for RCS at 0.35 µCi/gm DEI-131are taken from 10080-UR(B)-507.

Time (Hours)	Unit 1 (R/Hr) Table 18 219A	Unit 1 (R/Hr) Table 19 219B	Unit 2 (R/Hr) Table 32 206	Unit 2 (R/Hr) Table 33 207
0.00833	6.06E-01	5.34E-01	7.22E-01	7.55E-01
0.083	6.02E-01	5.30E-01	7.17E-01	7.50E-01
0.1	6.01E-01	5.29E-01	7.16E-01	7.49E-01
0.50833	5.79E-01	5.10E-01	6.90E-01	7.21E-01
1	5.49E-01	4.83E-01	6.54E-01	6.84E-01
1.80833	5.05E-01	4.45E-01	6.02E-01	6.29E-01
2	4.96E-01	4.37E-01	5.91E-01	6.18E-01
8	3.52E-01	3.10E-01	4.20E-01	4.39E-01
24	2.52E-01	2.22E-01	3.01E-01	3.15E-01
96	1.50E-01	1.32E-01	1.79E-01	1.87E-01

Note: Calculated values are below the low range (1 R/hr) of the containment high range monitors.

4 ASSUMPTIONS

4.1 The NUREG-1465 Table 3.13 gap release fraction of 0.05 (5%) for halogens was selected over the 3% value in the note to table 3.13 which assumes long-term core cooling is maintained. This assumption results in a slightly lower calculated clad failure value and is conservative with regard to the containment monitor reading used for the fission product barrier threshold.

4.2 A pressurizer liquid volume of 708 ft^3 from 10080-UR(B)-484 was included in the total coolant volume used to determine the % clad failure equivalent to 300 µCi/gm DEI-131. At 60% pressurizer level for normal operation volume is calculated to be approximately 842 ft^3. At 1404 kW pressurizer heater capacity, all heater banks are capable of supporting a normal operations spray flow rate of around 85 gpm, thereby replacing the liquid volume once each 75 minutes. Unit 2 currently has 974 kW heater output (plus 430 kW proportional heater in auto), which results in a recirculation time of ~100 to 120 minutes. Unit 1 would be longer at around 200 minutes. Both of these time periods fall within the period used to develop the fission product barrier containment radiation monitor reading graphs.

4.3 The 20% clad failure CRM values developed in this document are based on the lower monitor reading of each unit for ease of use. Inherent assumption limitations and operational variability of the input parameters (i.e. maximum source term) make the use of the lower monitor value reasonable and slightly conservative.

- U1 219B readings are 88% of the U1 219A readings.
- U2 206 readings are 96% of the U2 207 readings.

4.4 The CRM values for the 0 to 1 hour period are set at the 1 hour value for ease of use. Calculated values show fluctuation up and down over several decades of range hindering the prompt determination of barrier status. Establishing a single value for the 0 to 1 hour period is reasonable and conservative.

4.5 TS basis B 3.4.16 analyses are for two cases of RCS activity. The RC2 threshold values are based on the higher RCS TS activity of 21 µCi/gm DEI-131 to provide an on scale CRM reading.

5 CALCULATIONS

5.1 Fuel Clad Damage Estimate Based on 300 µCi/gm DEI-131

See Attachment 1 for the iterative results to the below calculation steps used to determine the fuel clad source term activity and the % clad damage.

5.1.1 Reactor Coolant System (RCS) Mass (mRCS)

mRCS (gm) = RCS (ft^3) x Density lbm/ft^3 x 453.6 gm/lbm

5.1.2 100% Core Activity Equivalent Halogen Coolant Concentrations

10080-UR(B)-483 Table 1 provides a total core activity, in Curies, for each iodine isotope. Those values are converted to an equivalent coolant concentration representing 100% core activity, in µCi/gm, as follows:

$$\text{Coolant Activity}_{\text{core-i}}\ (\mu Ci/gm) = \frac{\text{Core Activity}_i\ (Ci) \times 1E{+}06\ (\mu Ci/Ci)}{\text{mRCS}\ (gm)}$$

