

**Consumers  
Power  
Company**

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General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

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Mr James G Keppler  
Office of Inspection and Enforcement  
Region III  
US Nuclear Regulatory Commission  
799 Roosevelt Road  
Glen Ellyn, IL 60137

DOCKET 50-255 - LICENSE DPR-20 -  
PALISADES PLANT - 1978 RADIOLOGICAL  
ENVIRONMENTAL MONITORING REPORT

Attached are the results of the 1978 Radiological Environmental Monitoring  
Program as required by Technical Specification 6.9.3.1.B.

David P Hoffman (Signed)

David P Hoffman  
Assistant Nuclear Licensing Administrator

CC: Director, Office of Nuclear Reactor Regulation  
Director, Office of Inspection and Enforcement

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1978 ENVIRONMENTAL MONITORING REPORT

PALISADES NUCLEAR PLANT

CONSUMERS POWER COMPANY

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## A. RADIOLOGICAL

### 1. Introduction

The data obtained by analysis of samples, taken during 1978, has been evaluated to determine if any increases in radioactivity levels in the environment are attributable to plant operation. A summary of the data is presented in Table A-1. Figure A-1 and Table A-2 provide the locations of the sampling stations. Statistical analyses of the data show that, with the exception of tritium at the plant discharge (see 2(b) below), there has been no detectable increase in radioactivity levels of environmental media that can be attributed to plant effluents.

### 2. Discussion and Interpretation of Results

#### (a) Air Samples

No significant increase above concurrent background was observed at the air particulate sampling locations. However, gross beta concentrations in air particulate filters did begin to increase at all sampling stations in late March. The increases observed are believed to be due to worldwide meteorological processes which produce increased amounts of fallout from atmospheric nuclear weapons explosions.

No significant iodine-131 activity was observed above the minimum detectable level. This is consistent with expected results based on actual plant effluents and site meteorology.

#### (b) Lake Water

Monthly composite samples show no significant difference in gross beta concentrations between the two sampling locations. All gross beta concentrations were less than 6 pCi/l. Tritium concentrations ranged from 46 to 4700 pCi/l. Six discharge samples showed tritium concentrations greater than concurrent background. The difference in tritium levels between intake and discharge were statistically significant at  $p < 0.05$ . A comparison of calculated discharge concentrations based on effluent data and net measured discharge concentration is presented below.

Collection Period	Net Measured Discharge Tritium Concentration pCi/l	Calculated Discharge Tritium Concentration pCi/l
January	3910 ± 410	3246
June	650 ± 160	712
July	890 ± 160	1538
August	2050 ± 240	1905
November	1600 ± 215	1763
December	4400 ± 580	2874

The calculated exposure to a resident of South Haven from these six concentrations is estimated to be approximately 0.0001 mrem. Samples collected from the drinking water supply showed no significant increase in tritium activity.

(c) Drinking Water

Monthly composite samples of treated and untreated South Haven municipal water showed only background activity present. Gross beta activity ranged from less than 1 to 5 pCi/l. Tritium activity (treated water only) ranged from less than 100 to 560 pCi/l.

(d) Well Water

Monthly grab samples do not indicate any significant differences in gross beta concentrations among the three sampling locations. Concentrations ranged from less than 1 pCi/l to 10 pCi/l.

(e) Milk

Strontium-90 and cesium-137 were the only radionuclides detectable in milk samples collected during the year. Concentrations of these two isotopes are consistent with concurrent background.

(f) Sediment and Crops

Radioactivity in lake bottom sediment and crop samples collected throughout the year is consistent with previous years data including preoperational survey data.

(g) Gamma Dose

Thermoluminescent dosimeters are used to monitor the levels of gamma radiation in the vicinity of the site. No significant differences in radiation levels were observed among the various sampling locations.

