50-286

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ENVIRONMENTAL & RADIATION SAFETY TECHNOLOGY BRANCH INPUT TO INDIAN POINT 3 ACRS REPORT

Attached is the Environmental & Radiation Safety Technology Branch input for the Indian Point 3 ACRS report.

P. W. Howe, Chief, Environmental
and Radiation Safety Technology Branch
Division of Reactor Licensing

RT-16A
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E&RSTB Input-Indian Pt.3

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DATE ▶	12/13/68	12/13/68	12/19/68			

CONSOLIDATED EDISON

INDIAN POINT NO.3

DOCKET NO. 50-286

At the request of the Reactor Projects Branch No. 1, the following accidents and accident assumptions were analyzed for the Indian Point 3 facility:

A. Design Basis Accident

1. TID 14844 releases, 100% noble gases, 25% iodines and 1% solids.

2. Design leak rate, 0.1% per day for first day, and 0.045% per day thereafter.

3. Standard ground release meteorology and standard dose conversion factors.

4. With and without iodine removal by additive sprays.

B. Refueling Accident

1. Perforation of 15 fuel rods.

2. Accident occurs 100 hours after shutdown.

3. 20% of noble gases and 10% of iodine in perforated rods are released from damaged rods.

4. 90% of the released iodine is retained in the refueling water.

5. Standard ground release meteorology and dose conversion assumptions.

C. Steam Line Break Inside Containment

1. Accident causes 10% fuel failure with 20% of noble gases and 10% iodines released from these rods.

2. 3.6% of primary coolant released in 8 hours, 39% of which is released in the first 2 hours.

3. Primary coolant inventory based upon 1% failed fuel.

4. All of secondary coolant released.

5. Secondary coolant iodine activity based upon 10 gpm primary to secondary leak rate.

6. Iodine water to air partition factor of 50.

7. Standard ground release meteorology and dose conversion factors.

D. Steam Line Break Outside Containment

1. 3.6% of primary coolant released in 8 hours, 39% of which is released in first 2 hours.

2. Primary coolant activity based upon 1% failed fuel.

3. 25% of secondary coolant released.

4. Secondary coolant iodine activity based upon 10 gpm primary to secondary leak rate.

5. No iodine partition factor

6. Standard ground release meteorology and dose conversion factors.

E. Steam Generator Tube Rupture

1. 50% of primary coolant released in 2 hours.

2. Primary coolant activity based upon 1% failed fuel.

3. All of secondary activity released.

4. Secondary iodine activity based upon 10 gpm primary to secondary leak rate.

5. An iodine water to steam partition factor of 10.

6. Standard ground release meteorology and dose conversion factors.

Tabulated below are the results of these dose calculations:

Accident	Two Hour Dose @ 350 Meters		Course of Accident Dose @ 1100 Meters	
	Whole Body	Thyroid	Whole Body	Thyroid
Design Basis Accident				
Without Iodine Removal	9.4	1410	13.1	3348
With Iodine Removal*	5.8	272	7.6	383
Refueling Accident	0.26	105	0.11	44
Steam Line Break Inside Containment	18	201	12	199
Steam Line Break Outside Containment	0.28	139	0.23	62
Steam Generator Tube Rupture	12	73	5	31

* Assuming 10% non-removable methyliodide

Below is a suggested section for the Indian Point 3 ACRS report on iodine removal.

The iodine reduction factor for the chemical additive spray system has been calculated, using a modified form of the equation developed by Griffiths to determine the theoretical efficiency of the system. This deviates from the model used by the applicant in applying factors of conservatism to account for possible liquid film mass transfer resistance and drop coalescence. The value of the calculated removal constant for elemental iodine is 4.9 hr^{-1}. For a fraction of 10% unremovable iodine, the two hour overall iodine reduction factor attained is 5.2 and the thirty day overall iodine reduction factor approaches an upper limit of 10.

A value of 10% of the iodine in the containment atmosphere (2-1/2% of the core inventory based on TID-14844) has been adopted by DRL as a realistic upper limit for the fraction in the form of organic iodides. This is based both on an extensive literature examination of available data, as well as on a theoretical evaluation of all applicable formation mechanisms. The removal of organic iodides by an alkaline spray solution has been shown to be negligible and no reduction is credited in this analysis. Impregnated charcoal appears promising for this application and, when used in a suitably designed recirculating system, could possibly effect the required reduction over the extended time period.

CROSS-REFERENCE *(Name, number, or subject under which this form is filed)*		50 - 286
IDENTIFICATION OF RECORD	DATE	December 18,1968
	TO	
	FROM	
	BRIEF SUMMARY OF CONTENTS	Proposed independent measurements program (IMP) for the consolidated Edison Company's Indian Point Reactor
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