5.1.3 100% Fuel Clad Activity Equivalent Halogen Coolant Concentrations

The 100% core coolant activity is reduced by the release fraction (RF) to represent 100% fuel clad coolant activity by multiplying as follows:

$$\text{Coolant Activity}_{\text{clad-i}}\ (\mu Ci/gm) = \text{Coolant Activity}_{\text{core-i}}\ (\mu Ci/gm) \times RF$$

5.1.4 100% Fuel Clad Activity Equivalent Coolant DEI-131 Concentrations

The total DEI coolant activity associated with 100% fuel clad is calculated from the DEI isotopic conversion factors (ICFs) as follows:

$$\text{Total}_{\text{DEI}}\ (\mu Ci/gm) = \sum \text{Coolant Activity}_{\text{clad-i}}\ (\mu Ci/gm) \times \text{DEI ICF}_i$$

5.1.5 % Clad Damage for 300 µCi/gm DEI-131

$$\%\ \text{Clad Damage} = \text{Target}_{\text{DEI}}\ (\mu Ci/g) \,/\, \text{Total}_{\text{DEI}}\ (\mu Ci/g)$$

5.2 Containment Radiation Monitor (CRM) Readings for 20% Clad Damage

See Attachment 2 for the results of curve fit used to determine the CRM readings for 20% clad damage from 1 to 48 hours post event. See Attachment 3 for the CRM graphs.

5.2.1 The Weibull Model (curve fit) was applied to the 10080-UR(B)-507 CRM data points (0.50833 hours to 96 hours – highest monitor reading to lowest) to develop the coefficients for the below equation.

$$y = a - be^{-cx^d}$$

	U1 219B	U2 206
a	16411.588	21812.369
b	16165.003	21434.901
c	0.97050635	1.0028122
d	-0.81144184	-0.82788232

Where:

y: CRM reading in R/hr

x: post LOCA time in hours

Note: The number of iterations used in the Weibull Model to develop the coefficients for were established such that the fit converged to a tolerance of 1E-6. No weighting was used.

5.3 Containment Radiation Monitor (CRM) Readings for 1% Clad Damage

See Attachment 2 for the ratio results to the below calculation steps used to determine the CRM readings for 1% clad damage from 1 to 48 hours post event. See Attachment 3 for the CRM graphs.

5.3.1 The FC2 Loss CRM readings were developed by ratio of the CT2 Potential Loss CRM readings as follows:

$$\mathbf{CRM_{1\%}\ (R/Hr) = CRM_{20\%}\ (R/Hr) \times \frac{1\%}{20\%}}$$

5.4 Containment Radiation Monitor (CRM) Readings for TS Activity

5.4.1 The RC2 Loss CRM readings were developed by ratio of the lower 0.35 and 21 µCi/gm DEI-131 CRM readings as follows:

$$\mathbf{CRM_{21\ \mu Ci/gm\ DEI\text{-}131}\ (R/Hr) = CRM_{0.35\ \mu Ci/gm\ DEI\text{-}131}\ (R/Hr) \times \frac{21}{0.35}}$$

$$\mathbf{Unit\ 1:\ 7.9\ R/Hr = 0.132\ R/Hr \times \frac{21}{0.35}}$$

$$\mathbf{Unit\ 2:\ 11\ R/Hr = 0.179\ R/Hr \times \frac{21}{0.35}}$$

6 CONCLUSIONS

6.1 300 µCi/gm DEI-131 is equivalent to 1% fuel clad (gap) damage.

6.2 See Attachment 3 for the CRM graphs representative of 20% fuel clad damage.

6.3 See Attachment 3 for the CRM graphs representative of 1% fuel clad damage.

6.4 Unit 1 RC2 Loss for TS RCS activity of 21 µCi/gm DEI-131 is 7.9 R/Hr.

Unit 2 RC2 Loss for TS RCS activity of 21 µCi/gm DEI-131 is 11 R/Hr.