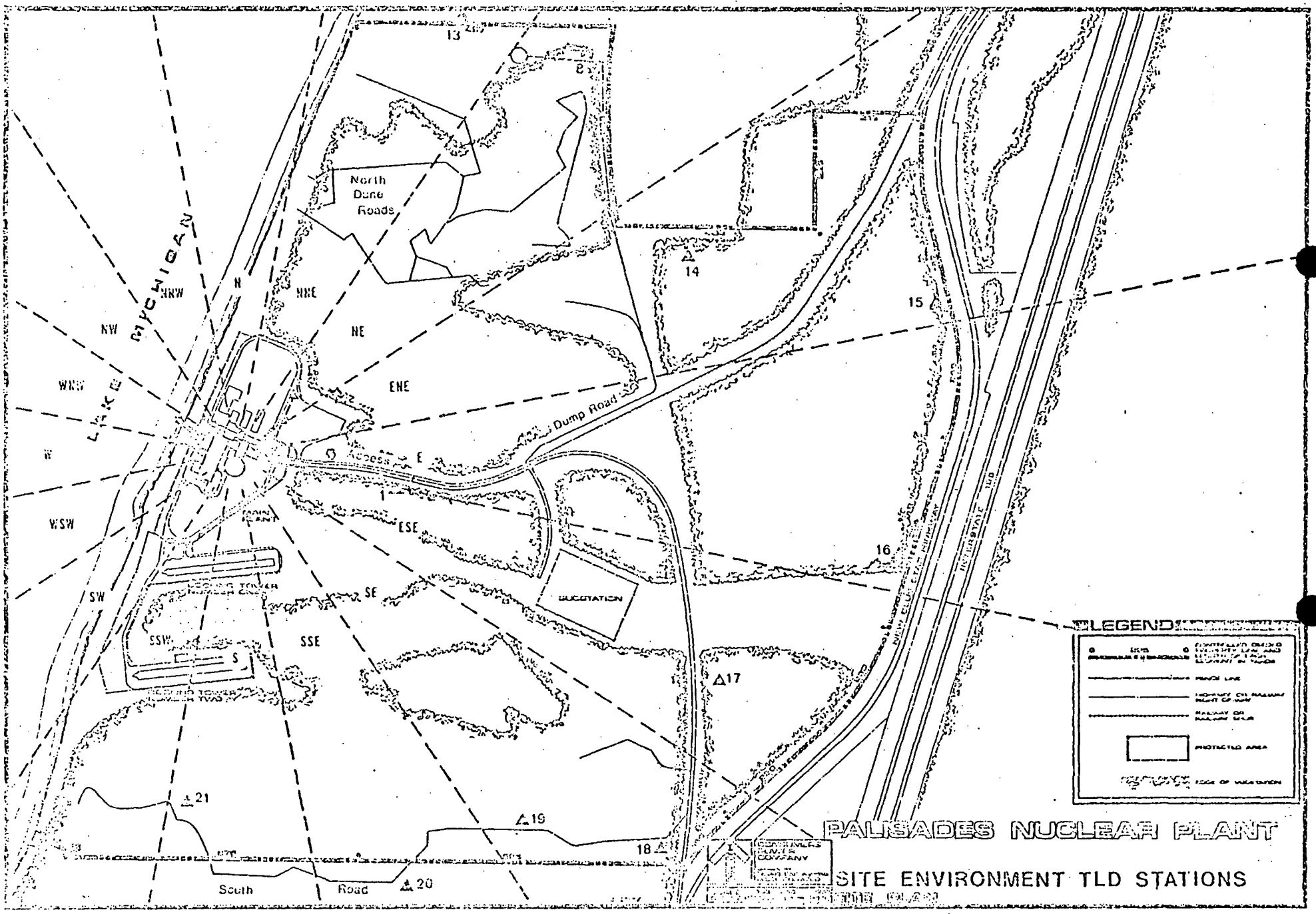
3. Sampling Summary

For each media sampled, Table A-3 lists the sampling locations and the total number of samples collected. A listing of the highest, lowest and average concentrations for the sampling location with the highest average concentration is presented in Table A-4.

#### 4. Environmental Dose Estimates

Levels of radioactive materials in environmental media do not indicate the likelihood of public exposure in excess of 5% of those that would result from continuous exposure to the concentration values listed in Appendix B, Table II, 10CFR20.

