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10 CFR 50, Appendix I

U.S. Nuclear Regulatory Commission
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT
2001 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

Attached is the Palisades Plant Annual Radiological Environmental Operating Report. This report was prepared in accordance with the requirements of 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, IV.C, and Technical Specification 5.6.2. The period covered by the attached report is January 1, 2001, through December 31, 2001.

SUMMARY OF COMMITMENTS

This letter contains no new commitments and no revisions to existing commitments.

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Attachment
Enclosures

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ATTACHMENT

**NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255**

May 2002

**2001 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
JANUARY 1, 2001 THROUGH DECEMBER 31, 2001**

162 pages follow

PALISADES NUCLEAR PLANT

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I. INTRODUCTION

The 2001 Palisades Nuclear Plant Annual Radiological Environmental Operating Report provides a summary and data interpretation of the Palisades Radiological Environmental Monitoring Program as conducted during the 2001 reporting period. This report was prepared in accordance with the requirements of 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, IV.C, and Technical Specification 5.6.2.

Detailed sample station identification and location information can be found in Attachment 2 of Health Physics Procedure HP 10.10 (Enclosure C). The results of all environmental samples collected are evaluated as follows:

- A. Air iodine and particulate, and thermoluminescent dosimetry (TLD) (monthly, quarterly and annual) data were statistically evaluated at the 95% confidence level. The data was compared against two criteria. The first criterion is the statistical difference, which indicates whether the sample results from near sites are greater than those from control sites, and whether or not the difference is significant. The second criterion is the evaluation level (twice the statistical difference), which is the minimum difference in the population means for which a corresponding difference in sample means will exceed the statistical difference with 95% confidence. If the evaluation level is exceeded, then correlation of the results with effluent releases is done.

- B. Well water, lake water, sediment, fish, and other aquatic biota samples were evaluated using data means comparisons against an appropriate control location (if available) and Palisades Offsite Dose Calculation Manual, Appendix A, limits.

II. NON-ROUTINE REPORTS

No non-routine reportable events occurred during this reporting period.

III. DISCUSSION AND INTERPRETATION OF RESULTS

A. Air Samples

A total of 626 air samples were collected and analyzed for I-131, and 625 air samples were collected and analyzed for gross beta. During the year, one of the particulate filters was lost in the handling process and was not

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analyzed. In addition, one sample was not collected due to equipment problems. Refer to Enclosure A for all sample collection anomaly evaluations.

Air iodine/particulate samples are collected on a weekly basis from twelve air sampling locations. Air is metered into the sampling unit at a continuous one cubic foot per minute flow rate (approximately) through a Gelman 47mm air filter (air particulate) and a HI-Q air iodine cartridge. Both filters are in-line with each other and housed within the same filter holder. Weekly samples are sent to Environmental, Inc., Midwest Laboratory for analysis.

Comparison of the airborne particulate sample data between the nine near-site indicator locations, and the three control locations, did not exceed the statistical difference. In many instances, control location sample values were greater than indicator location samples. The mean values of gross beta results for indicator and control locations were identical at 0.028 pCi/m^3 . When rounding to 5 significant numbers, the control station's results of 0.02777 pCi/m^3 are slightly higher than indicator station's results at 0.02771 . In 2001, station 11-KZ had the highest annual mean for gross beta results at 0.029 pCi/m^3 . This is a control station located 35 miles east of the site. Overall, gross beta results are trending slightly higher for both indicator and control stations when compared to previous years. No sample analyses identified I-131 activity above minimum detectable levels.

B. Lake Water

Palisades Lake-in, South Haven Municipal, and Ludington Lake-in water samples are collected daily for composite into a monthly sample. One gallon of Palisades Lake-in water, and Ludington Lake-in water, and two gallons each of South Haven Municipal treated and raw water are sent to Environmental, Inc., Midwest Laboratory for analysis. No treatment of the water samples with preservative is required.

A total of 36 individual monthly lake water composite samples were collected from three locations during 2001. Lake water samples from the indicator locations, Palisades Lake-in (1-ST Intake), South Haven Municipal Water system intake (25-SH Raw water), and the control location Ludington Lake-in (32-LP Intake), were collected daily.

Evaluation of the monthly lake water analytical results was based on a

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data means comparison between the indicator locations and control location. The results were also evaluated against the Palisades ODCM, Appendix A, reporting limits.

Gross beta analyses were completed for all lake water samples. The mean values for gross beta indicators and controls were 2.2 pCi/L and 2.0 pCi/L, respectively. Tritium was detected in two indicator samples and one control sample at an average of 192 pCi/L, and 179 pCi/L, respectively. No trends in gross beta results are discernable when compared to previous years sample results.

Although the Lake-out (discharge) sample was not used as an indicator in the Radiological Environmental Monitoring Program, it is monitored for activity. Monthly gross alpha and tritium results from the Palisades Lake-in were used for comparison data against the Lake-out (discharge) sample results. Gross alpha was detected in several Lake-out and Lake-in samples at slightly above minimum detectable activity levels. On six occasions during 2001, tritium activity was detected in the discharge monthly samples. Four of these elevated levels were all correlated to liquid effluent releases and were confirmed by comparison to calculated effluent tritium concentrations. The other two samples were at minimum detection levels.

C. Drinking Water

Water samples from South Haven Municipal Water System (25-SH Raw Water, 25-SH Treated), and Ludington Lake-in (32-LP Intake), are collected daily for composite into a monthly sample. One gallon of Ludington Lake-in water, and two gallons each of South Haven Municipal treated and raw water are sent to Environmental, Inc., Midwest Laboratory for analysis. No treatment of water samples with preservative is required.

A total of 36 individual monthly drinking water samples were collected from the three locations in 2001.

Evaluation of the drinking water analytical results was based on a data means comparison between the indicator locations and the control location, as well as a comparison to the Palisades ODCM reporting limits. Both of the South Haven Municipal lake water intake and treated drinking water samples require gross beta analyses. A tritium analysis is required for the treated water only. The gross beta mean values for the indicator and control locations were 2.2 pCi/L and 2.0 pCi/L, respectively. Tritium

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was only detected in one control sample at 179 pCi/L in 2001.

D. Well Water

The Palisades site well (1-ST) location is collected daily and composited into a monthly sample. The other eight well locations consist of monthly grab samples.

Well water samples consisting of two one-gallon quantities for each well are sent to Environmental, Inc., Midwest Laboratory for analysis (Ludington control station consists of one one-gallon sample). No treatment of the water samples with a preservative is necessary.

A total of 108 monthly well water samples were collected from nine locations during 2001. Evaluation of the well water analytical results was based on a data means comparison between the six indicator locations (1-ST, 39-ST, 40-ST, 41-ST, 42-ST and 43-ST) and the three control locations (8-SP, 9-TP, and 32-LP), as well as with the Palisades ODCM reporting limits.

Tritium and gross beta analyses were completed for all well water samples. The gross beta means for indicator and control locations were 3.8 pCi/L and 1.7 pCi/L, respectively. No trends in gross beta results are discernable when compared to previous years sample results. Tritium was detected in five indicator samples at a mean value of 266 pCi/L, and two control samples at a mean value of 176 pCi/L.

The site well 1-ST had four out of the five positive results for tritium for indicator stations, with an average of 273 pCi/L. The Lower Limit of Detection (LLD) required for tritium is 500 pCi/L, the action level is 1000 pCi/L, and the reporting level is 20,000 pCi/L. During 2001, three additional well samples were collected directly from well number 17, which supplies the Domestic Storage Tank (well 1-ST). One of these samples showed tritium at 193 pCi/L, which is just above the minimum detectable activity level. During 2002, a Work Order is scheduled to look at the Domestic Storage Tank heat exchanger for a possible tube leak, which could potentially cause cross contamination.

Evaluation of the gross beta activity between indicator and control locations revealed a statistical difference, however, in a comparison between wells used for plant drinking water (1-ST, 40-ST) versus the three control samples, the gross beta results were identical at 1.7 pCi/L.

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The difference between indicator and control stations was caused by the Steam Generator storage facility monitoring wells, which had a gross beta average of 5.5 pCi/L.

E. Milk

Milk samples are required monthly (usually collected the first week of the month) from each designated location. Two one-gallon quantities of raw milk (grab sample) are obtained per sample location in order to meet analytical requirements. Each sample quantity is treated with a sodium bisulfite (40 grams per gallon) preservative prior to being sent to Environmental, Inc., Midwest Laboratory.

A total of 48 individual monthly milk samples were collected from four different dairy farms (stations 26-AK, 27-DH, 28-DC and 29-WS) during 2001. The milk samples are obtained as grab samples from dairy milk holding tanks. No milk analysis identified activity above the minimum detectable level.

F. TLDs - Gamma Dose

Environmental gamma doses are measured monthly, quarterly, and annually by placement of three TLD badges per designated location. Each TLD badge contains a 4-zone CaSO_4 wafer (the wafer includes an additional backup/reserve readout zone). Sensitivity for the multi-zone TLDs is 1.0 millirem, with a linear response of 0.1 millirem to 1000 rem.

There were a total of 348 monthly, 116 quarterly, and 29 annual TLDs collected and analyzed during 2001.

The Palisades gamma assessment program consists of twenty-nine locations: one directly on-site, nine near-site and six Steam Generator Storage facility TLDs for a total of sixteen inner ring TLDs; ten outer ring (1.0 to 5.5 miles out); and three control TLDs (30 to 55 miles out). A thirtieth TLD is placed in a lead storage cave and used as a control for in-transit dose monitoring and subtraction.

The monthly and quarterly TLD data evaluations were accomplished by statistically comparing the inner ring TLDs (site boundary locations 1-ST, 13-21 ST and 33-38 ST) and the outer ring TLDs (locations 2-TH through 9-TP, 23-SN25 and 24-SN22) against the control TLD locations (10-GR, 11-KZ, and 12-DG). The annual TLD data evaluation was done by direct

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comparison of data points only. No monthly or quarterly statistical differences were exceeded.

For 2001, the average gamma readings (mR) were:

	<u>Monthly</u>	<u>Quarterly</u>	<u>Annual</u>
Inner ring TLDs (site boundary)	3.9	11.5	41.7
Outer ring TLDs (1.0 to 5.5 miles out)	4.5	13.2	49.1
Control TLD locations	4.2	13.3	48.4

The one on-site TLD location (1-ST) serves as an individual reference TLD; however, it was evaluated along with the inner ring (site boundary) TLDs in the statistical evaluation.

In evaluating the inner ring TLDs to the control TLDs, inner ring 35-ST had the greatest monthly mean value of 4.8 mR, and control station 11-KZ (35 miles east) had the greatest quarterly, and annual mean values of 14.6 mR, and 52.0 mR respectively.

When the same comparison was made for the outer ring TLDs, 2-TH (Tower Hill, 5 miles south) had the greatest monthly, quarterly and annual mean value for any location of 5.4 mR, 16.3 mR, and 58.3 mR, respectively. Overall, the monthly results are trending just slightly higher for indicator and control locations, with a stable trend for the quarterly and annual results.

G. Crops

Food crop samples were collected when available and in season. Two principal area crops, apples and blueberries, are regularly collected. While there are no designated locations where food crops are collected, samples are generally obtained from the same areas where the air monitoring stations are located within the ESE, SE or SSE sectors. The collection of food crops assists in verifying stack effluent deposition patterns. When collected, approximately 1 Kg of sample is placed in a sealable plastic bag for shipment to Environmental, Inc., Midwest Laboratory. No special treatment of the samples with a preservative is necessary.

During 2001, sixteen crop samples were collected from two stations (4-JS, and 5-PR). Evaluation of sample analytical results was direct. There was

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no control location used.

Of the radionuclide analyses listed in Table HP 10.4-2, only gross beta analysis resulted in any detectable activity. The gross beta mean value for the indicator locations was 1.73 pCi/g. The crop samples at station 4-JS had the greatest individual mean value for gross beta activity of 2.01 pCi/g. No trends for gross beta results are discernable when compared to previous years sample results.

H. Sediment

Sediment samples are collected semi-annually from each designated location. No treatment of the samples with a preservative is necessary prior to shipment to Environmental, Inc., Midwest Laboratory.

A total of ten individual sediment samples were collected from five locations during 2001. Eight sediment samples were obtained from Palisades [1-ST discharge, 31-STS (.5 miles south of discharge), 30-STN (.5 miles north of discharge), and 25-SH (South Haven Beach)] locations and two samples from the Ludington Control Station (32-LP).

Evaluation of the sediment analytical results was based on a data means comparison between Palisades and the Ludington control samples, as well as the Palisades ODCM, Appendix A, reporting limits. Of the radionuclide analyses listed on Table HP 10.4-2, only gross beta, and Cs-137 activity were detectable. The gross beta mean values for indicator and control locations were 6.87 pCi/g and 13.51 pCi/g, respectively. The Cs-137 mean values for indicator and control locations were 0.010 pCi/L and 0.016 pCi/L, respectively. The gross beta results for the control station in Ludington are trending up slightly the past several years.

I. Fish

Fish samples are collected semi-annually. Samples consist of two species of commercially and/or recreational important species in the vicinity of the Plant discharge area. One sample of the same species in an area not influenced by Plant discharge is collected. Each one liter quantity of fish sample is prepared for shipment to Environmental, Inc., Midwest Laboratory. Each sample is either frozen or treated with a ten percent formaldehyde solution for preservation.

A total of eight individual fish samples were collected from two locations

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during 2001. Four indicator samples were obtained from Palisades (1-ST discharge) and four control samples from the Ludington Station (32-LP). The same species were collected at both locations during each of the two collection periods.

Evaluation of the fish analytical results was based on a data means comparison between the Palisades and Ludington Control Samples, as well as with the Palisades ODCM reporting limits. The gross beta mean values for indicator and control locations were 2.24 pCi/g and 2.26 pCi/g, respectively. Cs-137 was the only gamma emitter detected, with the means identical for indicator and control stations at 0.041 pCi/L. No trends in gross beta or Cs-137 are discernable when compared to previous year's sample results.

J. Broad Leaf Vegetation

No broad leaf vegetation samples were collected from the surrounding Palisades environs during 2001. The collection of broad leaf vegetation samples serves as a backup and/or alternative sampling media in case any milk sampling location(s) become(s) unavailable. There were no problems associated with the quantity or quality of milk samples for the 2001 reporting year.

K. Non-Routine Samples

No non-routine samples were collected during this reporting period.

L. Gaseous and Liquid Radwaste Effluent Composite Samples

Both the gaseous and liquid radwaste effluent composite samples are collected monthly and sent to Environmental, Inc., Midwest Laboratory for analysis. No special sample treatment with a preservative is required prior to laboratory analysis. The liquid effluent composite sample is based on a specific amount of sample collected per total batch volume release. As noted in Enclosure A, for those months in which there were no liquid batch effluent releases, no sample is sent to Environmental, Inc., Midwest Laboratory. The gaseous radwaste effluent weekly composite sample results are based on analyzing weekly stack gas filters.

Although not a direct reporting component in the Palisades Annual Radiological Environmental Operating Report, results of the gaseous and liquid monthly radwaste effluent composite samples are evaluated against

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overall environmental trending data. This evaluation is the basis for determining isotopic dispersion and deposition patterns within the surrounding environs of Palisades. All gaseous and liquid effluent results are compared to Palisades ODCM, Appendix A, reporting levels. All isotopic LLDs were met.

IV. ASSESSMENT OF PALISADES OPERATION ENVIRONMENTAL IMPACT

In reviewing the 2001 Palisades radiological environmental monitoring data and comparing it to previous operational and pre-operational data, all trending parameters continue to indicate that the operation of Palisades has minimal environmental impact. Most isotopic activity is at environmental background levels. Evidence of an overall environmental isotopic buildup (attributable to Plant effluents) remains negligible as well. In most instances, sample analytical results were below previously established environmental background levels.

Palisades Nuclear Plant, Van Buren County, Mi. Docket 50-255
 Annual Radiological Environmental Operating Report
 January 1 to December 31, 2001
 Table HP 10.4-1
 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> Weekly
Air	Continuous at Weekly @ 1 CFM	1-ST thru 12-DG	626	Gross Beta, I-131	Weekly
Lake Water	1 Gallon Composite	1-ST Intake 25-SH Raw 32-LP Intake	36	Gross Beta, Gross Alpha(1), Tritium(1)	Monthly
Drinking Water	1 Gallon Composite/Grab	25-SH Raw 25-SH Treated 32-LP Intake	36(2,3)	Gross Beta, Tritium(1)	Monthly
Well Water	1 Gallon Grab	1-ST Well, 8-SP, 9-TP, 32-LP Well, 39-ST, 40-ST, 41-ST, 42-ST, 43-ST	108	Gross Beta, Tritium	Monthly
Milk	2 Gallon Grab	26-AK, 27-DH, 28-DC, 29-WS	48	I-131, Cs-137, Cs-134, BaLa-140	Monthly
TLD	Continuous	1-ST thru 24-ST, 33-ST thru 38-ST	348 116 29	Gamma	Monthly Quarterly Annual
Crops	Grab	4-JS, 5-PR,	16	Gross Beta, Cs-137, Other Gamma	In Season
Sediment	Grab	1-ST, 25-SH, 30-STN 31-STs, 32-LP	10	Gross Beta, Cs-137, Other Gamma	Semi-Annual
Fish	Grab	1-ST, 32-LP	8	Gross Beta, Cs-137 Other Gamma	Seasonally

- (1) Not required for 25-SH Raw
 (2) Same 25-SH Raw water samples as Lake Water
 (3) Same 32-LP Intake water samples as Lake Water

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 Table HP 10.4-2
 Sample Data Summary

Medium or Pathway Sampled Unit of Measurement	Analyses Evaluated/ Analyses Performed	Lower Limit of Detection(a)		All Indicator Locations		Location With Greatest Annual Mean		All Control Locations		Nonroutine Reports(c)	
		LLD		Mean(b) Range(b)		Name Distance and Direction	Mean(b) Range(b)	Mean(b) Range(b)			
Air (pCi/m ³)	I-131	626/626	0.07	0/467	LLD	N/A		LLD	0/159	LLD	None
	Gross Beta	625/625	0.01	467/467	0.028 (0.011-0.067)	11-KZ 35 mi E	52/52	0.029 (0.014-0.059)	158/158	0.028 (0.011-0.059)	None
Lake Water (pCi/L)	Gross Alpha(f)	12/12	1.0	3/12	0.73 (0.4-1.4)	1-ST Palisades Plant Site	3/12	0.73 (0.4-1.4)	N/A	N/A	None
	Gross Beta	36/36	4.0	24/24	2.2 (1.6-3.4)	25-SH 5.5 mi NNE	12/12	2.3 (1.7-3.4)	12/12	2.0 (1.0-2.6)	None
	Tritium(f)	24/24	500.0	2/12	192 (186-197)	1-ST Palisades Plant Site	2/12	192 (186-197)	1/12	179	None
Drinking Water (pCi/L)	Gross Beta	36/36	4.0	24/24(1)	2.2 (1.2-3.4)	25-SH 5.5 mi NNE	12/12	2.3 (1.7-3.4)	12/12(2)	2.0 (1.0-2.6)	None
	Tritium(f)	24/24	500.0	0/12	N/A	32-LP 125 mi N	1/12	179	1/12(2)	179	None
Well Water (pCi/L)	Gross Beta	108/108	4.0	68/72	3.8 (1.0-9.1)	42-ST Palisades Plant Site	12/12	7.0 (5.1-9.0)	24/36	1.7 (0.9-4.1)	None
	Tritium	108/108	500.0	5/72	266 (205-338)	1-ST Palisades Plant Site	4/12	273 (205-338)	2/36	176 (150-201)	None
Milk (pCi/L)	I-131	48/48	1.0	0/36	LLD	N/A		LLD	0/12	LLD	None
	Cs-137	48/48	18.0	0/36	LLD	N/A		LLD	0/12	LLD	None
	Other Gamma	48/48	15.0	0/36	LLD	N/A		LLD	0/12	LLD	None

(1) 12 of these indicator samples were from the lake water media indicator location (25-SH Raw).

(2) Control samples were from the lake water media control location (32-LP Intake).

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 Table HP 10.4-2
 Sample Data Summary

Medium or Pathway Sampled Unit of Measurement	Analyses Evaluated/ Analyses Performed	Lower Limit of Detection(a) LLD	All Indicator Locations	Location With Greatest Annual Mean				All Control Locations Mean(b) Range(b)	Nonroutine Reports(c)	
				Name	Distance and Direction	Mean(b) Range(b)	Mean(b) Range(b)			
TLD (gamma mR) Inner Ring (Site Boundary)	TLD(monthly)(e) 228/228	1.0	192/192	35-ST Plant Site	E 12/12	3.9 (2.5-6.3)	4.8 (4.1-6.3)	36/36	4.2 (3.1-6.4)	None
	TLD(quarterly)(e) 76/76	1.0	64/64	11-KZ	35 mi. E 4/4	11.5 (7.5-13.8)	14.6 (13.2-16.0)	12/12	13.3 (11.3-16.0)	None
	TLD(annual) 19/19	1.0	16/16	11-KZ	35 mi. E 1/1	41.7 (38.9-49.9)	52.0	3/3	48.4 (45.3-52.0)	None
TLD (gamma mR) Outer Ring	TLD(monthly)(e) 156/156	1.0	120/120	2-TH	5.6 mi S 12/12	4.5 (3.1-7.2)	5.4 (4.7-7.2)	36/36(3)	4.2 (3.1-6.4)	None
	TLD(quarterly)(e) 52/52	1.0	40/40	2-TH	5.6 mi S 4/4	13.2 (10.4-16.8)	16.3 (15.1-16.8)	12/12(3)	13.3 (11.3-16.0)	None
	TLD(annual) 13/13	1.0	10/10	2-TH	5.6 mi S 1/1	49.1 (43.9-58.3)	58.3	3/3(3)	48.4 (45.3-52.0)	None
Crops	Gross Beta 16/16	1.0	16/16	4-JS	3.5 mi SE 11/11	1.73 (0.67-3.88)	2.01 (0.70-3.88)	N/A		None
	Other Gamma 16/16	0.05-0.10	0/16	LLD	N/A	LLD	LLD	N/A		None
Sediment (pCi/g dry)	Gross Beta 10/10	1.0	8/8	32-LP	125 mi N 2/2	6.87 (4.97-9.39)	13.51 (12.71-14.30)	2/2	13.51 (12.71-14.30)	None
	Cs-137 10/10	0.18	3/8	32-LP	125 mi N 1/2	0.010 (0.008-0.013)	0.016	1/2	0.016	None
	Other Gamma 10/10	0.05-0.15	0/8	LLD	N/A	LLD	LLD	0/2	LLD	None

(3) Same control TLDs as Inner Ring.

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 Table HP 10.4-2
 Sample Data Summary

Medium or Pathway Sampled Unit of Measurement	Analyses Evaluated/ Analyses Performed	Lower Limit of Detection(a) LLD	All Indicator Locations		Location With Greatest Annual Mean		All Control Locations		Nonroutine Reports(c)		
			Mean(b) Range(b)		Name Distance and Direction	Mean(b) Range(b)	Mean(b) Range(b)				
Fish (pCi/g wet)	Gross Beta	8/8	1.0	4/4	2.24 (1.39-3.25)	32-LP 125 mi N	4/4	2.26 (1.76-2.68)	4/4	2.26 (1.76-2.68)	None
	Cs-137	8/8	0.15	3/4	0.041 (0.032-0.046)	1-ST Palisades Plant Site	3/4	0.041 (0.032-0.046)	3/4	0.041 (0.037-0.047)	None
	Other Gamma	8/8	0.10-0.26	0/4	LLD	N/A		LLD	0/4	LLD	None
Broadleaf Vegetation(d) (pCi/g wet)	Gross Beta		1.0	No Samples Collected							
	Cs-137		0.08								
	Other Gamma		0.05-0.10								

- (a) Nominal Lower Limit of Detection (LLD) as defined in MASL-300 (Rev 0/73), pages D-06-01, 02 and 03; Palisades ODCM, Appendix A, Table E-3 and vendor analytical capabilities.
- (b) Mean and range based upon detectable measurements only. Fraction of detectable measurements at specific locations is indicated next to the mean.
- (c) Nonroutine reported measurements are defined in the Palisades ODCM, Appendix A, Section IV.C.
- (d) Supplemental sample when milk is unavailable.
- (e) Monthly TLD results are normalized for 30 days net; Quarterly TLD results are normalized for 91 days net.
- (f) Analysis not required for (25-SH) South Haven Municipal raw water.

Palisades Nuclear Plant, Van Buren County, Mi. Docket 50-255
 Annual Radiological Environmental Operating Report
 January 1 to December 31, 2001
 Table HP 10.4-3
 Greatest Mean Sampling Location

<u>Medium</u>	<u>Type of Analysis</u>	<u>Location</u>	<u>High</u>	<u>Low</u>	<u>Mean</u>
Air (pCi/m ³)	I-131	LLD	-----	-----	<0.07
	Gross Beta	11-KZ 35 mi E	0.059	0.014	0.029
Lake Water (pCi/L)	Gross Alpha	1-ST Palisades Plant Site	1.40	0.40	0.73
	Gross Beta	25-SH South Haven 5.5 mi NNE	3.4	1.7	2.3
	Tritium	1-ST Palisades Plant Site	197	186	192
Drinking Water (pCi/L)	Gross Beta	25-SH South Haven 5.5 mi NNE	3.4	1.7	2.3
	Tritium	32-LP Ludington 125 mi N	179	179	179
Well Water (pCi/L)	Gross Beta	42-ST Palisades Plant Site	9.0	5.1	7.0
	Tritium	1-ST Palisades Plant Site	338	205	273
Milk (pCi/L)	I-131	LLD	-----	-----	<1.0
	Cs-137	LLD	-----	-----	<18.0
	Other Gamma	LLD	-----	-----	<15.0
TLD (Gamma-mR) Inner Ring (Site Boundary)	TLD (Monthly)	35-ST Palisades Plant Site	6.3	4.1	4.8
	TLD (Quarterly)	11-KZ 35 mi E	16.0	13.2	14.6
	TLD (Annual)	11-KZ 35 mi E	N/A	N/A	52.0
TLD (Gamma-mR) Outer Ring	TLD (Monthly)	2-TH 5.6 mi S	7.2	4.7	5.4
	TLD (Quarterly)	2-TH 5.6 mi S	16.8	15.1	16.3
	TLD (Annual)	2-TH 5.6 mi S	N/A	N/A	58.3

Palisades Nuclear Plant, Van Buren County, Mi. Docket 50-255
 Annual Radiological Environmental Operating Report
 January 1 to December 31, 2001
 Table HP 10.4-3
 Greatest Mean Sampling Location

<u>Medium</u>	<u>Type of Analysis</u>	<u>Location</u>	<u>High</u>	<u>Low</u>	<u>Mean</u>
Crops (pCi/g wet)	Gross Beta	4-JS 3.5 mi SE	3.88	0.70	2.01
	Other Gamma	LLD	-----	-----	<0.05-0.10
Sediment (pCi/g dry)	Gross Beta	32-LP Ludington 125 mi N	14.30	12.71	13.51
	Cs-137	32-LP Ludington 125 mi N	0.016	0.016	0.016
	Other Gamma	LLD	-----	-----	<0.05-0.15
Fish (pCi/g wet)	Gross Beta	32-LP Ludington 125 mi N	2.68	1.76	2.26
	Cs-137	1-ST Palisades Plant Site	0.046	0.032	0.041
	Other Gamma	LLD	-----	-----	<0.10-0.26
Broad Leaf Veg (pCi/g wet)	Gross Beta	No Samples Collected			
	I-131				
	Other Gamma				

ENCLOSURE A

**NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255**

**PALISADES NUCLEAR PLANT
2001 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
SAMPLE COLLECTION ANOMALIES**

1 page follows

Enclosure A Sample Collection Anomalies

<u>Sample Affected</u>	<u>Location</u>	<u>Date</u>	<u>Problem</u>	<u>Evaluation</u>
AP- I-131 Beta	ST-7	1-29-01	No samples collected	Station trouble shooting (1)
AP-Beta	ST-11	9-12-01	Laboratory did not receive Particulate Filter for analysis	Sample lost in mail (2)
Liquid Radwaste	Plant Site	Jan, Feb, Apr, July Aug, Sep Oct, Nov	No sample	There were no liquid effluent batch releases during these time periods. Consequently no sample is collected.

- (1) On January 22, 2001, an air meter was found inoperable (not recording) at Station 7-SD. Power at this station was terminated, and the air meter was returned to station for replacement or repair. During the troubleshooting effort on January 23, 2001, it was determined that the air meter was unable to be repaired, and no spare meter was available. Power was not restored to the station at the end of the troubleshooting sequence. Power was restored at the next sampling date of January 29, 2001. This is a one-time event, no action is deemed necessary to prevent recurrence.

- (2) On September 12, 2001, the Iodine cartridge and Particulate filter samples were collected from control station 11-KZ and mailed to the local Environmental Inc. vendor. The local vendor then mailed these samples to the Environmental Inc. Laboratory. During this re-packaging evolution, the particulate filter was misplaced and was not forwarded to the Lab. These samples are now forwarded to the Environmental contact at Palisades Nuclear Plant for packaging and shipment. There has been no recurrence of this event.

ENCLOSURE B

**NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255**

**PALISADES NUCLEAR PLANT
2001 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
PALISADES 2001 LAND USE CENSUS**

8 pages follow

To JL Beer, Palisades

From MLGrogan, Palisades CONSUMERS ENERGY

Date September 20, 2001

Subject PALISADES PLANT - Internal Correspondence
2001 LAND USE CENSUS

CC JLFontaine, Palisades MLG01*007
REMP/RETS File
ERC: LANUSECEN

The attached tables and map are the results of the Palisades Land Use Census conducted by MLGrogan and TAVeal on August 22, 2001. Table 10.11-1 references the distance from Palisades to the nearest residence, garden (greater than 500 square feet), beef/dairy cattle, and goat per meteorological sector. Table 10.11-2 identifies the locations of the nearest residence and garden; and of all beef/dairy cattle and goats within a five (5) mile radius of Palisades per meteorological sector. Table 10.11-3 lists the critical receptor locations used in calculation of the offsite doses by the GASPARG computer program.

There were no changes to critical receptor locations from the 2000 Land Use Survey.

Tables 10.11-1 and 10.11-3 are required to be updated in the ODCM as Tables 1.4 and 1.4a respectively. Attached to this report are the new revisions of Tables 1.4 and 1.4a. The ODCM revision is in progress.

In addition, I requested Air Improvement Resource, Inc. (Dennis Kahlbaum) to run computer code XOQDOQ82, using the 1996 - 2000 met data, in conjunction with the critical receptor, to determine if X/Q values had significantly changed. The following table compares existing data with the results of this run.

Location	Current X/Q (met data 1/92 - 12/96)	Calculated X/Q (met data 1/96 - 12/00)
*Site boundary	2.13E-06	2.17E-06
Residence	1.38E-06	1.62E-06
Garden	5.87E-07	5.72E-07
Beef Cattle	2.14E-07	1.97E-07
Dairy Cow	6.83E-08	6.75E-08
Goat	2.10E-07	2.06E-07

The site boundary X/Q is within 2% of our existing value, and most of the other critical receptors currently used are higher than those calculated with current met data. Based on this we will continue to use the 1992 -1996 meteorological data.

*site boundary data used in all effluent calculations

2001 PALISADES LAND USE CENSUS

TABLE 10.11-1

Distance to the nearest residence, garden, dairy/beef cattle and goat in each sector.

<u>SECTOR</u>	<u>RESIDENCE</u>	<u>GARDEN</u>	<u>BEEF CATTLE</u>	<u>DAIRY COW</u>	<u>GOAT</u>
NNE	1.1 mi	1.7 mi	>5 mi	>5 mi	>5mi
NE	1.2 mi	1.2 mi	2.9 mi	>5 mi	3.2 mi
ENE	1.3 mi	1.6 mi	1.8 mi	>5 mi	>5 mi
E	1.0 mi	2.1 mi	3.5 mi	>5 mi	>5 mi
ESE	1.0 mi	*1.0 mi	4.0 mi	>5 mi	*2.0 mi
SE	1.0 mi	*1.0 mi	2.2 mi	4.3 mi	*2.0 mi
SSE	0.7 mi	1.6 mi	>5 mi	>5 mi	>5 mi
S	0.5 mi	4.0 mi	>5 mi	>5 mi	4.7 mi
SSW	0.7 mi	4.9 mi	>5 mi	>5 mi	>5 mi

* Note: Garden and Farm bisected by ESE/SE boundary line.

2001 PALISADES LAND USE CENSUS

TABLE 10.11-2

Verification of Items

<u>Sector</u>	<u>Location Description</u>	<u>Item</u>	<u>Number/Comment</u>
NNE Ruggles Rd	State Park Manager	Residence	1
NNE 20th	0.1 mile South of Ruggles Rd south side of road)	Garden	1
NE Blue Star Hwy	L. Swetay, Route 3, Box 133 (East side of highway)	Residence Garden	1 1
NE M-140	18847 M-140, .25 miles N of 20th, west side of road	Cattle	5-Beef
NE M-140	C. Bernt, 18019 M-140	Goats	3
NE M-43	M-43, N side of road, between 12th & 16th, (approximately 0.3 mile outside the 5 mile limit)	Goats	20
ENE 24th Ave	Trailer-West 24th Avenue, dead end at sand dune	Residence	1
ENE 24th	SE corner of 76th street and 24th avenue	Garden	1
ENE 72nd	72nd St, 0.3 miles N of 20th (East side of road)	Cattle	12-Beef
ENE 76th	22595 76th St, .3 mi N of 24th, East side of road	Cattle	2-Beef
ENE 69th	380 & 69th, NE corner (.3 miles outside 5 mile limit)	Goat	2

2001 PALISADES LAND USE CENSUS

TABLE 10.11-2

Verification of Items

<u>Sector</u>	<u>Location Description</u>	<u>Item</u>	<u>Number/Comment</u>
E 77th	77th St, Dead end of 77th St near 28th Ave intersection	Residence	1
E 72nd St	C. Mims, 26200 72nd St intersection of 72nd & 26th Ave NW corner	Cattle Garden	3-Beef 1
E 75th	27723 75th, 0.1 mile North of 28th (East side of road)	Garden	1
ESE 77 1/2 St	O. Ashley, 28008 77 1/2th St Northwest corner of 77 1/2th St and 28th Ave intersection	Residence	1
ESE/SE 34th Ave	Herchy House, 72753 34th Ave (South side of road)	Cattle	4-Beef
ESE/SE 30th	Corner of 30th and 76th SE corner	Goats	15
ESE 69th	A. Karr, 69th St 0.5 mile North of 69th St and 30th Avenue intersection	Cattle	20-Dairy Cow
SE/ESE 28th	77550 28th Avenue	Residence Garden	1 1
SE 36th	72401 36th Avenue, 0.2 mile West from 72nd, South side of road	Cattle Goat	8-Beef, 4 Dairy 1
SE 76th	76th Street, 0.3 mi N of 34th (east side of road)	Cattle	11-Beef

2001 PALISADES LAND USE CENSUS

TABLE 10.11-2

Verification of Items

<u>Sector</u>	<u>Location Description</u>	<u>Item</u>	<u>Number/Comment</u>
SE 76th	76th Street, 0.5 mi N of 34th (east side of road)	Cattle	8-Beef
SSE 29th	80119 29th Avenue	Residence	1
SSE 77 ½	77 ½ St, 0.3 mile North of 32nd Ave (west side of 77 ½ th St)	Garden	1
S 29th Ave	Palisades Park, 0.5 mile West of 29th Ave and Blue Star Hwy intersection (North side of 29th)	Residence	1
S CR 376	79911 46th Street (CR 376), at 80th St intersection	Goat	2
S 78th	78th, 0.5 mi North of CR 376 west side of road	Garden	1
SSW 29th	29th Ave, at dead end of Palisades Park	Residence	1
SSW 82nd	Blue Star & 82nd, off of 376th (west side of road)	Garden	1

2001 PALISADES LAND USE CENSUS

TABLE 10.11-3

Critical Receptor Items

<u>Sector</u>	<u>Distance Miles</u>	<u>Location/Description</u>	<u>Item</u>	<u>*X/Q (sec/m³).</u>
SSE	0.48	Site Boundary	N/A	2.13E-06
S	0.50	Residence, Palisades Park; ½ mile West of 29th Avenue and Blue Star intersection.	Residence	1.38E-06
SE	1.0	77550 28th Avenue	Garden	5.87E-07
ENE	1.8	22595 76th Ave, .3 miles N of 24th, East side of road	Beef Cattle	2.14E-07
SE	4.3	72401 36th Ave.	Dairy Cow	6.83E-08
SE	2.0	SE corner of 30th and 76th	Goat	2.10E-07

*Based on Palisades 5 year composite meteorological data, 1992 -1996.

TABLE 1.4

2001 PALISADES LAND USE CENSUS

Distance to the nearest residence, garden, dairy/beef cattle and goat in each sector.

<u>SECTOR</u>	<u>RESIDENCE</u>	<u>GARDEN</u>	<u>BEEF CATTLE</u>	<u>DAIRY COW</u>	<u>GOAT</u>
NNE	1.1 mi	1.7 mi	>5 mi	>5 mi	>5 mi
NE	1.2 mi	1.2 mi	2.9 mi	>5 mi	3.2 mi
ENE	1.3 mi	1.6 mi	1.8 mi	>5 mi	> 5mi
E	1.0 mi	2.1 mi	3.5 mi	>5 mi	>5 mi
ESE	1.0 mi	*1.0 mi	4.0 mi	>5 mi	*2.0 mi
SE	1.0 mi	*1.0 mi	2.2 mi	4.3 mi	*2.0 mi
SSE	0.7 mi	1.6 mi	>5 mi	>5 mi	>5 mi
S	0.5 mi	4.0 mi	>5 mi	>5 mi	4.7 mi
SSW	0.7 mi	4.9 mi	>5 mi	>5 mi	>5 mi

* Note: Garden and Fam bisected by ESE/SE boundary line.