7 REFERENCES

7.1 NEI 99-01 R5, Methodology for Development of Emergency Action Levels

7.2 NUREG-1465, Accident Source Terms for Light-Water Nuclear Power Plants, February 1995

7.3 10080-UR(B)-483 Table 1, BVPS Uprate Core Inventory – Noble Gases, Halogens, and Other Isotopes with Half-Life Greater than 1 Minute and Activity Greater than 0.01% of the Total Activity (2918 MWth)

7.4 10080-UR(B)-484 Rev 0 and Addendum 1, Primary and Secondary Coolant Design/Technical Specification Activity Concentrations including Pre-Accident Iodine Spike Concentrations and Equilibrium Iodine Appearance Rates.

7.5 10080-UR(B)-507 Rev 0, Containment High Range Area Radiation Monitor Readings due to LOCAs with Various Source Terms – Addresses Alternative Source Term and Power Uprate

7.6 TS Basis B 3.4.16, RCS Specific Activity

	10080-UR(B)-483 Table 1 Core Activity (Curies)	Coolant Activity (uCi/gm 100% Core)	Coolant Activity (uCi/gm 100% Gap)	10080-UR(B)-484 Table 12 DEI FCF	Coolant Activity (uCi/gm 100% Gap DEI)
I-131	7.78E+07	4.17E+05	2.09E+04	1.00E+00	2.09E+04
I-132	1.14E+08	6.12E+05	3.06E+04	5.88E-03	1.80E+02
I-133	1.60E+08	8.58E+05	4.29E+04	1.67E-01	7.17E+03
I-134	1.77E+08	9.50E+05	4.75E+04	1.00E-03	4.75E+01
I-135	1.52E+08	8.15E+05	4.08E+04	2.94E-02	1.20E+03
Total	6.81E+08	3.65E+06	1.83E+05		2.95E+04

RCS Volume (ft3):	8.33E+03
Pressurizer Volume (ft3):	7.08E+02
Total Coolant Volume (ft3):	9.04E+03
Average Coolant Density (lbm/ft3):	4.55E+01
Mass Conversion Factor (g/lbm):	4.54E+02
Total Coolant Mass (gm):	1.86E+08
Activity Conversion Factor (uCi/Ci):	1.00E+06
Release Fraction (RF):	5.00E-02
Target DEI:	3.00E+02
% Clad Damage:	1.0%

