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Docket No. 50-346 JAN 5 1977

MEMORANDUM FOR: J. F. Stolz, Chief, Light Water Reactors Branch No. 1, DPM

FROM: D. F. Bunch, Chief, Accident Analysis Branch, DSE

SUBJECT: REVISED DAVIS BESSE UNIT NO. 1 DBA DOSES

PLANT NAME: Davis Besse Unit No. 1
LICENSING STAGE: OL
DOCKET NUMBER: 50-346
MILESTONE NUMBER: 27-31
RESPONSIBLE BRANCH: LWR #1; L. Engle, LPM
REQUESTED COMPLETION DATE: N/A
REVIEW STATUS: Review Continuing

Attached are the revised Davis Besse Unit No. 1 design basis accident doses which are based on the two years of meteorological data provided by the applicant. Revised X/Q values were provided by HMB on December 13, 1976. The 0-2 hour site boundary X/Q value remains unchanged while the 0-30 day LPZ values are reduced by roughly a factor of .85 from those used in our previous analysis. These LOCA doses are based on the 802 second positive pressure period as provided by the LPM and D. Pickett of CSB on January 3, 1977. If the positive pressure period was further increased to 840 seconds, the site boundary thyroid doses would be about 8 rem higher.

This evaluation was provided by C. Ferrell, Site Analyst, Section B, Accident Analysis Branch.

/S/
D. F. Bunch, Chief
Accident Analysis Branch
Division of Site Safety and
Environmental Analysis

Enclosure:
Revised Davis Besse Unit No. 1 DBA Doses

MEMO

OFFICE	AAB:DSE	AAB:DSE	AAB:DSE			
SURNAME	CFerrell/bm	LSoffer	DFBunch			
DATE	1/3/77	1/4/77	1/5/77			

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TABLE 15.1

ASSUMPTIONS USED TO ESTIMATE RADIOLOGICAL CONSEQUENCES DUE TO A POSTULATED LOSS OF COOLANT ACCIDENT AT DAVIS BESSE UNIT 1

Power level, megawatts thermal	2772
Operating time, years	3
Primary Containment Leak Rate, percent per day	0.5 to 24 hours 0.25 greater than 24 hours
Fraction of Core Inventory Available for Leakage from Containment:	
Noble Gases	100 percent
Iodine	25 percent
Bypass Leakage Fraction, percent of Primary Containment Leak Rate	
0-802 sec.	100.
802 sec. to 30 days	3.
Primary Containment Free Volume, cubic feet	2.834×10^{6}
Iodine Form Fractions, percent	
Elemental	91
Particulate	5
Organic	4
Filter Efficiencies for Iodine Forms, percent	
Elemental	95
Particulate	90
Organic	95
Spray Removal Rates, per hour	
Elemental (Effective to 1.1 hours)	0.5
Particulate	0.2
Relative Concentrations, seconds per cubic meter	
0-2 hours at 732 meters	2.2×10^{-4}
0-8 hours at 3200 meters	8.2×10^{-6}
8-24 hours at 3200 meters	5.7×10^{-6}
24-96 hours at 3200 meters	2.6×10^{-6}
96-720 hours at 3200 meters	8.0×10^{-7}

TABLE 15.2

HYDROGEN PURGE DOSE

The assumptions used to calculate the low population zone doses due to post-loss-of-coolant accident hydrogen purging are:

Power Level: 2772 megawatts thermal

Containment Volume: 2.83×10^6 cubic feet

Purge Time: 30 days

Holdup Time Prior to Purging: 24 days

Purge Rate: 47 cubic feet per minute

Charcoal Filter Efficiency of 95 percent and 95 percent for Elemental and Organic Iodine, respectively

X/Q Value: 4-30 days (8.0×10^{-7} seconds per cubic meter)

Estimated Consequences

LPZ	Doses, Rem	
	Thyroid	Whole Body
	11	< 1

TABLE 15.3

ESTIMATED LOSS OF COOLANT ACCIDENT DOSE RESULTS

	Doses, Rem	
	Thyroid	Whole Body
Exclusion Area Boundary		
0-802 sec	163.6	1.73
802 sec - 2 hrs.	115.8	4.68
	279.4	6.41
LPZ		
0-802 sec.	6.08	.064
802 sec - 8 hrs.	10.56	.410
8-24 hours	3.76	.110
1-4 days	3.38	.027
4-20 days	2.74	.013
	26.52	.624