TABLE 1.4a

2001 PALISADES LAND USE CENSUS

Critical Receptor Items

<u>Sector</u>	<u>Distance Miles</u>	<u>Location/Description</u>	<u>Item</u>	<u>*X/Q (sec/m³).</u>
SSE	0.48	Site Boundary	N/A	2.13E-06
S	0.50	Residence, Palisades Park; ½ mile West of 29th Avenue and Blue Star intersection.	Residence	1.38E-06
SE	1.0	77550 28th Avenue	Garden	5.87E-07
ENE	1.8	22595 76th Ave .3 miles N of 24th, East side of road	Beef Cattle	2.14E-07
SE	4.3	72401 36th Ave.	Dairy Cow	6.83E-08
SE	2.0	SE corner of 30th and 76th	Goat	2.10E-07

*Based on Palisades 5 year composite meteorological data, 1992 -1996.

ENCLOSURE C

**NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255**

**PALISADES NUCLEAR PLANT
2001 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
HEALTH PHYSICS PROCEDURE HP 10.10**

34 pages follow

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

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**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

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- Attachment 1, "Environmental Sample Collection Schedule"
- Attachment 2, "Sample Locations"
- Attachment 3, "Sample Identification"
- Attachment 4, "Sample Packaging and Shipment"
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**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

USER ALERT

INFORMATION USE PROCEDURE

The activities covered by this procedure may be performed from memory.

1.0 PURPOSE

To provide methodology for collection of environmental samples in support of the Radiological Environmental Monitoring Program (REMP).

2.0 REFERENCES

2.1 SOURCE DOCUMENTS

2.1.1 Reg Guide 4.15(7)

2.1.2 10CFR50, Appendix I

2.1.3 Palisades Administrative Procedure 7.08, "Nuclear Plants Radiological Environmental Monitoring Program"

2.1.4 REMF Sample Shipping Manual, Teledyne Isotopes Midwest Laboratory

2.1.5 Health Physics Procedure 10.1, "Radiological Environmental Monitoring Program Surveillance"

2.1.6 Technical Specifications Chapter 5, Section 5.5.1, "Offsite Dose Calculation Manual (ODCM)"

2.2 REFERENCE DOCUMENTS

2.2.1 Palisades ODCM, Appendix A, Sections III.J, IV.C, and Tables E-1 and E-2

2.2.2 Palisades Administrative Procedure 10.46, "Plant Records"

3.0 PREREQUISITES

As indicated in procedure.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

4.0 PRECAUTIONS AND LIMITATIONS

- 4.1 This procedure shall be applicable to Palisades/C&RSD HP, Environmental Department, and any contractual personnel assigned to collect or evaluate REMP samples.
- 4.2 Any revisions to this procedure shall be reviewed against Palisades ODCM Specifications to verify compliance to all requirements.
- 4.3 Deviations from the required sampling schedule shall be documented in the Annual Radiological Environmental Operating Report.
- 4.4 Every effort shall be made to complete corrective action on malfunctioning sampling equipment prior to the end of the next sampling period.
- 4.5 If it is not possible to obtain the required samples, suitable alternative media and locations shall be substituted within 30 days.
- 4.6 Samples shall be collected, prepared, and shipped for analysis in a timely manner to preserve integrity. Other specific handling precautions for sample media are indicated in Section 5.0 as required.
- 4.7 Obtain best available replacement sample for any missing sample. Notify Palisades C&RSD Radiological Environmental contact with description and location of the replacement sample. Some samples are not replaceable (TLDs, air samples, etc), however, water, milk, crop samples, etc, should be.
- 4.8 Document any missing samples or malfunctioning equipment on sample data collection sheets.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

5.0 PROCEDURE

USER ALERT
INFORMATION USE PROCEDURE

The activities covered by this procedure may be performed from memory.

5.1 CONTROL AND OVERSIGHT OF SAMPLING FOR THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

5.1.1 Sampling techniques described by this procedure must be strictly adhered with.

- a. This includes use of forceps for air sample media change out to ensure the collected media is not disturbed.
- b. Recorded data should be verified including verification of transcribed data to avoid errors.
- c. All deviations from performance requirements, unavailable samples, or other sampling anomalies must be reported to the C&RSD Radiological Environmental Contact.

5.1.2 Failure of sample collectors to comply with sampling and reporting requirements may result in remedial training, disciplinary action, or reassignment of sampling duties.

5.1.3 The C&RSD radiological environmental contact shall conduct periodic (annual) audits of sampling activities.

- a. These audits shall include observation of collection techniques, verification of procedural compliance and review of equipment condition.

Included in the review of equipment condition, is to ensure that any fast growing trees and bushes in the vicinity of the station are removed, along with any branches extending over the top of the sampler. The goal is to keep every station away from the drip line.

- b. Audits should specifically address air sample collection and should include observation of all individuals involved in sample changeout.

e

TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT

- c. Audit of collection of other sample media may be performed at the discretion of the C&RSD environmental contact.
- d. Results of the audits and any follow up action should be documented in the REMP file.

Collect samples using the following methodology in accordance with schedule and location data described in Attachments 1 and 2.

5.2 REMP AIR SAMPLE COLLECTION

5.2.1 Precautions

- a. New filters and cartridges should be transported and handled such that potential contamination of them is minimized (ie, placed in clean plastic bags, etc).
- b. If an air sampling unit is discovered not operating, attempt to find the cause and repair. If this cannot be done, replace applicable component and document on air sample collection data sheet.
- c. Airflow meters shall be calibrated annually by General Meter. All in service calibrated meters will have affixed a valid calibration sticker/card stating date of calibration and calibration due date.
- d. Airflow meters shall be changed out prior to the expiration of calibration dates. Replacement air meters are available from Plant C&RSD Environmental contact.
- e. Air station leakage shall be none detectable. If the replacement of air station components is required due to air leakage, document on air sample collection data sheet.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

5.2.2 Prerequisites

- a. Glass fiber (particulate) air filters
- b. Charcoal cartridges for iodine sampling (prelabeled for each air sampler)
- c. Glassine or plastic envelopes (prelabeled for each air sampler)
- d. REMP Air Sample Data Sheet (containing installation data)
- e. Replacement air sample meters (as required)
- f. Forceps
- g. Stop Watch
- h. Step Ladder

NOTE: The Control Stations 10-GR, 11-KZ, and 12-DG are changed out weekly by three independent collectors, and mailed in separately. The prelabeling of cartridges and envelopes, detailed below, is not required for these stations as sample mix-up is not possible. In addition, for these control stations, the Palisades Sample Collection Form and Records (Page 1 of Attachment 5) is completed by the Technician changing out the nine local stations by transferring the recorded data provided by the independent collectors.

5.2.3 Perform the following weekly at each sample location:

- a. Open the protective cover on the air sample station and verify the sampling location number written on the inside of the door is the same as the prelabeled sample change-out package.
- b. Verify that the meter serial number and calibration due date are correctly documented on Palisades Plant Environmental Monitor Operability Check and Sample Collection data form (Page 1 of Attachment 5.)
- c. Determine and record the "As Found Flow" rate (seconds for one cubic foot of volume).

TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT

- d. Determine and record the "As Found Leak" rate by placing hand over filter housing inlet to form a seal. While holding hand over the inlet, determine if air leakage is evident by checking the air flow meter needle for movement (leakage). If no air leakage, record (N) in the "As Found Leak" column. If air leakage is indicated, determine the cause and repair as soon as possible.
- e. Unplug or turn off the air pump and record the "REMOVED MONTH/DAY/YEAR," "REMOVED TIME," and "GAS METER READING REMOVED."
- f. Remove the prelabeled charcoal cartridge and place in zip lock bag.
- g. Using tweezers, carefully remove particulate filter from the sampler head and place in the prelabeled glassine envelope or plastic envelope.
- h. Clean out any residue or moisture buildup in sampler head before replacement filter is installed. Check the condition of the sampler head o-rings. Replace cracked o-rings as necessary to prevent air leakage.
- i. Install new particulate filter and charcoal cartridge and ensure that both are properly centered in sampler head to prevent air leakage. Ensure the fiber side of the particulate filter is facing out (smooth side facing inward).
- j. Restart air pump. Place hand over the filter housing inlet to form a seal, determine if air leakage is evident by checking air flow meter needle movement. If no air leakage, record (N) in the "As Left Leak" column. If air leakage indicated, determine the cause of the leakage (filter not centered in holder properly or cracked o-ring) and correct problem as soon as possible, restoring system to no air leakage.
- k. Determine and record "As Left" flow rate. If greater than 90 seconds are required for one cubic foot of volume, the sample pump is degrading. Replace pump as soon as possible to avoid failure to reach minimum sample volume. (5000 ft³).

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

- i. If an airflow meter must be replaced, record this in the "Comments" column. Record replacement meter data in the reading on the upcoming week's sample collection data sheet.
- m. Close the protective cover on the air sample station.
- n. Calculate and record "SAMPLE VOL (FT3)," ALSO ensure all pertinent data is recorded.
- o. Proceed to the next station. Date and sign the current weeks data sheet upon completion of the entry of all current data.
- p. Transcribe the "REMOVED MONTH/DAY/YR" and "GAS METER READING REMOVED" taken in Step 5.2.3e to the "INSTALLED" reading columns on the sample collection sheet to be used for the upcoming week's air sample collection. Also transcribe the meter serial number and calibration due date to the upcoming week's sample collection sheet.

**5.3 REMP LAKE (DRINKING) WATER SAMPLE COLLECTION -
SOUTH HAVEN, MICHIGAN**

5.3.1 Prerequisites

- a. Four clean one-gallon plastic containers labeled with sample type, location, amount, and date (or collection period)
- b. REMP Miscellaneous Data Sheet (Attachment 3)

5.3.2 Perform the following sample collection monthly:

- a. Leave four containers with the Plant Superintendent at the South Haven Municipal Water Treatment Plant. New water sample containers should be left at the South Haven Water Treatment Plant upon pickup of end-of-month composite samples.
- b. Instruct the Plant Superintendent to add approximately 300 ml per day of raw water to container labeled "RAW" and approximately 300 ml per day of treated water to container labeled "TREATED," or "TAP."

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

- c. Return at end of month to collect containers. Obtain verbal verification that Step 5.3.2b was carried out. Note any deviations in "Remarks" column of data sheet.
- d. Label containers with sample type, amount, location, and collection period.
- e. Package and ship samples per Attachment 4.
- f. Record location, sample types (raw and treated), and amount on sample identification data sheet (Attachment 3). Sign and date data sheet.

5.4 REMP WELL WATER SAMPLE COLLECTION

5.4.1 Prerequisites

- a. Clean, one-gallon plastic containers
- b. REMP Miscellaneous Data Sheet (Attachment 3)

5.4.2 Perform the following sample collection monthly:

NOTE: During the winter months, the State and Township Park wells may be out of service. When this occurs, note the unavailability of the water samples and document on sample data sheet.

- a. Turn on water supply (or begin pumping water) and allow water to run for approximately one minute to purge the lines.
- b. Fill two clean, one-gallon plastic containers with well water from each sample location.
- c. Label containers with sample type, amount, location, and collection date.
- d. Package and ship samples per Attachment 4.
- e. Record on data sheet (Attachment 3) location, type, date, amount, and under "Remarks" any pertinent information. Sign form in space provided.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

5.5 REMP MILK SAMPLE COLLECTION

5.5.1 Precautions

- a. Milk samples shall be sent to the laboratory as soon as possible because of the short half-life of I-131. Any undue delay may cause ODCM, Appendix A, Table E-3 analytical LLD requirements to be violated.
- b. Obtain best available replacement sample for any missing milk sample(s). Identify new sample location(s) and notify Palisades C&RSD Radiological Environmental contact as soon as possible.
- c. If milk samples are unavailable, then samples of three different kinds of broad leaf vegetation grown nearest to Palisades in each of two different offsite locations of the highest predicted average ground level D/Q (SE or SSE sectors near site), and one sample of each kind of similar broad leaf vegetation grown 15-30 km distant from Palisades in the least prevalent wind direction (NNE, NE or ENE sectors) may be used as replacement samples. The new sample locations shall be identified and the REMP procedures revised within 30 days to reflect sampling changes. Collect approximately one kilogram (2.2 lb) of each sample type.

5.5.2 Prerequisites

- a. Two clean, plastic one-gallon containers for each sample location
- b. Sodium bisulfite preservative (approximately 40 gm per gallon of milk required)
- c. Miscellaneous sample data form (Attachment 3)

5.5.3 Perform the following monthly at each specified sample collection location:

- a. Obtain two one-gallon grab samples of raw milk as specified in Attachments 1 and 2.
- b. If problems are encountered in obtaining a sufficient quantity of milk sample, notify the Palisades C&RSD Radiological Environmental contact.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

- c. Add approximately 40 gm of sodium bisulfite to each one-gallon container of milk and thoroughly mix. The sodium bisulfite can either be in prepared packets or "scooped" with a volumetric measure from its container.
- d. Label containers with sample type, amount, location, date, and time.
- e. Package and ship samples as per Attachment 4.
- f. Record on Sample Data Form (Attachment 3), the location, type, date, and amount of samples. Under "Remarks," note any other pertinent information. Sign form in space provided.

5.6 REMP AQUATIC BIOTA COLLECTION

5.6.1 Precautions

- a. Collection to be coordinated between Radiological Services Department RMC Section and the Environmental Department. At least one individual in the collection party is required to have MDNR Cultural and Scientific Fish Collectors Permit.
- b. If logistical problems prevent use of a boat to set gill nets from the lake side of Palisades, then the nets can be set offshore from the site boundary (by wading). Notify Security prior to using offshore wading method for beach access.

5.6.2 Prerequisites

- a. Boat with required safety equipment, or waders
- b. Gill nets (of varying size mesh) and weights and floats
- c. Plastic one-liter wide-mouth bottles
- d. REMP Miscellaneous Data Sheet (Attachment 3)
- e. 10% formaldehyde solution
- f. Fillet knives

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

- g. Black permanent felt markers for sample identification on containers
- h. Notify district MDNR Fisheries biologist prior to sample collection

5.6.3 Collect samples twice during the season of greatest abundance (typically May through October) as follows:

- a. Gill nets are placed at the locations specified in Attachment 1 to collect at least two species of commercially and/or recreationally important fish in the vicinity of the Plant discharge area and the same species in an area not influenced by the Plant discharge (Ludington Pump Storage Plant). One liter of flesh should be collected for each species caught for analysis accuracy.
- b. Normally fish will be collected first from the vicinity of the discharge. REMP coordinator will then collect at least two of the same species at Ludington (control station). Or REMP coordinator will provide the Ludington collector with a list of the species collected in the vicinity of the discharge, with instructions to collect at least two of the same species.
- c. Label all containers with sample type, amount, location, and date.
- d. Package and ship samples per Attachment 4.
- e. Record on data sheet (Attachment 3) location, type, date, amount, and under "Remarks" indicate any pertinent information. Sign form in space provided.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

5.7 REMP SEDIMENT SAMPLE COLLECTION

5.7.1 Prerequisites

- a. One-liter, wide-mouth plastic sample bottles
- b. Miscellaneous Data Sheet (Attachment 3)

5.7.2 Collect sediment samples semiannually at collection locations specified in Attachment 1 (includes control sample at the Ludington Pump Storage Plant). Palisades C&RSD and/or Environmental Department personnel shall collect these sediment samples.

- a. Label containers with sample type, amount, location, and date.
- b. Package and ship samples per Attachment 4.
- c. Record on Sample Data Sheet (Attachment 3) location, type, date, and amount of sample. Note any other pertinent information in the "Remarks" section. Sign form in space provided.

5.8 REMP FOOD PRODUCT SAMPLE COLLECTION

- a. Sample containers
- b. Miscellaneous Data Sheet (Attachment 3)

5.8.1 Collect food samples monthly during the harvest season, as per ODCM, Appendix A, Table E-1. One sample each of the two principal fruit crops blueberries and apples must be collected.

- a. Collect approximately one kilogram (2.2 lb) of each sample type. Samples are not to be washed, shaken, or cleaned. Samples should not be collected from a single source, but at random from the entire orchard or field.
- b. Label all containers with sample type, amount, location, and date.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

- c. Package and ship samples per Attachment 4.
- d. Record on data sheet (Attachment 3) location, type, date, amount, and under "Remarks" note any unusual conditions. Sign form in space provided.

5.9 REMP TLD SAMPLE COLLECTION

5.9.1 Prerequisites

- a. TLDs
- b. TLD Data Sheet (Attachment 5)

5.9.2 Monthly TLDs are to be changed each month; quarterly TLDs during January, April, July, and October; and annual TLDs during January.

5.9.3 Monthly, quarterly, and annually at each sample location perform the following:

- a. Upon receipt of TLDs from the laboratory contractor, all TLDs shall be inventoried and immediately placed in the lead cave (at offsite sample collector's residence). Note date of receipt and inventory on TLD data sheet.
- b. Field TLDs shall only be removed from the lead cave for delivery to their proper locations. All control TLDs remain in the lead cave throughout the entire exposure period.
- c. Remove and replace TLDs at each sample location.
- d. For any missing TLDs, perform the following:
 - 1. Search immediate area.
 - 2. If lost TLD is found, collect it and perform standard change out procedure.
 - 3. If lost TLD is not found, post the new TLD in proper location.
 - 4. Record in "Remarks" column of data sheet any of the above circumstances.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

- e. Store collected field TLDs in lead cave along with control TLDs until ready for mailing to laboratory contractor. Mark "Do not x-ray" on TLD package.
- f. Transportation control TLDs are to be stored in a special lead shield provided by laboratory contractor after the field TLDs are posted.

Ensure that designated transportation control TLDs are included with the correct TLD package being mailed to laboratory contractor. Also ensure that laboratory contractor's TLD data sheet is completed and enclosed with shipment.

- g. Record TLD collection date and the date that the TLDs are returned to the vendor. Initial/sign the data sheet (Attachment 5). Record the installation date for the new TLDs on the appropriate data sheet.
- h. Package and ship samples per Attachment 4.

5.10 MISCELLANEOUS SAMPLES

5.10.1 Ludington - Control Station

e | **NOTE:** Sediment samples are also collected at Ludington Pump Storage Plant per Sections 5.6 and 5.7 of this procedure.

- a. Ludington Lake In & Well Water composites are collected daily and shipped to Palisades on a monthly basis.
- b. Palisades RETS/REMP personnel record appropriate data on the Sample Identification Form (Attachment 3), and deliver samples to the local Teledyne sample collector for shipment to Teledyne Midwest Laboratory.

**TITLE: PALISADES RADIOLOGICAL ENVIRONMENTAL PROGRAM
SAMPLE COLLECTION AND SHIPMENT**

5.10.2 **Palisades Daily Samples**

- a. Palisades Lake In, Lake Out, Site Well Water, Service Water, and Turbine Sump effluent samples are collected on a daily basis per Palisades per Health Physics Procedure HP 6.52, "Palisades (Onsite) Radiological Environmental Program Sample Collection."
- b. Palisades RETS/REMP personnel record appropriate data on the Sample Identification Form (Attachment 3), label all samples, and deliver samples to the local Teledyne sample collector for shipment to Teledyne Midwest Laboratory.

6.0 **ACCEPTANCE CRITERIA**

Proper completion of procedure.

7.0 **ATTACHMENTS AND RECORDS**

7.1 **ATTACHMENTS**

7.1.1 Attachment 1, "Environmental Sample Collection Schedule"

7.1.2 Attachment 2, "Sample Locations"

7.1.3 Attachment 3, "Sample Identification"

7.1.4 Attachment 4, "Sample Packaging and Shipment"

7.1.5 Attachment 5, "Palisades Sample Collection Forms and Records"

7.2 **RECORDS**

7.2.1 Distribution of Sample Collection Data Sheet as per Attachment 4.

7.2.2 All Radiological Environmental Monitoring Program Records shall be considered complete when the Annual Radiological Environmental Operating Report is submitted to the NRC. Records shall be retained in accordance with Palisades Administrative Procedure 10.46, "Plant Records."

8.0 **SPECIAL REVIEWS**

None

ENVIRONMENTAL SAMPLE COLLECTION SCHEDULE

Proc No HP 10.10

Attachment 1

Revision 5

Page 1 of 2

Palisades Nuclear Plant

<u>Exposure Pathway and/or Sample</u>	<u>Number of Samples and Locations*</u>	<u>Sample Type</u>	<u>Collection Frequency</u>
Airborne: Particulates	1 - Onsite 8 - Within a 10 km Radius 3 - 25 to 89 km Distant	Continuous at approximately 1 cfm (may be less due to dust loading)	Weekly
Iodines	Same as Particulates	Same as particulates	Weekly
Waterborne: Lake Water	1 - Intake 1 - Discharge 1 - Intake (Ludington Control)	Daily composite to obtain a two-gallon sample	Monthly
Drinking Water	1 - S Haven Municipal System - Raw 1 - S Haven Municipal System - Treated		
Well Water	6 - Plant Site Locations 1 - State Park 1 - Township park 1 - Ludington Control	Two-gallon grab sample	Monthly
Sediment	1 - Within 152.4 m of discharge (500 ft) 1 - 0.8 km North of discharge 1 - 0.8 km South of discharge 1 - 8.9 km North 1 - Ludington control (2 recommended)	One-liter grab sample	Semiannually
Ingestion: Milk	3 - From 5 to 13 km 1 - Control from 15 to 30 km	Two-gallon grab sample	Monthly

*If samples are unavailable at the specified location, an attempt should be made to sample at an alternate location (Refer to Step 4.5).

ENVIRONMENTAL SAMPLE COLLECTION SCHEDULE

Palisades Nuclear Plant

<u>Exposure Pathway and/or Sample</u>	<u>Number of Samples and Locations*</u>	<u>Sample Type</u>	<u>Collection Frequency</u>
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NOTE: If milk samples are unavailable, see Step 5.5.1c.

Food Products	1 - Each of two principal fruit crops (blueberries and apples).	Two-pound grab sample	At time of harvest
e Fish	2 - Location in vicinity of Plant discharge 2 - Ludington control	One-liter fish flesh from each available species, two species required. Obtain the same species from the control location.	Twice in season
Direct: TLD	1 - Onsite 16 - Site boundary 9 - Within 12 km radius 3 - Control stations 1 - Control in lead cave (Contractor's House)	Continuous	Monthly Quarterly and Annually

*If samples are unavailable at the specified location, an attempt should be made to sample at an alternate location (Refer to Step 4.5).

SAMPLE LOCATIONS
Palisades Nuclear Plant

Station	Code	Location	Air Particulates	Air Iodine	Lake Water	Well Water	Milk	Food Products	Sediment	TLD	Fish
*1	Palisades Nuclear Plant	Mounted onsite, 500 ft east of main gate. 25 ft south of access road next to well.	X	X	X	X			X	X	X
2	RR 3 Coloma, MI 5.6 miles S	Along 48th Ave, 500 ft east of 80th St, 25 ft off north side of road.	X	X						X	
3	76182 48th Ave Covert, MI 5.8 miles SSE	Along 48th Ave, 1/4 mile west of 76th St. In barnyard 50 yds off north side of road.	X	X						X	
4	36197 M-140 Hwy Covert, MI 3-1/2 miles SE	Along 36th Ave, 1/2 mile east of M-140 15 ft off south side of road.	X	X				X		X	
5	72723 CR 378 Covert, MI 3-1/2 miles ESE	Along CR 378, 3/4 mile east of M-140, 30 ft off north side of road.	X	X				X		X	
6	RR 3 South Haven, MI 4-1/2 miles NE	Along 12th Ave, 1/4 mile west of M-43, 30 ft off south side of road.	X	X						X	
7	Sherman Dairy South Haven, MI 6.5 miles NNE	Along Phoenix Rd, directly behind Sherman Dairy. 1/4 mile east of I-196 and Phoenix Rd on north side.	X	X							
7a	Emergency Siren 35 4-3/4 miles NINE	On Monroe Blvd.								X	
8	State Park 1 mile NE	Onsite along the dump road, north of Plant. One mile from main gate. Near State Park boundary, on side of road as road turns west.	X	X		X				X	

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*Plant Site Well #2 or #3

SAMPLE LOCATIONS
Palisades Nuclear Plant

Station	Code	Location	Air Particulates	Air Iodine	Lake Water	Well Water	Milk	Food Products	Sediment	TLD	Fish
9	TP Covert Township Park 1.5 miles SSW	Along 32nd Ave, 1/4 mile west of Blue Star Hwy. 5 ft off south side of road.	X	X		X				X	
10	GR Grand Rapids, MI 55 miles NNE	Control TLD and air sample.	X	X						X	
11	KZ Kalamazoo, MI 35 miles E	Control TLD and air sample.	X	X						X	
12	DG Dowagiac, MI 30 miles SSE	Control TLD and air sample.	X	X						X	
13	ST Perimeter of Palisades NNE	Past #8 along dump road. Proceed west up dune path at right of containment test structure. At first crest, turn north and proceed up adjacent hill to #13 at top (approx 50 yds from crest). Near State Park fence line.								X	
14	ST Perimeter of Palisades NE	Along dump road to point where fence divides old Blue Star Hwy, 25 yds to east of road.								X	

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SAMPLE LOCATIONS
Palisades Nuclear Plant

Station	Code	Location	Air Particulates	Air Iodine	Lake Water	Well Water	Milk	Food Products	Sediment	TLD	Fish
15	ST Perimeter of Palisades E	North along Blue Star Hwy, 0.75 miles from access road, 10 ft off west side of road.								X	
16	ST Perimeter of Palisades E	North along Blue Star Hwy, 0.4 miles from access road, 50 ft off west side of road.								X	
17	ST Perimeter of Palisades ESE	Along access road, 25 yds south of southern power line, 15 yds off east side of road.								X	
18	ST Perimeter of Palisades SE	20 yds from access road along south road. 40 yds off south road.								X	
19	ST Perimeter of Palisades SSE	0.2 miles along south road from access road, 30 ft off north side of road.								X	
20	ST Perimeter of Palisades S	0.4 miles along south road from access road, 20 ft off south side of road.								X	
21	ST Perimeter of Palisades SSW	0.7 miles along south road from access road. 5 ft off east side of road. Near Lake Michigan Bluff.								X	
22	JS Jerry Sarno 36197 M-140 Hwy Covert, MI 3-1/2 miles SE	Control TLD in lead cave inside garage at Station 4.								X	

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SAMPLE LOCATIONS
Palisades Nuclear Plant

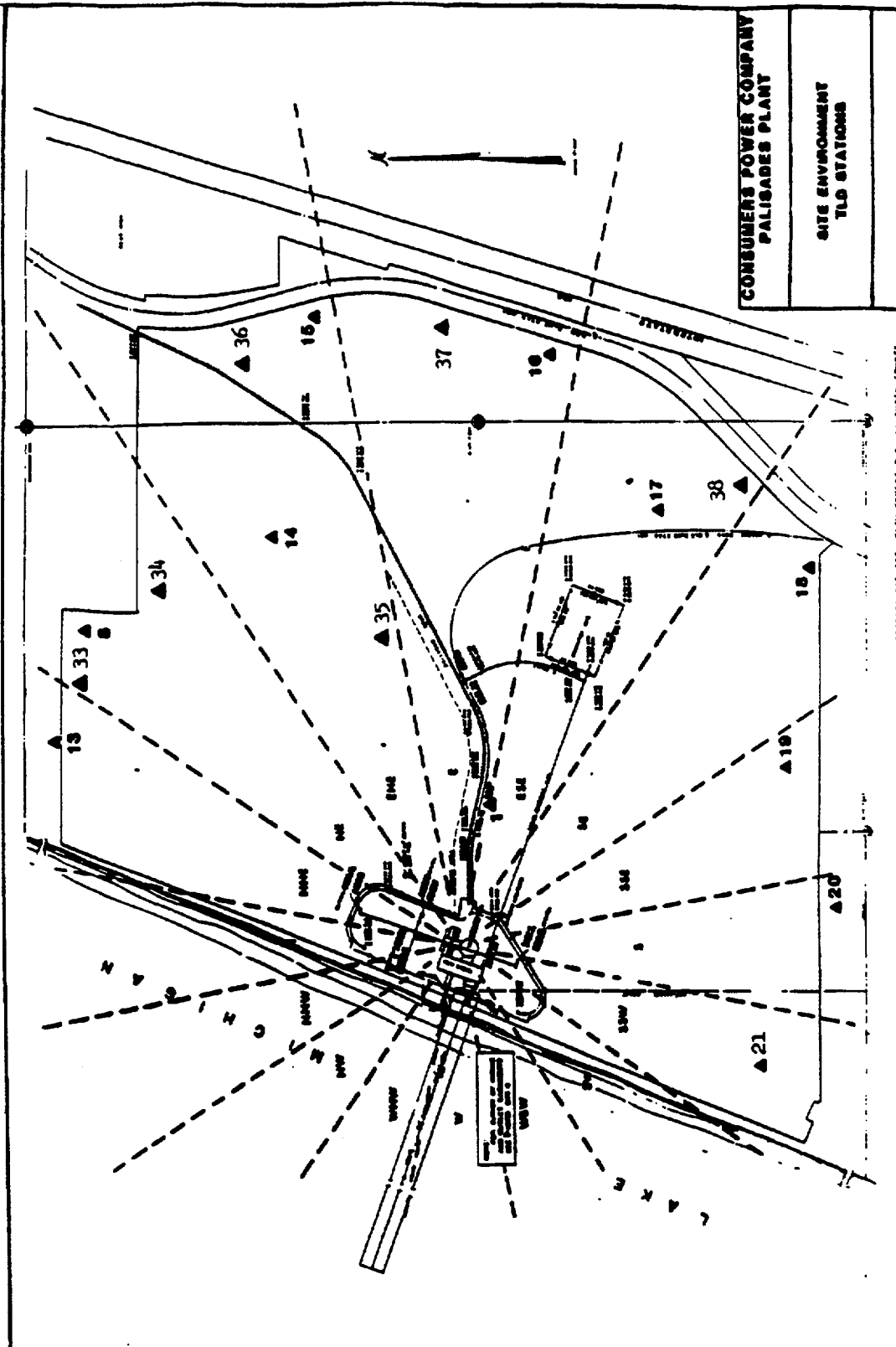
Station	Code	Location	Air Particulates	Air Iodine	Lake Water	Well Water	Milk	Food Products	Sediment	TLD	Fish
23	SN25 Emergency Siren 25 3 miles ENE	On CR 380								X	
24	SN22 Emergency Siren 22 4-1/2 miles E	On 24th Ave								X	
25	SH South Haven, MI 5-1/2 miles NNE	South Haven Water Treatment Plant			X				X		
26	AK Allen Karr 31110 68th St Covert, MI 5.75 miles ESE						X				
27	DH Dennis Hessey 26959 66th St South Haven, MI 6.6 miles E						X				
28	DC Danny Carpenter 64015 M-43 Bangor, MI 7.25 miles E						X				
29	WS William Shine 60364 M-43 West Bangor, MI 10 miles E						X				
30	STN 1/2 mile N of discharge								X		
31	STS 1/2 mile S of discharge								X		
32	LP Ludington Pumped Storage 125 Miles N				X				X		X
33	ST Perimeter of Palisades NE	Onsite along south side dump road, just 15 yards west of Air Station 8SP								X	

SAMPLE LOCATIONS
Palisades Nuclear Plant

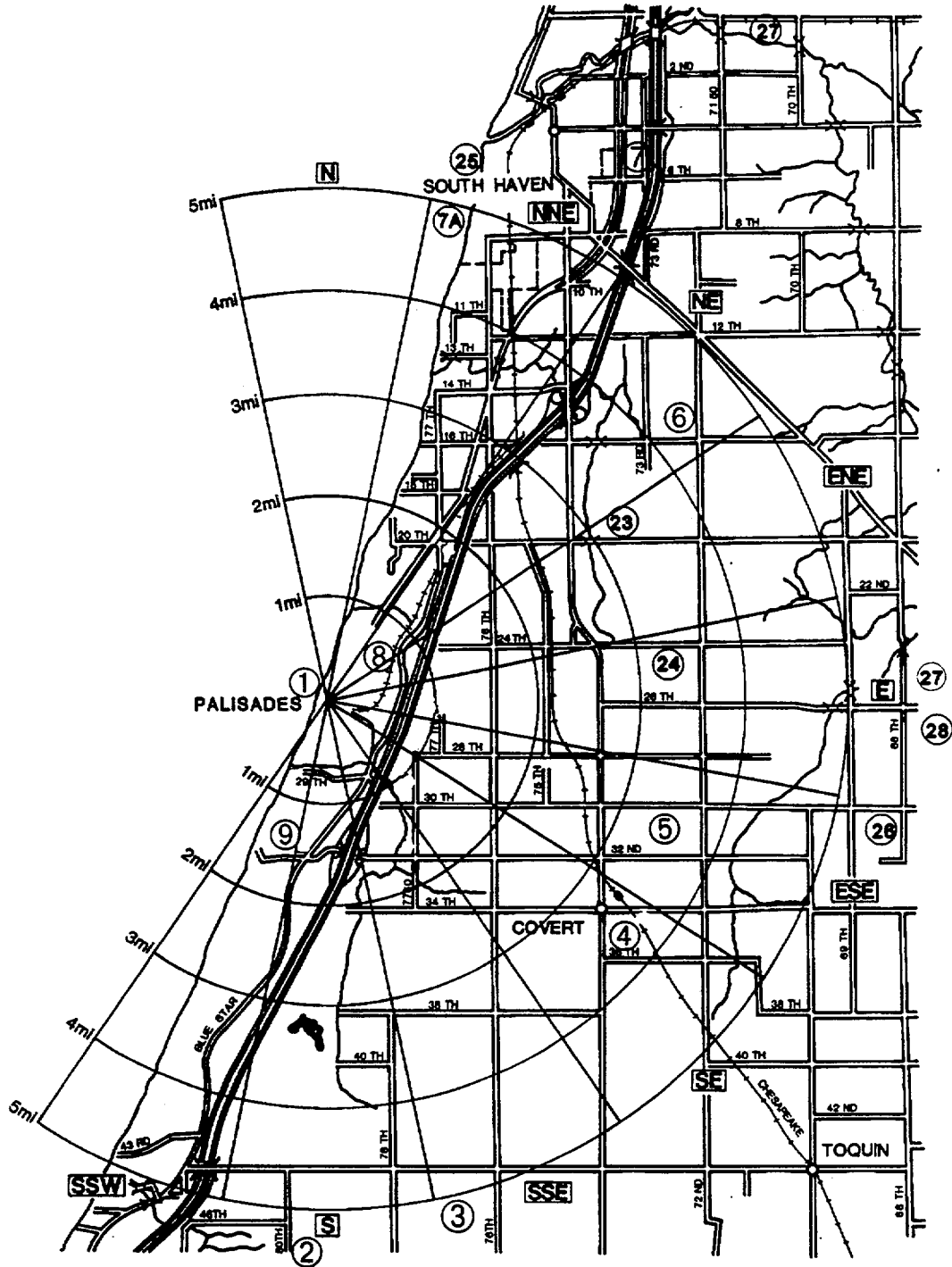
Station	Code	Location	Air Particulates	Air Iodine	Lake Water	Well Water	Milk	Food Products	Sediment	TLD	Fish
34	ST Perimeter of Palisades NE	Along dump road to area where fence divides old Blue Star Hwy, 25 yards east of road, near Station 14								X	
35	ST Perimeter of Palisades ENE	Located on the main post directly across the storeroom, near Training Building								X	
36	ST Perimeter of Palisades ENE	North along Blue Star Hwy, 0.9 miles from access road, 50 Ft off West side of road								X	
37	ST Perimeter of Palisades E	North along Blue Star Hwy, 0.6 miles from access road, 50 Ft off West side of road								X	
38	ST Perimeter of Palisades SE	North along Blue Star Hwy, 0.15 miles from access road, near old RR spur, 50 Ft off West side of road								X	
39	ST Plant Site Wells #7 or #9 (Warehouse)					X					
40	ST Plant Site Wells #11, 12, 13 (Outage Building)					X					
41	ST Plant Site Monitoring Well #14					X					
42	ST Plant Site Monitoring Well #15					X					
43	ST Plant Site Monitoring Well #16					X					

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SAMPLE LOCATIONS
Palisades Nuclear Plant