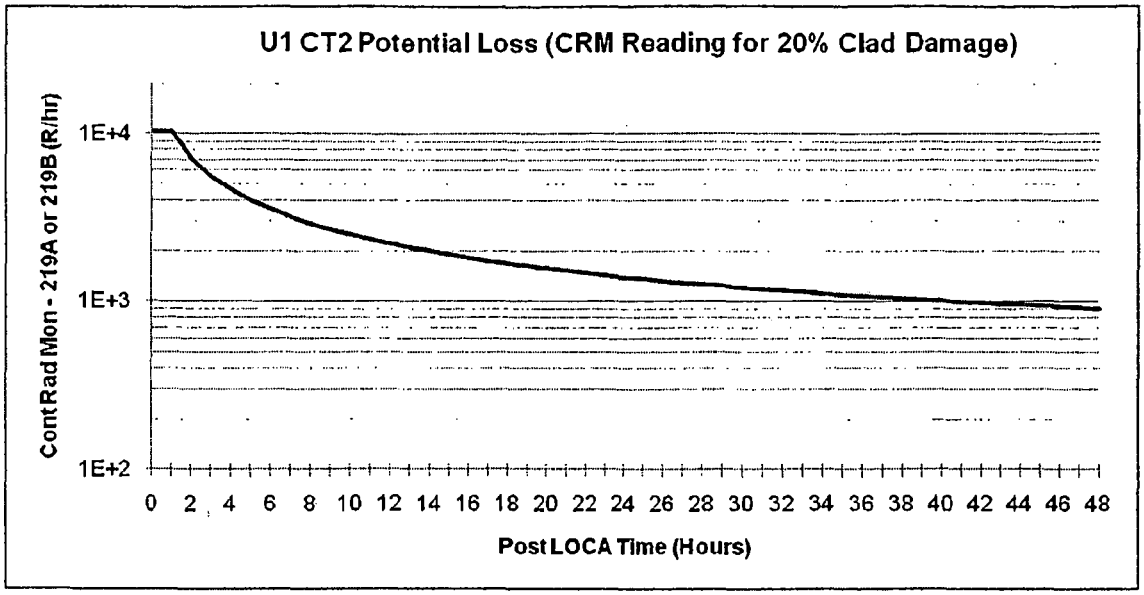
20% Clad Damage Coefficients

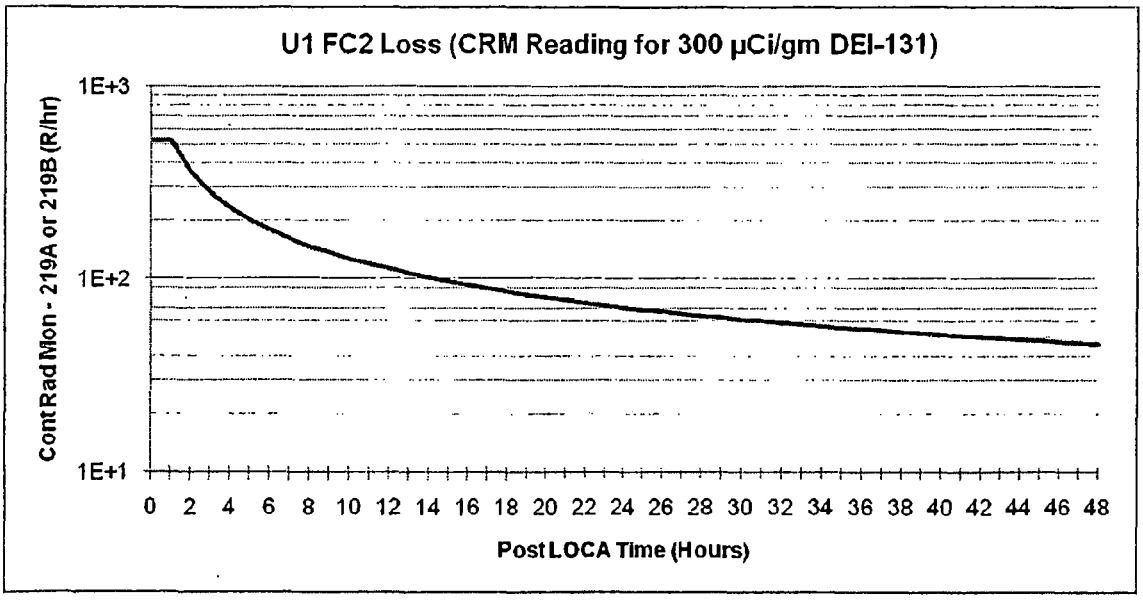
	U1 219B	U2 206
a	16411.588	21812.369
b	16165.003	21434.901
c	0.97050635	1.0028122
d	-0.81144184	-0.82788232

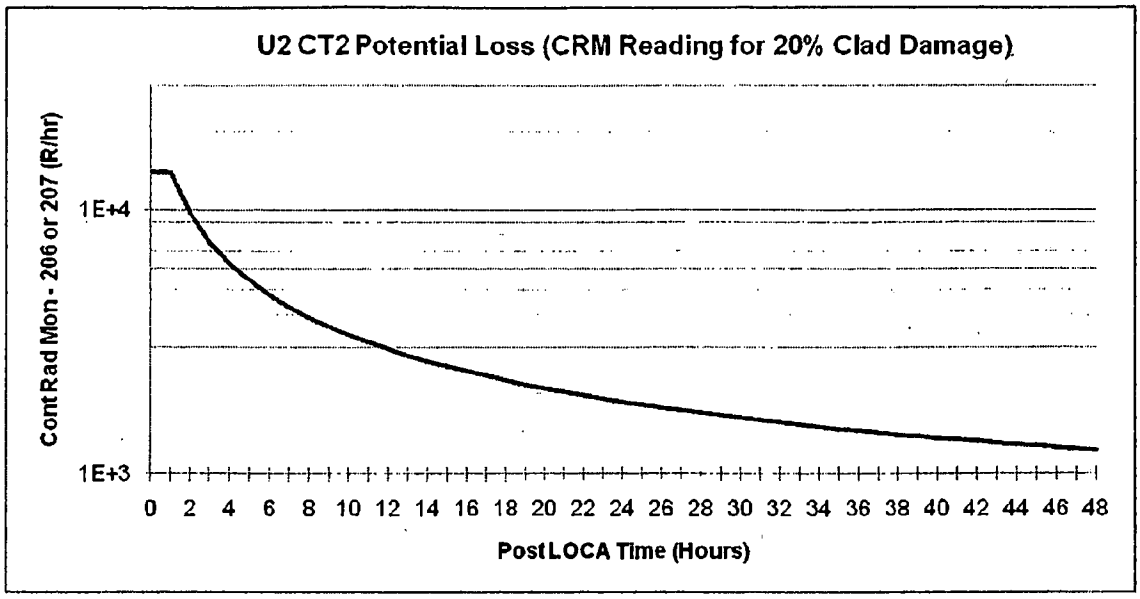
Base Damage (%)	20.0%
Target Damage (%)	1.0%