FIGURE 1



**LEGEND**

- SITES
- UNDEVELOPED OR DISCONTINUED SITES
- FENCE LINE
- HIGHWAY OR RAILWAY RIGHT OF WAY
- RAILWAY OR RAILWAY RIGHT OF WAY
- ▭ PROTECTED AREA
- ⋯⋯⋯ EDGE OF VEGETATION

PALISADES NUCLEAR PLANT

SITE ENVIRONMENT TLD STATIONS

CONSOLIDATED  
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TABLE A-1  
ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY  
PALISADES NUCLEAR PLANT, DOCKET NO DPR-20  
 VAN BUREN COUNTY, MICHIGAN, JANUARY 1, 1978 TO DECEMBER 31, 1978

Medium or Pathway Sampled (Unit of Measurement)	Analysis and Total Number of Analyses Performed	Lower Limit or Detection (a) (LLD)	All Indicator Location Mean <sup>(c)</sup> Range <sup>(b)</sup>	Location With Highest Annual Mean		Control Locations Mean <sup>(c)</sup> Range <sup>(b)</sup>	Number Nonrout Report Measurements	
				Name Distance and Direction	Mean <sup>(c)</sup> Range <sup>(b)</sup>			
Air (pCi/m <sup>3</sup> )	Gross Beta	624	0.01	0.13 (447/468) (0.01-0.83)	Dowagiac 30 Miles SSE	0.14 (50/52) (0.04-0.32)	0.13 (133/147) (0.01-0.32)	None
	I-131	624	0.02	< LLD	Grand Rapids 55 Miles NNE	0.03 (1/52) (0.03-0.03)	0.03 (1/156) (0.03-0.03)	None
Lake Water (pCi/l)	Gross Beta	24	1.0	2.7 (11/12) (2-6)	Plant Intake	3.8 (11/12) (2-6)	3.8 (11/12) (2-6)	None
	Gross Alpha	24	1.0	1.5 (2/12) (1-2)	Plant Discharge	1.5 (2/12) (1-2)	2.0 (1/12) (2-2)	None
	Tritium	24	100.0	1411 (12/12) (56-4700)	Plant Discharge	1411 (12/12) (56-4700)	236 (12/12) (46-350)	None
Drinking Water (pCi/l)	Gross Beta	24	1.0	3.1 (20/24) (1-5)	South Haven Rav 5 Miles N	3.3 (10/12) (1-5)	None	None
	Tritium	12	100.0	295 (11/12) (83-560)	South Haven Treated 5 Miles N	295 (11/12) (83-560)	None	None
Well Water (pCi/l)	Gross Beta	36	1.0	3.4 (27/36) (1-10)	State Park 1 Mile N	5.2 (9/12) (2-10)	None	None
Milk (pCi/l)	I-131	50	0.5	0.5 (2/39) (0.4-0.5)	SDF 8 Miles NNE	0.5 (1/13) (0.5-0.5)	< LLD	None
	Sr-89	50	5.0	3.0 (1/39) (3-3)	HS 5 Miles SE	3.0 (1/13) (3-3)	< LLD	None
	Sr-90	50	1.0	6.3 (39/39) (3-17)	HS 5 Miles SE	8.1 (13/13) (3-13)	4.5 (10/11) (2-8)	None
	Cs-137	50	1.0	4.7 (35/39) (2-7)	HS 5 Miles SE	5.5 (13/13) (3-7)	6.1 (11/11) (2-10)	None
	Other Gamma Emitters	50	1.0	< LLD	-	-	< LLD	None
Gamma Dose <sup>(f)</sup> (mR/Day)	TLD (Monthly)	248	1	6.7 (213/213) (3.8-11.2)	RB 4.75 Miles NE	7.8 (12/12) (4.4-11.2)	6.7 (35/36) (3.6-10.6)	None
	TLD (Quarterly)	82	1	14.6 (69/69) (10.9-20.0)	RB 4.75 Miles NE	16.9 (4/4) (15.1-20.0)	13.9 (12/12) (10.0-17.5)	None
Crops (pCi/g Wet)	Gross Beta	12	1.0	1.3 (6/12) (1-2)	(d)	2 (1/1) (2-2)	None	None
	Sr-89	12	0.025	< LLD	-	-	None	None
	Sr-90	12	0.005	0.016 (7/12) (0.006-0.034)	PR (Pears) 3 Miles E	0.034 (1/1) (0.034-0.034)	None	None
	Cs-137	12	0.08	< LLD	-	-	< LLD	None
	Co-60	12	0.05	< LLD	-	-	< LLD	None
	Other Gamma Emitters	12	0.1	< LLD	-	-	< LLD	None
Sediment (pCi/g Dry)	Gross Beta	8	1.0	1 (2/6) (1-1)	(e)	1 (1/2) (1-1)	< LLD	None
	Sr-89	8	0.025	< LLD	-	-	< LLD	None
	Sr-90	8	0.005	< LLD	-	-	< LLD	None
	Cs-137	8	0.08	0.08 (1/6) (0.08-0.08)	Plant Discharge	0.08 (1/8) (0.08-0.08)	< LLD	None
	Co-60	8	0.05	< LLD	-	-	< LLD	None
	Other Gamma Emitters	8	0.1	< LLD	-	-	< LLD	None