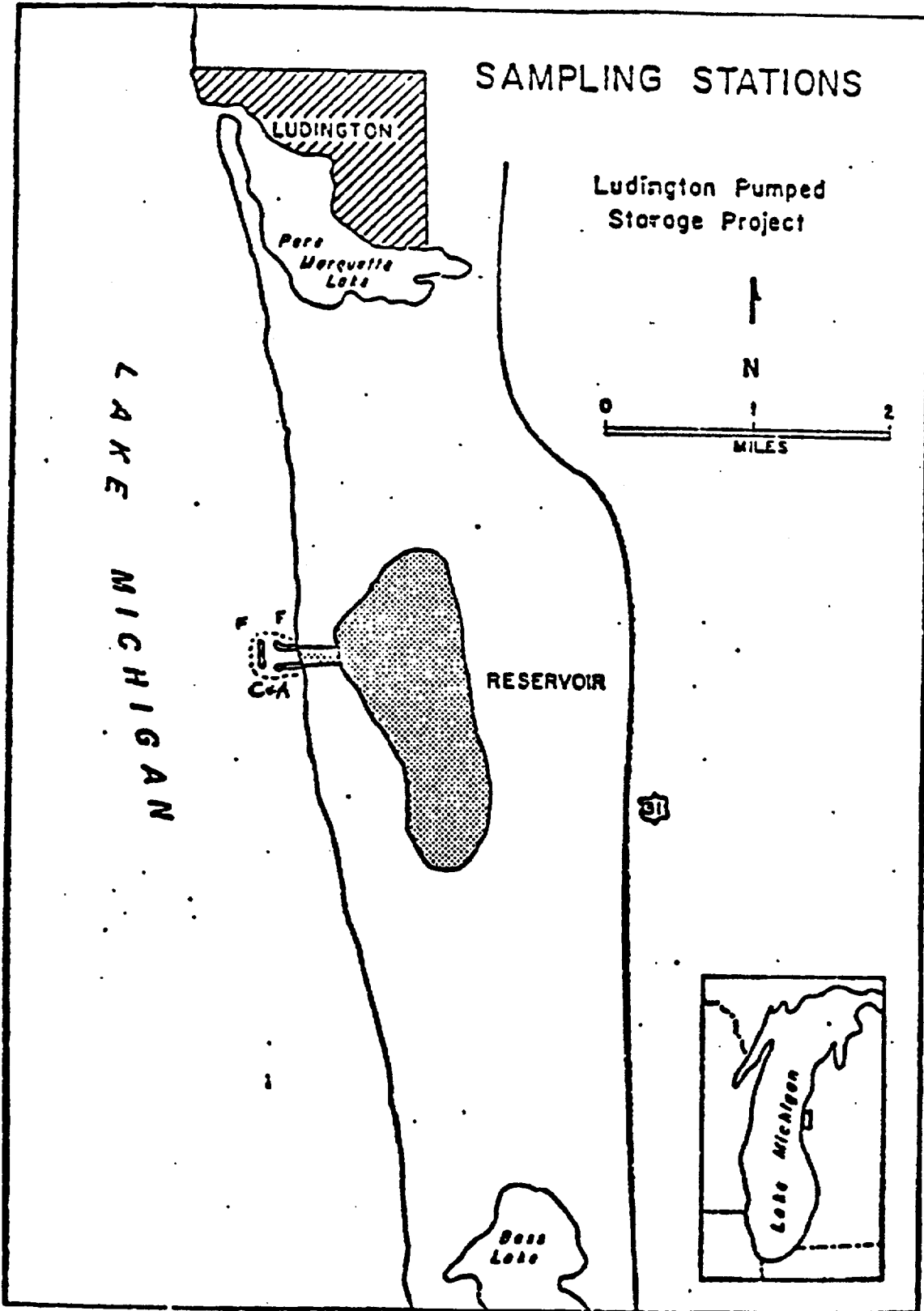
SAMPLE LOCATIONS
Palisades Nuclear Plant



NOT SHOWN (Control Locations)

- 10 Grand Rapids (55 mi NNE)
- 11 Kalamazoo (35 mi E)
- 12 Dowagiac (30 mi SSE)
- 22 Control TLD placed in lead cave at Location 4
- 29 William Shine (WS - 10 mi E)

SAMPLE LOCATIONS
Palisades Nuclear Plant

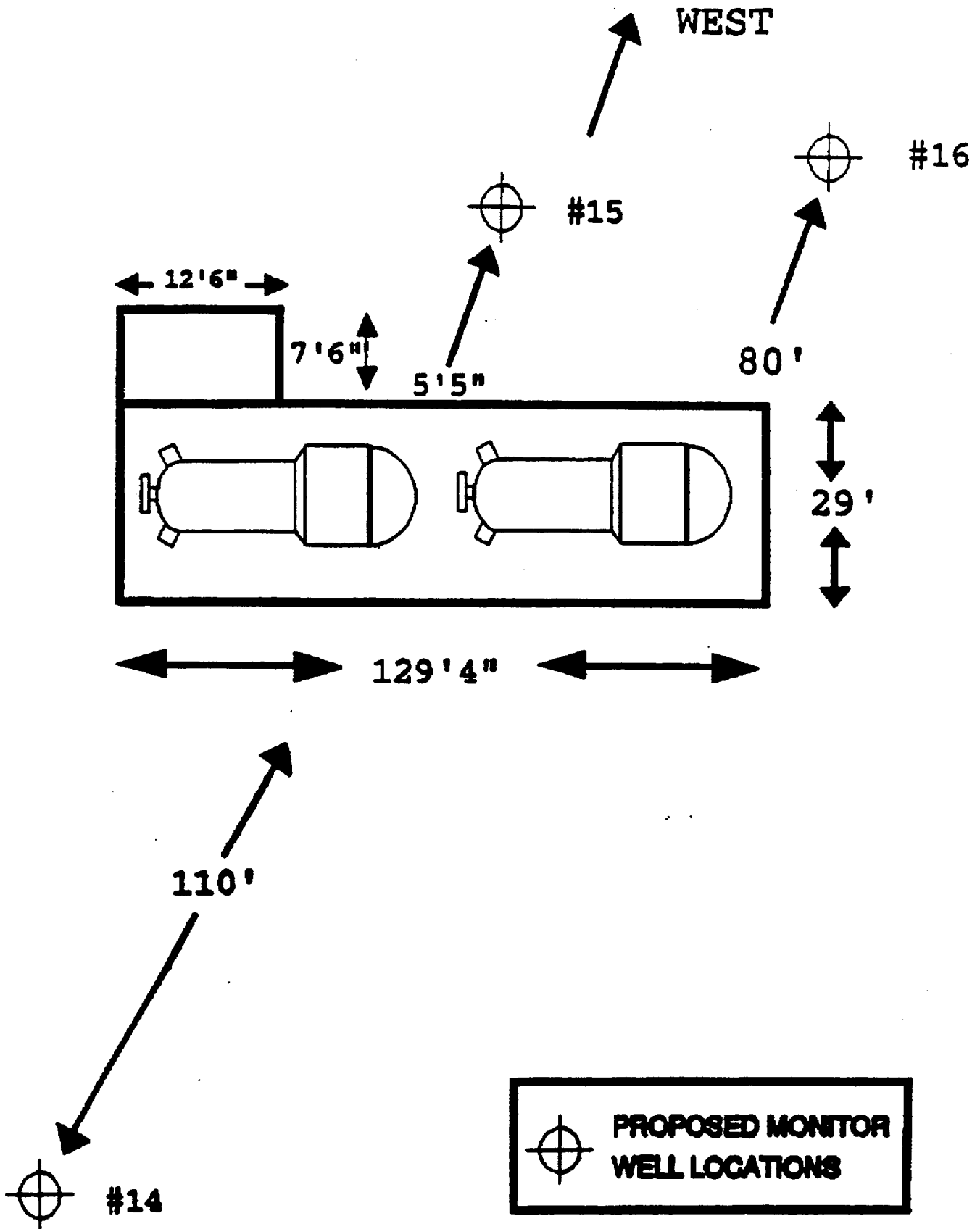


SAMPLE LOCATIONS
Palisades Nuclear Plant

<u>REMP SAMPLING</u>	<u>NUMBER</u>	<u>WELL STATUS</u>	<u>LOCATION</u>
NO	#1	Abandon	NA
YES	#2	In Service	North side of Support Building. Supports Plant site.
YES (Note 1)	#3	Active	Across from East-Radwaste (South Side) backup for well #2.
NO	#4	Abandon	NA
NO	#5	Abandon	NA
NO	#6	Active	Located ~ 145 ft west of Blue Star Hwy. Used for training trailers, well capped when not in service and well is outside of Westerly Groundwater Flow to Plant and interim storage facility.
YES	#7	In Service	Just to the west & between outage building and interim storage facility: Water is nonpotable and used in warehouse restrooms (later to be used for fire system only).
NO	#8	Abandon	NA
YES (Note 2)	#9	Active	Located at junction of access and warehouse road, domestic water supply for warehouse when it is put in service.
NO	#10	Abandon	NA
YES (Note 3)	#11 #12 #13	In Service In Service In Service	North of access road and east of construction road, supplies domestic water for outage building, all in one tie-in.
YES	#14	Active	East of Interim Storage Facility, used for REMP monitoring well.
YES	#15	Active	Southwest of Interim Storage Facility, used for REMP monitoring well.
YES	#16	Active	Northwest of Interim Storage Facility, used for REMP monitoring well.

- NOTES:**
1. When well #2 is out of service, well #3 is put in service with same sample point as well #2, only one sample required in combination of wells #2 and #3.
 2. Sample point will be same as well #7 (in warehouse restroom) when well is put in service.
 3. Wells #11, #12, and #13 all have a common line which supplies domestic water to outage building, only one sample required in conjunction with all 3 wells.

SAMPLE LOCATIONS
Palisades Nuclear Plant



SAMPLE PACKAGING AND SHIPMENT

1. Label samples clearly per Attachment 3.
2. Seal all liquid, biota, fish, and sediment sample containers with tape to prevent leakage.
3. Ship liquid samples separately from air particulate and air iodine samples and TLDs.
4. Use sufficient packing material (ie, crumpled newspaper) to avoid possible sample container damage during shipment.
5. Package air filters in glassine or plastic envelopes.
6. For TLD shipments, make sure that Laboratory contractor's own TLD data sheet is enclosed with package.
7. Ship milk samples as soon as possible. Be sure to add a sufficient amount of sodium bisulfite (40 grams) as preservative to each sample.
8. Ship food products as soon as possible after collection.
9. Ship fish packed in ice, or with a 10% formaldehyde solution added (preservative). Only 10 milliliters is required per sample. Samples should be shipped as soon as possible after processing. | e
10. Distribute copies of the Sample Collection Data Sheet(s) to the:

Analytical Laboratory
Radiological Services Department Environmental Contact (Palisades)
Sample Collector
11. Send samples to the following address:

Teledyne Brown Engineering Services Midwest Laboratory
Att: Laboratory Manager
700 Landwehr Road
Northbrook, IL 60062
12. Ship all samples to the Laboratory contractor with minimal delay after collection so as to avoid elevated analytical levels of detection.

PALISADES SAMPLE COLLECTION FORMS AND RECORDS

PALISADES PLANT
 ENVIRONMENTAL MONITOR OPERABILITY CHECK
 AND SAMPLE COLLECTION

	INSTALLED (MO/DA/YR)	REMOVED (MO/DA/YR)	REMOVED TIME	GAS METER READING		METER SERIAL NO		FLOW TEST				REPLACEMENT METER			SAMPLE VOL (Ft 3)	COMMENTS	
				INSTALLED (Ft 3)	REMOVED (Ft 3)	CAL DUE DATE	AS FOUND	AS LEFT	AS FOUND	AS LEFT	SERIAL NUMBER	CALIB ACCURACY ACCEPTABLE	CAL DUE DATE				
								FLOW (SEC/Ft3)	LEAK (Y/N)	FLOW (SEC/Ft3)	LEAK (Y/N)	FLOW (SEC/Ft3)	LEAK (Y/N)				
1ST																	
2TH																	
3HS																	
4JS																	
5PR																	
6RB																	
7SD																	
8SP																	
9TP																	
10GR																	
11KZ																	
12DG																	

TEST PERFORMED BY: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

PALISADES SAMPLE COLLECTION FORMS AND RECORDS

CONSUMERS ENERGY
PALISADES ENVIRONMENTAL TLD REPORT

- MONTHLY
- QUARTERLY
- ANNUAL

Collector _____

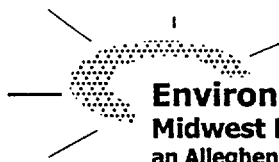
STATION - LOCATION	INSTALLED		COLLECTED		REMARKS
	DATE	TIME	DATE	TIME	
C-1					
C-2					
ST22	ST				
ST5	PR				
ST6	RB				
ST24	SN21				
ST23	SN25				
ST7a	SN35				
ST16	ST				
ST15	ST				
ST1	ST				
ST14	ST				
ST8	SP				
ST13	ST				
ST17	ST				
ST18	ST				
ST19	ST				
ST20	ST				
ST21	ST				
ST9	TP				
ST12	DG				
ST3	HS				
ST2	TH				
ST4	JS				
ST10	GR				
ST11	KZ				
ST-33	ST				
ST-34	ST				
ST-35	ST				
ST-36	ST				
ST-37	ST				
ST-38	ST				
Date Received From Vendor (With Intransit TLDs) and Initials		Date TLDs Inventoried and Placed in Lead Cave (With Intransit TLDs) and Initials		Date TLDs Returned to Vendor For Analysis (With Intransit TLDs) and Initials	

ENCLOSURE D

**NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255**

**PALISADES NUCLEAR PLANT
2001 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
2001 PALISADES FINAL REPORT**

48 pages follow



Environmental, Inc.
Midwest Laboratory
an Allegheny Technologies Co.

700 Landwehr Road • Northbrook, IL 60062-2310
(847) 564-0700 fax (847) 564-4517

FINAL REPORT
TO
CONSUMERS ENERGY COMPANY
JACKSON, MICHIGAN

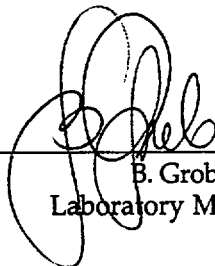
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)
FOR
PALISADES NUCLEAR GENERATING PLANT

PREPARED AND SUBMITTED
BY
ENVIRONMENTAL, INC., MIDWEST LABORATORY

Project Number: 8022

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PALISADES

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1.0 INTRODUCTION

The following constitutes the final 2001 Monthly Progress Report for the Radiological Environmental Monitoring Program conducted at the Consumers Energy Company, Palisades Nuclear Generating Plant. Results of completed analyses are presented in the attached tables

For gamma isotopic analyses, a spectrum is collected covering an energy range from 80 to 2048 KeV. Specifically included are Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-95, Nb-95, I-131, Ba-La-140, Cs-134 and Cs-137. Naturally-occurring gamma-emitters, such as K-40 and Ra daughters, are frequently detected but not listed here. Data listed as "<" are at the 4.66 sigma level, others are 2 sigma.

All concentrations, except gross alpha and gross beta, are decay corrected to the time of collection.

All samples were collected within the scheduled period unless noted otherwise in the Listing of Missed Samples.

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2.0 LISTING OF MISSED SAMPLES

Sample Type	Location	Expected Collection Date	Reason
AP	PA-7	01-29-01	Sample not collected.
AP	PA-11	09-12-01	Air particulate lost in mail.

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Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: IST - Palisades

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	278	0.032 ± 0.004	< 0.014	07-09-01	269	0.022 ± 0.003	< 0.007
01-15-01	320	0.028 ± 0.003	< 0.013	07-16-01	266	0.022 ± 0.003	< 0.010
01-22-01	320	0.033 ± 0.004	< 0.009	07-23-01	258	0.044 ± 0.004	< 0.012
01-29-01	320	0.031 ± 0.004	< 0.005	07-30-01	261	0.027 ± 0.004	< 0.015
02-05-01	320	0.030 ± 0.004	< 0.009	08-06-01	255	0.033 ± 0.004	< 0.011
02-12-01	314	0.027 ± 0.004	< 0.013	08-13-01	255	0.033 ± 0.004	< 0.007
02-19-01	320	0.034 ± 0.004	< 0.010	08-20-01	255	0.023 ± 0.003	< 0.013
02-26-01	317	0.034 ± 0.003	< 0.009	08-27-01	252	0.028 ± 0.004	< 0.011
03-05-01	314	0.031 ± 0.004	< 0.008	09-04-01	280	0.025 ± 0.003	< 0.010
03-12-01	314	0.020 ± 0.003	< 0.009	09-10-01	210	0.021 ± 0.004	< 0.011
03-19-01	309	0.028 ± 0.003	< 0.012	09-17-01	246	0.024 ± 0.004	< 0.015
03-26-01	306	0.025 ± 0.004	< 0.008	09-24-01	244	0.032 ± 0.005	< 0.007
04-02-01	275	0.024 ± 0.004	< 0.017	10-01-01	246	0.017 ± 0.003	< 0.008
1st Qtr. Mean ± s.d.		0.029 ± 0.004	< 0.017	3rd Qtr. Mean ± s.d.		0.027 ± 0.007	< 0.015
04-09-01	292	0.030 ± 0.004	< 0.007	10-08-01	241	0.033 ± 0.004	< 0.013
04-16-01	297	0.019 ± 0.003	< 0.007	10-15-01	241	0.029 ± 0.004	< 0.013
04-23-01	289	0.031 ± 0.004	< 0.013	10-22-01	238	0.023 ± 0.004	< 0.011
04-30-01	280	0.026 ± 0.004	< 0.013	10-29-01	238	0.019 ± 0.004	< 0.007
05-07-01	286	0.032 ± 0.004	< 0.009	11-05-01	246	0.032 ± 0.005	< 0.009
05-14-01	292	0.024 ± 0.003	< 0.007	11-12-01	297	0.024 ± 0.004	< 0.008
05-21-01	283	0.027 ± 0.003	< 0.009	11-19-01	348	0.059 ± 0.005	< 0.006
05-29-01	329	0.014 ± 0.003	< 0.008	11-26-01	241	0.027 ± 0.004	< 0.006
				12-03-01	348	0.031 ± 0.004	< 0.011
06-04-01	246	0.021 ± 0.003	< 0.008				
06-11-01	283	0.022 ± 0.003	< 0.009	12-10-01	348	0.044 ± 0.004	< 0.011
06-18-01	266	0.031 ± 0.004	< 0.014	12-17-01	354	0.043 ± 0.004	< 0.011
06-25-01	275	0.025 ± 0.004	< 0.007	12-26-01	456	0.032 ± 0.003	< 0.005
07-02-01	269	0.031 ± 0.004	< 0.005	12-31-01	263	0.034 ± 0.004	< 0.013
2nd Qtr. Mean ± s.d.		0.026 ± 0.006	< 0.014	4th Qtr. Mean ± s.d.		0.033 ± 0.011	< 0.013
Cumulative Average						0.029	
Previous Annual Average						0.026	

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 2TH - Coloma (5.6 mi. S)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	297	0.034 ± 0.004	< 0.013	07-09-01	326	0.024 ± 0.003	< 0.006
01-15-01	346	0.029 ± 0.003	< 0.012	07-16-01	320	0.024 ± 0.003	< 0.009
01-22-01	351	0.035 ± 0.004	< 0.008	07-23-01	317	0.038 ± 0.004	< 0.009
01-29-01	351	0.031 ± 0.004	< 0.005	07-30-01	320	0.025 ± 0.003	< 0.012
02-05-01	348	0.031 ± 0.004	< 0.008	08-06-01	317	0.030 ± 0.004	< 0.010
02-12-01	351	0.023 ± 0.003	< 0.012	08-13-01	295	0.038 ± 0.004	< 0.006
02-19-01	348	0.040 ± 0.004	< 0.009	08-20-01	326	0.025 ± 0.003	< 0.010
02-26-01	354	0.031 ± 0.003	< 0.008	08-27-01	331	0.050 ± 0.004	< 0.009
03-05-01	351	0.031 ± 0.004	< 0.007	09-04-01	365	0.028 ± 0.003	< 0.008
03-12-01	348	0.020 ± 0.003	< 0.008	09-10-01	266	0.020 ± 0.003	< 0.009
03-19-01	346	0.026 ± 0.003	< 0.011	09-17-01	329	0.020 ± 0.003	< 0.011
03-26-01	346	0.023 ± 0.003	< 0.007	09-24-01	326	0.035 ± 0.004	< 0.005
04-02-01	340	0.024 ± 0.003	< 0.014	10-01-01	334	0.017 ± 0.003	< 0.006
1st Qtr. Mean ± s.d.		0.029 ± 0.006	< 0.014	3rd Qtr. Mean ± s.d.		0.029 ± 0.009	< 0.012
04-09-01	340	0.024 ± 0.003	< 0.006	10-08-01	331	0.026 ± 0.003	< 0.010
04-16-01	337	0.018 ± 0.003	< 0.006	10-15-01	334	0.026 ± 0.003	< 0.009
04-23-01	337	0.029 ± 0.004	< 0.011	10-22-01	337	0.025 ± 0.003	< 0.008
04-30-01	337	0.023 ± 0.003	< 0.011	10-29-01	326	0.019 ± 0.003	< 0.005
05-07-01	326	0.032 ± 0.004	< 0.008	11-05-01	343	0.024 ± 0.003	< 0.007
05-14-01	331	0.022 ± 0.003	< 0.007	11-12-01	329	0.023 ± 0.003	< 0.007
05-21-01	326	0.025 ± 0.003	< 0.008	11-19-01	337	0.067 ± 0.005	< 0.007
05-29-01	379	0.014 ± 0.003	< 0.007	11-26-01	340	0.027 ± 0.003	< 0.004
				12-03-01	334	0.030 ± 0.004	< 0.011
06-04-01	289	0.016 ± 0.003	< 0.007	12-10-01	337	0.042 ± 0.004	< 0.012
06-11-01	331	0.019 ± 0.003	< 0.008	12-17-01	340	0.042 ± 0.004	< 0.012
06-18-01	317	0.028 ± 0.004	< 0.012	12-26-01	442	0.033 ± 0.003	< 0.005
06-25-01	323	0.022 ± 0.003	< 0.006	12-31-01	255	0.030 ± 0.004	< 0.014
07-02-01	320	0.027 ± 0.003	< 0.004				
2nd Qtr. Mean ± s.d.		0.023 ± 0.005	< 0.012	4th Qtr. Mean ± s.d.		0.032 ± 0.013	< 0.014
Cumulative Average						0.028	
Previous Annual Average						0.027	

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 3HS - Covert (5.8 mi. SE)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	300	0.038 ± 0.004	< 0.013	07-09-01	326	0.022 ± 0.003	< 0.006
01-15-01	348	0.031 ± 0.003	< 0.012	07-16-01	323	0.024 ± 0.003	< 0.008
01-22-01	348	0.032 ± 0.004	< 0.008	07-23-01	317	0.042 ± 0.004	< 0.009
01-29-01	354	0.032 ± 0.004	< 0.005	07-30-01	320	0.025 ± 0.003	< 0.012
02-05-01	346	0.028 ± 0.003	< 0.008	08-06-01	320	0.030 ± 0.004	< 0.009
02-12-01	351	0.025 ± 0.003	< 0.012	08-13-01	312	0.033 ± 0.004	< 0.006
02-19-01	351	0.034 ± 0.004	< 0.009	08-20-01	326	0.023 ± 0.003	< 0.010
02-26-01	354	0.035 ± 0.003	< 0.008	08-27-01	329	0.027 ± 0.003	< 0.009
03-05-01	348	0.031 ± 0.004	< 0.007	09-04-01	365	0.029 ± 0.003	< 0.008
03-12-01	348	0.017 ± 0.003	< 0.008	09-10-01	278	0.022 ± 0.003	< 0.009
03-19-01	348	0.024 ± 0.003	< 0.011	09-17-01	329	0.024 ± 0.003	< 0.011
03-26-01	346	0.021 ± 0.003	< 0.007	09-24-01	329	0.032 ± 0.004	< 0.005
04-02-01	343	0.022 ± 0.003	< 0.014	10-01-01	337	0.017 ± 0.003	< 0.006
1st Qtr. Mean ± s.d.		0.028 ± 0.006	< 0.014	3rd Qtr. Mean ± s.d.		0.027 ± 0.006	< 0.012
04-09-01	343	0.026 ± 0.003	< 0.006	10-08-01	331	0.031 ± 0.003	< 0.010
04-16-01	337	0.019 ± 0.003	< 0.006	10-15-01	331	0.028 ± 0.004	< 0.009
04-23-01	340	0.029 ± 0.004	< 0.011	10-22-01	337	0.023 ± 0.003	< 0.008
04-30-01	331	0.027 ± 0.004	< 0.011	10-29-01	343	0.020 ± 0.003	< 0.005
05-07-01	326	0.030 ± 0.004	< 0.008	11-05-01	346	0.028 ± 0.003	< 0.007
05-14-01	331	0.025 ± 0.003	< 0.007	11-12-01	329	0.026 ± 0.003	< 0.007
05-21-01	326	0.028 ± 0.003	< 0.008	11-19-01	334	0.060 ± 0.005	< 0.007
05-29-01	379	0.014 ± 0.003	< 0.007	11-26-01	340	0.028 ± 0.003	< 0.004
				12-03-01	337	0.030 ± 0.004	< 0.011
06-04-01	289	0.015 ± 0.003	< 0.007	12-10-01	340	0.039 ± 0.004	< 0.011
06-11-01	331	0.018 ± 0.003	< 0.008	12-17-01	346	0.044 ± 0.004	< 0.012
06-18-01	317	0.027 ± 0.004	< 0.012	12-26-01	445	0.032 ± 0.003	< 0.005
06-25-01	323	0.023 ± 0.003	< 0.006	12-31-01	255	0.026 ± 0.004	< 0.014
07-02-01	320	0.031 ± 0.003	< 0.004				
2nd Qtr. Mean ± s.d.		0.024 ± 0.006	< 0.012	4th Qtr. Mean ± s.d.		0.032 ± 0.011	< 0.014
Cumulative Average						0.028	
Previous Annual Average						0.026	

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 4JS - Covert (3.5 mi. SE)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	306	0.032 ± 0.004	< 0.013	07-09-01	329	0.024 ± 0.003	< 0.006
01-15-01	360	0.030 ± 0.003	< 0.012	07-16-01	326	0.023 ± 0.003	< 0.008
01-22-01	360	0.033 ± 0.004	< 0.008	07-23-01	320	0.041 ± 0.004	< 0.009
01-29-01	363	0.031 ± 0.004	< 0.004	07-30-01	320	0.023 ± 0.003	< 0.012
02-05-01	360	0.030 ± 0.003	< 0.008	08-06-01	317	0.035 ± 0.004	< 0.010
02-12-01	360	0.025 ± 0.003	< 0.011	08-13-01	278	0.036 ± 0.004	< 0.007
02-19-01	360	0.037 ± 0.004	< 0.009	08-20-01	323	0.022 ± 0.003	< 0.010
02-26-01	363	0.034 ± 0.003	< 0.008	08-27-01	329	0.027 ± 0.003	< 0.009
03-05-01	360	0.026 ± 0.003	< 0.007	09-04-01	363	0.024 ± 0.003	< 0.008
03-12-01	357	0.018 ± 0.003	< 0.008	09-10-01	275	0.019 ± 0.003	< 0.009
03-19-01	354	0.026 ± 0.003	< 0.010	09-17-01	329	0.022 ± 0.003	< 0.011
03-26-01	354	0.024 ± 0.003	< 0.007	09-24-01	326	0.035 ± 0.004	< 0.005
04-02-01	351	0.024 ± 0.003	< 0.013	10-01-01	334	0.018 ± 0.003	< 0.006
1st Qtr. Mean ± s.d.		0.028 ± 0.005	< 0.013	3rd Qtr. Mean ± s.d.		0.027 ± 0.007	< 0.012
04-09-01	346	0.023 ± 0.003	< 0.006	10-08-01	329	0.029 ± 0.003	< 0.010
04-16-01	343	0.020 ± 0.003	< 0.006	10-15-01	331	0.027 ± 0.003	< 0.009
04-23-01	346	0.028 ± 0.003	< 0.011	10-22-01	334	0.020 ± 0.003	< 0.008
04-30-01	343	0.023 ± 0.003	< 0.011	10-29-01	340	0.019 ± 0.003	< 0.005
05-07-01	334	0.029 ± 0.004	< 0.008	11-05-01	340	0.029 ± 0.004	< 0.007
05-14-01	340	0.024 ± 0.003	< 0.006	11-12-01	329	0.023 ± 0.003	< 0.007
05-21-01	329	0.027 ± 0.003	< 0.008	11-19-01	331	0.062 ± 0.005	< 0.007
05-29-01	394	0.013 ± 0.002	< 0.007	11-26-01	337	0.026 ± 0.003	< 0.004
				12-03-01	334	0.029 ± 0.004	< 0.011
06-04-01	292	0.017 ± 0.003	< 0.007	12-10-01	337	0.040 ± 0.004	< 0.012
06-11-01	337	0.019 ± 0.003	< 0.008	12-17-01	340	0.045 ± 0.004	< 0.012
06-18-01	323	0.026 ± 0.003	< 0.012	12-26-01	439	0.032 ± 0.003	< 0.005
06-25-01	329	0.023 ± 0.003	< 0.006	12-31-01	255	0.024 ± 0.004	< 0.014
07-02-01	323	0.032 ± 0.003	< 0.004				
2nd Qtr. Mean ± s.d.		0.023 ± 0.005	< 0.012	4th Qtr. Mean ± s.d.		0.031 ± 0.012	< 0.014
Cumulative Average						0.028	
Previous Annual Average						0.026	

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: SPR - Covert (3.5 mi. ESE)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	326	0.030 ± 0.003	< 0.012	07-09-01	314	0.021 ± 0.003	< 0.006
01-15-01	343	0.028 ± 0.003	< 0.012	07-16-01	317	0.019 ± 0.003	< 0.009
01-22-01	343	0.035 ± 0.004	< 0.008	07-23-01	309	0.038 ± 0.004	< 0.010
01-29-01	340	0.032 ± 0.004	< 0.005	07-30-01	312	0.027 ± 0.003	< 0.012
02-05-01	348	0.035 ± 0.004	< 0.008	08-06-01	309	0.033 ± 0.004	< 0.010
02-12-01	343	0.027 ± 0.003	< 0.012	08-13-01	269	0.038 ± 0.004	< 0.007
02-19-01	346	0.036 ± 0.004	< 0.009	08-20-01	314	0.021 ± 0.003	< 0.011
02-26-01	348	0.035 ± 0.003	< 0.008	08-27-01	323	0.027 ± 0.003	< 0.009
03-05-01	343	0.030 ± 0.004	< 0.007	09-04-01	351	0.024 ± 0.003	< 0.008
03-12-01	348	0.018 ± 0.003	< 0.008	09-10-01	269	0.018 ± 0.003	< 0.009
03-19-01	337	0.024 ± 0.003	< 0.011	09-17-01	320	0.022 ± 0.003	< 0.012
03-26-01	343	0.021 ± 0.003	< 0.007	09-24-01	317	0.034 ± 0.004	< 0.005
04-02-01	334	0.021 ± 0.003	< 0.014	10-01-01	329	0.016 ± 0.003	< 0.006
1st Qtr. Mean ± s.d.		0.029 ± 0.006	< 0.014	3rd Qtr. Mean ± s.d.		0.026 ± 0.008	< 0.012
04-09-01	334	0.025 ± 0.003	< 0.006	10-08-01	320	0.030 ± 0.003	< 0.010
04-16-01	329	0.020 ± 0.003	< 0.006	10-15-01	323	0.026 ± 0.004	< 0.009
04-23-01	331	0.025 ± 0.003	< 0.011	10-22-01	329	0.022 ± 0.003	< 0.008
04-30-01	326	0.029 ± 0.004	< 0.011	10-29-01	331	0.020 ± 0.003	< 0.005
05-07-01	317	0.032 ± 0.004	< 0.008	11-05-01	334	0.027 ± 0.003	< 0.007
05-14-01	323	0.025 ± 0.003	< 0.007	11-12-01	320	0.024 ± 0.003	< 0.007
05-21-01	320	0.026 ± 0.003	< 0.008	11-19-01	323	0.060 ± 0.005	< 0.007
05-29-01	371	0.014 ± 0.003	< 0.007	11-26-01	331	0.029 ± 0.003	< 0.004
				12-03-01	329	0.029 ± 0.004	< 0.011
06-04-01	280	0.018 ± 0.003	< 0.007	12-10-01	329	0.043 ± 0.004	< 0.012
06-11-01	323	0.019 ± 0.003	< 0.008	12-17-01	337	0.038 ± 0.004	< 0.012
06-18-01	309	0.027 ± 0.004	< 0.012	12-26-01	430	0.030 ± 0.003	< 0.006
06-25-01	314	0.020 ± 0.003	< 0.006	12-31-01	246	0.025 ± 0.004	< 0.014
07-02-01	314	0.034 ± 0.003	< 0.005				
2nd Qtr. Mean ± s.d.		0.024 ± 0.006	< 0.012	4th Qtr. Mean ± s.d.		0.031 ± 0.011	< 0.014
Cumulative Average						0.028	
Previous Annual Average						0.026	

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 6RB - South Haven (4.75 mi. NE)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	306	0.035 ± 0.004	< 0.013	07-09-01	340	0.021 ± 0.003	< 0.006
01-15-01	357	0.045 ± 0.004	< 0.012	07-16-01	334	0.020 ± 0.003	< 0.008
01-22-01	354	0.031 ± 0.004	< 0.008	07-23-01	331	0.038 ± 0.004	< 0.009
01-29-01	360	0.032 ± 0.004	< 0.004	07-30-01	334	0.021 ± 0.004	< 0.011
02-05-01	354	0.029 ± 0.003	< 0.008	08-06-01	329	0.029 ± 0.004	< 0.009
02-12-01	354	0.023 ± 0.003	< 0.012	08-13-01	337	0.030 ± 0.004	< 0.005
02-19-01	360	0.032 ± 0.004	< 0.009	08-20-01	337	0.022 ± 0.003	< 0.010
02-26-01	357	0.033 ± 0.003	< 0.008	08-27-01	340	0.025 ± 0.003	< 0.008
03-05-01	354	0.029 ± 0.003	< 0.007	09-04-01	382	0.024 ± 0.003	< 0.008
03-12-01	360	0.017 ± 0.003	< 0.008	09-10-01	289	0.017 ± 0.003	< 0.008
03-19-01	351	0.024 ± 0.003	< 0.011	09-17-01	343	0.023 ± 0.003	< 0.011
03-26-01	363	0.023 ± 0.003	< 0.007	09-24-01	340	0.027 ± 0.003	< 0.005
04-02-01	354	0.024 ± 0.003	< 0.013	10-01-01	351	0.018 ± 0.003	< 0.006
<u>1st Qtr. Mean ± s.d.</u>		<u>0.029 ± 0.007</u>	<u>< 0.013</u>	<u>3rd Qtr. Mean ± s.d.</u>		<u>0.024 ± 0.006</u>	<u>< 0.011</u>
04-09-01	354	0.023 ± 0.003	< 0.006	10-08-01	348	0.024 ± 0.003	< 0.009
04-16-01	348	0.018 ± 0.003	< 0.006	10-15-01	346	0.024 ± 0.003	< 0.009
04-23-01	348	0.025 ± 0.003	< 0.011	10-22-01	351	0.021 ± 0.003	< 0.008
04-30-01	343	0.023 ± 0.003	< 0.011	10-29-01	360	0.014 ± 0.003	< 0.005
05-07-01	343	0.027 ± 0.003	< 0.008	11-05-01	357	0.024 ± 0.003	< 0.006
05-14-01	343	0.020 ± 0.003	< 0.006	11-12-01	346	0.026 ± 0.003	< 0.007
05-21-01	337	0.023 ± 0.003	< 0.008	11-19-01	351	0.056 ± 0.004	< 0.006
05-29-01	396	0.011 ± 0.002	< 0.007	11-26-01	357	0.026 ± 0.003	< 0.004
				12-03-01	351	0.026 ± 0.003	< 0.011
06-04-01	300	0.015 ± 0.003	< 0.007	12-10-01	357	0.036 ± 0.003	< 0.011
06-11-01	346	0.021 ± 0.003	< 0.007	12-17-01	360	0.043 ± 0.004	< 0.011
06-18-01	329	0.026 ± 0.003	< 0.011	12-26-01	467	0.024 ± 0.003	< 0.005
06-25-01	340	0.021 ± 0.003	< 0.006	12-31-01	266	0.026 ± 0.004	< 0.013
07-02-01	337	0.030 ± 0.003	< 0.004				
<u>2nd Qtr. Mean ± s.d.</u>		<u>0.022 ± 0.005</u>	<u>< 0.011</u>	<u>4th Qtr. Mean ± s.d.</u>		<u>0.028 ± 0.011</u>	<u>< 0.013</u>
Cumulative Average						0.026	
Previous Annual Average						0.026	

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 7SD - South Haven (6.5 mi. NNE)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	303	0.031 ± 0.003	< 0.012	07-09-01	331	0.025 ± 0.003	< 0.008
01-15-01	354	0.028 ± 0.003	< 0.007	07-16-01	326	0.020 ± 0.003	< 0.011
01-22-01	286 ^a	0.046 ± 0.005	< 0.009	07-23-01	323	0.042 ± 0.004	< 0.011
01-29-01	ND ^b	-	-	07-30-01	326	0.023 ± 0.003	< 0.014
02-05-01	351	0.029 ± 0.003	< 0.008	08-06-01	326	0.033 ± 0.004	< 0.013
02-12-01	351	0.026 ± 0.003	< 0.009	08-13-01	326	0.036 ± 0.004	< 0.013
02-19-01	354	0.034 ± 0.004	< 0.008	08-20-01	331	0.021 ± 0.003	< 0.008
02-26-01	346	0.031 ± 0.003	< 0.009	08-27-01	337	0.026 ± 0.003	< 0.007
03-05-01	351	0.030 ± 0.004	< 0.009	09-04-01	235	0.025 ± 0.004	< 0.012
03-12-01	351	0.018 ± 0.003	< 0.005	09-10-01	278	0.024 ± 0.003	< 0.013
03-19-01	348	0.026 ± 0.003	< 0.010	09-17-01	331	0.022 ± 0.003	< 0.011
03-26-01	351	0.026 ± 0.003	< 0.008	09-24-01	331	0.036 ± 0.004	< 0.005
04-02-01	343	0.024 ± 0.003	< 0.006	10-01-01	337	0.018 ± 0.003	< 0.010
1st Qtr. Mean ± s.d.		0.029 ± 0.007	< 0.012	3rd Qtr. Mean ± s.d.		0.027 ± 0.007	< 0.014
04-09-01	346	0.024 ± 0.003	< 0.006	10-08-01	337	0.028 ± 0.003	< 0.014
04-16-01	331	0.021 ± 0.003	< 0.007	10-15-01	334	0.025 ± 0.003	< 0.005
04-23-01	340	0.027 ± 0.003	< 0.011	10-22-01	340	0.025 ± 0.003	< 0.012
04-30-01	337	0.027 ± 0.003	< 0.005	10-29-01	346	0.018 ± 0.003	< 0.010
05-07-01	331	0.030 ± 0.004	< 0.007	11-05-01	346	0.027 ± 0.003	< 0.007
05-14-01	337	0.024 ± 0.003	< 0.009	11-12-01	331	0.025 ± 0.003	< 0.012
05-21-01	329	0.025 ± 0.003	< 0.009	11-19-01	334	0.060 ± 0.005	< 0.013
05-29-01	385	0.014 ± 0.003	< 0.009	11-26-01	340	0.028 ± 0.003	< 0.007
				12-03-01	337	0.033 ± 0.004	< 0.014
06-04-01	292	0.017 ± 0.003	< 0.012	12-10-01	343	0.042 ± 0.004	< 0.012
06-11-01	337	0.020 ± 0.003	< 0.011	12-17-01	346	0.045 ± 0.004	< 0.023
06-18-01	320	0.030 ± 0.004	< 0.010	12-26-01	447	0.031 ± 0.003	< 0.007
06-25-01	329	0.026 ± 0.003	< 0.008	12-31-01	252	0.028 ± 0.004	< 0.013
07-02-01	323	0.034 ± 0.003	< 0.010				
2nd Qtr. Mean ± s.d.		0.025 ± 0.006	< 0.012	4th Qtr. Mean ± s.d.		0.032 ± 0.011	< 0.023
Cumulative Average						0.028	
Previous Annual Average						0.026	

^a Meter out of service; pump working.