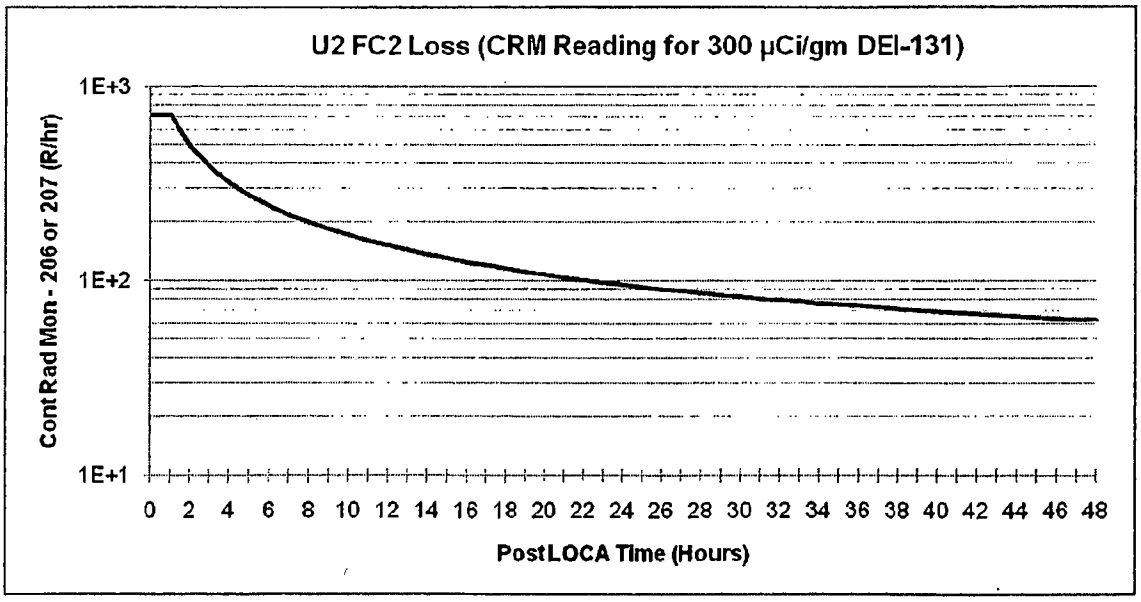
CRM Readings (R/Hr)