(a) Nominal lower limit of detection (LLD) as defined in HASL-300 (Rev 8/73), Pages D-03-01, 02 and 03.

(b) Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses.

(c) Nonroutine reported measurements are defined in Section 6.9.3.2.

(d) Locations: TH (peaches), 5 miles SSE; JS (grapes), 3.5 miles ESE.

(e) Locations: Discharge within 500 feet of the discharge; site boundary, 0.5 mile south.

(f) Includes transit dose which averages approximately 2.4 mR.

TABLE A-2  
Sampling Locations  
 Palisades Nuclear Plant

Station	Code	Location	Sample							
			Air Particulates	Air Iodine	Lake Water	Well Water	Milk	Crops	Sediment	TLD
1	ST	Palisades Nuclear Plant	X	X	X	X			X	X
2	TH	Tower Hill Farms RR 3, Coloma, Michigan 5 Miles SSE	X	X				X		X
3	HS	Herbert Soberberg RR 1, Covert, Michigan 5 Miles SE	X	X			X	X		X
4	JS	Jerry Sarno RR 1, Covert, Michigan 3-1/2 Miles ESE	X	X				X		X
5	PR	Paul Rude RR 1, Covert, Michigan 3 Miles E	X	X				X		X
6	RB	Richard Bus RR 3, South Haven, MI 4-3/4 Miles NE	X	X				X		X
7	SD	Serman Dairy South Haven, Michigan 7-1/2 Miles NNE	X	X						X
7A	SDF	Serman Dairy Farm South Haven, Michigan 8 Miles NNE					X			
8	SP	State Park, 1 Mile N	X	X		X				X
9	TP	Covert Township Park 1-1/2 Miles S	X	X		X				X
10	GR	Grand Rapids, Michigan 55 Miles NNE	X	X						X
11	KZ	Kalamazoo, Michigan 35 Miles E	X	X			X			X
12	DG	Dowagiac, Michigan 30 Miles SSE	X	X						X
	SH	South Haven, Michigan			X			X		
	AK	Alan Karr RR 2, Covert, Michigan 5-1/2 Miles ESE					X			



TABLE A-3  
PALISADES NUCLEAR PLANT  
 JANUARY 1, 1978 TO DECEMBER 31, 1978  
 SAMPLING AND ANALYSIS SUMMARY

<u>Medium</u>	<u>Description</u>	<u>Location</u>	<u>Number of Samples Collected</u>	<u>Type of Analysis</u>	<u>Frequency of Analysis</u>
Air	Continuous at Apx 1 CFM	All	624	Gross Beta, I-131	Weekly
Lake Water	1 Gallon Composite	Intake, Discharge	24	Gross Beta, Gross Alpha, Tritium	Monthly
Drinking Water	1 Gallon Composite	South Haven	24	Gross Beta, Tritium	Monthly
Well Water	1 Gallon Grab	Site, TP, SP	36	Gross Beta	Monthly
Milk	1 Gallon Grab	SDF, KZ, HS, AK	50	I-131, Sr-89 and Sr-90, Isotopic	Monthly
Gamma Dose	Continuous	All	248 82	TLD Dose	Monthly Quarterly
Crops	Grab	ST, TH, JS, PR, RB	12	Gross Beta, Isotopic, Sr-89 and Sr-90	When Available
Sediment	Grab	Discharge, N & S Site Boundary 5 Miles North	8	Gross Beta, Isotopic, Sr-89 and Sr-90	When Available