^b No data; sample not taken.

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
 Location: 8SP - State Park (1.0 mi. N)
 Units: pCi/m³
 Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	286	0.035 ± 0.003	< 0.012	07-09-01	326	0.022 ± 0.003	< 0.008
01-15-01	348	0.029 ± 0.003	< 0.007	07-16-01	323	0.019 ± 0.003	< 0.011
01-22-01	351	0.046 ± 0.005	< 0.007	07-23-01	320	0.040 ± 0.004	< 0.011
01-29-01	351	0.029 ± 0.003	< 0.010	07-30-01	320	0.025 ± 0.003	< 0.014
02-05-01	351	0.028 ± 0.003	< 0.008	08-06-01	317	0.032 ± 0.004	< 0.013
02-12-01	351	0.023 ± 0.003	< 0.009	08-13-01	280	0.036 ± 0.004	< 0.016
02-19-01	351	0.035 ± 0.004	< 0.008	08-20-01	323	0.022 ± 0.003	< 0.008
02-26-01	351	0.032 ± 0.003	< 0.009	08-27-01	329	0.029 ± 0.003	< 0.007
03-05-01	354	0.028 ± 0.003	< 0.009	09-04-01	365	0.025 ± 0.003	< 0.012
03-12-01	348	0.018 ± 0.003	< 0.005	09-10-01	278	0.020 ± 0.003	< 0.013
03-19-01	357	0.026 ± 0.003	< 0.010	09-17-01	326	0.023 ± 0.003	< 0.011
03-26-01	348	0.022 ± 0.003	< 0.008	09-24-01	326	0.032 ± 0.004	< 0.005
04-02-01	343	0.022 ± 0.003	< 0.006	10-01-01	331	0.016 ± 0.003	< 0.010
1st Qtr. Mean ± s.d.		0.029 ± 0.007	< 0.012	3rd Qtr. Mean ± s.d.		0.026 ± 0.007	< 0.016
04-09-01	340	0.023 ± 0.003	< 0.006	10-08-01	329	0.029 ± 0.003	< 0.014
04-16-01	337	0.019 ± 0.003	< 0.007	10-15-01	329	0.024 ± 0.003	< 0.006
04-23-01	337	0.026 ± 0.003	< 0.011	10-22-01	334	0.026 ± 0.004	< 0.012
04-30-01	329	0.024 ± 0.003	< 0.005	10-29-01	340	0.018 ± 0.003	< 0.010
05-07-01	326	0.031 ± 0.004	< 0.008	11-05-01	340	0.029 ± 0.004	< 0.007
05-14-01	331	0.025 ± 0.003	< 0.009	11-12-01	326	0.024 ± 0.003	< 0.012
05-21-01	326	0.024 ± 0.003	< 0.009	11-19-01	331	0.063 ± 0.005	< 0.013
05-29-01	379	0.012 ± 0.002	< 0.009	11-26-01	334	0.026 ± 0.003	< 0.007
				12-03-01	340	0.030 ± 0.004	< 0.013
06-04-01	283	0.016 ± 0.003	< 0.013	12-10-01	340	0.041 ± 0.004	< 0.012
06-11-01	334	0.019 ± 0.003	< 0.011	12-17-01	348	0.039 ± 0.004	< 0.022
06-18-01	320	0.027 ± 0.003	< 0.010	12-26-01	447	0.029 ± 0.003	< 0.007
06-25-01	326	0.023 ± 0.003	< 0.008	12-31-01	258	0.025 ± 0.004	< 0.012
07-02-01	320	0.031 ± 0.003	< 0.010				
2nd Qtr. Mean ± s.d.		0.023 ± 0.005	< 0.013	4th Qtr. Mean ± s.d.		0.031 ± 0.011	< 0.022
Cumulative Average						0.027	
Previous Annual Average						0.026	

PALISADES

Table I. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 9TP - Covert Township Park (1.5 mi. SSW)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-08-01	252	0.035 ± 0.004	< 0.014	07-09-01	272	0.025 ± 0.003	< 0.010
01-15-01	295	0.030 ± 0.004	< 0.008	07-16-01	266	0.022 ± 0.003	< 0.013
01-22-01	295	0.033 ± 0.004	< 0.009	07-23-01	263	0.042 ± 0.004	< 0.014
01-29-01	295	0.033 ± 0.004	< 0.012	07-30-01	266	0.024 ± 0.004	< 0.017
02-05-01	292	0.029 ± 0.004	< 0.010	08-06-01	263	0.032 ± 0.004	< 0.016
02-12-01	292	0.031 ± 0.004	< 0.011	08-13-01	229	0.039 ± 0.005	< 0.019
02-19-01	295	0.037 ± 0.004	< 0.009	08-20-01	269	0.026 ± 0.003	< 0.010
02-26-01	295	0.031 ± 0.004	< 0.011	08-27-01	269	0.027 ± 0.004	< 0.009
03-05-01	295	0.033 ± 0.004	< 0.011	09-04-01	295	0.026 ± 0.003	< 0.015
03-12-01	312	0.021 ± 0.003	< 0.006	09-10-01	215	0.021 ± 0.004	< 0.017
03-19-01	289	0.025 ± 0.003	< 0.012	09-17-01	266	0.023 ± 0.003	< 0.013
03-26-01	289	0.025 ± 0.004	< 0.010	09-24-01	261	0.038 ± 0.005	< 0.006
04-02-01	286	0.025 ± 0.004	< 0.007	10-01-01	269	0.018 ± 0.003	< 0.013
1st Qtr. Mean ± s.d.		0.030 ± 0.005	< 0.014	3rd Qtr. Mean ± s.d.		0.028 ± 0.008	< 0.019
04-09-01	283	0.023 ± 0.004	< 0.007	10-08-01	269	0.029 ± 0.004	< 0.017
04-16-01	278	0.020 ± 0.003	< 0.008	10-15-01	266	0.027 ± 0.004	< 0.007
04-23-01	283	0.027 ± 0.004	< 0.013	10-22-01	263	0.024 ± 0.004	< 0.015
04-30-01	275	0.026 ± 0.004	< 0.006	10-29-01	275	0.017 ± 0.004	< 0.013
05-07-01	272	0.032 ± 0.004	< 0.009	11-05-01	275	0.028 ± 0.004	< 0.009
05-14-01	278	0.026 ± 0.003	< 0.011	11-12-01	275	0.027 ± 0.004	< 0.015
05-21-01	275	0.025 ± 0.003	< 0.011	11-19-01	289	0.064 ± 0.005	< 0.015
05-29-01	317	0.016 ± 0.003	< 0.010	11-26-01	295	0.027 ± 0.004	< 0.008
				12-03-01	292	0.029 ± 0.004	< 0.016
06-04-01	241	0.018 ± 0.003	< 0.015	12-10-01	292	0.042 ± 0.004	< 0.014
06-11-01	280	0.019 ± 0.003	< 0.013	12-17-01	292	0.044 ± 0.005	< 0.027
06-18-01	258	0.030 ± 0.004	< 0.012	12-26-01	379	0.033 ± 0.003	< 0.008
06-25-01	269	0.026 ± 0.004	< 0.010	12-31-01	215	0.026 ± 0.004	< 0.015
07-02-01	266	0.031 ± 0.004	< 0.012				
2nd Qtr. Mean ± s.d.		0.025 ± 0.005	< 0.015	4th Qtr. Mean ± s.d.		0.032 ± 0.012	< 0.027
Cumulative Average						0.029	
Previous Annual Average						0.027	

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 10GR - Grand Rapids (55 mi. NNE)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-04-01	354	0.021 ± 0.003	< 0.014	07-05-01	314	0.026 ± 0.003	< 0.012
01-11-01	340	0.027 ± 0.003	< 0.010	07-12-01	320	0.026 ± 0.003	< 0.015
01-18-01	334	0.030 ± 0.003	< 0.011	07-19-01	306	0.029 ± 0.003	< 0.017
01-25-01	343	0.035 ± 0.003	< 0.014	07-26-01	320	0.032 ± 0.003	< 0.020
02-01-01	340	0.023 ± 0.003	< 0.012	08-02-01	331	0.034 ± 0.003	< 0.018
02-08-01	331	0.027 ± 0.003	< 0.013	08-09-01	312	0.036 ± 0.004	< 0.019
02-15-01	379	0.025 ± 0.003	< 0.009	08-16-01	309	0.018 ± 0.003	< 0.020
02-22-01	348	0.036 ± 0.003	< 0.013	08-23-01	334	0.022 ± 0.003	< 0.011
03-01-01	343	0.032 ± 0.003	< 0.014	08-30-01	323	0.029 ± 0.003	< 0.020
03-08-01	346	0.026 ± 0.003	< 0.008	09-06-01	320	0.024 ± 0.003	< 0.016
03-15-01	346	0.018 ± 0.003	< 0.008	09-13-01	326	0.021 ± 0.003	< 0.015
03-22-01	340	0.025 ± 0.003	< 0.012	09-20-01	326	0.029 ± 0.003	< 0.007
03-29-01	346	0.020 ± 0.003	< 0.008	09-27-01	326	0.024 ± 0.003	< 0.015
1st Qtr. Mean ± s.d.		0.027 ± 0.006	< 0.014	3rd Qtr. Mean ± s.d.		0.027 ± 0.005	< 0.020
04-05-01	337	0.025 ± 0.003	< 0.008	10-04-01	331	0.029 ± 0.004	< 0.019
04-12-01	329	0.018 ± 0.003	< 0.009	10-11-01	329	0.025 ± 0.003	< 0.008
04-19-01	334	0.027 ± 0.003	< 0.015	10-18-01	334	0.020 ± 0.003	< 0.016
04-26-01	354	0.026 ± 0.003	< 0.007	10-25-01	323	0.026 ± 0.004	< 0.015
05-03-01	323	0.032 ± 0.003	< 0.011	10-31-01	292	0.025 ± 0.004	< 0.012
05-10-01	331	0.026 ± 0.003	< 0.013	11-08-01	371	0.028 ± 0.003	< 0.015
05-17-01	323	0.023 ± 0.003	< 0.013	11-15-01	331	0.037 ± 0.003	< 0.017
05-24-01	331	0.017 ± 0.003	< 0.015	11-22-01	317	0.048 ± 0.004	< 0.011
05-31-01	329	0.015 ± 0.003	< 0.015	11-30-01	348	0.029 ± 0.004	< 0.016
06-07-01	326	0.011 ± 0.003	< 0.016	12-06-01	317	0.038 ± 0.004	< 0.018
06-14-01	317	0.029 ± 0.003	< 0.014	12-13-01	346	0.038 ± 0.004	< 0.031
06-21-01	323	0.024 ± 0.003	< 0.012	12-20-01	337	0.043 ± 0.004	< 0.015
06-28-01	314	0.029 ± 0.003	< 0.015	12-27-01	334	0.027 ± 0.003	< 0.013
2nd Qtr. Mean ± s.d.		0.023 ± 0.006	< 0.016	01-03-02	351	0.020 ± 0.003	< 0.015
				4th Qtr. Mean ± s.d.		0.031 ± 0.008	< 0.031
Cumulative Average						0.027	
Previous Annual Average						0.025	

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 11KZ - Kalamazoo (35 mi. E)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-04-01	351	0.024 ± 0.003	< 0.014	07-05-01	329	0.026 ± 0.003	< 0.011
01-11-01	346	0.028 ± 0.003	< 0.010	07-11-01	286	0.030 ± 0.004	< 0.007
01-18-01	343	0.030 ± 0.003	< 0.011	07-18-01	255	0.027 ± 0.004	< 0.022
01-25-01	334	0.039 ± 0.004	< 0.014	07-25-01	286	0.042 ± 0.004	< 0.024
02-01-01	348	0.026 ± 0.003	< 0.012	08-02-01	278	0.029 ± 0.004	< 0.021
02-08-01	343	0.029 ± 0.003	< 0.013	08-09-01	312	0.043 ± 0.004	< 0.019
02-15-01	343	0.029 ± 0.004	< 0.010	08-15-01	244	0.024 ± 0.003	< 0.017
02-22-01	340	0.035 ± 0.003	< 0.013	08-23-01	326	0.024 ± 0.003	< 0.011
03-01-01	340	0.032 ± 0.003	< 0.014	08-29-01	266	0.035 ± 0.004	< 0.027
03-08-01	346	0.029 ± 0.003	< 0.008	09-05-01	303	0.026 ± 0.004	< 0.018
03-15-01	334	0.022 ± 0.003	< 0.008	09-12-01	ND ^a	-	< 0.017
03-22-01	334	0.021 ± 0.003	< 0.012	09-21-01	408	0.027 ± 0.003	< 0.005
03-29-01	329	0.020 ± 0.003	< 0.008	09-27-01	252	0.024 ± 0.004	< 0.019
1st Qtr. Mean ± s.d.		0.028 ± 0.005	< 0.014	3rd Qtr. Mean ± s.d.		0.030 ± 0.007	< 0.027
04-05-01	306	0.027 ± 0.003	< 0.009	10-05-01	326	0.031 ± 0.003	< 0.018
04-12-01	300	0.020 ± 0.003	< 0.010	10-10-01	283	0.028 ± 0.003	< 0.010
04-18-01	343	0.022 ± 0.003	< 0.015	10-17-01	326	0.019 ± 0.003	< 0.019
04-25-01	323	0.028 ± 0.004	< 0.008	10-24-01	306	0.032 ± 0.004	< 0.017
05-02-01	320	0.026 ± 0.003	< 0.011	11-01-01	294	0.021 ± 0.003	< 0.014
05-10-01	365	0.025 ± 0.003	< 0.012	11-07-01	292	0.029 ± 0.004	< 0.021
05-16-01	275	0.024 ± 0.003	< 0.016	11-14-01	377	0.037 ± 0.003	< 0.017
05-24-01	314	0.019 ± 0.003	< 0.017	11-21-01	289	0.059 ± 0.005	< 0.010
05-30-01	323	0.014 ± 0.003	< 0.017	11-28-01	320	0.033 ± 0.003	< 0.022
06-07-01	379	0.014 ± 0.003	< 0.014	12-05-01	280	0.038 ± 0.004	< 0.022
06-13-01	258	0.025 ± 0.004	< 0.019	12-13-01	289	0.044 ± 0.005	< 0.042
06-21-01	334	0.033 ± 0.003	< 0.011	12-19-01	303	0.049 ± 0.005	< 0.018
06-27-01	261	0.023 ± 0.003	< 0.019	12-26-01	379	0.035 ± 0.003	< 0.013
				01-03-02	297	0.022 ± 0.004	< 0.018
2nd Qtr. Mean ± s.d.		0.023 ± 0.005	< 0.019	4th Qtr. Mean ± s.d.		0.034 ± 0.011	< 0.042

Cumulative Average 0.029
 Previous Annual Average 0.027

^aNo data; filter lost in mail.

PALISADES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.

Location: 12DG - Dowagiac (30 mi. SSE)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	I-131	Date Collected	Volume (m ³)	Gross Beta	I-131
<u>Required LLD</u>		<u>0.010</u>	<u>0.070</u>			<u>0.010</u>	<u>0.070</u>
01-03-01	323	0.021 ± 0.003	< 0.016	07-05-01	360	0.030 ± 0.003	< 0.010
01-10-01	320	0.030 ± 0.004	< 0.011	07-11-01	326	0.025 ± 0.003	< 0.015
01-17-01	317	0.030 ± 0.003	< 0.012	07-19-01	351	0.027 ± 0.003	< 0.015
01-25-01	317	0.044 ± 0.004	< 0.015	07-26-01	334	0.035 ± 0.003	< 0.019
01-31-01	320	0.026 ± 0.003	< 0.013	08-02-01	346	0.034 ± 0.003	< 0.017
02-08-01	360	0.030 ± 0.003	< 0.012	08-09-01	340	0.036 ± 0.004	< 0.017
02-14-01	278	0.028 ± 0.004	< 0.014	08-15-01	300	0.020 ± 0.003	< 0.014
02-21-01	317	0.046 ± 0.004	< 0.015	08-23-01	399	0.023 ± 0.003	< 0.009
02-28-01	326	0.030 ± 0.003	< 0.015	08-29-01	297	0.032 ± 0.004	< 0.018
03-07-01	371	0.029 ± 0.003	< 0.008	09-06-01	416	0.022 ± 0.003	< 0.013
03-14-01	360	0.022 ± 0.003	< 0.015	09-13-01	334	0.023 ± 0.003	< 0.015
03-21-01	363	0.024 ± 0.003	< 0.012	09-20-01	354	0.027 ± 0.003	< 0.006
03-28-01	368	0.023 ± 0.003	< 0.007	09-27-01	357	0.021 ± 0.003	< 0.013
1st Qtr. Mean ± s.d.		0.029 ± 0.008	< 0.016	3rd Qtr. Mean ± s.d.		0.027 ± 0.006	< 0.019
04-04-01	360	0.024 ± 0.003	< 0.009	10-04-01	357	0.029 ± 0.003	< 0.018
04-11-01	357	0.020 ± 0.003	< 0.009	10-11-01	360	0.027 ± 0.003	< 0.007
04-19-01	388	0.021 ± 0.003	< 0.014	10-17-01	357	0.018 ± 0.003	< 0.018
04-25-01	323	0.026 ± 0.004	< 0.008	10-24-01	446	0.026 ± 0.003	< 0.015
05-03-01	382	0.028 ± 0.003	< 0.009	10-30-01	365	0.020 ± 0.003	< 0.010
05-09-01	320	0.027 ± 0.003	< 0.015	11-07-01	363	0.023 ± 0.003	< 0.017
05-16-01	354	0.022 ± 0.003	< 0.012	11-14-01	371	0.035 ± 0.003	< 0.017
05-23-01	379	0.018 ± 0.003	< 0.013	11-23-01	462	0.050 ± 0.004	< 0.007
05-31-01	357	0.014 ± 0.002	< 0.014	11-29-01	323	0.027 ± 0.004	< 0.019
06-07-01	357	0.014 ± 0.003	< 0.015	12-06-01	334	0.038 ± 0.003	< 0.017
06-14-01	346	0.025 ± 0.003	< 0.013	12-13-01	346	0.042 ± 0.004	< 0.035
06-20-01	320	0.027 ± 0.003	< 0.013	12-19-01	340	0.039 ± 0.004	< 0.016
06-28-01	377	0.023 ± 0.003	< 0.012	12-26-01	385	0.032 ± 0.003	< 0.013
				01-02-02	377	0.027 ± 0.003	< 0.015
2nd Qtr. Mean ± s.d.		0.022 ± 0.005	< 0.015	4th Qtr. Mean ± s.d.		0.031 ± 0.009	< 0.035
				Cumulative Average		0.028	
				Previous Annual Average		0.027	

PALISADES

Table 2. Gamma radiation, as measured by TLDs, monthly exposure.

Units: mR/30 days^a

	<u>January</u>	<u>February</u>	<u>March</u>
Date Placed	01-04-01	02-01-01	03-04-01
Date Removed	02-01-01	03-04-01	04-03-01
Intransit (mR)	5.9 ± 0.2	4.7 ± 0.2	3.7 ± 0.2
ST-01	3.6 ± 0.2	3.6 ± 0.2	4.1 ± 0.3
ST-02	5.3 ± 0.2	4.7 ± 0.2	5.7 ± 0.3
ST-03	4.9 ± 0.2	4.2 ± 0.2	5.0 ± 0.2
ST-04	5.4 ± 0.3	4.9 ± 0.3	4.9 ± 0.2
ST-05	4.8 ± 0.2	4.5 ± 0.2	5.3 ± 0.2
ST-06	4.9 ± 0.2	4.1 ± 0.2	4.0 ± 0.4
ST-07A	5.0 ± 0.3	3.9 ± 0.2	4.1 ± 0.3
ST-08	4.5 ± 0.2	3.7 ± 0.2	4.3 ± 0.3
ST-09	3.8 ± 0.2	3.8 ± 0.2	4.0 ± 0.3
ST-10	3.7 ± 0.2	5.3 ± 0.2	4.0 ± 0.4
ST-11	4.5 ± 0.2	4.0 ± 0.2	5.0 ± 0.2
ST-12	4.1 ± 0.2	4.0 ± 0.2	4.0 ± 0.2
ST-13	3.6 ± 0.3	3.7 ± 0.2	3.6 ± 0.2
ST-14	4.5 ± 0.3	3.8 ± 0.2	3.7 ± 0.2
ST-15	4.9 ± 0.3	3.8 ± 0.3	4.0 ± 0.2
ST-16	4.6 ± 0.3	3.7 ± 0.2	4.1 ± 0.3
ST-17	4.5 ± 0.3	3.4 ± 0.2	4.0 ± 0.3
ST-18	5.0 ± 0.3	3.8 ± 0.2	4.9 ± 0.2
ST-19	4.2 ± 0.2	3.5 ± 0.2	4.0 ± 0.2
ST-20	4.1 ± 0.2	3.5 ± 0.2	4.1 ± 0.2
ST-21	5.3 ± 0.2	3.1 ± 0.2	4.0 ± 0.2
ST-22	3.3 ± 0.2	1.8 ± 0.2	2.0 ± 0.2
ST-23	4.6 ± 0.2	3.7 ± 0.2	4.5 ± 0.2
ST-24	4.1 ± 0.2	3.5 ± 0.2	4.0 ± 0.3
ST-33	4.2 ± 0.3	3.7 ± 0.2	4.0 ± 0.3
ST-34	4.4 ± 0.2	3.7 ± 0.2	4.9 ± 0.2
ST-35	5.4 ± 0.3	4.4 ± 0.2	4.9 ± 0.2
ST-36	4.3 ± 0.3	3.7 ± 0.2	3.7 ± 0.2
ST-37	3.7 ± 0.3	3.6 ± 0.2	3.7 ± 0.2
ST-38	<u>3.7 ± 0.3</u>	<u>3.3 ± 0.2</u>	<u>3.6 ± 0.3</u>
Mean ± s.d.	4.4 ± 0.6	3.8 ± 0.6	4.2 ± 0.7
Control 1	1.9 ± 0.2	1.4 ± 0.2	1.6 ± 0.2
Control 2	1.9 ± 0.2	1.4 ± 0.2	1.6 ± 0.2

^a Intransit exposure has been subtracted.

PALISADES

Table 2. Gamma radiation, as measured by TLDs, monthly exposure.

	<u>April</u>	<u>May</u>	<u>June</u>
Date Placed	04-03-01	05-03-01	05-28-01
Date Removed	05-03-01	05-28-01	07-04-01
Intransit (mR)	4.1 ± 0.2	6.1 ± 0.2	4.4 ± 0.3
ST-01	4.2 ± 0.2	3.9 ± 0.2	3.6 ± 0.2
ST-02	5.1 ± 0.3	5.8 ± 0.3	5.2 ± 0.3
ST-03	4.6 ± 0.2	5.3 ± 0.2	4.3 ± 0.3
ST-04	4.6 ± 0.3	5.9 ± 0.2	4.8 ± 0.2
ST-05	4.3 ± 0.2	5.0 ± 0.3	4.6 ± 0.2
ST-06	3.8 ± 0.2	4.3 ± 0.2	3.9 ± 0.2
ST-07A	3.5 ± 0.2	4.4 ± 0.3	3.8 ± 0.2
ST-08	3.7 ± 0.2	4.4 ± 0.3	4.0 ± 0.3
ST-09	3.4 ± 0.3	4.1 ± 0.3	3.5 ± 0.2
ST-10	4.4 ± 0.2	3.3 ± 0.3	3.6 ± 0.2
ST-11	4.3 ± 0.2	4.1 ± 0.3	4.5 ± 0.2
ST-12	3.5 ± 0.3	4.8 ± 0.2	4.2 ± 0.2
ST-13	3.4 ± 0.2	4.1 ± 0.3	3.6 ± 0.2
ST-14	3.3 ± 0.3	3.9 ± 0.3	3.6 ± 0.2
ST-15	3.3 ± 0.3	4.3 ± 0.3	3.9 ± 0.2
ST-16	3.5 ± 0.3	4.0 ± 0.3	3.5 ± 0.2
ST-17	3.5 ± 0.2	3.9 ± 0.3	3.5 ± 0.2
ST-18	3.8 ± 0.2	4.8 ± 0.3	3.6 ± 0.2
ST-19	3.4 ± 0.3	4.3 ± 0.3	3.9 ± 0.2
ST-20	3.4 ± 0.3	4.1 ± 0.3	3.5 ± 0.2
ST-21	3.0 ± 0.3	3.9 ± 0.3	3.5 ± 0.2
ST-22	1.8 ± 0.3	2.0 ± 0.2	1.4 ± 0.2
ST-23	3.6 ± 0.2	4.3 ± 0.3	4.2 ± 0.2
ST-24	3.3 ± 0.3	3.8 ± 0.3	3.5 ± 0.2
ST-33	3.4 ± 0.3	4.3 ± 0.2	3.5 ± 0.2
ST-34	3.5 ± 0.2	4.4 ± 0.2	3.8 ± 0.2
ST-35	4.3 ± 0.2	4.9 ± 0.3	4.5 ± 0.2
ST-36	3.5 ± 0.2	3.9 ± 0.3	3.6 ± 0.2
ST-37	3.3 ± 0.3	3.4 ± 0.3	3.7 ± 0.2
ST-38	3.4 ± 0.2	3.1 ± 0.2	3.5 ± 0.2
Mean ± s.d.	3.7 ± 0.6	4.2 ± 0.8	3.8 ± 0.6
Control 1	1.7 ± 0.2	1.9 ± 0.3	1.5 ± 0.2
Control 2	1.8 ± 0.2	1.9 ± 0.3	1.5 ± 0.2

^a Intransit exposure has been subtracted.

PALISADES

Table 2. Gamma radiation, as measured by TLDs, monthly exposure.

Units: mR/30 days^a

	<u>July</u>	<u>August</u>	<u>September</u>
Date Placed	07-04-01	08-05-01	09-02-01
Date Removed	08-05-01	09-02-01	10-02-01
Intransit (mR)	5.3 ± 0.2	4.3 ± 0.2	5.6 ± 0.2
ST-01	3.8 ± 0.3	5.8 ± 0.2	3.6 ± 0.2
ST-02	6.1 ± 0.4	7.2 ± 0.2	4.8 ± 0.3
ST-03	4.6 ± 0.3	6.7 ± 0.3	4.0 ± 0.2
ST-04	5.0 ± 0.3	7.1 ± 0.3	4.4 ± 0.3
ST-05	4.2 ± 0.3	6.3 ± 0.3	3.8 ± 0.3
ST-06	4.0 ± 0.3	6.2 ± 0.3	3.6 ± 0.3
ST-07A	4.7 ± 0.3	6.3 ± 0.3	3.5 ± 0.3
ST-08	4.0 ± 0.3	5.8 ± 0.3	3.6 ± 0.2
ST-09	3.4 ± 0.3	5.7 ± 0.2	2.9 ± 0.2
ST-10	3.8 ± 0.3	4.0 ± 0.2	3.1 ± 0.2
ST-11	4.7 ± 0.3	5.1 ± 0.2	4.6 ± 0.3
ST-12	4.1 ± 0.3	6.4 ± 0.3	3.4 ± 0.3
ST-13	3.4 ± 0.2	5.8 ± 0.3	2.8 ± 0.2
ST-14	3.4 ± 0.3	5.8 ± 0.3	2.5 ± 0.2
ST-15	4.1 ± 0.3	5.9 ± 0.3	3.1 ± 0.2
ST-16	3.3 ± 0.3	5.4 ± 0.3	3.1 ± 0.2
ST-17	3.4 ± 0.2	5.4 ± 0.2	3.7 ± 0.3
ST-18	3.7 ± 0.3	5.7 ± 0.3	3.7 ± 0.2
ST-19	4.0 ± 0.3	5.7 ± 0.2	3.6 ± 0.3
ST-20	3.6 ± 0.3	4.9 ± 0.3	3.0 ± 0.2
ST-21	3.4 ± 0.2	4.9 ± 0.3	3.0 ± 0.2
ST-22	1.6 ± 0.2	1.8 ± 0.3	1.9 ± 0.2
ST-23	4.2 ± 0.3	6.2 ± 0.3	3.7 ± 0.2
ST-24	3.4 ± 0.2	5.8 ± 0.3	3.2 ± 0.2
ST-33	3.6 ± 0.3	5.4 ± 0.3	3.6 ± 0.3
ST-34	3.8 ± 0.3	5.8 ± 0.3	3.6 ± 0.3
ST-35	4.6 ± 0.2	6.3 ± 0.3	4.4 ± 0.3
ST-36	3.4 ± 0.3	5.7 ± 0.3	3.0 ± 0.2
ST-37	3.4 ± 0.3	5.3 ± 0.3	3.3 ± 0.2
ST-38	3.5 ± 0.2	4.9 ± 0.3	3.5 ± 0.2
Mean ± s.d.	3.9 ± 0.8	5.6 ± 1.0	3.5 ± 0.6
Control 1	1.3 ± 0.2	1.8 ± 0.3	1.5 ± 0.2
Control 2	1.3 ± 0.2	1.8 ± 0.3	1.5 ± 0.2

^a Intransit exposure has been subtracted.

PALISADES

Table 2. Gamma radiation, as measured by TLDs, monthly exposure.

Units: mR/30 days^a

	<u>October</u>	<u>November</u>	<u>December</u>
Date Placed	10-02-01	11-01-01	12-02-01
Date Removed	11-01-01	12-02-01	01-02-02
Intransit (mR)	4.2 ± 0.2	4.7 ± 0.2	5.1 ± 0.2
ST-01	4.9 ± 0.3	4.9 ± 0.3	3.5 ± 0.2
ST-02	5.5 ± 0.3	5.0 ± 0.3	4.8 ± 0.3
ST-03	4.8 ± 0.2	4.6 ± 0.3	4.1 ± 0.3
ST-04	5.5 ± 0.3	4.8 ± 0.3	4.7 ± 0.2
ST-05	5.5 ± 0.3	4.5 ± 0.2	4.5 ± 0.3
ST-06	4.1 ± 0.2	3.7 ± 0.3	4.2 ± 0.3
ST-07A	4.4 ± 0.2	3.7 ± 0.2	4.0 ± 0.3
ST-08	4.3 ± 0.2	3.8 ± 0.3	3.8 ± 0.2
ST-09	4.2 ± 0.3	3.1 ± 0.3	3.6 ± 0.2
ST-10	3.9 ± 0.2	3.4 ± 0.3	3.5 ± 0.3
ST-11	5.1 ± 0.3	4.6 ± 0.3	4.6 ± 0.2
ST-12	5.5 ± 0.3	3.6 ± 0.3	4.1 ± 0.2
ST-13	4.3 ± 0.3	3.3 ± 0.8	3.4 ± 0.3
ST-14	4.6 ± 0.2	3.3 ± 0.3	3.4 ± 0.2
ST-15	4.0 ± 0.2	4.9 ± 0.3	4.0 ± 0.3
ST-16	4.1 ± 0.3	4.6 ± 0.3	3.5 ± 0.2
ST-17	4.0 ± 0.3	2.9 ± 0.3	3.3 ± 0.2
ST-18	4.2 ± 0.2	4.0 ± 0.3	3.5 ± 0.2
ST-19	4.3 ± 0.3	3.8 ± 0.2	3.5 ± 0.2
ST-20	4.0 ± 0.2	3.1 ± 0.3	3.2 ± 0.2
ST-21	3.7 ± 0.3	3.0 ± 0.3	3.1 ± 0.2
ST-22	1.7 ± 0.3	1.8 ± 0.3	1.6 ± 0.2
ST-23	4.8 ± 0.3	4.3 ± 0.2	4.4 ± 0.2
ST-24	4.2 ± 0.3	4.4 ± 0.3	3.8 ± 0.2
ST-33	4.1 ± 0.3	3.3 ± 0.3	3.1 ± 0.2
ST-34	4.4 ± 0.2	3.2 ± 0.3	3.4 ± 0.2
ST-35	4.9 ± 0.3	4.1 ± 0.3	4.3 ± 0.3
ST-36	4.1 ± 0.2	3.2 ± 0.4	3.9 ± 0.3
ST-37	4.0 ± 0.2	3.1 ± 0.4	4.1 ± 0.3
ST-38	<u>3.7 ± 0.3</u>	<u>2.9 ± 0.3</u>	<u>3.6 ± 0.3</u>
Mean ± s.d.	4.4 ± 0.7	3.8 ± 0.8	3.8 ± 0.6
Control 1	1.7 ± 0.3	1.4 ± 0.2	1.4 ± 0.2
Control 2	1.8 ± 0.2	1.4 ± 0.2	1.5 ± 0.2

^a Intransit exposure has been subtracted.

PALISADES

Table 3. Gamma radiation, as measured by TLDs, quarterly exposure.

Units: mR/91 days^a

	<u>1st Qtr.</u>	<u>2nd Qtr.</u>	<u>3rd Qtr.</u>	<u>4th Qtr.</u>
Date Placed	01-04-01	04-03-01	07-04-01	10-02-01
Date Removed	04-03-01	07-04-01	10-02-01	01-02-02
Intransit (mR)	8.4 ± 0.2	5.7 ± 0.6	6.3 ± 0.6	5.8 ± 0.7
ST-01	10.9 ± 0.2	12.1 ± 0.6	11.7 ± 0.6	12.9 ± 0.7
ST-02	15.1 ± 0.2	16.6 ± 0.6	16.7 ± 0.6	16.8 ± 0.7
ST-03	13.1 ± 0.2	14.0 ± 0.7	14.1 ± 0.7	14.3 ± 0.7
ST-04	13.8 ± 0.2	14.8 ± 0.6	14.1 ± 0.8	15.2 ± 0.7
ST-05	12.5 ± 0.3	14.0 ± 0.7	13.4 ± 0.6	14.5 ± 0.7
ST-06	12.9 ± 0.2	12.5 ± 0.7	13.9 ± 0.7	13.4 ± 0.7
ST-07A	11.9 ± 0.4	12.1 ± 0.6	12.0 ± 0.6	13.2 ± 0.8
ST-08	11.7 ± 0.3	12.4 ± 0.6	12.4 ± 0.7	12.7 ± 0.7
ST-09	10.4 ± 0.2	10.9 ± 0.6	11.7 ± 0.7	11.8 ± 0.7
ST-10	11.3 ± 0.2	12.9 ± 0.6	12.0 ± 0.6	13.1 ± 0.7
ST-11	13.2 ± 0.2	14.2 ± 0.7	14.8 ± 0.6	16.0 ± 0.7
ST-12	12.0 ± 0.4	14.1 ± 0.7	12.1 ± 0.6	13.9 ± 0.7
ST-13	11.2 ± 0.2	12.1 ± 0.6	12.2 ± 0.6	12.1 ± 0.7
ST-14	10.4 ± 0.2	11.0 ± 0.6	10.1 ± 0.7	10.7 ± 0.7
ST-15	10.4 ± 0.2	11.2 ± 0.6	10.4 ± 0.7	11.8 ± 0.7
ST-16	7.5 ± 0.2	11.3 ± 0.6	10.9 ± 0.6	11.5 ± 0.7
ST-17	10.4 ± 0.3	11.3 ± 0.6	11.2 ± 0.6	11.3 ± 0.7
ST-18	11.9 ± 0.3	11.6 ± 0.6	12.2 ± 0.6	12.2 ± 0.8
ST-19	11.3 ± 0.2	12.5 ± 0.6	12.2 ± 0.6	12.6 ± 0.7
ST-20	11.2 ± 0.2	11.3 ± 0.7	11.8 ± 0.6	11.8 ± 0.7
ST-21	10.8 ± 0.2	10.9 ± 0.6	11.3 ± 0.6	11.3 ± 0.7
ST-22	6.4 ± 0.2	5.8 ± 0.7	10.6 ± 0.6	6.2 ± 0.7
ST-23	11.9 ± 0.3	12.5 ± 0.6	12.1 ± 0.6	13.3 ± 0.9
ST-24	10.9 ± 0.3	13.0 ± 0.6	11.7 ± 0.6	12.8 ± 0.7
ST-33	10.3 ± 0.2	11.3 ± 0.6	10.8 ± 0.6	11.4 ± 0.7
ST-34	11.3 ± 0.2	11.3 ± 0.6	11.7 ± 0.6	11.7 ± 0.7
ST-35	13.8 ± 0.2	12.9 ± 0.6	13.0 ± 0.6	13.3 ± 0.7
ST-36	11.2 ± 0.2	11.8 ± 0.6	11.0 ± 0.6	12.1 ± 0.7
ST-37	12.0 ± 0.4	11.8 ± 0.6	11.6 ± 0.6	12.0 ± 0.7
ST-38	10.9 ± 0.2	11.3 ± 0.6	11.1 ± 0.6	12.2 ± 0.7
Mean ± s.d.	11.4 ± 1.7	12.2 ± 1.8	12.2 ± 1.4	12.6 ± 1.9
Control 1	5.6 ± 0.2	5.7 ± 0.7	9.2 ± 0.6	5.9 ± 0.7
Control 2	5.8 ± 0.2	5.9 ± 0.6	9.1 ± 0.6	6.2 ± 0.7

^a Intransit exposure has been subtracted.