	20% Clad Damage		1% Clad Damage	
Hrs	U1 219B	U2 206	U1 219B	U2 206
0	1.0E+04	1.4E+04	5.2E+02	7.1E+02
1	1.0E+04	1.4E+04	5.2E+02	7.1E+02
2	7.1E+03	9.6E+03	3.6E+02	4.9E+02
3	5.6E+03	7.5E+03	2.8E+02	3.8E+02
4	4.6E+03	6.2E+03	2.4E+02	3.2E+02
5	4.0E+03	5.4E+03	2.0E+02	2.7E+02
6	3.5E+03	4.7E+03	1.8E+02	2.4E+02
7	3.2E+03	4.3E+03	1.6E+02	2.2E+02
8	2.9E+03	3.9E+03	1.5E+02	2.0E+02
9	2.7E+03	3.6E+03	1.4E+02	1.8E+02
10	2.5E+03	3.3E+03	1.3E+02	1.7E+02
11	2.3E+03	3.1E+03	1.2E+02	1.6E+02
12	2.2E+03	3.0E+03	1.1E+02	1.5E+02
13	2.1E+03	2.8E+03	1.1E+02	1.4E+02
14	2.0E+03	2.7E+03	1.0E+02	1.4E+02
15	1.9E+03	2.5E+03	9.7E+01	1.3E+02
16	1.8E+03	2.4E+03	9.3E+01	1.2E+02
17	1.7E+03	2.3E+03	8.9E+01	1.2E+02
18	1.7E+03	2.3E+03	8.6E+01	1.1E+02
19	1.6E+03	2.2E+03	8.3E+01	1.1E+02
20	1.6E+03	2.1E+03	8.0E+01	1.1E+02
21	1.5E+03	2.0E+03	7.7E+01	1.0E+02
22	1.5E+03	2.0E+03	7.5E+01	1.0E+02
23	1.4E+03	1.9E+03	7.3E+01	9.8E+01
24	1.4E+03	1.9E+03	7.1E+01	9.5E+01
25	1.4E+03	1.8E+03	6.9E+01	9.3E+01
26	1.3E+03	1.8E+03	6.7E+01	9.1E+01
27	1.3E+03	1.7E+03	6.6E+01	8.8E+01
28	1.3E+03	1.7E+03	6.4E+01	8.6E+01
29	1.2E+03	1.7E+03	6.3E+01	8.5E+01
30	1.2E+03	1.6E+03	6.2E+01	8.3E+01
31	1.2E+03	1.6E+03	6.0E+01	8.1E+01
32	1.2E+03	1.6E+03	5.9E+01	8.0E+01
33	1.1E+03	1.5E+03	5.8E+01	7.8E+01
34	1.1E+03	1.5E+03	5.7E+01	7.7E+01
35	1.1E+03	1.5E+03	5.6E+01	7.5E+01
36	1.1E+03	1.5E+03	5.5E+01	7.4E+01
37	1.1E+03	1.4E+03	5.4E+01	7.3E+01
38	1.0E+03	1.4E+03	5.3E+01	7.2E+01
39	1.0E+03	1.4E+03	5.2E+01	7.1E+01
40	1.0E+03	1.4E+03	5.2E+01	7.0E+01
41	1.0E+03	1.3E+03	5.1E+01	6.9E+01
42	9.8E+02	1.3E+03	5.0E+01	6.8E+01
43	9.7E+02	1.3E+03	4.9E+01	6.7E+01
44	9.6E+02	1.3E+03	4.9E+01	6.6E+01
45	9.5E+02	1.3E+03	4.8E+01	6.5E+01
46	9.3E+02	1.3E+03	4.8E+01	6.4E+01
47	9.2E+02	1.2E+03	4.7E+01	6.3E+01
48	9.1E+02	1.2E+03	4.6E+01	6.3E+01


U1 CT2 Potential Loss (CRM Reading for 20% Clad Damage)
Cont Rad Mon - 219A or 219B (R/hr)
1E+4
1E+3
1E+2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
Post LOCA Time (Hours)


U1 FC2 Loss (CRM Reading for 300 µCi/gm DEI-131)
Cont Rad Mon - 219A or 219B (R/hr)
1E+3
1E+2
1E+1
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
Post LOCA Time (Hours)


U2 CT2 Potential Loss (CRM Reading for 20% Clad Damage)
Cont Rad Mon - 206 or 207 (R/hr)
1E+4
1E+3
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
PostLOCA Time (Hours)


U2 FC2 Loss (CRM Reading for 300 µCi/gm DEI-131)
Cont Rad Mon - 206 or 207 (R/hr)
1E+3
1E+2
1E+1
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
PostLOCA Time (Hours)