TABLE A-4  
PALISADES NUCLEAR PLANT  
JANUARY 1, 1978 TO DECEMBER 31, 1978  
HIGH, LOW AND AVERAGE CONCENTRATIONS  
FOR HIGHEST AVERAGE SAMPLING LOCATION

Medium	Type of Analysis	Location	High	Low	Average <sup>(6)</sup>
Air	Gross Beta I-131(1)	DG (30 Mi SSE)	0.82 pCi/m <sup>3</sup>	0.04 pCi/m <sup>3</sup>	0.14 pCi/m <sup>3</sup> (2)
		GR (55 Mi NNE)	0.03 pCi/m <sup>3</sup>	< MDL	
Lake Water	Gross Beta <sup>(1)</sup>	Plant Intake	6 pCi/l	< MDL	3.6 pCi/l
	Gross Alpha(1)	Plant Discharge	2 pCi/l	< MDL	(2)
	Tritium	Plant Discharge	4700 pCi/l	56 pCi/l	1411 pCi/l
Drinking Water	Gross Beta <sup>(1)</sup>	South Haven Raw	5 pCi/l	< MDL	2.9 pCi/l
	Tritium <sup>(1)</sup>	South Haven Treated <sup>(5)</sup>	560 pCi/l	< MDL	279 pCi/l
Well Water	Gross Beta <sup>(1)</sup>	State Park (1 Mi N)	10 pCi/l	< MDL	4.2 pCi/l
Milk	I-131 <sup>(1)</sup>	SDF (8 Mi NNE)	0.5 pCi/l	< MDL	(2)
	Sr-89(1)	HS (5 Mi SE)	3 pCi/l	< MDL	(2)
	Sr-90	HS (5 Mi SE)	13 pCi/l	3 pCi/l	7.7 pCi/l
	Cs-137(1)	HS (5 Mi SE)	7 pCi/l	3 pCi/l	5.5 pCi/l
	Other Gamma Emitters <sup>(1)</sup>	All	< MDL	< MDL	< MDL
Gamma Dose	TLD (Monthly) <sup>(7)</sup>	RB (4.75 Mi NE)	11.2 mR/Mo	4.4 mR/Mo	7.3 mR/Mo
	TLD (Quarterly) <sup>(7)</sup>	RB (4.75 Mi NE)	20.0 mR/Qtr	15.1 mR/Qtr	16.9 mR/Qtr
Crops <sup>(3)</sup>	Gross Beta <sup>(1)</sup>	All	2 pCi/g	< MDL	1.2 pCi/g
	Sr-89 <sup>(1)</sup>	All	-	-	< MDL
	Sr-90 <sup>(1)</sup>	All	0.034 pCi/g	< MDL	0.013 pCi/g
	Gamma Emitters <sup>(1)</sup>	All	< MDL	< MDL	< MDL
Sediment <sup>(4)</sup>	Gross Beta <sup>(1)</sup>	Plant Discharge S Site Boundary	1 pCi/g (Dry)	< MDL	(2)
	Sr-89 <sup>(1)</sup>	All	< MDL	< MDL	< MDL
	Sr-90 <sup>(1)</sup>	All	< MDL	< MDL	< MDL
	Co-60 <sup>(1)</sup>	All	-	-	< MDL
	Cs-137 <sup>(1)</sup>	Plant Discharge	0.08 pCi/g	< MDL	(2)

NOTES:

- (1) Minimum detectable level (MDL) = air, I-131 0.02 pCi/m<sup>3</sup>; water, gross beta 1.0 pCi/l, gross alpha 1.0 pCi/l, H-3 100 pCi/l; milk, I-131 0.5 pCi/l, Sr-89 5.0 pCi/l, gamma isotopic 1.0 pCi/l; crops and sediment, gross beta 1.0 pCi/g, Sr-89 0.025 pCi/g, Sr-90 0.005 pCi/g, gamma isotopic 0.05 pCi/g; some samples may have higher MDLs due to sample size, shipping delays or statistical phenomenon.
- (2) Numerous samples contained less than MDL; therefore, a meaningful average cannot be calculated.
- (3) Samples collected monthly in season.
- (4) Two samples per location.
- (5) Tritium analysis performed on South Haven treated only.
- (6) All "less than" (<) numbers are assumed to be "equal to."
- (7) Includes transit dose which averages approximately 2.4 mR.