PALISADES

Table 4. Gamma radiation, as measured by TLDs, annual exposure.
Units: mR/365 days^a

	<u>2001</u>
Date Placed	01-04-01
Date Removed	01-02-02
Intransit (mR)	3.8 ± 2.4
ST-01	41.6 ± 2.6
ST-02	58.3 ± 2.4
ST-03	50.9 ± 2.4
ST-04	52.2 ± 2.4
ST-05	49.7 ± 2.4
ST-06	47.3 ± 2.4
ST-07A	47.7 ± 2.5
ST-08	46.5 ± 2.4
ST-09	43.9 ± 2.5
ST-10	45.3 ± 2.4
ST-11	52.0 ± 2.4
ST-12	47.9 ± 2.4
ST-13	42.1 ± 2.4
ST-14	38.9 ± 2.4
ST-15	39.4 ± 2.4
ST-16	40.5 ± 2.4
ST-17	39.5 ± 2.4
ST-18	41.9 ± 2.4
ST-19	43.9 ± 2.5
ST-20	42.0 ± 2.4
ST-21	42.7 ± 2.4
ST-22	23.2 ± 2.4
ST-23	49.0 ± 2.5
ST-24	45.7 ± 2.4
ST-33	40.6 ± 2.4
ST-34	41.7 ± 2.4
ST-35	49.9 ± 2.4
ST-36	40.3 ± 2.4
ST-37	42.3 ± 2.4
ST-38	40.6 ± 2.5
Mean ± s.d.	44.3 ± 6.2
Control 1	21.9 ± 2.4
Control 2	21.9 ± 2.4

^a Intransit exposure has been subtracted.

PALISADES

Table 5. Lake Water, analyses for gross alpha, gross beta and tritium.

Collection: Monthly composites of daily collections.

Units: pCi/L

Location Date Collected	Lab Code	Discharge		
		Gross Alpha	Gross Beta	H-3
<u>Required LLD</u>		<u>1.0</u>	<u>4.0</u>	<u>500</u>
01-31-01	PALW -1010	< 0.4	1.6 ± 0.4	< 112
02-28-01	PALW -1815	< 0.5	2.0 ± 0.4	< 182
03-31-01	PALW -2616	< 0.4	2.1 ± 0.4	2026 ± 160 ^a
04-30-01	PALW -3727	< 0.4	1.6 ± 0.4	< 180
05-31-01	PALW -4714	< 0.3	1.3 ± 0.3	2851 ± 164
06-30-01	PALW -5680	< 0.4	2.2 ± 0.4	3309 ± 173
07-31-01	PALW -7044	< 0.6	2.5 ± 0.4	< 151
08-31-01	PALW -7861	0.8 ± 0.4	1.8 ± 0.4	< 152
09-30-01	PALW -8881	< 0.5	1.8 ± 0.4	< 155
10-30-01	PALW -10352	< 0.4	1.0 ± 0.4	166 ± 88
11-30-01	PALW -11097	0.4 ± 0.3	1.8 ± 0.4	293 ± 93
12-31-01	PALW -11739	< 0.3	1.9 ± 0.4	23169 ± 427 ^b

Location Date Collected	Lab Code	Intake		
		Gross Alpha	Gross Beta	H-3
<u>Required LLD</u>		<u>1.0</u>	<u>4.0</u>	<u>500</u>
01-31-01	PALW -1011	< 0.5	2.0 ± 0.4	< 177
02-28-01	PALW -1814	< 0.4	2.0 ± 0.5	186 ± 98
03-31-01	PALW -2617	0.4 ± 0.3	1.9 ± 0.4	< 185
04-30-01	PALW -3728	< 0.5	2.5 ± 0.4	< 162
05-31-01	PALW -4715	1.4 ± 0.3	2.5 ± 0.4	< 153
06-30-01	PALW 5681,2	< 0.3	2.3 ± 0.3	197 ± 84
07-31-01	PALW -7045	< 0.4	1.8 ± 0.4	< 151
08-31-01	PALW -7862	< 0.5	2.0 ± 0.4	< 152
09-30-01	PALW -8882	< 0.4	1.8 ± 0.4	< 155
10-31-01	PALW -10353	< 0.5	1.8 ± 0.4	< 163
11-30-01	PALW -11098	0.4 ± 0.2	1.6 ± 0.3	< 162
12-31-01	PALW 11740,1	< 0.4	2.1 ± 0.3	< 164

^a Tritium repeated with a result of 2627±180.

^b Tritium repeated with a result of 23038±407 pCi/L.

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Table 6. Lake Water, drinking, analyses for gross beta and tritium^a.

Collection: Monthly composites of daily collections.

Units: pCi/L

Location	South Haven Municipal System (Raw)		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-31-01	PALW -780	2.1 ± 0.5	-
02-28-01	PALW -1587	3.4 ± 0.6	-
03-31-01	PALW 2467,8	2.5 ± 0.4	-
04-30-01	PALW -3542	2.4 ± 0.3	-
05-31-01	PALW -4551	2.0 ± 0.6	-
06-30-01	PALW -5757	2.8 ± 0.5	-
07-31-01	PALW -6955	2.4 ± 0.6	-
08-31-01	PALW -7850	2.2 ± 0.5	-
09-30-01	PALW -8766	2.2 ± 0.5	-
10-31-01	PALW -10138	1.7 ± 0.6	-
11-30-01	PALW -10920	2.3 ± 0.3	-
12-31-01	PALW -11742	1.8 ± 0.6	-

Location	South Haven Municipal System (Treated)		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-31-01	PALW -781	2.3 ± 0.3	< 182
02-28-01	PALW -1588	2.7 ± 0.6	< 186
03-31-01	PALW -2469	2.4 ± 0.5	< 162
04-30-01	PALW -3543	2.0 ± 0.3	< 175
05-31-01	PALW -4552	2.1 ± 0.6	< 160
06-30-01	PALW -5758	1.8 ± 0.5	< 148
07-31-01	PALW -6956	1.8 ± 0.6	< 152
08-31-01	PALW 7851,2	2.2 ± 0.3	< 153
09-30-01	PALW -8767	2.1 ± 0.6	< 162
10-31-01	PALW -10139	1.5 ± 0.6	< 143
11-30-01	PALW -10921	2.3 ± 0.3	< 160
12-31-01	PALW -11743	1.2 ± 0.5	< 164

^a Tritium analysis required on treated samples only.

PALISADES

Table 7. Well water, analyses for gross beta and tritium.
 Collection: Monthly composites of daily collections.
 Units: pCi/L

Location	Site Wells No. 2 and 3 (Domestic)		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-31-01	PAWW -1013	1.9 ± 0.5	< 182
02-28-01	PAWW -1817	1.8 ± 0.6	< 182
03-31-01	PAWW -2619	2.0 ± 0.4	205 ± 105
04-30-01	PAWW -3730	2.1 ± 0.6	< 180
05-31-01	PAWW -4717	2.8 ± 0.6	338 ± 91
06-30-01	PAWW -5684	2.4 ± 0.7	261 ± 87
07-31-01	PAWW -7047	1.8 ± 0.5	289 ± 86
08-31-01	PAWW -7864	3.1 ± 0.6	< 330
09-30-01	PAWW -8885	2.3 ± 0.4	< 330
10-31-01	PAWW -10355	2.0 ± 0.5	< 330
11-30-01	PAWW -11100	2.6 ± 0.3	< 330
12-31-01	PAWW -11744	2.0 ± 0.6	< 330

Location	State Park		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-05-01	PAWW -10522	1.0 ± 0.5	201 ± 97
02-01-01	PAWW -782	0.9 ± 0.5	< 177
03-06-01	PAWW -1589	< 0.8	< 186
04-03-01	PAWW -2460	1.3 ± 0.6	< 162
05-03-01	PAWW -3544	3.2 ± 0.6	< 175
06-05-01	PAWW -4545	3.1 ± 0.5	< 160
07-07-01	PAWW -5750	1.1 ± 0.4	< 148
08-07-01	PAWW -6947	3.7 ± 0.6	< 156
09-11-01	PAWW -7880	3.3 ± 0.4	< 152
10-02-01	PAWW -8768	4.1 ± 0.5	< 179
11-01-01	PAWW -10140	< 0.9	< 143
12-04-01	PAWW -10922	1.8 ± 0.5	< 160

PALISADES

Table 7. Well water, analyses for gross beta and tritium.
 Collection: Monthly composites of daily collections.
 Units: pCi/L

Location Date Collected	Lab Code	Township Park	
		Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-05-01	PAWW -10523	1.6 ± 0.5	< 178
02-01-01	PAWW -783	2.8 ± 0.6	< 177
03-06-01	PAWW -1590	3.5 ± 0.6	< 186
04-04-01	PAWW -2461	3.8 ± 0.7	< 162
05-02-01	PAWW 3545,6	1.5 ± 0.4	< 180
06-06-01	PAWW -4544	0.9 ± 0.5	< 160
07-07-01	PAWW -5751	1.5 ± 0.6	150 ± 80
08-07-01	PAWW -6948	1.0 ± 0.5	< 156
09-05-01	PAWW -7853	2.1 ± 0.4	< 152
10-01-01	PAWW -8769	1.6 ± 0.4	< 179
11-02-01	PAWW -10141	< 0.9	< 143
12-04-01	PAWW -10923	2.5 ± 0.5	< 160

Location Date Collected	Lab Code	Warehouse (Site Well #7)	
		Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-05-01	PAWW -10524	3.6 ± 1.0	< 178
02-01-01	PAWW -784	3.2 ± 1.0	< 112
03-06-01	PAWW -1591	5.2 ± 0.6	< 186
04-02-01	PAWW -2462	1.8 ± 1.0	< 162
05-02-01	PAWW -3547	< 1.9	236 ± 97
06-04-01	PAWW -4546	4.0 ± 1.1	< 160
07-09-01	PAWW -5752	2.2 ± 1.1	< 148
08-06-01	PAWW -6954	3.6 ± 1.0	< 156
09-05-01	PAWW -7858	3.0 ± 0.9	< 152
10-01-01	PAWW -8770	4.4 ± 0.8	< 179
11-01-01	PAWW -10142	3.0 ± 1.0	< 143
12-03-01	PAWW -10924	3.1 ± 0.8	< 160

NOTE: Gamma isotopic analysis required if gross beta exceeds 10 pCi/L. Results listed in Appendix C.

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Table 7. Well water, analyses for gross beta and tritium.
 Collection: Monthly composites of daily collections.
 Units: pCi/L

Location	Outage Buildings (Site Wells #11, 12 and 13)		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-04-01	PAWW -10525	1.1 ± 0.4	< 183
02-01-01	PAWW -785	< 0.8	< 112
03-06-01	PAWW -1592	1.1 ± 0.4	< 186
04-02-01	PAWW -2463	< 1.0	< 162
05-02-01	PAWW -3548	1.1 ± 0.6	< 180
06-04-01	PAWW -4547	1.1 ± 0.5	< 160
07-09-01	PAWW -5753	< 0.8	< 148
08-06-01	PAWW -6949	1.0 ± 0.5	< 152
09-05-01	PAWW -7854	1.7 ± 0.5	< 152
10-01-01	PAWW -8771	1.6 ± 0.4	< 179
11-01-01	PAWW -10143	1.4 ± 0.5	< 143
12-03-01	PAWW -10925	1.2 ± 0.4	< 160

Location	Site Well #14		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-05-01	PAWW -10526	4.0 ± 0.6	< 178
02-01-01	PAWW -786	3.9 ± 0.6	< 157
03-06-01	PAWW -1593	4.0 ± 0.7	< 186
04-02-01	PAWW -2464	3.1 ± 0.7	< 162
05-02-01	PAWW -3549	3.2 ± 0.6	< 175
06-04-01	PAWW -4548	3.0 ± 0.6	< 172
07-09-01	PAWW -5754	3.8 ± 0.7	< 148
08-06-01	PAWW -6950	2.6 ± 0.6	< 152
09-05-01	PAWW -7855	2.7 ± 0.4	< 152
10-01-01	PAWW -8772	4.1 ± 0.5	< 162
11-01-01	PAWW 10144,5	3.1 ± 0.4	< 143
12-03-01	PAWW -10926	4.1 ± 0.5	< 160

NOTE: Gamma isotopic analysis required if gross beta exceeds 10 pCi/L. Results listed in Appendix C.

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Table 7. Well water, analyses for gross beta and tritium.
 Collection: Monthly composites of daily collections.
 Units: pCi/L

Location	Site Well #15		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-05-01	PAWW -10527	6.3 ± 0.7	< 178
02-01-01	PAWW -787	6.7 ± 0.7	< 157
03-06-01	PAWW -1594	5.5 ± 0.6	< 186
04-02-01	PAWW -2465	5.8 ± 0.8	< 183
05-02-01	PAWW -3550	6.9 ± 0.9	< 180
06-04-01	PAWW -4549	5.1 ± 0.7	< 172
07-09-01	PAWW -5755	7.9 ± 0.8	< 148
08-06-01	PAWW -6951	7.4 ± 0.8	< 152
09-05-01	PAWW -7856	8.3 ± 0.8	< 152
10-01-01	PAWW -8773	8.0 ± 0.6	< 162
11-01-01	PAWW -10146	6.7 ± 0.7	< 143
12-03-01	PAWW -10927	9.0 ± 0.6	< 160

Location	Site Well #16		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
01-03-00	PAWW -10528	9.1 ± 1.0	< 178
02-01-01	PAWW -788	6.7 ± 0.7	< 157
03-06-01	PAWW -1595	6.2 ± 0.7	< 186
04-03-01	PAWW -2466	4.9 ± 0.8	< 162
05-02-01	PAWW -3551	4.5 ± 0.4	< 180
06-04-01	PAWW -4550	4.5 ± 0.6	< 172
07-09-01	PAWW -5756	5.9 ± 0.7	< 148
08-06-01	PAWW 6952,3	5.6 ± 0.5	< 152
09-05-01	PAWW -7857	5.0 ± 0.5	< 152
10-01-01	PAWW 8774,5	6.0 ± 0.4	< 162
11-01-01	PAWW -10147	4.6 ± 0.6	< 143
12-03-01	PAWW -10928	7.7 ± 0.7	< 160

NOTE: Gamma isotopic analysis required if gross beta exceeds 10 pCi/L. Results listed in Appendix C.

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Table 7. Well water, analyses for gross beta and tritium.
 Collection: Monthly composites of daily collections.
 Units: pCi/L

Location	Site Well #17 ^a		
Date Collected	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
05-31-01	PAWW -4770	2.3 ± 0.6	< 172
07-09-01	PAWW -5686	2.9 ± 0.7	193 ± 83
07-31-01	PAWW -7042	3.0 ± 0.6	< 147

NOTE: Gamma isotopic analysis required if gross beta exceeds 10 pCi/L. Results listed in Appendix C.

^a New location as of May, 2001

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Table 8. Water, Ludington controls, analyses for gross beta and tritium.

Collection: Monthly composites of daily collections.

Units: pCi/L

Location Date Collected	Ludington (Lake In)		
	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
02-01-01	PALW -1012	1.5 ± 0.5	< 177
03-01-01	PALW -1816	2.0 ± 0.6	< 182
04-02-01	PALW -2618	2.1 ± 0.5	< 185
05-01-01	PALW -3729	2.3 ± 0.6	< 180
06-01-01	PALW -4716	1.9 ± 0.5	< 153
06-30-01	PALW -5683	2.5 ± 0.6	< 151
08-01-01	PALW -7046	2.0 ± 0.6	< 147
09-04-01	PALW -7863	2.0 ± 0.5	179 ± 84
10-01-01	PALW -8883	2.3 ± 0.4	< 179
11-01-01	PALW -10354	1.9 ± 0.5	< 163
12-03-01	PALW -11099	2.6 ± 0.3	< 162
01-02-02	PALW -145	1.0 ± 0.5	< 164

Location Date Collected	Ludington (Well water)		
	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>
02-01-01	PAWW -1014	< 0.8	< 182
03-01-01	PAWW -1818	< 1.1	< 182
04-02-01	PAWW -2620	< 0.9	< 185
05-01-01	PAWW -3731	1.1 ± 0.6	< 162
06-01-01	PAWW -4718	< 0.9	< 153
07-03-01	PAWW -5685	1.1 ± 0.5	< 151
08-01-01	PAWW -7048	< 0.8	< 151
09-04-01	PAWW -7865	< 0.5	< 152
10-01-01	PAWW -8886	< 0.6	< 155
11-01-01	PAWW 10356,7	< 0.6	< 163
12-03-01	PAWW -11101	1.0 ± 0.3	< 162
01-02-02	PAWW -146	< 1.1	< 164

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Table 9. In-Plant water, analyses for gross alpha, gross beta, strontium-89, strontium-90, tritium and gamma emitting isotopes.

Collection: Monthly composites

Units: uCi/mL

Location		Service Water			
Date Collected	Required	01-31-01	02-28-01	03-31-01	
Lab Code	LLD	PACW-1009	PACW-1813	PACW-2615	
Gross Alpha	1.0 E-09	3.9 ± 2.9 E-10	< 4.2 E-10	< 4.3 E-10	
Gross Beta	1.0 E-09	2.2 ± 0.4 E-09	2.7 ± 0.4 E-09	2.4 ± 0.4 E-09	
H-3	5.0 E-07	< 1.1 E-07	< 1.8 E-07	< 1.8 E-07	
Sr-89	5.0 E-09	< 8.9 E-10	< 7.3 E-10	< 8.2 E-10	
Sr-90	1.0 E-09	< 6.8 E-10	1.1 ± 0.4 E-9	9.4 ± 3.7 E-10	
Cs-137	1.0 E-08	< 3.0 E-09	< 3.5 E-09	< 4.6 E-09	
Others ^a	1.0 E-08	< 2.3 E-09	< 5.0 E-09	< 2.1 E-09	
Date Collected	Required	04-30-01	05-31-01	06-30-01	
Lab Code	LLD	PACW-3726	PACW-4713	PACW-5687	
Gross Alpha	1.0 E-09	< 5.8 E-10	3.9 ± 3.1 E-10	< 4.3 E-10	
Gross Beta	1.0 E-09	2.4 ± 0.5 E-09	1.6 ± 0.4 E-09	2.0 ± 0.3 E-09	
H-3	5.0 E-07	< 1.8 E-07	< 1.5 E-07	< 1.5 E-07	
Sr-89	5.0 E-09	< 9.2 E-10	< 6.6 E-10	< 1.3 E-9	
Sr-90	1.0 E-09	< 5.8 E-10	< 5.0 E-10	< 6.4 E-10	
Cs-137	1.0 E-08	< 2.0 E-09	< 2.1 E-09	< 5.0 E-09	
Others ^a	1.0 E-08	< 3.2 E-09	< 2.7 E-09	< 4.1 E-09	
Date Collected	Required	07-31-01	08-31-01	09-30-01	
Lab Code	LLD	PACW-7043	PACW-7859	PACW-8884	
Gross Alpha	1.0 E-09	< 5.9 E-10	< 4.6 E-10	1.5 ± 0.4 E-09	
Gross Beta	1.0 E-09	1.9 ± 0.4 E-09	2.5 ± 0.4 E-09	2.4 ± 0.4 E-09	
H-3	5.0 E-07	< 1.5 E-07	< 1.5 E-07	< 1.2 E-07	
Sr-89	5.0 E-09	< 9.1 E-10	< 8.1 E-10	< 6.9 E-10	
Sr-90	1.0 E-09	7.9 ± 3.9 E-10	2.2 ± 0.4 E-09	9.8 ± 3.6 E-10	
Cs-137	1.0 E-08	< 3.7 E-09	< 3.4 E-09	< 3.1 E-09	
Others ^a	1.0 E-08	< 5.0 E-09	< 3.2 E-09	< 3.0 E-09	

^a Co-60

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Table 9. In-Plant water, analyses for gross alpha, gross beta, strontium-89, strontium-90, tritium and gamma emitting isotopes.

Collection: Monthly composites

Units: uCi/mL

Location	Service Water			
Date Collected	Required	10-31-01	11-30-01	12-31-01
Lab Code	LLD	PACW-10358	PACW-11102	PACW-11745
Gross Alpha	1.0 E-09	< 2.5 E-10	< 2.6 E-10	< 4.5 E-10
Gross Beta	1.0 E-09	2.0 ± 0.4 E-09	2.3 ± 0.4 E-09	2.3 ± 0.4 E-09
H-3	5.0 E-07	< 1.6 E-07	< 1.6 E-07	< 1.1 E-07
Sr-89	5.0 E-09	< 1.4 E-9	< 1.2 E-9	< 7.2 E-10
Sr-90	1.0 E-09	< 6.4 E-10	< 9.1 E-10	< 7.0 E-10
Cs-137	1.0 E-08	< 2.9 E-09	< 5.9 E-09	< 2.1 E-09
Others ^a	1.0 E-08	< 3.1 E-09	< 2.2 E-09	< 1.8 E-09

^aCo-60

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Table 9. In-Plant water, analyses for gross alpha, gross beta, strontium-89, strontium-90, tritium and gamma emitting isotopes.

Collection: Monthly composites

Units: uCi/mL

Location		Turbine Sump			
Date Collected	Required	01-31-01	02-28-01	03-31-01	
Lab Code	LLD	PACW-885	PACW-1836	PACW-2417	
Gross Alpha	1.0 E-09	< 2.6 E-10	8.0 ± 3.8 E-10	< 3.1 E-10	
Gross Beta	1.0 E-09	1.3 ± 0.3 E-09	1.3 ± 0.4 E-09	2.4 ± 0.4 E-09	
H-3	5.0 E-07	9.1 ± 0.3 E-06	9.6 ± 0.3 E-06	7.6 ± 0.3 E-06	
Sr-89	5.0 E-09	< 7.5 E-10	< 1.0 E-09	< 1.0 E-09	
Sr-90	1.0 E-09	< 5.8 E-10	< 7.6 E-10	< 8.4 E-10	
Cs-137	1.0 E-08	< 3.1 E-09	< 4.4 E-09	< 5.3 E-09	
Others ^a	1.0 E-08	< 2.6 E-09	< 3.1 E-09	< 3.7 E-09	
Date Collected	Required	04-30-01	05-31-01	06-30-01	
Lab Code	LLD	PACW-3762	PACW-4828	PACW-5748	
Gross Alpha	1.0 E-09	< 4.5 E-10	3.2 ± 2.4 E-10	< 4.2 E-10	
Gross Beta	1.0 E-09	4.3 ± 0.5 E-09	1.6 ± 0.4 E-09	1.5 ± 0.3 E-09	
H-3	5.0 E-07	2.1 ± 0.1 E-05	2.1 ± 0.1 E-05	7.3 ± 0.1 E-06	
Sr-89	5.0 E-09	< 1.1 E-9	< 1.0 E-9	< 1.1 E-9	
Sr-90	1.0 E-09	< 5.6 E-10	< 5.7 E-10	< 5.9 E-10	
Cs-137	1.0 E-08	< 3.7 E-09	< 2.7 E-09	< 4.1 E-09	
Others ^a	1.0 E-08	< 1.1 E-09	< 1.3 E-09	< 6.5 E-09	
Date Collected	Required	07-31-01	08-31-01	09-30-01	
Lab Code	LLD	PACW-6869	PACW-7860	PACW-8956	
Gross Alpha	1.0 E-09	< 3.6 E-10	4.4 ± 3.0 E-10	1.7 ± 0.5 E-09	
Gross Beta	1.0 E-09	3.4 ± 0.4 E-09	2.4 ± 0.4 E-09	2.7 ± 0.5 E-09	
H-3	5.0 E-07	4.8 ± 0.2 E-06	3.8 ± 0.2 E-06	2.8 ± 0.2 E-06	
Sr-89	5.0 E-09	< 1.0 E-9	< 1.4 E-09	< 9.1 E-10	
Sr-90	1.0 E-09	< 6.1 E-10	1.6 ± 0.4 E-09	1.2 ± 0.4 E-09	
Cs-137	1.0 E-08	< 2.6 E-09	< 3.3 E-09	< 1.3 E-09	
Others ^a	1.0 E-08	< 1.7 E-09	< 2.7 E-09	< 2.1 E-09	

^a Co-60

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Table 9. In-Plant water, analyses for gross alpha, gross beta, strontium-89, strontium-90, tritium and gamma emitting isotopes.
 Collection: Monthly composites
 Units: uCi/mL

Location	Turbine Sump			
Date Collected	Required	10-31-01	11-30-01	12-31-01
Lab Code	LLD	PACW-10231	PACW-11026	PACW-11781
Gross Alpha	1.0 E-09	< 5.2 E-10	5.5 ± 3.5 E-10	< 4.3 E-10
Gross Beta	1.0 E-09	3.0 ± 0.4 E-09	3.4 ± 0.4 E-09	3.3 ± 0.5 E-09
H-3	5.0 E-07	2.2 ± 0.1 E-06	1.2 ± 0.0 E-05	1.4 ± 0.0 E-05
Sr-89	5.0 E-09	< 1.5 E-9	< 1.4 E-9	< 5.9 E-10
Sr-90	1.0 E-09	< 6.1 E-10	< 9.1 E-10	< 5.5 E-10
Cs-137	1.0 E-08	< 5.5 E-09	< 5.8 E-09	< 1.3 E-09
Others ^a	1.0 E-08	< 4.6 E-09	< 3.3 E-09	< 1.5 E-09

^aCo-60

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Table 10. Milk, analyses for iodine-131 and gamma emitting isotopes,
Collection: Monthly

Location		AK - Allen Karr Farm				
Date Collected	Lab Code	Concentration (pCi/L)				
		I-131	K-40	Cs-134	Cs-137	Ba-La-140
<u>Required LLD</u>		<u>1.0</u>	-	<u>15.0</u>	<u>18.0</u>	<u>15.0</u>
01-08-01	PAMI -83	< 0.3	1075 ± 157	< 4.8	< 3.6	< 4.3
02-12-01	PAMI -1008	< 0.2	1081 ± 160	< 3.1	< 3.1	< 3.9
03-12-01	PAMI -1812	< 0.4	1341 ± 179	< 8.2	< 5.8	< 9.3
04-09-01	PAMI -2572	< 0.2	1720 ± 163	< 6.8	< 6.4	< 4.2
05-01-01	PAMI -3640	< 0.4	1338 ± 141	< 4.2	< 3.2	< 7.9
06-11-01	PAMI -4712	< 0.3	1395 ± 175	< 4.4	< 6.4	< 6.0
07-09-01	PAMI -5679	< 0.3	1236 ± 103	< 4.6	< 3.5	< 4.2
08-13-01	PAMI -7041	< 0.2	1350 ± 194	< 5.8	< 5.4	< 8.4
09-10-01	PAMI -7846	< 0.3	1192 ± 198	< 8.1	< 7.4	< 5.2
10-08-01	PAMI -8880	< 0.4	1311 ± 176	< 6.4	< 5.9	< 10.2
11-12-01	PAMI -10343	< 0.3	1337 ± 180	< 7.5	< 6.9	< 4.3
12-11-01	PAMI 11061,2	< 0.4	1208 ± 119	< 5.5	< 4.7	< 2.4

Location		DC - Danny Carpenter Farm				
Date Collected	Lab Code	Concentration (pCi/L)				
		I-131	K-40	Cs-134	Cs-137	Ba-La-140
<u>Required LLD</u>		<u>1.0</u>	-	<u>15.0</u>	<u>18.0</u>	<u>15.0</u>
01-04-01	PAMI -38	< 0.3	1363 ± 107	< 1.9	< 3.5	< 3.8
02-01-01	PAMI -707	< 0.3	1395 ± 183	< 3.5	< 3.5	< 5.9
03-06-01	PAMI -1584	< 0.2	1317 ± 106	< 3.4	< 3.0	< 8.2*
04-02-01	PAMI -2445	< 0.2	1354 ± 128	< 3.2	< 3.6	< 6.1
05-03-01	PAMI -3539	< 0.4	1452 ± 173	< 5.6	< 5.9	< 3.1
06-06-01	PAMI -4541	< 0.4	1470 ± 123	< 4.5	< 2.8	< 2.6
07-09-01	PAMI -5719	< 0.4	1354 ± 225	< 5.6	< 8.7	< 10.7
08-07-01	PAMI -6921	< 0.2	1441 ± 173	< 7.4	< 6.1	< 7.2
09-11-01	PAMI 7876,7	< 0.4	1367 ± 124	< 5.3	< 6.5	< 3.0
10-02-01	PAMI -8599	< 0.4	1416 ± 27	< 1.2	< 1.0	< 14.9
11-02-01	PAMI -10085	< 0.3	1424 ± 111	< 2.8	< 2.6	< 13.6
12-04-01	PAMI -10742	< 0.3	1332 ± 214	< 5.9	< 7.1	< 5.3

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Table 10. Milk, analyses for iodine-131 and gamma emitting isotopes,
Collection: Monthly

Location		DH - Dennis Hessey Farm				
Date Collected	Lab Code	Concentration (pCi/L)				
		I-131	K-40	Cs-134	Cs-137	Ba-La-140
<u>Required LLD</u>		<u>1.0</u>	-	<u>15.0</u>	<u>18.0</u>	<u>15.0</u>
01-04-01	PAMI -39	< 0.3	1187 ± 153	< 6.6	< 4.2	< 4.9
02-01-01	PAMI 708,9	< 0.4	1230 ± 68	< 1.8	< 2.8	< 2.1
03-06-01	PAMI -1585	< 0.4	1252 ± 138	< 4.0	< 4.8	< 14.0
04-02-01	PAMI 2446,7	< 0.3	1331 ± 125	< 4.7	< 5.4	< 4.2
05-03-01	PAMI -3540	< 0.4	1280 ± 163	< 2.8	< 4.6	< 4.2
06-06-01	PAMI -4542	< 0.3	1379 ± 197	< 7.7	< 5.6	< 5.2
07-09-01	PAMI -5720	< 0.4	1424 ± 110	< 5.2	< 4.5	< 8.5
08-07-01	PAMI -6922	< 0.2	1303 ± 168	< 5.1	< 3.3	< 6.8
09-11-01	PAMI -7878	< 0.4	1406 ± 187	< 6.5	< 6.5	< 2.5
10-02-01	PAMI -8600	< 0.4	1424 ± 66	< 2.0	< 1.8	< 14.2
11-02-01	PAMI -10086	< 0.3	1542 ± 126	< 3.4	< 2.7	< 12.0
12-04-01	PAMI -10743	< 0.4	1384 ± 226	< 5.0	< 9.0	< 4.8

Location		WS - William Shine Farm				
Date Collected	Lab Code	Concentration (pCi/L)				
		I-131	K-40	Cs-134	Cs-137	Ba-La-140
<u>Required LLD</u>		<u>1.0</u>	-	<u>15.0</u>	<u>18.0</u>	<u>15.0</u>
01-04-01	PAMI -40	< 0.4	1370 ± 111	< 3.4	< 3.1	< 2.5
02-01-01	PAMI -710	< 0.2	1630 ± 191	< 5.5	< 6.5	< 4.6
03-06-01	PAMI -1586	< 0.4	1505 ± 121	< 3.6	< 3.4	< 6.8
04-02-01	PAMI -2448	< 0.5	1630 ± 130	< 3.6	< 3.9	< 5.9
05-03-01	PAMI -3541	< 0.3	1384 ± 168	< 4.9	< 4.4	< 4.8
06-06-01	PAMI -4543	< 0.4	1461 ± 128	< 4.1	< 3.0	< 2.8
07-09-01	PAMI -5721	< 0.4	1396 ± 118	< 2.3	< 4.4	< 9.6
08-07-01	PAMI -6923	< 0.2	1331 ± 85	< 3.0	< 3.4	< 8.6
09-11-01	PAMI -7879	< 0.4	1474 ± 219	< 5.8	< 5.1	< 5.5
10-02-01	PAMI -8601	< 0.3	1215 ± 188	< 5.8	< 6.2	< 7.6
11-02-01	PAMI -10087	< 0.4	1434 ± 68	< 2.5	< 2.1	< 12.4
12-04-01	PAMI -10744	< 0.3	1585 ± 208	< 7.7	< 6.0	< 7.3

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Table 11. Food Crops, analyses for gross beta and gamma-emitting isotopes.
 Collection: Semiannually, at the time of harvest.
 Units: pCi/g wet

Location		Paul Rood				
Lab Code	PAVE-6046	PAVE-6047	PAVE-9542	PAVE-9543		
Date Collected	7/15/01	7/15/01	10/5/01	10/22/01		Req. LLD
Sample Type	Plums	Apples	Apples	Pears		
Gross Beta	1.47 ± 0.02	1.05 ± 0.01	1.25 ± 0.03	1.15 ± 0.02		1.00
Mn-54	< 0.011	< 0.008	< 0.017	< 0.009		0.08
Fe-59	< 0.032	< 0.013	< 0.020	< 0.014		0.10
Co-58	< 0.009	< 0.008	< 0.013	< 0.008		0.08
Co-60	< 0.009	< 0.009	< 0.012	< 0.009		0.05
Zn-65	< 0.010	< 0.024	< 0.023	< 0.015		0.10
Zr-Nb-95	< 0.015	< 0.017	< 0.020	< 0.008		0.10
I-131	< 0.016	< 0.028	< 0.112	< 0.112		0.06 ^a
Cs-134	< 0.005	< 0.007	< 0.019	< 0.011		0.08
Cs-137	< 0.006	< 0.015	< 0.010	< 0.011		0.08

Location		T.H.				
Lab Code	PAVE-9544					
Date Collected	10/22/01					Req. LLD
Sample Type	Pears					
Gross Beta	0.67 ± 0.01					1.00
Mn-54	< 0.009					0.08
Fe-59	< 0.023					0.10
Co-58	< 0.010					0.08
Co-60	< 0.011					0.05
Zn-65	< 0.016					0.10
Zr-Nb-95	< 0.016					0.10
I-131	< 0.017					0.06 ^a
Cs-134	< 0.015					0.08
Cs-137	< 0.009					0.08

^a Required for broadleaf vegetation only.

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Table 11. Food Crops, analyses for gross beta and gamma-emitting isotopes.

Collection: Semiannually, at the time of harvest.

Units: pCi/g wet

J. Sarno Farm					
Location					
Lab Code	PAVE-5731	PAVE-5732	PAVE-5733	PAVE-6048	
Date Collected	7/8/01	7/8/01	7/8/01	7/15/01	Req. LLD
Sample Type	Blubberies	Apricots	Sweet Cherries	Peaches	
Gross Beta	0.70 ± 0.02	2.55 ± 0.06	1.74 ± 0.04	2.50 ± 0.03	1.00
Mn-54	< 0.012	< 0.012	< 0.008	< 0.007	0.08
Fe-59	< 0.017	< 0.023	< 0.024	< 0.021	0.10
Co-58	< 0.012	< 0.014	< 0.010	< 0.011	0.08
Co-60	< 0.005	< 0.009	< 0.009	< 0.011	0.05
Zn-65	< 0.015	< 0.023	< 0.020	< 0.020	0.10
Zr-Nb-95	< 0.008	< 0.017	< 0.010	< 0.014	0.10
I-131	< 0.029	< 0.038	< 0.026	< 0.029	0.06 ^a
Cs-134	< 0.007	< 0.010	< 0.011	< 0.007	0.08
Cs-137	< 0.009	< 0.015	< 0.008	< 0.006	0.08
<hr/>					
Lab Code	PAVE-7803	PAVE-7804	PAVE-7805	PAVE-7806	
Date Collected	8/18/01	9/5/01	9/5/01	9/5/01	Req. LLD
Sample Type	Blubberies	Peaches	Apples	Plums	
Gross Beta	0.85 ± 0.03	2.61 ± 0.10	1.32 ± 0.05	2.02 ± 0.10	1.00
Mn-54	< 0.010	< 0.011	< 0.019	< 0.007	0.08
Fe-59	< 0.016	< 0.017	< 0.041	< 0.022	0.10
Co-58	< 0.012	< 0.006	< 0.016	< 0.009	0.08
Co-60	< 0.009	< 0.008	< 0.017	< 0.012	0.05
Zn-65	< 0.020	< 0.021	< 0.030	< 0.022	0.10
Zr-Nb-95	< 0.016	< 0.009	< 0.018	< 0.016	0.10
I-131	< 0.159	< 0.039	< 0.032	< 0.045	0.06 ^a
Cs-134	< 0.008	< 0.018	< 0.018	< 0.009	0.08
Cs-137	< 0.008	< 0.014	< 0.011	< 0.011	0.08

^a Required for broadleaf vegetation only.