TABLE 15.4

ASSUMPTIONS FOR STEAM LINE BREAK & STEAM GENERATOR TUBE RUPTURE ACCIDENTS

. Core Power Level	2772 MWt
. 2-hour relative concentration at exclusion boundary	2.2×10^{-4} seconds per cubic meter
. Iodine water/steam decontamination factor	10
. Source spike factor after accidents	500
. Iodine and noble gases fuel activity in gaps	10 percent
. percent fuel with clad failures after rod ejection accident	28 percent
. percent fuel reaching initiation of melting	0 percent
. Coolant equilibrium concentrations as limited by Technical Specifications*	
Reactor Coolant, Iodine-131 Equivalent without Iodine spike	1.0 microcuries per gram
Reactor Coolant, Iodine-131 Equivalent with Iodine spike at 2827 megawatts thermal	60.0 microcuries per gram
Reactor Coolant, Noble Gases	100/$\bar{E}$ microcuries per gram
Secondary Coolant, Iodine-131 Equivalent	0.1 microcuries per gram

*All releases through Secondary System

TABLE 15.6

DOSE RESULTS FOR STEAM LINE BREAK, STEAM GENERATOR TUBE RUPTURE AND CONTROL ROD EJECTION ACCIDENTS

DOSES	THYROID (REM) (732 METERS)	WHOLE BODY (REM) (732 METERS)
Tube Rupture Accident	1.5	less than 1.0
Tube Rupture Accident with Coincident Iodine Spike	12.0	less than 1.0
Steam Line Break	less than 1.0	less than 1.0
Loss of Offsite Power	less than 1.0	less than 1.0
Loss of Offsite Power with Coincident Iodine Spike	less than 1.0	less than 1.0
Rod Ejection Accident		
Case I*	4	less than 1.0
Case II**	34	less than 1.0
Rod Ejection Accident (0-8 hour Low Population Zone Relative Concentration Value 8.2×10^{-6} seconds per cubic meter)	2.0	less than 1.0
Rod Ejection Accident (8-24 hour Low Population Zone Relative Concentration Value 5.7×10^{-6} seconds per cubic meter)	less than 1.0	less than 1.0

*Releases through the containment.
**Releases through the secondary system.

TABLE 15.7

ASSUMPTIONS FOR AND CONSEQUENCES OF A POSTULATED FUEL HANDLING ACCIDENT

Power Level	2772 Megawatts-thermal
Power Peaking Factor	1.7
Operating Time	3 years
Number of Rods Failed	208
Number of Rods in Core	38,816
Fraction of Inventory in Gap:	
Noble Gases	10 percent
Iodines	10 percent
Effective Iodine Decontamination Factor in Pool	100
Filter Efficiencies:	
Elemental Iodine	90 percent
Organic Iodine	70 percent
Iodine Fractions Leaving Pool	
Elemental	75 percent
Organic	25 percent
Shutdown Time	72 hours
Q/X Relative Concentration Values	
0 - 2 hours at 732 meters	2.2×10^{-4} seconds per cubic meter
0 - 2 hours at 3200 meters	8.2×10^{-6} seconds per cubic meter

Estimated Consequences:

	Dose, rem	
	Thyroid	Whole Body
Exclusion Area Boundary (732 meters)	9	less than 1
Low Population Zone Boundary (3200 meters)	less than 1	less than 1

TABLE 15.8

ASSUMPTIONS FOR AND CONSEQUENCES OF
A POSTULATED GAS DECAY TANK ACCIDENT

Gas Decay Tank Rupture

The assumptions used to calculate the offsite doses from a gas decay tank rupture were:

(1) Gas decay tank contains one complete primary coolant loop inventory of noble gases resulting from operation with 1 percent failed fuel (94,000 curies of noble gases).

(2) The release is complete within 2 hours.

(3) Meteorological assumptions are the same as for the loss-of-coolant accident.

	Dose, Rem	
Estimated Consequences:	Thyroid	Whole Body
Exclusion Area Boundary (732 meters)	Negligible	< .1
Low Population Zone (3200 meters)	Negligible	< 1