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Table 11. Food Crops, analyses for gross beta and gamma-emitting isotopes.
 Collection: Semiannually, at the time of harvest.
 Units: pCi/g wet

Location	J. Sarno Farm			
Lab Code	PAVE-7807	PAVE-9539,40	PAVE-9541	
Date Collected	9/5/01	10/10/01	10/10/01	Req. LLD
Sample Type	Pears	Grapes	Grapes	
Gross Beta	1.03 ± 0.03	2.91 ± 0.07	3.88 ± 0.11	1.00
Mn-54	< 0.008	< 0.010	< 0.008	0.08
Fe-59	< 0.031	< 0.027	< 0.024	0.10
Co-58	< 0.014	< 0.007	< 0.012	0.08
Co-60	< 0.008	< 0.011	< 0.011	0.05
Zn-65	< 0.011	< 0.015	< 0.027	0.10
Zr-Nb-95	< 0.020	< 0.012	< 0.012	0.10
I-131	< 0.040	< 0.036	< 0.038	0.06 ^a
Cs-134	< 0.017	< 0.010	< 0.014	0.08
Cs-137	< 0.014	< 0.011	< 0.011	0.08

^a Required for broadleaf vegetation only.

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Table 12. Fish, analyses for gross beta and gamma-emitting isotopes.
 Collection: Semiannually
 Units: pCi/g wet

Location	Discharge				
Lab Code	PAF-2318	PAF-2319	PAF-10096	PAF-10097	
Date Collected	3/30/01	3/30/01	10/2/01	10/2/01	Req. LLD
Sample Type	Salmon	Brown Trout	Lake Trout	Chinook Salmon	
Gross Beta	1.39 ± 0.07	2.02 ± 0.10	2.30 ± 0.04	3.25 ± 0.04	1.00
Mn-54	< 0.012	< 0.012	< 0.013	< 0.012	0.13
Fe-59	< 0.012	< 0.032	< 0.057	< 0.051	0.26
Co-58	< 0.012	< 0.010	< 0.016	< 0.014	0.13
Co-60	< 0.012	< 0.011	< 0.005	< 0.008	0.13
Zn-65	< 0.018	< 0.023	< 0.030	< 0.025	0.26
Zr-Nb-95	< 0.019	< 0.016	< 0.048	< 0.031	0.10
Cs-134	< 0.014	< 0.012	< 0.016	< 0.011	0.13
Cs-137	0.032 ± 0.018	< 0.015	0.045 ± 0.017	0.046 ± 0.013	0.15

Location	Ludington Pumped Storage Plant (Control)				
Lab Code	PAF-3346	PAF-3347	PAF-10098	PAF-11029 ^a	
Date Collected	4/25/01	4/25/01	10/19/01	11/19/01	Req. LLD
Sample Type	Brown Trout	Salmon	Chinook Salmon	Lake Trout	
Gross Beta	2.28 ± 0.12	2.30 ± 0.12	2.68 ± 0.03	1.76 ± 0.05	1.00
Mn-54	< 0.007	< 0.012	< 0.010	< 0.010	0.13
Fe-59	< 0.024	< 0.032	< 0.027	< 0.038	0.26
Co-58	< 0.006	< 0.019	< 0.011	< 0.013	0.13
Co-60	< 0.006	< 0.014	< 0.008	< 0.013	0.13
Zn-65	< 0.016	< 0.042	< 0.012	< 0.029	0.26
Zr-Nb-95	< 0.010	< 0.012	< 0.027	< 0.012	0.10
Cs-134	< 0.007	< 0.010	< 0.007	< 0.010	0.13
Cs-137	0.038 ± 0.010	< 0.019	0.047 ± 0.014	0.037 ± 0.016	0.15

^a Collected at control location Saugatuck.

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Table 14. Bottom sediment, analyses for gross beta and gamma-emitting isotopes.

Collection: Semiannually

Units: pCi/g dry

Location	Palisades Discharge		
Lab Code	PABS-3102	PABS-9510	
Date Collected	4/19/01	10/1/01	Req. LLD
Gross Beta	5.27 ± 1.57	4.97 ± 1.26	1.00
Mn-54	< 0.005	< 0.014	0.08
Fe-59	< 0.011	< 0.093	0.10
Co-58	< 0.005	< 0.029	0.08
Co-60	< 0.006	< 0.017	0.05
Zn-65	< 0.013	< 0.045	0.10
Zr-Nb-95	< 0.007	< 0.028	0.10
Cs-134	< 0.007	< 0.019	0.15
Cs-137	0.008 ± 0.005	< 0.015	0.18

Location	North Property (0.8 mi.)		South Property (0.8 mi.)		
Lab Code	PABS-3103,4	PABS-9512	PABS-3106	PABS-9514	
Date Collected	4/19/01	10/1/01	4/19/01	10/1/01	Req. LLD
Gross Beta	8.08 ± 1.25	6.52 ± 1.16	6.77 ± 1.59	6.12 ± 1.18	1.00
Mn-54	< 0.005	< 0.012	< 0.004	< 0.010	0.08
Fe-59	< 0.010	< 0.079	< 0.015	< 0.040	0.10
Co-58	< 0.005	< 0.021	< 0.006	< 0.012	0.08
Co-60	< 0.006	< 0.012	< 0.004	< 0.009	0.05
Zn-65	< 0.010	< 0.058	< 0.014	< 0.031	0.10
Zr-Nb-95	< 0.005	< 0.019	< 0.007	< 0.021	0.10
Cs-134	< 0.007	< 0.024	< 0.007	< 0.015	0.15
Cs-137	< 0.006	< 0.021	0.009 ± 0.004	< 0.014	0.18

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Table 13. Bottom sediment, analyses for gross beta and gamma-emitting isotopes.
 Collection: Semiannually
 Units: pCi/g dry

Location	South Haven (8.9 km North)		Ludington (Control)		
Lab Code	PABS-3105	PABS-9513	PABS-3348	PABS-9511	
Date Collected	4/19/01	10/1/01	4/25/01	10/19/01	Req. LLD
Gross Beta	9.39 ± 1.78	7.80 ± 1.21	14.30 ± 2.10	12.71 ± 1.72	1.00
Mn-54	<0.003	<0.015	<0.007	<0.015	0.08
Fe-59	<0.015	<0.059	<0.024	<0.081	0.10
Co-58	<0.006	<0.019	<0.007	<0.034	0.08
Co-60	<0.007	<0.011	<0.007	<0.018	0.05
Zn-65	<0.016	<0.059	<0.014	<0.063	0.10
Zr-Nb-95	<0.007	<0.043	<0.012	<0.026	0.10
Cs-134	<0.008	<0.016	<0.008	<0.022	0.15
Cs-137	0.013 ± 0.006	<0.015	0.016 ± 0.006	<0.021	0.18

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Table 14.1. Liquid Radwaste, analyses for gross alpha, tritium, strontium-89, strontium-90, plutonium-239 and gamma emitting isotopes.

Collection: Monthly
Units: uCi/ml

Lab Code	Required LLD	NS ^a	NS ^a	PARW-2418
Date Collected	-	01-31-01	03-01-01	03-31-01
Gross Alpha	1.0 E-07	-	-	< 7.3 E-10
H-3	1.0 E-05	-	-	3.04 ± 0.01 E-01
Sr-89	5.0 E-08	-	-	< 3.5 E-09
Sr-90	5.0 E-08	-	-	< 2.4 E-08
Pu-239	5.0 E-08	-	-	< 9.6 E-11
Cr-51	5.0 E-07	-	-	< 7.69 E-08
Mn-54	5.0 E-07	-	-	< 3.80 E-09
Fe-59	5.0 E-07	-	-	< 1.05 E-08
Co-58	5.0 E-07	-	-	1.10 ± 0.48 E-08
Co-60	5.0 E-07	-	-	6.15 ± 0.54 E-08
Zn-65	5.0 E-07	-	-	< 7.83 E-09
Zr-95	5.0 E-07	-	-	< 7.11 E-09
Nb-95	5.0 E-07	-	-	< 6.44 E-09
Ag-110m	5.0 E-07	-	-	1.60 ± 0.23 E-08
Sb-124	5.0 E-07	-	-	< 5.37 E-09
Cs-134	5.0 E-07	-	-	< 4.12 E-09
Cs-137	5.0 E-07	-	-	8.67 ± 0.45 E-08
Ba-140	5.0 E-07	-	-	< 1.15 E-07
La-140	5.0 E-07	-	-	< 1.13 E-08
Ce-141	5.0 E-07	-	-	< 1.39 E-08
Ce-144	5.0 E-07	-	-	< 3.04 E-08

^a No sample received.

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Table 15.1. Liquid Radwaste, analyses for gross alpha, tritium, strontium-89, strontium-90, plutonium-239 and gamma emitting isotopes.

Collection: Monthly
Units: uCi/ml

Lab Code	Required LLD	NS ^a	PARW-4829	PARW-5749
Date Collected	-	04-30-01	05-31-01	06-30-01
Gross Alpha	1.0 E-07	-	8.6 ± 2.0 E-09	2.8 ± 1.5 E-09
H-3	1.0 E-05	-	3.41 ± 0.01 E-01	2.71 ± 0.01 E-01
Sr-89	5.0 E-08	-	< 3.0 E-09	< 4.5 E-09
Sr-90	5.0 E-08	-	2.4 ± 1.0 E-09	5.9 ± 1.3 E-09
Pu-239	5.0 E-08	-	2.7 ± 1.6 E-10	3.1 ± 2.1 E-10
Cr-51	5.0 E-07	-	< 1.29 E-07	< 4.65 E-08
Mn-54	5.0 E-07	-	7.44 ± 4.10 E-09	1.05 ± 0.40 E-08
Fe-59	5.0 E-07	-	< 1.09 E-08	< 4.40 E-09
Co-58	5.0 E-07	-	4.00 ± 0.55 E-08	3.49 ± 0.39 E-08
Co-60	5.0 E-07	-	1.28 ± 0.05 E-07	1.36 ± 0.05 E-07
Zn-65	5.0 E-07	-	< 1.00 E-08	< 1.01 E-08
Zr-95	5.0 E-07	-	< 1.18 E-08	< 9.29 E-09
Nb-95	5.0 E-07	-	< 2.39 E-08	< 1.09 E-08
Ag-110m	5.0 E-07	-	2.17 ± 0.07 E-07	2.31 ± 0.09 E-07
Sb-124	5.0 E-07	-	< 8.78 E-09	< 5.66 E-09
Cs-134	5.0 E-07	-	< 4.80 E-09	< 5.02 E-09
Cs-137	5.0 E-07	-	1.01 ± 0.06 E-07	6.85 ± 0.50 E-08
Ba-140	5.0 E-07	-	< 4.14 E-07	< 2.43 E-08
La-140	5.0 E-07	-	< 1.04 E-07	< 7.32 E-09
Ce-141	5.0 E-07	-	< 2.49 E-08	< 7.91 E-09
Ce-144	5.0 E-07	-	< 3.39 E-08	< 2.78 E-08

^a No sample received.

PALISADES

Table 15.1. Liquid Radwaste, analyses for gross alpha, tritium, strontium-89, strontium-90, plutonium-239 and gamma emitting isotopes.

Collection: Monthly

Units: uCi/ml

Lab Code	Required LLD	NS ^a	NS ^a	NS ^a
Date Collected	-	07-26-01	08-31-01	09-30-01
Gross Alpha	1.0 E-07	-	-	-
H-3	1.0 E-05	-	-	-
Sr-89	5.0 E-08	-	-	-
Sr-90	5.0 E-08	-	-	-
Pu-239	5.0 E-08	-	-	-
Cr-51	5.0 E-07	-	-	-
Mn-54	5.0 E-07	-	-	-
Fe-59	5.0 E-07	-	-	-
Co-58	5.0 E-07	-	-	-
Co-60	5.0 E-07	-	-	-
Zn-65	5.0 E-07	-	-	-
Zr-95	5.0 E-07	-	-	-
Nb-95	5.0 E-07	-	-	-
Ag-110m	5.0 E-07	-	-	-
Sb-124	5.0 E-07	-	-	-
Cs-134	5.0 E-07	-	-	-
Cs-137	5.0 E-07	-	-	-
Ba-140	5.0 E-07	-	-	-
La-140	5.0 E-07	-	-	-
Ce-141	5.0 E-07	-	-	-
Ce-144	5.0 E-07	-	-	-

^a No sample received.

PALISADES

Table 15.1. Liquid Radwaste, analyses for gross alpha, tritium, strontium-89, strontium-90, plutonium-239 and gamma emitting isotopes.

Collection: Monthly
Units: uCi/ml

Lab Code	Required LLD	NS ^a	NS ^a	PARW-11028
Date Collected	-	10-31-01	11-30-01	11-29-01
Gross Alpha	1.0 E-07	-	-	9.7 ± 6.8 E-10
H-3	1.0 E-05	-	-	2.48 ± 0.01 E-01
Sr-89	5.0 E-08	-	-	< 3.2 E-09
Sr-90	5.0 E-08	-	-	9.5 ± 1.5 E-09
Pu-239	5.0 E-08	-	-	< 1.9 E-10
Cr-51	5.0 E-07	-	-	< 7.45 E-08
Mn-54	5.0 E-07	-	-	< 3.95 E-09
Fe-59	5.0 E-07	-	-	< 8.47 E-09
Co-58	5.0 E-07	-	-	1.09 ± 0.06 E-07
Co-60	5.0 E-07	-	-	1.66 ± 0.07 E-07
Zn-65	5.0 E-07	-	-	< 8.96 E-09
Zr-95	5.0 E-07	-	-	< 9.10 E-09
Nb-95	5.0 E-07	-	-	< 9.26 E-09
Ag-110m	5.0 E-07	-	-	5.19 ± 0.39 E-08
Sb-124	5.0 E-07	-	-	< 8.33 E-09
Cs-134	5.0 E-07	-	-	< 1.13 E-08
Cs-137	5.0 E-07	-	-	2.1 ± 0.06 E-07
Ba-140	5.0 E-07	-	-	< 8.76 E-08
La-140	5.0 E-07	-	-	< 1.57 E-08
Ce-141	5.0 E-07	-	-	< 1.39 E-08
Ce-144	5.0 E-07	-	-	< 3.31 E-08

^a No sample received.

PALISADES

Table 14.2. Stack Filters, analyses for gross alpha, plutonium-239, strontium-89 and strontium-90.

Collection: Continuous, monthly exchange.

Units: pCi/filter

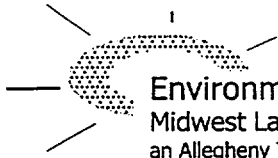
Location		Palisades			
Date Collected	Lab Code	Gross Alpha	Sr-89	Sr-90	Pu-239
<u>Required LLD</u>		<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
01-31-01	PASP -886	< 0.6	< 8.3	< 3.5	< 0.6
03-06-01	PASP -1835	< 0.4	< 6.6	< 3.0	< 0.2
03-31-01	PASP -2419	0.8 ± 0.3	< 4.6	< 3.1	< 0.4
05-03-01	PASP -3763	< 0.5	< 5.2	< 4.1	< 0.1
05-31-01	PASP -4830	< 0.3	< 6.0	< 2.9	< 0.2
06-28-01	PASP 5749A	< 0.3	< 5.3	< 3.3	< 0.3
07-26-01	PASP -6870	< 0.4	< 5.1	< 4.4	< 0.1
08-30-01	PASP -7866	< 0.4	< 7.3	< 2.6	< 0.5
09-25-01	PASP -8955	< 0.3	< 7.5	< 2.9	< 0.3
11-01-01	PASP -10232	0.5 ± 0.3	< 3.8	< 2.4	< 0.3
11-29-01	PASP -11027	2.1 ± 0.8	< 8.1	< 4.0	< 0.4
12-30-01	PASP -11782	1.8 ± 0.5	< 4.0	< 2.9	< 0.2

ENCLOSURE E

**NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255**

**PALISADES NUCLEAR PLANT
2001 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
INTERLABORATORY COMPARISON PROGRAM RESULTS**

24 pages follow



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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

NOTE: Environmental, Inc., Midwest Laboratory participates in intercomparison studies administered by Environmental Resources Associates, and serves as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. Results are reported in Appendix A. TLD Intercomparison results, in-house spikes, blanks, duplicates and mixed analyte performance evaluation program results are also reported. Appendix A is updated four times a year; the complete Appendix is included in March, June, September and December monthly progress reports only.

January, 2001 through December, 2001

Appendix A

Interlaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory, formerly Teledyne Brown Engineering Environmental Services Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of its quality control program in December 1971. These programs are operated by agencies which supply environmental type samples (e.g., milk or water) containing concentrations of radionuclides known to the issuing agency but not to participant laboratories. The purpose of such a program is to provide an independent check on a laboratory's analytical procedures and to alert it of any possible problems.

Participant laboratories measure the concentration of specified radionuclides and report them to the issuing agency. Several months later, the agency reports the known values to the participant laboratories and specifies control limits. Results consistently higher or lower than the known values or outside the control limits indicate a need to check the instruments or procedures used.

The results in Table A-1 were obtained through participation in the environmental sample crosscheck program for milk, water and air filters during the past twelve months. Data for previous years is available upon request.

This program was conducted by the U.S. Environmental Protection Agency Office of Research and Development National Exposure Research Laboratory Characterization Research Division-Las Vegas, Nevada.

The results in Table A-2 were obtained for Thermoluminescent Dosimeters (TLDs), via various International Intercomparisons of Environmental Dosimeters under the sponsorships listed in Table A-2. Results of crosscheck testing with Teledyne Brown Engineering are also listed.

Table A-3 lists results of the analyses on in-house "spiked" samples for the past twelve months. All samples are prepared using NIST traceable sources. Data for previous years available upon request.

Table A-4 lists results of the analyses on in-house "blank" samples for the past twelve months. Data for previous years available upon request.

Table A-5 list results of the in-house "duplicate" program for the past twelve months. Acceptance is based on the difference of the results being less than the sum of the errors. Data for previous years available upon request.

The results in Table A-6 were obtained through participation in the Mixed Analyte Performance Evaluation Program.

The results in Table A-7 were obtained through participation in the Environmental Measurement Laboratory Quality Assessment Program.

Attachment A lists acceptance criteria for "spiked" samples.

Out-of-limit results are explained directly below the result.

12-31-01

ATTACHMENT A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES^a

Analysis	Level	One Standard Deviation for single determinations
Gamma Emitters	5 to 100 pCi/liter or kg > 100 pCi/liter or kg	5.0 pCi/liter 5% of known value
Strontium-89 ^b	5 to 50 pCi/liter or kg > 50 pCi/liter or kg	5.0 pCi/liter 10% of known value
Strontium-90 ^b	2 to 30 pCi/liter or kg > 30 pCi/liter or kg	5.0 pCi/liter 10% of known value
Potassium-40	> 0.1 g/liter or kg	5% of known value
Gross alpha	20 pCi/liter > 20 pCi/liter	5.0 pCi/liter 25% of known value
Gross beta	100 pCi/liter > 100 pCi/liter	5.0 pCi/liter 5% of known value
Tritium	4,000 pCi/liter > 4,000 pCi/liter	1s = (pCi/liter) = 169.85 x (known) ^{0.0933} 10% of known value
Radium-226,-228	0.1 pCi/liter	15% of known value
Plutonium	0.1 pCi/liter, gram, or sample	10% of known value
Iodine-131, Iodine-129 ^b	55 pCi/liter >55 pCi/liter	6.0 pCi/liter 10% of known value
Uranium-238, Nickel-63 ^b Technetium-99 ^b	35 pCi/liter > 35 pCi/liter	6.0 pCi/liter 15% of known value
Iron-55 ^b	50 to 100 pCi/liter > 100 pCi/liter	10 pCi/liter 10% of known value
Others ^b	--	20% of known value

^a From EPA publication, "Environmental Radioactivity Laboratory Intercomparison Studies Program, Fiscal Year, 1981-1982, EPA-600/4-81-004.

^b Laboratory limit.

Table A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^b		
				Laboratory result ^c	ERA Result ^d	Control Limits
STW-897	WATER	Jan, 2001	Gr. Alpha	31.9 ± 2.1	45.7 ± 11.4	25.9 - 65.5
STW-897	WATER	Jan, 2001	Gr. Beta	25.3 ± 2.7	16.7 ± 5.0	8.0 - 25.4
STW-900	WATER	Feb, 2001	I-131	27.2 ± 0.8	28.3 ± 3.0	23.1 - 33.5
STW-902	WATER	Feb, 2001	Ra-226	4.0 ± 0.1	4.7 ± 0.7	3.4 - 5.9
STW-902	WATER	Feb, 2001	Ra-228	13.8 ± 0.4	14.4 ± 3.6	8.2 - 20.6
STW-902	WATER	Feb, 2001	Uranium	17.0 ± 0.3	20.4 ± 3.0	15.2 - 25.6
STW-903	WATER	Mar, 2001	H-3	17,400.0 ± 69.7	17,800.0 ± 1,780.0	14,700.0 - 20,900.0
STW-917	WATER	Apr, 2001	Gr. Alpha	57.4 ± 3.5	56.0 ± 14.0	31.8 - 80.2
STW-917	WATER	Apr, 2001	Ra-226	13.5 ± 0.4	17.7 ± 2.7	13.1 - 22.3
STW-917	WATER	Apr, 2001	Ra-228	10.1 ± 0.6	8.1 ± 2.0	4.6 - 11.6
STW-917	WATER	Apr, 2001	Uranium	14.2 ± 0.2	15.6 ± 3.0	10.4 - 20.8
STW-918	WATER	Apr, 2001	Co-60	27.9 ± 1.4	26.4 ± 5.0	17.7 - 35.1
STW-918	WATER	Apr, 2001	Cs-134	16.0 ± 0.4	16.9 ± 5.0	8.2 - 25.6
STW-918	WATER	Apr, 2001	Cs-137	195.4 ± 1.5	186.0 ± 9.3	170.0 - 202.0
STW-918	WATER	Apr, 2001	Gr. Beta	340.0 ± 51.0	343.0 ± 1.7	252.0 - 428.0
STW-918	WATER	Apr, 2001	Sr-89	62.8 ± 5.7	64.1 ± 5.0	55.5 - 72.8
STW-918	WATER	Apr, 2001	Sr-90	34.2 ± 1.6	33.8 ± 5.0	25.1 - 42.5
STW-919	WATER	Jun, 2001	Ba-133	37.8 ± 1.2	36.0 ± 5.0	27.3 - 44.7
STW-919	WATER	Jun, 2001	Co-60	49.9 ± 0.7	46.8 ± 5.0	38.1 - 55.5
STW-919	WATER	Jun, 2001	Cs-134	16.0 ± 1.4	15.9 ± 5.0	7.2 - 24.6
STW-919	WATER	Jun, 2001	Cs-137	208.0 ± 1.7	197.0 ± 9.9	180.0 - 214.0
STW-919	WATER	Jun, 2001	Zn-65	37.8 ± 0.7	36.2 ± 5.0	27.5 - 44.9
STW-920	WATER	Jun, 2001	Ra-226	14.6 ± 0.4	15.4 ± 2.3	11.4 - 19.4
STW-920	WATER	Jun, 2001	Ra-228	6.2 ± 0.2	4.5 ± 1.1	2.6 - 6.5
STW-920	WATER	Jun, 2001	Uranium	49.0 ± 1.0	55.7 ± 5.6	46.1 - 65.3
STW-921	WATER	Jul, 2001	Sr-89	19.8 ± 1.5	31.2 ± 5.0	22.5 - 39.9
Delay in processing may have attributed to deviation.						
Result of reanalysis; Sr-89, 35.3 ± 4.4 pCi/L. Sr-90, 25.0 ± 2.8 pCi/L.						
STW-921	WATER	Jul, 2001	Sr-90	26.3 ± 1.1	25.9 ± 5.0	17.2 - 34.6
STW-922	WATER	Jul, 2001	Gr. Alpha	23.3 ± 1.9	17.8 ± 5.0	9.1 - 26.5
STW-922	WATER	Jul, 2001	Gr. Beta	48.5 ± 4.6	53.0 ± 10.0	35.7 - 70.3
STW-924	WATER	Aug, 2001	H-3	2,680.0 ± 41.9	2,730.0 ± 356.0	2,110.0 - 3,350.0
STW-931	WATER	Sep, 2001	Ra-226	10.9 ± 0.2	10.8 ± 1.6	8.0 - 13.6
STW-931	WATER	Sep, 2001	Ra-228	9.7 ± 1.1	9.0 ± 2.2	5.1 - 12.8
STW-931	WATER	Sep, 2001	Uranium	11.2 ± 0.1	13.1 ± 3.0	7.9 - 18.3
STW-932	WATER	Oct, 2001	I-131	7.7 ± 0.3	7.7 ± 2.0	4.2 - 11.2
STW-933	WATER	Oct, 2001	Gr. Alpha	82.2 ± 4.0	97.5 ± 24.4	55.3 - 140.0
STW-933	WATER	Oct, 2001	Ra-226	9.5 ± 1.2	10.8 ± 1.6	8.0 - 13.6

Table A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^b		Control Limits
				Laboratory result ^c	ERA Result ^d	
STW-933	WATER	Oct, 2001	Ra-228	17.0 ± 0.8	15.6 ± 3.9	8.9 - 22.4
STW-933	WATER	Oct, 2001	Uranium	32.2 ± 1.4	37.2 ± 3.7	30.7 - 43.6
STW-934	WATER	Oct, 2001	Co-60	82.4 ± 0.9	78.4 ± 5.0	69.7 - 87.1
STW-934	WATER	Oct, 2001	Cs-134	52.2 ± 1.3	54.1 ± 5.0	45.4 - 62.8
STW-934	WATER	Oct, 2001	Cs-137	39.4 ± 0.6	37.9 ± 5.0	26.3 - 43.7
STW-934	WATER	Oct, 2001	Gr. Beta	166.0 ± 7.1	192.0 ± 28.8	142.0 - 242.0
STW-934	WATER	Oct, 2001	Sr-89	12.8 ± 0.8	16.7 ± 5.0	8.0 - 25.4
STW-934	WATER	Oct, 2001	Sr-90	6.8 ± 0.7	7.7 ± 5.0	-1.0 - 16.4
STW-935	WATER	Oct, 2001	Gr. Alpha	63.5 ± 2.5	64.0 ± 16.0	36.5 - 91.5
STW-935	WATER	Oct, 2001	Gr. Beta	26.0 ± 1.2	21.5 ± 5.0	12.8 - 30.2
STW-938	WATER	Nov, 2001	Ba-133	66.7 ± 1.2	69.3 ± 6.9	57.5 - 81.1
STW-938	WATER	Nov, 2001	Co-60	59.3 ± 0.6	59.7 ± 5.0	51.0 - 68.4
STW-938	WATER	Nov, 2001	Cs-134	86.7 ± 1.5	93.9 ± 5.0	85.2 - 103.0
STW-938	WATER	Nov, 2001	Cs-137	45.0 ± 1.0	42.0 ± 5.0	33.3 - 50.7
STW-938	WATER	Nov, 2001	Zn-65	80.7 ± 0.6	77.3 ± 7.7	63.9 - 90.7

^a Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the environmental samples crosscheck program operated by Environmental Resources Associates (ERA).

^b All results are in pCi/L, except for elemental potassium (K) data in milk, which are in mg/L; air filter samples, which are in pCi/Filter.

^c Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

^d Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA.

Table A-2. Crosscheck program results; Thermoluminescent Dosimeters. (TLDs).

Lab Code	TLD Type	Date	Measurement	mR		
				Known Value	Lab result ± 2 Sigma	Control Limits
<u>Teledyne Brown Engineering</u>						
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #1	17.8	14.4 \pm 0.2	12.46 - 23.14
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #2	35.5	32.4 \pm 0.1	24.85 - 46.15
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #3	62.2	61.8 \pm 0.9	43.54 - 80.86
<u>Teledyne Brown Engineering</u>						
2000-2	CaSO ₄ : Dy Cards	Mar, 2000	Reader 1, #1	17.8	21.3 \pm 0.3	12.46 - 23.14
2000-2	CaSO ₄ : Dy Cards	Mar, 2000	Reader 1, #2	35.5	40.1 \pm 1.9	24.85 - 46.15
2000-2	CaSO ₄ : Dy Cards	Mar, 2000	Reader 1, #3	62.2	69.9 \pm 3.5	43.54 - 80.86
Chips and cards irradiated by Teledyne Brown Engineering, Westwood, New Jersey, in March of 2000.						
<u>12th International Intercomparison</u>						
022-1	CaSO ₄ : Dy Cards	Jun, 2000	Field	161.0	184.9 \pm 1.9	112.70 - 209.30
022-1	CaSO ₄ : Dy Cards	Jun, 2000	Field 1	548.0	502.2 \pm 1.7	383.60 - 712.40
022-1	CaSO ₄ : Dy Cards	Jun, 2000	Field 2	391.0	412.0 \pm 2.9	273.70 - 508.30
022-1	CaSO ₄ : Dy Cards	Jun, 2000	Field 3	623.0	643.2 \pm 2.9	436.10 - 809.90
022-1	CaSO ₄ : Dy Cards	Jun, 2000	Lab, 1	391.0	442.8 \pm 2.5	273.70 - 508.30
<u>Environmental, Inc.</u>						
2001-1	CaSO ₄ : Dy Cards	Dec, 2001	Reader 1, #1	4.0	3.7 \pm 0.1	2.79 - 5.17
2001-1	CaSO ₄ : Dy Cards	Dec, 2001	Reader 1, #1	4.0	3.4 \pm 0.1	2.79 - 5.17
2001-1	CaSO ₄ : Dy Cards	Dec, 2001	Reader 1, #2	7.1	7.9 \pm 0.2	4.95 - 9.19
2001-1	CaSO ₄ : Dy Cards	Dec, 2001	Reader 1, #2	7.1	7.6 \pm 0.3	4.95 - 9.19
2001-1	CaSO ₄ : Dy Cards	Dec, 2001	Reader 1, #3	15.9	18.6 \pm 0.4	11.13 - 20.67
2001-1	CaSO ₄ : Dy Cards	Dec, 2001	Reader 1, #3	15.9	19.6 \pm 0.1	11.13 - 20.67
2001-1	CaSO ₄ : Dy Cards	Dec, 2001	Reader 1, #4	63.6	78.2 \pm 1.2	44.53 - 82.69
2001-1	CaSO ₄ : Dy Cards	Dec, 2001	Reader 1, #4	63.6	79.9 \pm 2.5	44.53 - 82.69

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^a		
				Laboratory results 2s, n=1 ^b	Known Activity	Control ^c Limits
SPAP-477	Air Filter	Jan, 2001	Cs-137	1.76 ± 0.02	1.68	1.01 - 2.35
SPW-479	Water	Jan, 2001	H-3	54702.00 ± 644.00	54549.00	43639.20 - 65458.80
SPW-481	Water	Jan, 2001	Gr. Alpha	58.08 ± 2.79	69.14	34.57 - 103.71
SPW-481	Water	Jan, 2001	Gr. Beta	213.83 ± 3.07	220.26	198.23 - 242.29
SPW-482	Water	Jan, 2001	Gr. Alpha	51.77 ± 2.18	69.14	34.57 - 103.71
SPW-482	Water	Jan, 2001	Gr. Beta	202.48 ± 2.98	220.26	198.23 - 242.29
SPW-483	Water	Jan, 2001	Ra-226	20.11 ± 0.34	20.86	14.60 - 27.12
SPW-483	Water	Jan, 2001	Ra-228	10.55 ± 2.02	19.43	13.60 - 25.26
Sample was lost during analysis.						
SPW-485	Water	Jan, 2001	Co-60	33.53 ± 3.40	31.13	21.13 - 41.13
SPW-485	Water	Jan, 2001	Cs-134	32.80 ± 2.54	30.81	20.81 - 40.81
SPW-485	Water	Jan, 2001	Cs-137	42.10 ± 5.60	36.00	26.00 - 46.00
SPW-485	Water	Jan, 2001	Sr-90	154.34 ± 3.49	137.66	110.13 - 165.19
SPAP-754	Air Filter	Jan, 2001	Gr. Beta	8.53 ± 0.02	7.88	-2.12 - 17.88
SPW-1037	Water	Feb, 2001	U-233/4	3.74 ± 0.10	4.17	2.50 - 5.84
SPW-1037	Water	Feb, 2001	U-238	3.81 ± 0.10	4.17	-7.83 - 16.17
SPW-1224	Water	Feb, 2001	Ra-226	21.25 ± 0.50	20.68	14.48 - 26.88
SPW-1224	Water	Feb, 2001	Ra-228	21.76 ± 2.65	19.27	13.49 - 25.05
SPW-1225	Water	Feb, 2001	Gr. Alpha	71.87 ± 3.07	69.14	34.57 - 103.71
SPW-1225	Water	Feb, 2001	Gr. Beta	36.30 ± 1.47	28.75	18.75 - 38.75
SPW-1272	Water	Feb, 2001	I-131	56.82 ± 0.71	63.05	50.44 - 75.66
SPW-1272	Water	Feb, 2001	I-131(g)	65.69 ± 10.21	63.05	53.05 - 73.05
SPVE-1274	Vegetation	Feb, 2001	I-131(g)	0.78 ± 0.05	0.76	0.45 - 1.06
SPCH-1276	Charcoal	Feb, 2001	I-131(g)	1.57 ± 0.05	1.58	0.95 - 2.21
SPMI-1270	Milk	Mar, 2001	Cs-134	31.89 ± 4.71	29.77	19.77 - 39.77
SPMI-1270	Milk	Mar, 2001	Cs-137	46.61 ± 8.81	35.90	25.90 - 45.90
The Cs-137 spike is suspect; A new cesium spike has been prepared.						
SPMI-1270	Milk	Mar, 2001	I-131(g)	81.92 ± 10.80	81.95	71.95 - 91.95
SPU-2901	Urine	Mar, 2001	H-3	51512.00 ± 1369.00	50189.00	40151.20 - 60226.80
SPW-2161	Water	Mar, 2001	Ra-228	29.92 ± 5.13	31.75	22.23 - 41.28
SPU-3128	Urine	Apr, 2001	H-3	2065.00 ± 408.00	2008.00	1317.37 - 2698.63
SPW-3129	Water	Apr, 2001	Gr. Alpha	37.94 ± 2.42	34.57	17.29 - 51.86

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^a		
				Laboratory results 2s, n=1 ^b	Known Activity	Control ^c Limits
SPW-3129	Water	Apr, 2001	Gr. Beta	117.83 ± 2.37	109.46	98.51 - 120.41
SPAP-3508	Air Filter	Apr, 2001	Gr. Beta	0.80 ± 0.01	0.78	-9.22 - 10.78
SPMI-3232	Milk	Apr, 2001	Cs-134	32.69 ± 6.50	33.96	23.96 - 43.96
SPMI-3232	Milk	Apr, 2001	Cs-137	44.20 ± 9.08	35.79	25.79 - 45.79
SPMI-3232	Milk	Apr, 2001	I-131	48.05 ± 0.90	56.68	45.34 - 68.02
SPMI-3232	Milk	Apr, 2001	I-131(g)	55.64 ± 11.39	56.68	46.68 - 66.68
SPMI-3232	Milk	Apr, 2001	Sr-90	143.77 ± 3.04	136.82	109.46 - 164.18
SPSO-3356	Soil	Apr, 2001	Co-60	18.49 ± 0.21	19.57	9.57 - 29.57
SPSO-3356	Soil	Apr, 2001	Cs-137	18.71 ± 0.24	16.61	6.61 - 26.61
SPAP-3359	Air Filter	Apr, 2001	Cs-137	1.80 ± 0.01	1.67	1.00 - 2.34
SPW-3376	Water	Apr, 2001	Co-60	48.17 ± 4.85	45.19	35.19 - 55.19
SPW-3376	Water	Apr, 2001	Cs-134	37.14 ± 3.90	33.96	23.96 - 43.96
SPW-3376	Water	Apr, 2001	Sr-90	159.84 ± 3.42	136.82	109.46 - 164.18
SPW-3377	Water	Apr, 2001	I-131	68.60 ± 2.63	85.02	68.02 - 102.02
SPW-3129/1	Water	May, 2001	Gr. Alpha	37.94 ± 2.42	34.57	17.29 - 51.86
SPW-3129/1	Water	May, 2001	Gr. Beta	117.83 ± 2.37	109.46	98.51 - 120.41
SPW-3129/2	Water	Jun, 2001	Gr. Alpha	34.42 ± 2.14	34.57	17.29 - 51.86
SPW-3129/2	Water	Jun, 2001	Gr. Beta	119.99 ± 2.45	109.46	98.51 - 120.41
SPVE-3303	Vegetation	Jun, 2001	I-131(g)	0.81 ± 0.03	0.86	0.51 - 1.20
SPSO-5701	Soil	Jul, 2001	Co-60	17.42 ± 0.19	19.05	9.05 - 29.05
SPSO-5701	Soil	Jul, 2001	Cs-137	16.03 ± 0.22	16.52	6.52 - 26.52
SPW-5779	Water	Jul, 2001	Co-60	250.05 ± 18.63	233.26	209.93 - 256.59
SPW-5779	Water	Jul, 2001	Cs-137	178.68 ± 19.89	175.91	158.32 - 193.50
SPW-5779	Water	Jul, 2001	Sr-90	72.12 ± 2.24	68.12	54.50 - 81.74
SPF-5781	Fish	Jul, 2001	Co-60	1.87 ± 0.08	1.79	1.07 - 2.51
SPF-5781	Fish	Jul, 2001	Cs-137	1.43 ± 0.07	1.39	0.83 - 1.95
SPW-5937	Water	Jul, 2001	H-3	51177.00 ± 631.00	50189.00	40151.20 - 60226.80
SPW-59441	Water	Jul, 2001	Ra-226	36.62 ± 1.74	34.46	24.12 - 44.80
SPW-59441	Water	Jul, 2001	Ra-228	41.46 ± 6.44	36.06	25.24 - 46.88
SPAP-5703	Air Filter	Jul, 2001	Cs-137	1.81 ± 0.02	1.67	1.00 - 2.34
SPW-3129/3	Water	Jul, 2001	Gr. Alpha	35.31 ± 3.04	34.75	17.38 - 52.13

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^a		
				Laboratory results 2s, n=1 ^b	Known Activity	Control ^c Limits
SPW-3129/3	Water	Jul, 2001	Gr. Beta	113.28 ± 3.65	109.46	98.51 - 120.41
SPMI-6145	Milk	Jul, 2001	Cs-137	188.45 ± 19.10	175.91	158.32 - 193.50
SPW-6604	Water	Jul, 2001	Gr. Alpha	35.36 ± 1.94	34.57	17.29 - 51.86
SPW-6604	Water	Jul, 2001	Gr. Beta	112.56 ± 2.46	108.82	97.94 - 119.70
SPW-9008	Water	Oct, 2001	H-3	48285.00 ± 606.10	50189.00	40151.20 - 60226.80
SPAP-9010	Air Filter	Oct, 2001	Cs-137	1.91 ± 0.01	1.67	1.00 - 2.34
SPW-10723	Water	Dec, 2001	U-233/4	40.12 ± 1.09	41.73	25.04 - 58.42
SPW-10723	Water	Dec, 2001	U-238	40.16 ± 1.09	41.73	29.21 - 54.25
SPAP-11550	Air Filter	Dec, 2001	Gr. Beta	1.58 ± 0.02	1.56	-8.44 - 11.56
SPW-11757	Water	Dec, 2001	Co-60	43.82 ± 3.14	41.36	31.36 - 51.36
SPW-11757	Water	Dec, 2001	Cs-134	24.11 ± 2.42	22.59	12.59 - 32.59
SPW-11757	Water	Dec, 2001	Cs-137	52.11 ± 4.40	50.89	40.89 - 60.89
SPMI-11759	Milk	Dec, 2001	Cs-134	28.03 ± 2.64	27.10	17.10 - 37.10
SPMI-11759	Milk	Dec, 2001	Cs-137	54.59 ± 5.08	50.89	40.89 - 60.89
SPF-11761	Fish	Dec, 2001	Cs-134	0.94 ± 0.02	0.90	0.54 - 1.26
SPF-11761	Fish	Dec, 2001	Cs-137	1.43 ± 0.04	1.43	0.86 - 2.00

^a All results are in pCi/L, except for elemental potassium (K) in milk, which are in mg/L.; air filter samples, which are in pCi/Filter; and food products, which are in pCi/kg.

^b Results are based on single determinations.

^c Control limits are based on Attachment A, Page A2 of this report.

NOTE: For fish, Jello is used for the spike matrix. For vegetation, coleslaw is used for the spike matrix.

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L ^a		
				Laboratory results (4.66 Sigma)		Acceptance Criteria (4.66 Sigma)
				LLD	Activity ^b	
SPAP-478	AIR FILTER	Jan 2001	Co-60	< 1.12		< 100.0
SPAP-478	AIR FILTER	Jan 2001	Cs-134	< 1.66		< 100.0
SPAP-478	AIR FILTER	Jan 2001	Cs-137	< 2.46		< 100.0
SPW-480	WATER	Jan 2001	H-3	< 162.00	-1.86 ± 80.40	< 200.0
SPW-484	WATER	Jan 2001	Gr. Alpha	< 0.68		< 1.0
SPW-484	WATER	Jan 2001	Gr. Beta	< 1.35		< 3.2
SPW-484	WATER	Jan 2001	Ra-226	< 0.02	0.03 ± 0.01	< 1.0
SPW-484	WATER	Jan 2001	Ra-228	< 0.97	0.43 ± 0.50	< 2.0
SPW-486	WATER	Jan 2001	Co-60	< 2.68		< 10.0
SPW-486	WATER	Jan 2001	Cs-134	< 3.46		< 10.0
SPW-486	WATER	Jan 2001	Cs-137	< 5.43		< 10.0
SPW-486	WATER	Jan 2001	Sr-90	< 0.65	0.06 ± 0.31	< 1.0
SPAP-755	AIR FILTER	Jan 2001	Gr. Beta	< 1.60	0.16 ± 0.90	< 3.2
SPW-1038	WATER	Feb 2001	U-238	< 0.03		< 1.0
SPW-1038	WATER	Feb 2001	U-238	< 0.00		< 1.0
SPW-1223	WATER	Feb 2001	Gr. Alpha	< 0.46		< 1.0
SPW-1223	WATER	Feb 2001	Gr. Beta	< 1.50		< 3.2
SPW-1223	WATER	Feb 2001	Ra-226	< 0.02	0.03 ± 0.01	< 1.0
SPW-1223	WATER	Feb 2001	Ra-228	< 0.95	0.45 ± 0.49	< 2.0
SPMI-1268	MILK	Feb 2001	Cs-134	< 5.86		< 10.0
SPMI-1268	MILK	Feb 2001	Cs-137	< 3.02		< 10.0
SPMI-1268	MILK	Feb 2001	I-131(g)	< 7.46		< 20.0
SPW-1271	WATER	Feb 2001	Co-60	< 1.06		< 10.0
SPW-1271	WATER	Feb 2001	Cs-134	< 2.61		< 10.0
SPW-1271	WATER	Feb 2001	Cs-137	< 2.37		< 10.0
SPVE-1273	VEGETATION	Feb 2001	Cs-134	< 10.04		< 100.0
SPVE-1273	VEGETATION	Feb 2001	Cs-137	< 6.00		< 100.0
SPCH-1275	CHARCOAL CANISTER	Feb 2001	I-131(g)	< 0.01		< 9.6
SPW-2164	WATER	Mar 2001	Ra-226	< 0.02	0.05 ± 0.01	< 1.0
SPU-3126	URINE	Apr 2001	H-3	< 642.00	-66.00 ± 335.00	< 200.0

2.0 ml. sample volume.

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L ^a		
				Laboratory results (4.66 Sigma)		Acceptance Criteria (4.66 Sigma)
				LLD	Activity ^b	
SPDW-3130	WATER	Apr 2001	Gr. Alpha	< 0.54	0.04 ± 0.38	< 1.0
SPDW-3130	WATER	Apr 2001	Gr. Beta	< 1.46	0.67 ± 1.04	< 3.2
SPMI-3233	MILK	Apr 2001	Cs-137	< 2.66		< 10.0
SPMI-3233	MILK	Apr 2001	I-131	< 0.26	-0.06 ± 0.14	< 0.5
SPMI-3233	MILK	Apr 2001	I-131(g)	< 3.91		< 20.0
SPMI-3233	MILK	Apr 2001	Sr-89	< 0.79	-0.32 ± 0.79	< 5.0
SPMI-3233	MILK	Apr 2001	Sr-90		1.18 ± 0.35	< 1.0
Low level of Sr-90 concentration in milk (1-5 pCi/L) is not unusual.						
SPSO-3357	SOIL	Apr 2001	Cs-134	< 14.77		< 100.0
SPSO-3357	SOIL	Apr 2001	Cs-137	< 11.72		< 100.0
SPAP-3358	AIR FILTER	Apr 2001	Cs-137	< 0.55		< 100.0
SPW-3375	WATER	Apr 2001	Co-60	< 2.90		< 10.0
SPW-3375	WATER	Apr 2001	Cs-134	< 3.71		< 10.0
SPW-3375	WATER	Apr 2001	I-131(g)	< 0.39	0.02 ± 0.22	< 20.0
SPW-3375	WATER	Apr 2001	Sr-90	< 0.56	0.05 ± 0.27	< 1.0
SPDW-3130	WATER	May 2001	Gr. Alpha	< 0.45	0.15 ± 0.34	< 1.0
SPDW-3130	WATER	May 2001	Gr. Beta	< 1.26	0.34 ± 0.95	< 3.2
SPDW-3130	WATER	Jun 2001	Gr. Alpha	< 0.44	0.09 ± 0.32	< 1.0
SPDW-3130	WATER	Jun 2001	Gr. Beta	< 1.46	0.66 ± 1.04	< 3.2
SPVE-3304	VEGETATION	Jun 2001	Co-60	< 7.06		< 100.0
SPVE-3304	VEGETATION	Jun 2001	Cs-134	< 11.56		< 100.0
SPVE-3304	VEGETATION	Jun 2001	Cs-137	< 8.30		< 100.0
SPSO-5702	SOIL	Jul 2001	Co-60	< 12.80		< 100.0
SPSO-5702	SOIL	Jul 2001	Cs-134	< 13.96		< 100.0
SPSO-5702	SOIL	Jul 2001	Cs-137	< 8.10		< 100.0
SPAP-5704	AIR FILTER	Jul 2001	Co-60	< 0.79		< 100.0
SPAP-5704	AIR FILTER	Jul 2001	Cs-134	< 0.84		< 100.0
SPAP-5704	AIR FILTER	Jul 2001	Cs-137	< 0.60		< 100.0
SPW-5780	WATER	Jul 2001	Co-60	< 1.86		< 10.0
SPW-5780	WATER	Jul 2001	Cs-134	< 2.46		< 10.0
SPW-5780	WATER	Jul 2001	Cs-137	< 3.77		< 10.0

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L ^a .		
				Laboratory results (4.66 Sigma)		Acceptance Criteria (4.66 Sigma)
				LLD	Activity ^b	
SPF-5782	FISH	Jul 2001	Co-60	< 5.64		< 100.0
SPF-5782	FISH	Jul 2001	Cs-134	< 7.51		< 100.0
SPW-5938	WATER	Jul 2001	H-3	< 163.22	-16.21 ± 85.07	< 200.0
SPW-59451	WATER	Jul 2001	Ra-226	< 0.01	0.04 ± 0.01	< 1.0
SPW-59451	WATER	Jul 2001	Ra-228	< 0.77	0.70 ± 0.44	< 2.0
SPDW-3130	WATER	Jul 2001	Gr. Alpha	< 0.54	0.36 ± 0.40	< 1.0
SPDW-3130	WATER	Jul 2001	Gr. Beta	< 2.27	-0.78 ± 1.35	< 3.2
SPMI-6146	MILK	Jul 2001	Sr-90	< 0.50	1.09 ± 0.36	< 1.0
Low level of Sr-90 concentration in milk (1-5 pCi/L) is not unusual.						
SPW-6605	WATER	Jul 2001	Gr. Beta	< 1.34	0.55 ± 1.01	< 3.2
SPW-9009	WATER	Oct 2001	H-3	< 160.00	-56.70 ± 76.50	< 200.0
SPAP-9011	AIR FILTER	Oct 2001	Co-60	< 0.76		< 100.0
SPAP-9011	AIR FILTER	Oct 2001	Cs-137	< 0.58		< 100.0
SPW-5780	WATER	Oct 2001	Sr-90	< 0.54	0.36 ± 0.30	< 1.0
SPW-10724	WATER	Dec 2001	U-238	< 0.13	0.04 ± 0.10	< 1.0
SPAP-11549	AIR FILTER	Dec 2001	Gr. Beta	< 0.00	0.01 ± 0.00	< 3.2
SPW-11756	WATER	Dec 2001	Cs-137	< 2.62		< 10.0
SPMI-11758	MILK	Dec 2001	Cs-137	< 4.00		< 10.0
SPMI-11758	MILK	Dec 2001	I-131(g)	< 16.57		< 20.0
SPF-11760	FISH	Dec 2001	Cs-137	< 7.96		< 100.0

^a Liquid sample results are reported in pCi/Liter, air filter sample results are in pCi/filter, charcoal sample results are in pCi/charcoal, and solid sample results are in pCi/kilogram.

^b The activity reported is the net activity result.

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
AP-10675, 10676	Jan, 2001	Be-7	0.06 ± 0.02	0.06 ± 0.02	0.06 ± 0.01
AP-10803, 10804	Jan, 2001	Be-7	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01
AP-10833, 10834	Jan, 2001	Be-7	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01
WW-51, 52	Jan, 2001	H-3	362.60 ± 94.70	417.20 ± 96.80	389.90 ± 67.71
MI-72, 73	Jan, 2001	K-40	1,566.90 ± 196.80	1,372.40 ± 152.50	1,469.65 ± 124.49
MI-96, 97	Jan, 2001	K-40	1,418.30 ± 117.80	1,545.70 ± 162.50	1,482.00 ± 100.35
U-858, 859	Jan, 2001	Gr. Beta	2.17 ± 2.47	4.23 ± 2.74	3.20 ± 1.84
MI-389, 390	Jan, 2001	K-40	1,489.20 ± 141.10	1,463.30 ± 168.20	1,476.25 ± 109.77
DW-879, 880	Jan, 2001	Gr. Beta	2.63 ± 0.52	2.37 ± 0.50	2.50 ± 0.36
SWU-813, 814	Jan, 2001	Gr. Beta	2.48 ± 0.58	2.46 ± 0.63	2.47 ± 0.43
MI-708, 709	Feb, 2001	K-40	1,179.40 ± 103.00	1,280.40 ± 90.26	1,229.90 ± 68.48
MI-740, 741	Feb, 2001	I-131	0.01 ± 0.26	-0.12 ± 0.26	-0.05 ± 0.18
MI-740, 741	Feb, 2001	K-40	1,434.00 ± 156.50	1,435.00 ± 126.10	1,434.50 ± 100.49
MI-789, 790	Feb, 2001	K-40	1,584.30 ± 158.80	1,390.70 ± 136.50	1,487.50 ± 104.70
DW-901, 902	Feb, 2001	Gr. Beta	4.67 ± 1.08	5.54 ± 1.13	5.11 ± 0.78
SWU-1544, 1545	Feb, 2001	Gr. Beta	3.13 ± 0.63	2.33 ± 0.52	2.73 ± 0.41
DW-1426, 1427	Feb, 2001	Gr. Beta	2.05 ± 0.92	2.34 ± 0.93	2.20 ± 0.65
DW-1426, 1427	Feb, 2001	H-3	42.60 ± 94.23	131.31 ± 95.34	86.96 ± 67.02
WW-1476, 1477	Feb, 2001	H-3	53.06 ± 65.79	53.06 ± 93.03	53.06 ± 56.97
MI-1523, 1524	Mar, 2001	I-131	-0.01 ± 0.20	-0.10 ± 0.37	-0.06 ± 0.21
MI-1523, 1524	Mar, 2001	K-40	1,396.00 ± 184.80	1,576.00 ± 184.90	1,486.00 ± 130.71
MI-1572, 1573	Mar, 2001	K-40	1,499.20 ± 113.30	1,326.00 ± 118.80	1,412.60 ± 82.08
MI-1572, 1573	Mar, 2001	Sr-90	1.65 ± 0.44	1.51 ± 0.52	1.58 ± 0.34
SW-1648, 1649	Mar, 2001	K-40	297.80 ± 67.20	344.80 ± 82.30	321.30 ± 53.13
MI-1800, 1801	Mar, 2001	K-40	1,425.80 ± 183.30	1,372.20 ± 119.70	1,399.00 ± 109.46
SW-1779, 1780	Mar, 2001	Gr. Alpha	2.22 ± 0.73	2.14 ± 0.69	2.18 ± 0.50
SW-1779, 1780	Mar, 2001	Gr. Beta	6.28 ± 0.74	6.62 ± 0.70	6.45 ± 0.51
MI-1447, 1448	Mar, 2001	I-131	-0.65 ± 0.27	0.13 ± 0.55	-0.26 ± 0.31
MI-1447, 1448	Mar, 2001	K-40	1,496.20 ± 155.40	1,413.40 ± 169.60	1,454.80 ± 115.01
WW-2115, 2116	Mar, 2001	H-3	540.04 ± 111.84	500.85 ± 110.46	520.44 ± 78.59
SW-1698, 1699	Mar, 2001	Gr. Beta	6.07 ± 1.75	5.57 ± 1.85	5.82 ± 1.27
DW-2272, 2273	Mar, 2001	Gr. Beta	2.10 ± 0.86	1.63 ± 0.83	1.87 ± 0.60
WW-2356, 2357	Mar, 2001	Gr. Beta	1.22 ± 0.50	1.32 ± 0.47	1.27 ± 0.35
AP-2812, 2813	Mar, 2001	Be-7	0.07 ± 0.02	0.05 ± 0.01	0.06 ± 0.01
AP-2812, 2813	Mar, 2001	Be-7	0.07 ± 0.02	0.05 ± 0.01	0.06 ± 0.01
LW-2217, 2218	Mar, 2001	Gr. Beta	1.85 ± 0.51	2.23 ± 0.55	2.04 ± 0.37

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
AP-2833, 2834	Mar, 2001	Be-7	0.04 ± 0.01	0.06 ± 0.02	0.05 ± 0.01
AP-3038, 3039	Mar, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.02	0.07 ± 0.01
AP-3038, 3039	Mar, 2001	Be-7	0.06 ± 0.02	0.07 ± 0.01	0.07 ± 0.01
DW-2398, 2399	Mar, 2001	Gr. Beta	1.58 ± 0.89	1.81 ± 0.88	1.69 ± 0.63
LW-2467, 2468	Mar, 2001	Gr. Beta	2.52 ± 0.53	2.42 ± 0.53	2.47 ± 0.37
MI-2446, 2447	Apr, 2001	K-40	1,285.40 ± 177.10	1,376.00 ± 175.90	1,330.70 ± 124.81
AP-3017, 3018	Apr, 2001	Be-7	0.05 ± 0.01	0.05 ± 0.01	0.05 ± 0.00
SW-2423, 2424	Apr, 2001	K-40	255.60 ± 59.80	268.40 ± 65.40	262.00 ± 44.31
BS-3103, 3104	Apr, 2001	Gr. Beta	7.99 ± 1.80	8.17 ± 1.73	8.08 ± 1.25
SWU-3239, 3240	Apr, 2001	Gr. Beta	3.30 ± 0.60	4.30 ± 0.74	3.80 ± 0.48
SS-3322, 3323	Apr, 2001	K-40	15.99 ± 1.08	15.59 ± 1.01	15.79 ± 0.74
W-3990, 3991	Apr, 2001	Sr-89	91.35 ± 18.94	85.29 ± 23.99	88.32 ± 15.28
BS-4347, 4348	Apr, 2001	K-40	3,982.40 ± 489.60	3,255.80 ± 450.10	3,619.10 ± 332.53
BS-4347, 4348	Apr, 2001	K-40	3.26 ± 0.45	3.98 ± 0.49	3.62 ± 0.33
MI-3364, 3365	May, 2001	K-40	1,325.90 ± 160.20	1,453.20 ± 163.00	1,389.55 ± 114.27
SO-3385, 3386	May, 2001	Gr. Alpha	6.51 ± 3.09	9.01 ± 3.44	7.76 ± 2.31
SO-3385, 3386	May, 2001	Gr. Beta	24.63 ± 3.15	28.17 ± 3.12	26.40 ± 2.22
SO-3385, 3386	May, 2001	K-40	19.17 ± 1.08	17.94 ± 0.76	18.56 ± 0.66
CL-4068, 4069	May, 2001	K-40	1.09 ± 0.27	1.13 ± 0.23	1.11 ± 0.18
MI-3475, 3476	May, 2001	Gr. Beta	1,297.10 ± 114.60	1,433.60 ± 156.60	1,365.35 ± 97.03
WW-3545, 3546	May, 2001	Gr. Beta	1.57 ± 0.55	1.36 ± 0.53	1.47 ± 0.38
MI-3681, 3682	May, 2001	K-40	1,417.20 ± 125.70	1,496.20 ± 124.50	1,456.70 ± 88.46
SW-3702, 3703	May, 2001	Gr. Alpha	4.51 ± 1.66	3.22 ± 1.55	3.87 ± 1.13
SW-3702, 3703	May, 2001	Gr. Beta	8.74 ± 1.36	7.11 ± 1.38	7.93 ± 0.97
BS-4021, 4022	May, 2001	Cs-137	224.30 ± 30.20	205.90 ± 43.00	215.10 ± 26.27
BS-4021, 4022	May, 2001	H-3	842.00 ± 47.00	860.00 ± 48.00	851.00 ± 33.59
BS-4021, 4022	May, 2001	K-40	21,117.00 ± 953.00	21,629.00 ± 1,357.00	21,373.00 ± 829.10
BS-4021, 4022	May, 2001	Pu-238	80.30 ± 36.50	59.50 ± 22.00	69.90 ± 21.31
BS-4021, 4022	May, 2001	Pu-239/40	49.40 ± 31.80	41.10 ± 19.60	45.25 ± 18.68
BS-4021, 4022	May, 2001	Ra-226	7,436.00 ± 577.90	9,126.00 ± 751.90	8,281.00 ± 474.16
BS-4021, 4022	May, 2001	Sr-90	10.60 ± 2.71	16.80 ± 3.22	13.70 ± 2.10
F-3813, 3814	May, 2001	K-40	2.10 ± 0.17	2.30 ± 0.26	2.20 ± 0.16
G-4158, 4159	May, 2001	Be-7	0.37 ± 0.13	0.41 ± 0.14	0.39 ± 0.10
SO-4179, 4180	May, 2001	Ac-228	0.45 ± 0.13	0.52 ± 0.14	0.49 ± 0.10
SO-4179, 4180	May, 2001	Bi-214	0.31 ± 0.06	0.41 ± 0.06	0.36 ± 0.04
SO-4179, 4180	May, 2001	Cs-137	0.46 ± 0.05	0.47 ± 0.04	0.47 ± 0.03

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
SO-4179, 4180	May, 2001	Gr. Beta	26.65 ± 2.63	24.68 ± 2.52	25.67 ± 1.82
SO-4179, 4180	May, 2001	K-40	16.35 ± 0.86	16.05 ± 0.82	16.20 ± 0.59
SO-4179, 4180	May, 2001	Pb-212	0.35 ± 0.04	0.43 ± 0.05	0.39 ± 0.03
SO-4179, 4180	May, 2001	Ra-226	0.56 ± 0.98	1.03 ± 0.31	0.79 ± 0.51
SO-4179, 4180	May, 2001	Tl-208	0.14 ± 0.03	0.17 ± 0.03	0.15 ± 0.02
BS-4233, 4234	May, 2001	Cs-137	0.03 ± 0.01	0.03 ± 0.02	0.03 ± 0.01
BS-4233, 4234	May, 2001	K-40	8.18 ± 0.48	7.80 ± 0.58	7.99 ± 0.38
SWU-4376, 4377	May, 2001	Gr. Beta	2.58 ± 0.55	2.94 ± 0.58	2.76 ± 0.40
DW-4449, 4450	May, 2001	Gr. Beta	2.83 ± 0.55	3.74 ± 0.65	3.29 ± 0.43
DW-4397, 4398	May, 2001	Gr. Beta	9.13 ± 1.26	10.20 ± 1.34	9.66 ± 0.92
MI-4114, 4115	May, 2001	K-40	1,325.90 ± 118.80	1,394.70 ± 133.10	1,360.30 ± 89.20
F-4284, 4285	May, 2001	K-40	2.23 ± 0.32	2.12 ± 0.35	2.18 ± 0.24
DW-4326, 4327	Jun, 2001	Gr. Beta	2.60 ± 0.97	1.47 ± 0.83	2.04 ± 0.64
MI-4470, 4471	Jun, 2001	K-40	1,514.50 ± 116.60	1,456.80 ± 130.90	1,485.65 ± 87.65
SW-4493, 4494	Jun, 2001	Gr. Beta	4.05 ± 1.23	4.64 ± 1.32	4.35 ± 0.90
BS-4725, 4726	Jun, 2001	Co-60	112.00 ± 24.30	84.50 ± 8.70	98.25 ± 12.91
BS-4725, 4726	Jun, 2001	Cs-137	3,083.10 ± 100.10	3,094.80 ± 35.30	3,088.95 ± 53.07
BS-4725, 4726	Jun, 2001	K-40	8,143.70 ± 640.40	8,083.80 ± 225.10	8,113.75 ± 339.40
MI-4775, 4776	Jun, 2001	K-40	1,362.20 ± 71.80	1,363.90 ± 73.40	1,363.05 ± 51.34
WW-5110, 5111	Jun, 2001	H-3	1,173.50 ± 129.10	1,046.80 ± 125.20	1,110.15 ± 89.92
G-5085, 5086	Jun, 2001	Be-7	0.89 ± 0.17	1.14 ± 0.39	1.02 ± 0.21
G-5085, 5086	Jun, 2001	K-40	5.13 ± 0.39	5.22 ± 0.70	5.17 ± 0.40
MI-5259, 5260	Jun, 2001	K-40	1,529.70 ± 122.70	1,406.20 ± 123.80	1,467.95 ± 87.15
MI-5259, 5260	Jun, 2001	Sr-90	1.69 ± 0.42	1.71 ± 0.44	1.70 ± 0.30
SWU-5422, 5423	Jun, 2001	Gr. Beta	2.59 ± 0.54	1.91 ± 0.52	2.25 ± 0.37
VE-5401, 5402	Jun, 2001	Gr. Beta	8.12 ± 0.24	8.88 ± 0.26	8.50 ± 0.18
VE-5401, 5402	Jun, 2001	K-40	6.55 ± 0.52	6.26 ± 0.65	6.40 ± 0.42
AP-5830, 5831	Jun, 2001	Be-7	0.08 ± 0.01	0.08 ± 0.01	0.08 ± 0.01
SW-5557, 5558	Jun, 2001	Gr. Beta	5.43 ± 1.70	5.96 ± 1.56	5.70 ± 1.15
AP-5851, 5852	Jun, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.02	0.07 ± 0.01
SW-5636, 5637	Jun, 2001	Gr. Beta	4.75 ± 1.38	4.18 ± 1.34	4.47 ± 0.96
LW-5681, 5682	Jun, 2001	Gr. Beta	2.42 ± 0.37	2.18 ± 0.34	2.30 ± 0.25
G-5535, 5536	Jul, 2001	Be-7	0.99 ± 0.29	0.97 ± 0.54	0.98 ± 0.31
G-5535, 5536	Jul, 2001	Gr. Beta	7.62 ± 0.12	7.72 ± 0.12	7.67 ± 0.08
G-5535, 5536	Jul, 2001	K-40	7.26 ± 1.03	7.64 ± 0.93	7.45 ± 0.69
AP-5788, 5789	Jul, 2001	Be-7	0.08 ± 0.02	0.07 ± 0.02	0.08 ± 0.01

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
AP-5872, 5873	Jul, 2001	Be-7	0.07 ± 0.02	0.08 ± 0.02	0.07 ± 0.01
AP-5893, 5894	Jul, 2001	Be-7	0.08 ± 0.02	0.08 ± 0.01	0.08 ± 0.01
AP-5809, 5810	Jul, 2001	Be-7	0.07 ± 0.02	0.06 ± 0.01	0.06 ± 0.01
SW-5724, 5725	Jul, 2001	Gr. Alpha	2.95 ± 0.70	2.89 ± 0.60	2.92 ± 0.46
SW-5724, 5725	Jul, 2001	Gr. Beta	8.79 ± 0.71	8.21 ± 0.65	8.50 ± 0.48
SW-5767, 5768	Jul, 2001	I-131	0.79 ± 0.31	0.61 ± 0.26	0.70 ± 0.20
LW-5920, 5921	Jul, 2001	Gr. Beta	3.06 ± 0.64	3.15 ± 0.58	3.11 ± 0.43
SO-6172, 6173	Jul, 2001	Cs-137	0.30 ± 0.05	0.32 ± 0.04	0.31 ± 0.03
SO-6172, 6173	Jul, 2001	K-40	18.20 ± 1.08	17.55 ± 0.82	17.88 ± 0.68
SO-6172, 6173	Jul, 2001	Sr-90	0.03 ± 0.01	0.05 ± 0.02	0.04 ± 0.01
MI-6353, 6354	Jul, 2001	K-40	966.35 ± 82.28	986.31 ± 91.91	976.33 ± 61.68
SW-6376, 6377	Jul, 2001	I-131	0.58 ± 0.16	0.81 ± 0.17	0.70 ± 0.12
VE-6424, 6425	Jul, 2001	Gr. Beta	2.52 ± 0.05	2.49 ± 0.05	2.51 ± 0.03
VE-6424, 6425	Jul, 2001	K-40	3.04 ± 0.26	3.12 ± 0.37	3.08 ± 0.23
MI-6445, 6446	Jul, 2001	K-40	1,407.40 ± 97.10	1,442.20 ± 189.60	1,424.80 ± 106.51
LW-6489, 6490	Jul, 2001	Gr. Beta	2.61 ± 0.57	2.79 ± 0.54	2.70 ± 0.39
MI-6533, 6534	Jul, 2001	K-40	1,498.60 ± 113.90	1,375.50 ± 129.60	1,437.05 ± 86.27
DW-6835, 6836	Jul, 2001	Gr. Beta	2.01 ± 0.59	2.36 ± 0.63	2.19 ± 0.43
MI-6693, 6694	Aug, 2001	K-40	1,294.30 ± 118.70	1,417.30 ± 176.50	1,355.80 ± 106.35
MI-6693, 6694	Aug, 2001	Sr-90	1.47 ± 0.42	1.23 ± 0.41	1.35 ± 0.29
WW-6952, 6953	Aug, 2001	Gr. Beta	5.49 ± 0.69	5.80 ± 0.69	5.64 ± 0.49
MI-6906, 6907	Aug, 2001	K-40	1,613.80 ± 218.50	1,532.70 ± 135.80	1,573.25 ± 128.63
VE-6973, 6974	Aug, 2001	K-40	4.21 ± 0.24	4.29 ± 0.64	4.25 ± 0.34
LW-7851, 7852	Aug, 2001	Gr. Beta	2.20 ± 0.48	2.12 ± 0.42	2.16 ± 0.32
MI-7001, 7002	Aug, 2001	K-40	1,453.80 ± 148.10	1,285.30 ± 190.50	1,369.55 ± 120.65
MI-7073, 7074	Aug, 2001	K-40	1,217.30 ± 80.83	1,218.30 ± 99.13	1,217.80 ± 63.95
LW-7145, 7146	Aug, 2001	Gr. Beta	2.77 ± 0.53	3.60 ± 0.59	3.19 ± 0.39
MI-7221, 7222	Aug, 2001	K-40	1,192.90 ± 95.40	1,388.90 ± 132.70	1,290.90 ± 81.72
MI-7221, 7222	Aug, 2001	Sr-90	2.10 ± 0.48	1.72 ± 0.47	1.91 ± 0.34
SWU-7527, 7528	Aug, 2001	Gr. Beta	17.51 ± 3.06	20.36 ± 3.31	18.93 ± 2.25
VE-7485, 7486	Aug, 2001	K-40	2.12 ± 0.47	2.47 ± 0.34	2.30 ± 0.29
DW-7506, 7507	Aug, 2001	Gr. Beta	4.25 ± 1.18	4.13 ± 1.12	4.19 ± 0.81
MI-7622, 7623	Sep, 2001	K-40	1,340.10 ± 111.10	1,290.80 ± 116.50	1,315.45 ± 80.49
MI-7664, 7665	Sep, 2001	K-40	1,408.10 ± 102.70	1,396.90 ± 114.30	1,402.50 ± 76.83
MI-7876, 7877	Sep, 2001	K-40	1,416.40 ± 192.30	1,318.00 ± 155.50	1,367.20 ± 123.65
G-7960, 7961	Sep, 2001	Be-7	1.27 ± 0.21	1.25 ± 0.25	1.26 ± 0.16

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
G-7960, 7961	Sep, 2001	K-40	5.21 ± 0.57	5.70 ± 0.63	5.45 ± 0.43
F-8011, 8012	Sep, 2001	Cs-137	0.06 ± 0.02	0.04 ± 0.02	0.05 ± 0.01
F-8011, 8012	Sep, 2001	Gr. Beta	3.68 ± 0.12	3.50 ± 0.11	3.59 ± 0.08
F-8011, 8012	Sep, 2001	K-40	3.47 ± 0.49	3.38 ± 0.47	3.43 ± 0.34
MI-8149, 8150	Sep, 2001	K-40	1,551.70 ± 118.00	1,489.90 ± 123.60	1,520.80 ± 85.44
MI-8343, 8344	Sep, 2001	K-40	1,550.30 ± 170.60	1,368.10 ± 126.70	1,459.20 ± 106.25
VE-8319, 8320	Sep, 2001	Gr. Beta	3.37 ± 0.10	3.42 ± 0.11	3.39 ± 0.07
VE-8319, 8320	Sep, 2001	K-40	2.14 ± 0.46	2.24 ± 0.37	2.19 ± 0.29
AP-9069, 9070	Sep, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.01	0.07 ± 0.01
AP-9566, 9567	Sep, 2001	Be-7	0.08 ± 0.02	0.09 ± 0.03	0.09 ± 0.02
VE-8700, 8701	Oct, 2001	Be-7	0.24 ± 0.10	0.19 ± 0.10	0.22 ± 0.07
VE-8700, 8701	Oct, 2001	K-40	2.03 ± 0.24	2.03 ± 0.21	2.03 ± 0.16
VE-8700, 8701	Oct, 2001	Sr-90	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00
AP-9048, 9049	Oct, 2001	Be-7	0.07 ± 0.01	0.07 ± 0.00	0.07 ± 0.01
DW-8636, 8637	Oct, 2001	Gr. Beta	4.74 ± 1.06	5.08 ± 1.21	4.91 ± 0.80
DW-8615, 8616	Oct, 2001	Gr. Beta	4.65 ± 0.58	4.28 ± 0.54	4.47 ± 0.40
AP-9090, 9091	Oct, 2001	Be-7	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
AP-9166, 9167	Oct, 2001	Be-7	0.08 ± 0.02	0.08 ± 0.02	0.08 ± 0.01
AP-9187, 9188	Oct, 2001	Be-7	0.07 ± 0.01	0.05 ± 0.01	0.06 ± 0.01
VE-10562, 10563	Oct, 2001	Be-7	309.90 ± 158.80	348.30 ± 168.10	329.10 ± 115.62
VE-10562, 10563	Oct, 2001	K-40	6,407.10 ± 620.70	6,057.50 ± 660.40	6,232.30 ± 453.15
WW-8636, 8637	Oct, 2001	Gr. Beta	5.08 ± 1.20	4.74 ± 1.06	4.91 ± 0.80
DW-8894, 8895	Oct, 2001	Gr. Beta	4.28 ± 0.89	3.40 ± 0.90	3.84 ± 0.63
MI-9232, 9233	Oct, 2001	K-40	1,440.70 ± 46.60	1,424.80 ± 76.40	1,432.75 ± 44.75
VE-9518, 9519	Oct, 2001	K-40	1.91 ± 0.22	1.97 ± 0.39	1.94 ± 0.22
WW-10257, 10258	Nov, 2001	H-3	755.90 ± 102.50	684.70 ± 99.90	720.30 ± 71.57
VE-10333, 10334	Nov, 2001	Be-7	0.68 ± 0.26	0.99 ± 0.26	0.84 ± 0.18
VE-10333, 10334	Nov, 2001	K-40	6.10 ± 0.72	5.83 ± 0.72	5.97 ± 0.51
MI-10588, 10589	Nov, 2001	K-40	1,428.40 ± 114.70	1,445.50 ± 129.40	1,436.95 ± 86.46
DW-10688, 10689	Nov, 2001	Gr. Beta	3.49 ± 0.91	2.36 ± 0.76	2.93 ± 0.60
WW-10905, 10906	Dec, 2001	H-3	233.90 ± 90.60	226.30 ± 90.20	230.10 ± 63.92
SS-10953, 10954	Dec, 2001	Ac-228	1.10 ± 0.25	0.91 ± 0.16	1.00 ± 0.15
SS-10953, 10954	Dec, 2001	Bi-214	0.69 ± 0.08	0.75 ± 0.08	0.72 ± 0.06
SS-10953, 10954	Dec, 2001	Co-58	0.21 ± 0.05	0.18 ± 0.04	0.19 ± 0.03
SS-10953, 10954	Dec, 2001	Co-60	0.93 ± 0.06	0.94 ± 0.06	0.93 ± 0.04
SS-10953, 10954	Dec, 2001	Cs-137	0.13 ± 0.03	0.16 ± 0.03	0.14 ± 0.02

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
SS-10953, 10954	Dec, 2001	K-40	9.91 ± 0.83	8.36 ± 0.80	9.13 ± 0.57
SS-10953, 10954	Dec, 2001	Pb-212	0.94 ± 0.05	0.91 ± 0.06	0.92 ± 0.04
SS-10953, 10954	Dec, 2001	Pb-214	0.83 ± 0.08	0.82 ± 0.07	0.83 ± 0.05
SS-10953, 10954	Dec, 2001	Ra-226	1.76 ± 0.37	1.67 ± 0.37	1.72 ± 0.26
SS-10953, 10954	Dec, 2001	Tl-208	0.34 ± 0.05	0.31 ± 0.05	0.32 ± 0.04
MI-11033, 11034	Dec, 2001	K-40	1,339.80 ± 128.70	1,435.80 ± 117.30	1,387.80 ± 87.07
MI-11033, 11034	Dec, 2001	Sr-90	1.31 ± 0.41	1.38 ± 0.37	1.35 ± 0.28
AP-11888, 11889	Dec, 2001	Be-7	0.06 ± 0.02	0.06 ± 0.02	0.06 ± 0.01

Duplicate analyses are performed on every twentieth sample received in-house. Results are not listed for those analyses with activities that measure below the LLD.

^a Results are reported in units of pCi/L, except for elemental potassium (K) in milk (mg/L), air filters (pCi/Filter), food products and vegetation (pCi/g), soil and sediments (pCi/kg).

Table A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		
				Laboratory result ^c	MAPEP Result ^d 1s, N=1	Control Limits
STSO-923	SOIL	Jan, 2001	Am-241			0.00 - 2.60
Included as false positive. Result of analyses; < 0.8 Bq/L.						
STSO-923	SOIL	Jan, 2001	Co-57	100.20 ± 3.50	103.00 ± 10.30	72.10 - 133.90
STSO-923	SOIL	Jan, 2001	Co-60	1,285.10 ± 5.30	1,270.00 ± 127.00	889.00 - 1,651.00
STSO-923	SOIL	Jan, 2001	Cs-134	81.10 ± 1.80	91.10 ± 9.11	63.77 - 118.43
STSO-923	SOIL	Jan, 2001	Cs-137	1,210.60 ± 6.60	1,240.00 ± 124.00	868.00 - 1,612.00
STSO-923	SOIL	Jan, 2001	K-40	732.60 ± 21.20	652.00 ± 65.20	456.40 - 847.60
STSO-923	SOIL	Jan, 2001	Mn-54	212.60 ± 6.70	203.00 ± 20.30	142.10 - 263.90
STSO-923	SOIL	Jan, 2001	Pu-238	110.70 ± 7.20	115.00 ± 11.50	80.50 - 149.50
STSO-923	SOIL	Jan, 2001	Pu-239/40	79.60 ± 5.90	83.40 ± 8.34	58.38 - 108.42
STSO-923	SOIL	Jan, 2001	Sr-90	159.80 ± 9.50	209.00 ± 20.90	146.30 - 271.70
STSO-923	SOIL	Jan, 2001	U-233/4	45.00 ± 3.90	60.00 ± 6.00	42.00 - 78.00
STSO-923	SOIL	Jan, 2001	U-238	165.60 ± 7.40	191.00 ± 19.10	133.70 - 248.30
STSO-923	SOIL	Jan, 2001	Zn-65	428.50 ± 10.90	382.00 ± 38.20	267.40 - 496.60

^a Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the Department of Energy's Mixed Analyte Performance Evaluation Program, Idaho Operations office, Idaho Falls, Idaho.

^b All results are in Bq/kg or Bq/L as requested by the Department of Energy.

^c MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP.

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		Control Limits ^d
				Laboratory result	EML Result ^c	
STSO-904	SOIL	Mar, 2001	Ac-228	45.600 ± 4.000	42.700	0.80 - 1.50
STSO-904	SOIL	Mar, 2001	Am-241	14.400 ± 0.500	14.800	0.63 - 2.64
STSO-904	SOIL	Mar, 2001	Bi-212	53.200 ± 3.100	42.000	0.45 - 1.23
Possible effect of shield background.						
STSO-904	SOIL	Mar, 2001	Bi-214	42.100 ± 7.700	32.600	0.78 - 1.50
STSO-904	SOIL	Mar, 2001	Cs-137	1,772.600 ± 79.800	1,740.000	0.80 - 1.29
STSO-904	SOIL	Mar, 2001	K-40	583.800 ± 52.600	468.000	0.80 - 1.37
STSO-904	SOIL	Mar, 2001	Pb-212	46.600 ± 8.500	41.500	0.74 - 1.36
STSO-904	SOIL	Mar, 2001	Pb-214	45.300 ± 8.600	34.300	0.76 - 1.53
STSO-904	SOIL	Mar, 2001	Pu-239/40	26.000 ± 0.800	25.600	0.71 - 1.33
STSO-904	SOIL	Mar, 2001	Sr-90	55.600 ± 2.200	69.000	0.61 - 3.91
STW-905	WATER	Mar, 2001	Am-241	2.150 ± 0.140	1.670	0.76 - 1.48
STW-905	WATER	Mar, 2001	Co-60	97.000 ± 0.800	98.200	0.80 - 1.20
STW-905	WATER	Mar, 2001	Cs-137	70.100 ± 4.000	73.000	0.80 - 1.20
STW-905	WATER	Mar, 2001	H-3	76.500 ± 5.500	79.300	0.74 - 2.29
STW-905	WATER	Mar, 2001	Pu-238	1.690 ± 0.070	1.580	0.74 - 1.22
STW-905	WATER	Mar, 2001	Pu-239/40	1.690 ± 0.070	1.640	0.75 - 1.26
STW-905	WATER	Mar, 2001	Sr-90	3.850 ± 0.130	4.400	0.64 - 1.50
STW-905	WATER	Mar, 2001	U-233/4	0.900 ± 0.050	1.040	0.80 - 1.40
STW-905	WATER	Mar, 2001	U-238	0.880 ± 0.050	1.040	0.80 - 1.29
STW-906	WATER	Mar, 2001	Gr. Alpha	1,724.600 ± 141.700	1,900.000	0.58 - 1.26
STW-906	WATER	Mar, 2001	Gr. Beta	1,246.400 ± 31.100	1,297.000	0.56 - 1.50
STAP-907	AIR FILTER	Mar, 2001	Am-241	0.470 ± 0.040	0.486	0.69 - 2.40
STAP-907	AIR FILTER	Mar, 2001	Co-60	20.110 ± 0.160	19.440	0.79 - 1.30
STAP-907	AIR FILTER	Mar, 2001	Cs-134	2.710 ± 0.150	2.830	0.74 - 1.21
STAP-907	AIR FILTER	Mar, 2001	Cs-137	9.860 ± 0.230	8.760	0.78 - 1.35
STAP-907	AIR FILTER	Mar, 2001	Mn-54	7.250 ± 0.220	6.520	0.80 - 1.36
STAP-907	AIR FILTER	Mar, 2001	Pu-238	0.230 ± 0.030	0.215	0.66 - 1.35
STAP-907	AIR FILTER	Mar, 2001	Pu-239/40	0.120 ± 0.020	0.136	0.69 - 1.29

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		Control Limits ^d
				Laboratory result	EML Result ^c	
STAP-907	AIR FILTER	Mar, 2001	Sr-90	7.410 ± 0.150	7.100	0.55 - 2.05
STAP-907	AIR FILTER	Mar, 2001	U-233/4	0.050 ± 0.010	0.046	0.80 - 1.92
STAP-907	AIR FILTER	Mar, 2001	U-238	0.050 ± 0.010	0.046	0.80 - 1.59
STAP-908	AIR FILTER	Mar, 2001	Gr. Alpha	2.660 ± 0.020	3.970	0.57 - 1.47
STAP-908	AIR FILTER	Mar, 2001	Gr. Beta	2.300 ± 0.020	2.580	0.76 - 1.52
STVE-909	VEGETATION	Mar, 2001	Am-241	6.100 ± 0.200	6.170	0.72 - 2.34
STVE-909	VEGETATION	Mar, 2001	Cm-244	3.500 ± 0.500	3.690	0.61 - 1.61
STVE-909	VEGETATION	Mar, 2001	Co-60	28.500 ± 2.100	30.400	0.75 - 1.51
STVE-909	VEGETATION	Mar, 2001	Cs-137	795.500 ± 76.400	842.000	0.80 - 1.37
STVE-909	VEGETATION	Mar, 2001	K-40	592.600 ± 42.500	603.000	0.78 - 1.43
STVE-909	VEGETATION	Mar, 2001	Pu-239/40	8.500 ± 0.600	9.580	0.67 - 1.49
STVE-909	VEGETATION	Mar, 2001	Sr-90	1,239.600 ± 130.000	1,330.000	0.52 - 1.23
STW-925	WATER	Sep, 2001	Am-241	0.700 ± 0.100	0.760	0.76 - 1.48
STW-925	WATER	Sep, 2001	Co-60	206.700 ± 4.700	209.000	0.80 - 1.20
STW-925	WATER	Sep, 2001	Cs-137	46.600 ± 0.800	45.133	0.80 - 1.24
STW-925	WATER	Sep, 2001	H-3	254.100 ± 3.600	207.000	0.74 - 2.29
STW-925	WATER	Sep, 2001	Ni-63	50.900 ± 3.000	45.250	0.70 - 1.30
STW-925	WATER	Sep, 2001	Pu-238	1.100 ± 0.100	1.088	0.74 - 1.22
STW-925	WATER	Sep, 2001	Pu-239/40	1.600 ± 0.100	1.628	0.75 - 1.26
STW-925	WATER	Sep, 2001	Sr-90	4.100 ± 0.300	3.729	0.64 - 1.50
STW-925	WATER	Sep, 2001	Uranium	2.200 ± 0.200	2.372	0.73 - 1.37
STW-926	WATER	Sep, 2001	Gr. Alpha	1,220.000 ± 32.000	1,150.000	0.58 - 1.26
STW-926	WATER	Sep, 2001	Gr. Beta	8,461.000 ± 206.000	7,970.000	0.56 - 1.50
STSO-927	SOIL	Sep, 2001	Ac-228	68.100 ± 1.400	59.570	0.80 - 1.50
STSO-927	SOIL	Sep, 2001	Am-241	5.200 ± 1.300	4.432	0.63 - 2.64
STSO-927	SOIL	Sep, 2001	Bi-212	65.100 ± 1.600	62.067	0.45 - 1.23
STSO-927	SOIL	Sep, 2001	Bi-214	47.300 ± 4.700	36.900	0.78 - 1.50
STSO-927	SOIL	Sep, 2001	Cs-137	659.200 ± 10.800	612.330	0.80 - 1.29
STSO-927	SOIL	Sep, 2001	K-40	737.700 ± 16.600	623.330	0.80 - 1.37

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		Control Limits ^d
				Laboratory result	EML Result ^c	
STSO-927	SOIL	Sep, 2001	Pb-212	64.700 ± 3.800	58.330	0.74 - 1.36
STSO-927	SOIL	Sep, 2001	Pb-214	53.700 ± 7.700	39.670	0.76 - 1.53
STSO-927	SOIL	Sep, 2001	Pu-239/40	9.300 ± 2.900	8.948	0.71 - 1.33
STSO-927	SOIL	Sep, 2001	Sr-90	27.400 ± 6.300	30.596	0.61 - 3.91
STSO-927	SOIL	Sep, 2001	Uranium	155.600 ± 7.800	194.230	0.62 - 1.35
STVE-928	VEGETATION	Sep, 2001	Am-241	7.000 ± 0.300	6.915	0.72 - 2.34
STVE-928	VEGETATION	Sep, 2001	Cm-244	4.300 ± 0.800	4.308	0.61 - 1.61
STVE-928	VEGETATION	Sep, 2001	Co-60	40.200 ± 0.900	35.300	0.75 - 1.51
STVE-928	VEGETATION	Sep, 2001	Cs-137	1,184.000 ± 2.800	1,030.000	0.80 - 1.37
STVE-928	VEGETATION	Sep, 2001	K-40	1,023.000 ± 44.100	898.670	0.78 - 1.43
STVE-928	VEGETATION	Sep, 2001	Pu-239/40	8.900 ± 1.400	11.022	0.67 - 1.49
STVE-928	VEGETATION	Sep, 2001	Sr-90	1,364.000 ± 18.400	1,612.800	0.52 - 1.23
STAP-929	AIR FILTER	Sep, 2001	Am-241	0.090 ± 30.000	0.088	0.69 - 2.40
STAP-929	AIR FILTER	Sep, 2001	Co-60	16.900 ± 0.300	17.500	0.79 - 1.30
STAP-929	AIR FILTER	Sep, 2001	Cs-134	11.800 ± 0.200	12.950	0.74 - 1.21
STAP-929	AIR FILTER	Sep, 2001	Cs-137	18.300 ± 0.300	17.100	0.78 - 1.35
STAP-929	AIR FILTER	Sep, 2001	Mn-54	85.400 ± 1.300	81.150	0.80 - 1.36
STAP-929	AIR FILTER	Sep, 2001	Pu-238	0.051 ± 0.010	0.071	0.66 - 1.35
STAP-929	AIR FILTER	Sep, 2001	Pu-239/40	0.220 ± 0.020	0.229	0.69 - 1.29
STAP-929	AIR FILTER	Sep, 2001	Sr-90	3.110 ± 0.060	3.481	0.55 - 2.05
STAP-929	AIR FILTER	Sep, 2001	Uranium	0.240 ± 0.050	0.222	0.80 - 2.54
STAP-930	AIR FILTER	Sep, 2001	Gr. Alpha	6.300 ± 0.100	5.362	0.57 - 1.47
STAP-930	AIR FILTER	Sep, 2001	Gr. Beta	13.800 ± 0.100	12.770	0.76 - 1.52

^a The Environmental Measurements Laboratory provides the following nuclear species : Air Filters, Soil, Vegetation and Water.

^b Results are reported in Bq/L with the following exceptions: Air Filter results are reported in Bq/Filter, Soil results are reported in Bq/Kg, Vegetation results are reported in Bq/Kg.

^c The EML result listed is the mean of replicate determinations for each nuclide ± the standard error of the mean.

^d Control limits are reported by EML as the ratio of Reported Value / EML value.

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

1.0. All activities, except gross alpha and gross beta, are decay corrected to collection time or the end of the collection period.

2.0. Single Measurements

Each single measurement is reported as follows: $x \pm s$

where: x = value of the measurement;

s = $2s$ counting uncertainty (corresponding to the 95% confidence level).

In cases where the activity is less than the lower limit of detection L ; it is reported as: $<L$, where L = the lower limit of detection based on $4.66s$ uncertainty for a background sample.

3.0. Duplicate analyses

3.1 Individual results: For two analysis results; $x_1 \pm s_1$ and $x_2 \pm s_2$

Reported result: $x \pm s$; where $x = (1/2)(x_1 + x_2)$ and $s = (1/2) \sqrt{s_1^2 + s_2^2}$

3.2. Individual results: $<L_1, <L_2$ Reported result: $<L$, where L = lower of L_1 and L_2

3.3. Individual results: $x \pm s, <L$ Reported result: $x \pm s$ if $x \geq L$; $<L$ otherwise.

4.0. Computation of Averages and Standard Deviations

4.1 Averages and standard deviations listed in the tables are computed from all of the individual measurements over the period averaged; for example, an annual standard deviation would not be the average of quarterly standard deviations. The average \bar{x} and standard deviation s of a set of n numbers $x_1, x_2 \dots x_n$ are defined as follows:

$$\bar{x} = \frac{1}{n} \sum x \qquad s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

4.2 Values below the highest lower limit of detection are not included in the average.

4.3 If all values in the averaging group are less than the highest LLD, the highest LLD is reported.

4.4 If all but one of the values are less than the highest LLD, the single value x and associated two sigma error is reported.

4.5 In rounding off, the following rules are followed:

4.5.1. If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.443 is rounded off to 11.44.

4.5.2. If the figure following those to be retained is equal to or greater than 5, the figure is dropped and the last retained figure is raised by 1. As an example, 11.445 is rounded off to 11.45.

ENCLOSURE F

**NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255**

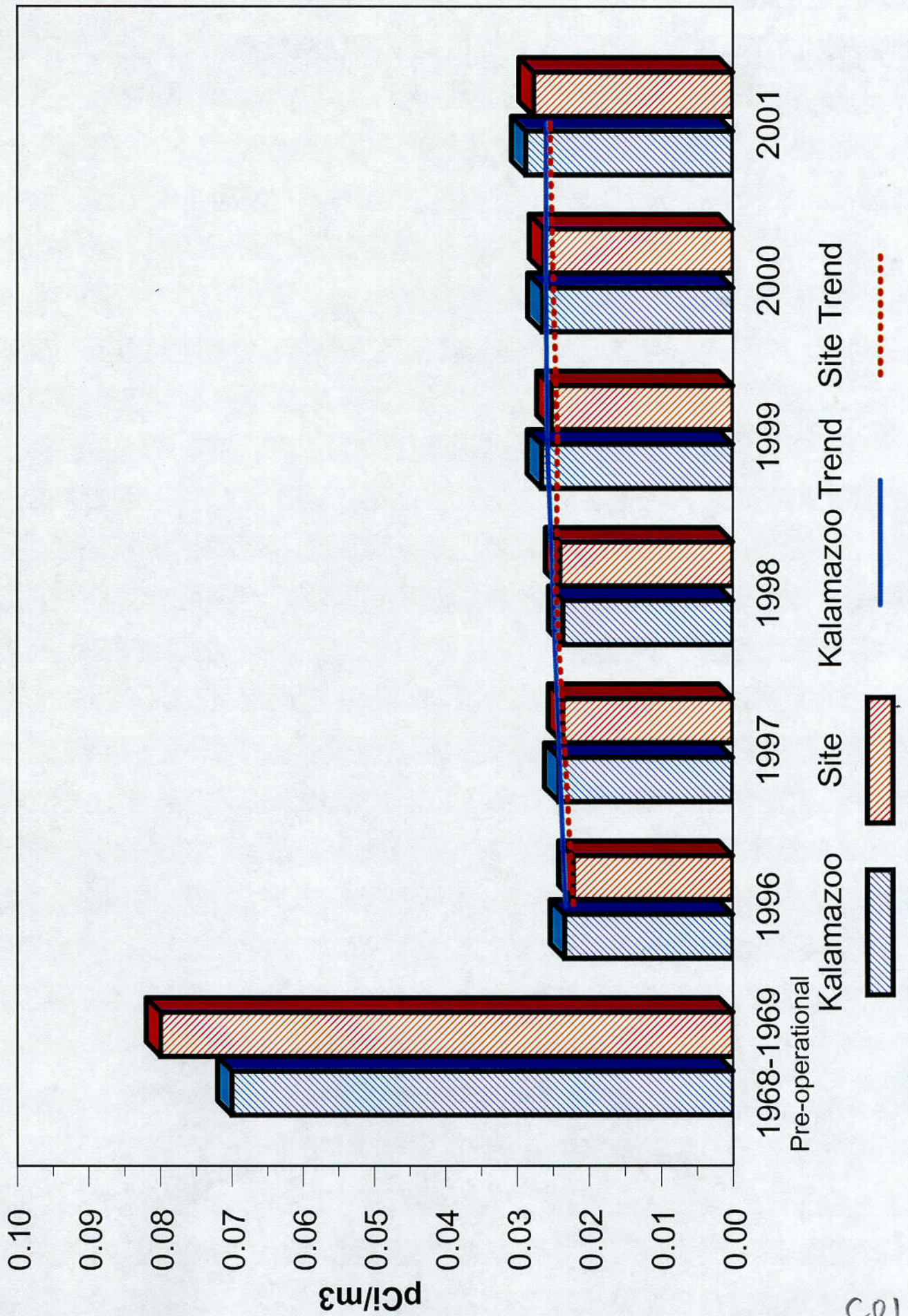
**PALISADES NUCLEAR PLANT
2001 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
DATA GRAPHS**

25 pages follow

Palisades Air Particulate

Gross Beta

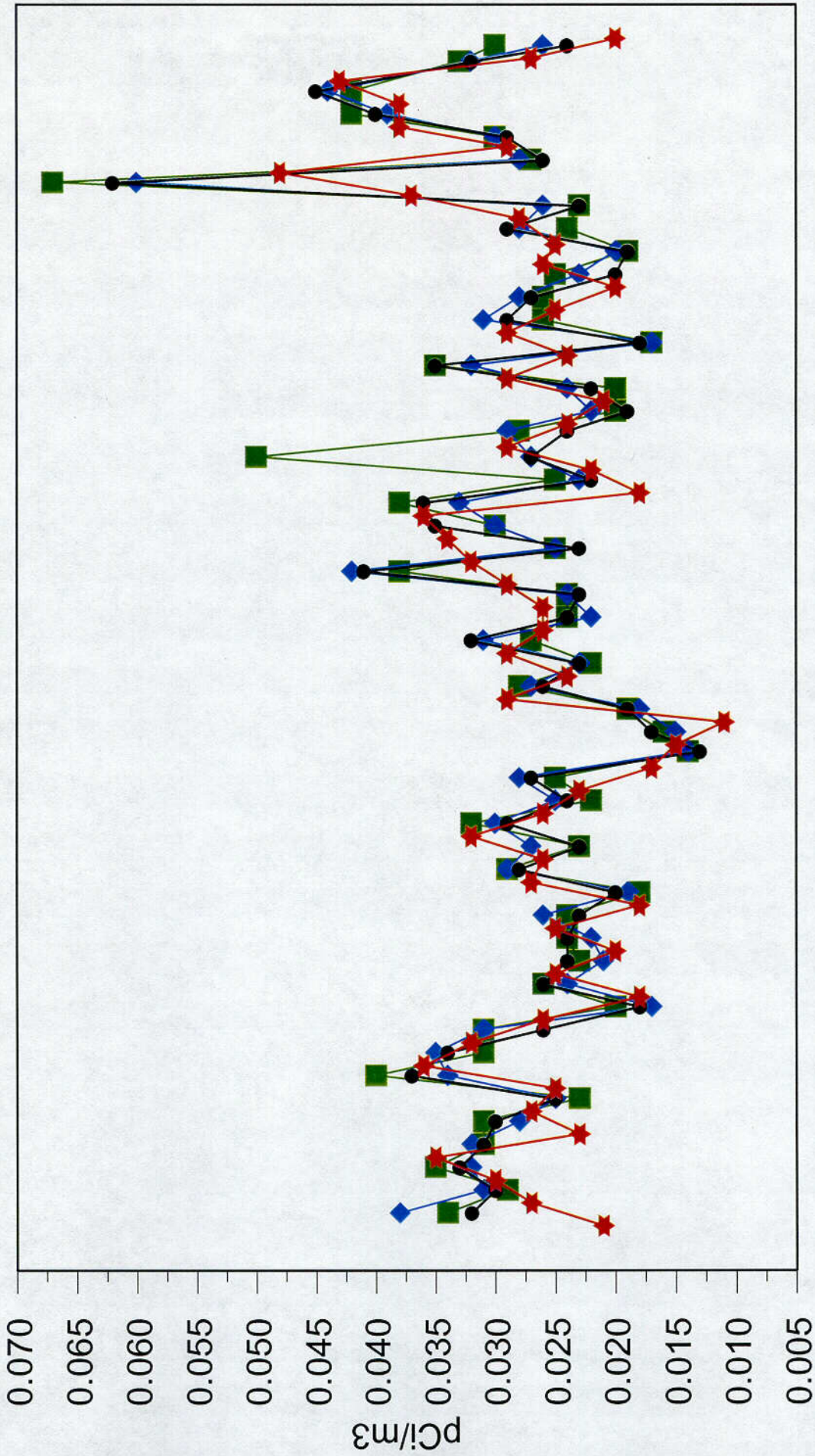
Pre-Operational vs. Operational



2001 PALISADES AIR PARTICULATE

Weekly Gross Beta

Grand Rapids-Control vs Tower Hill, H Soderberg, J Sarno



| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |

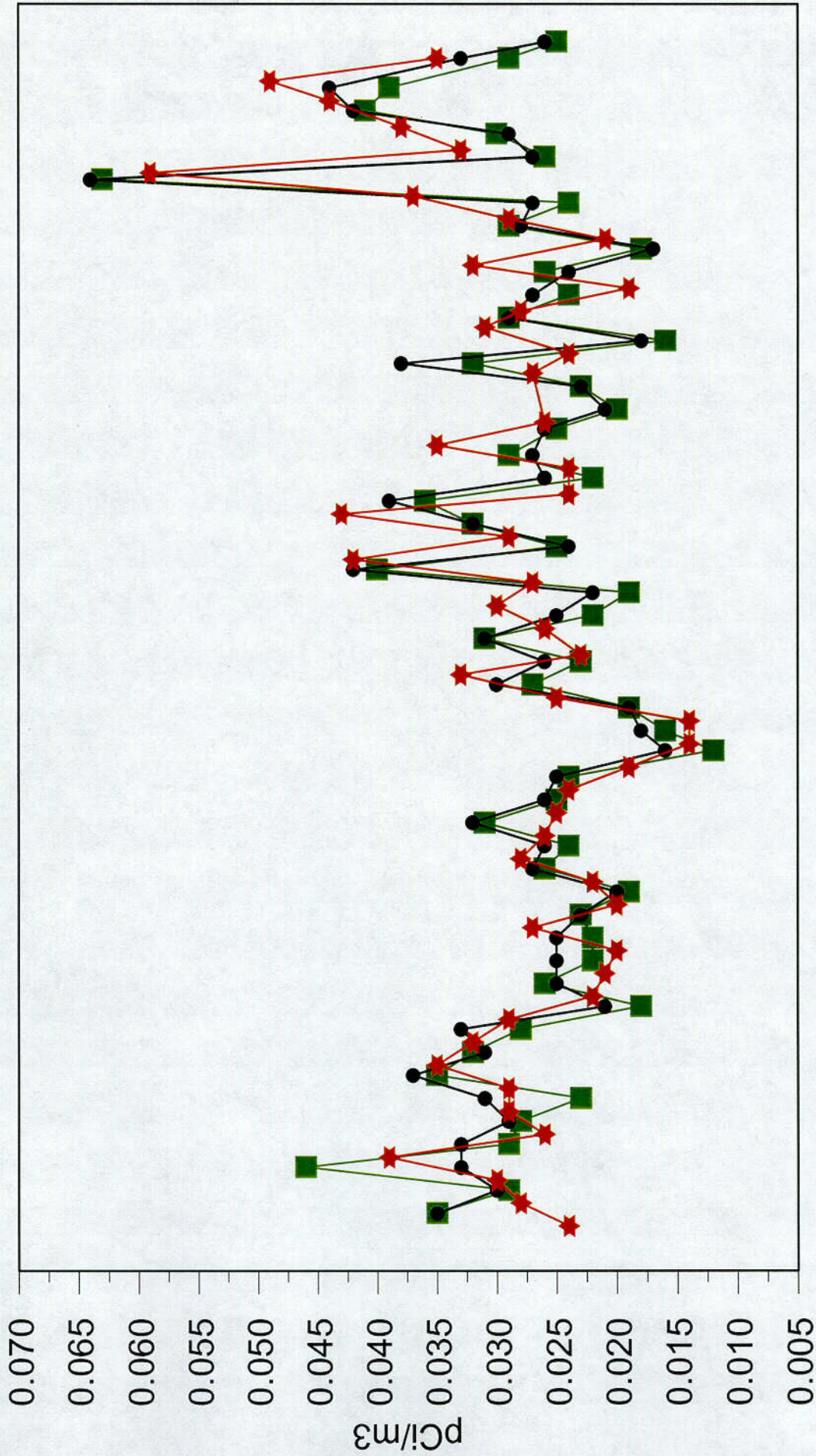
Tower Hill 5 SSE H. Soderberg 5 SE J Sarno 3.5 ESE G.R.-C 55 NNE



2001 PALISADES AIR PARTICULATE

Weekly Gross Beta

Kalamazoo-Control vs Township Park, State Park



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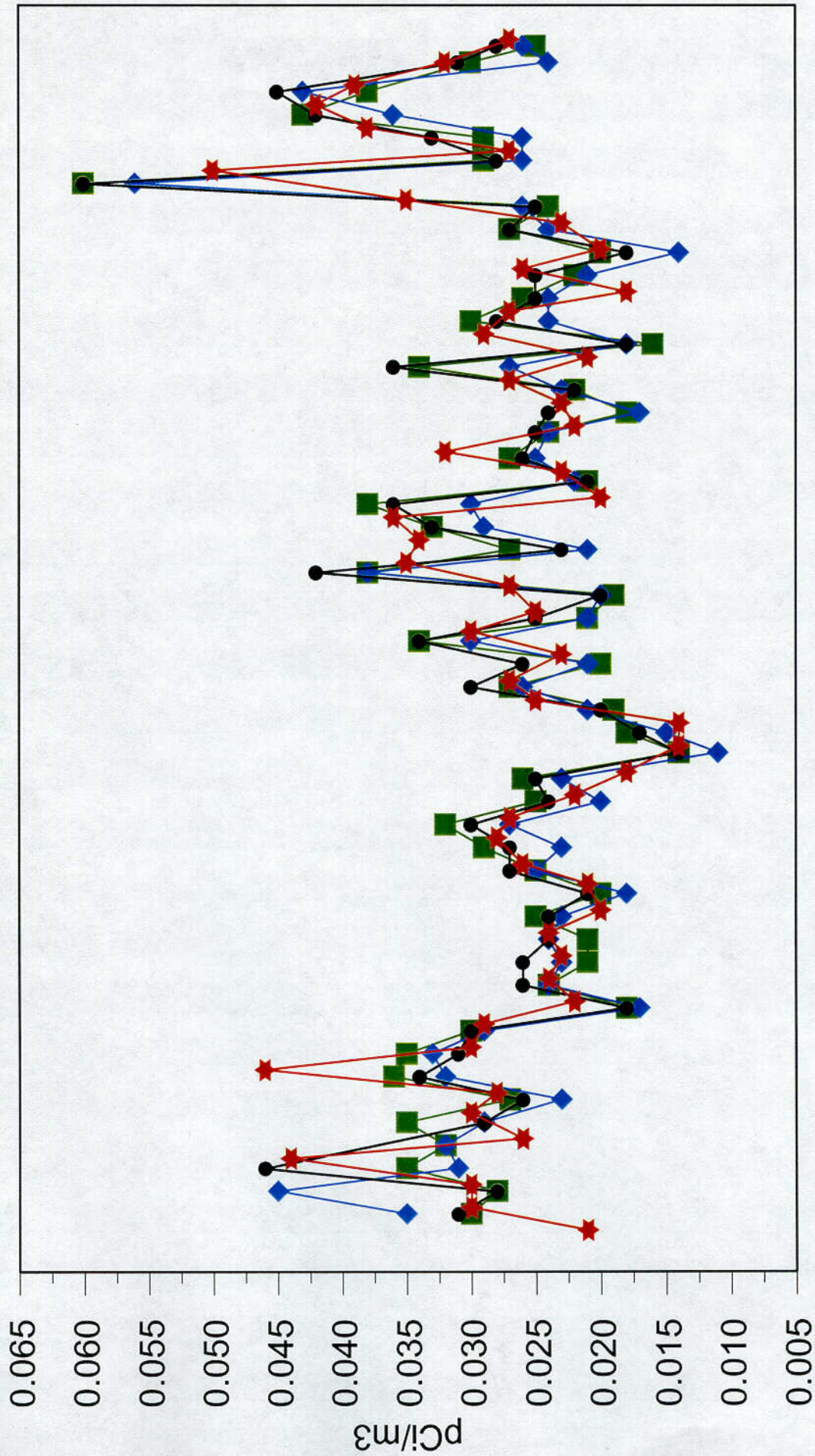
State Park 1 N Township Park 1.5 S Kalamazoo-C 35 E

■ ● ★

2001 PALISADES AIR PARTICULATE

Weekly Gross Beta

Dowagiac-Control vs Sherman Dairy, R Bus, P Rood



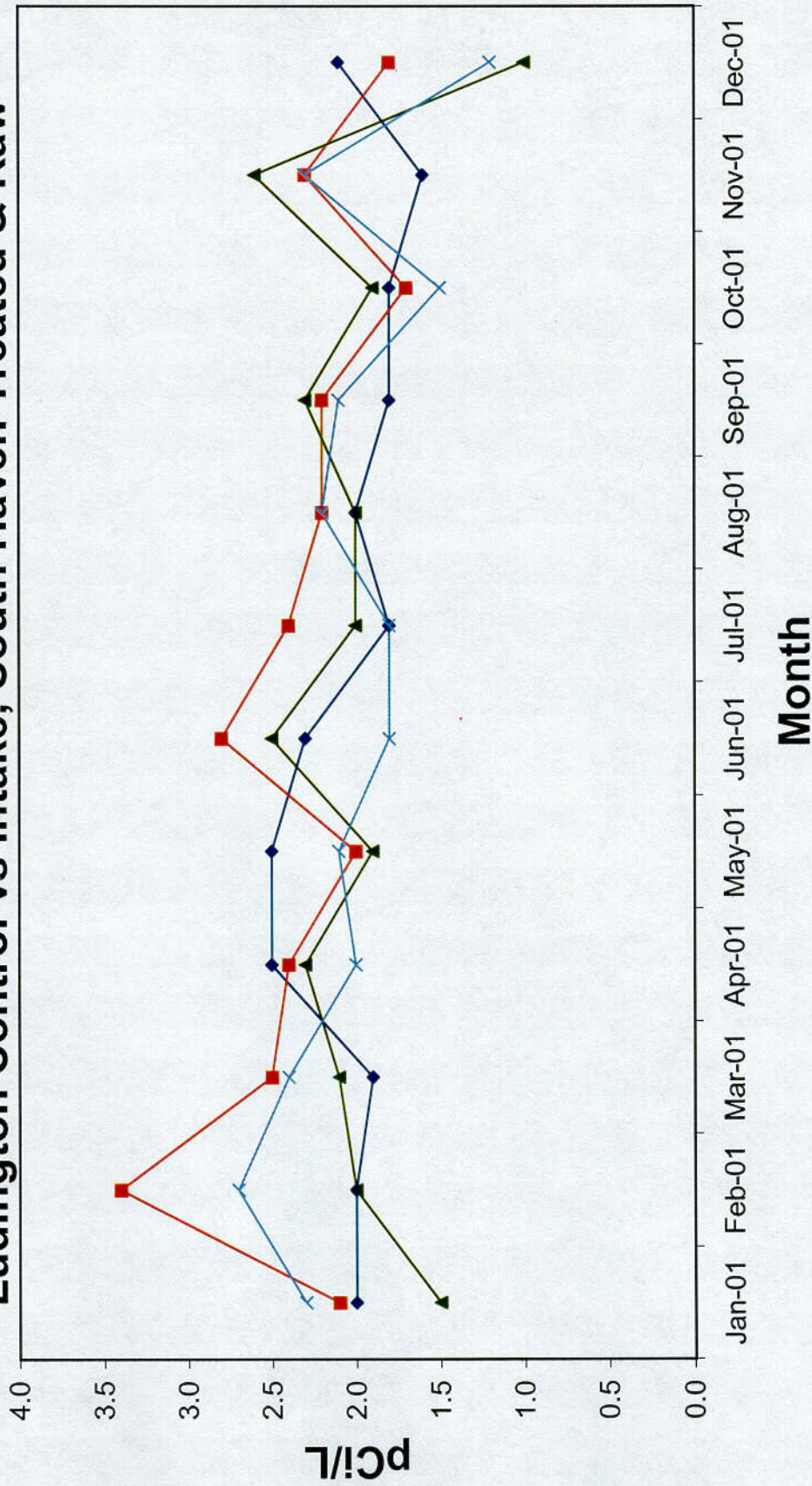
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |

P Rood 3 E R Bus 4.75 NE Sh Dairy 7.5 NNE Dowagiac-C 39 SSE

2001 Palisades Lake Water Samples

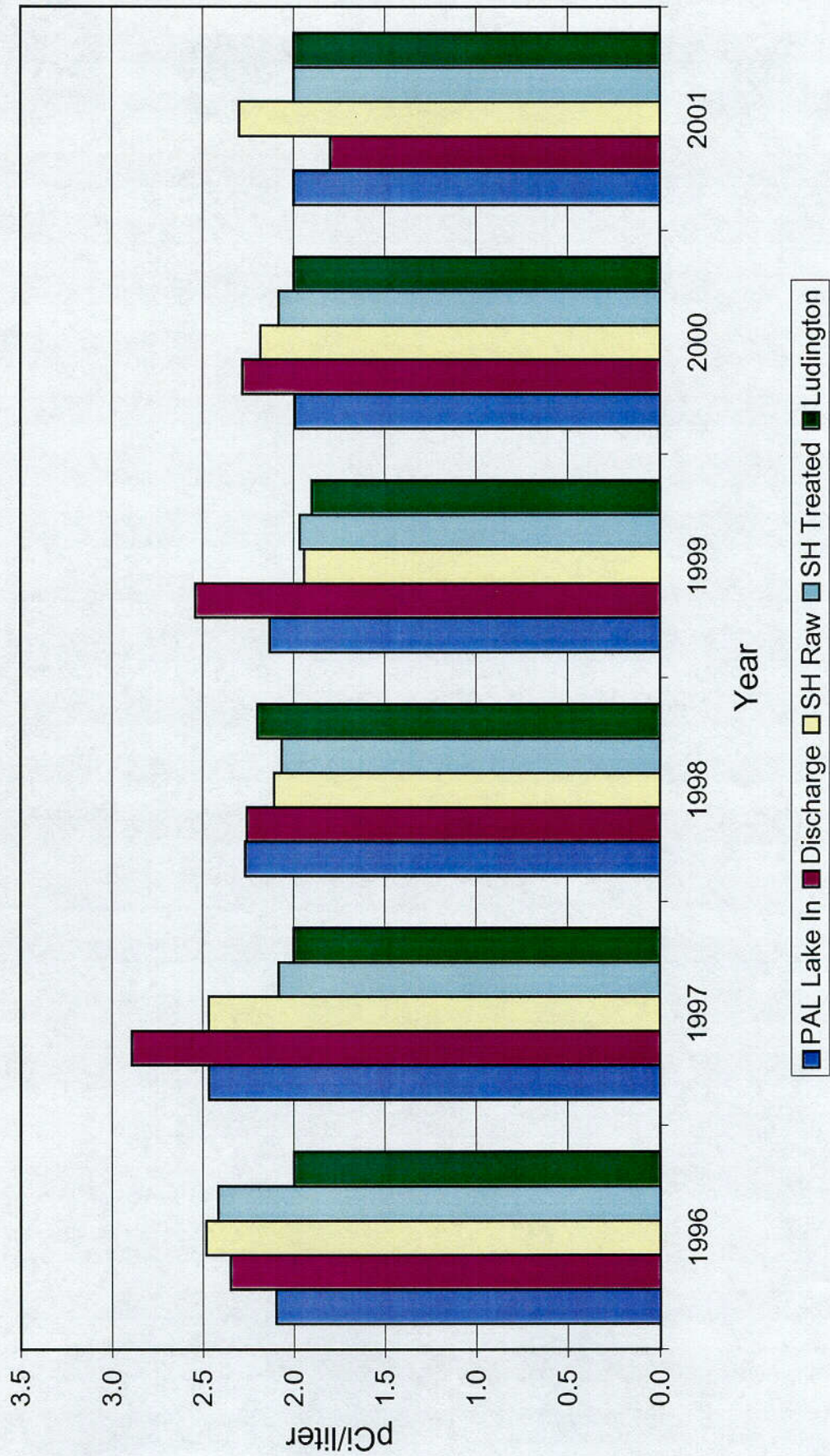
Gross Beta pCi/L

Ludington Control vs Intake, South Haven Treated & Raw



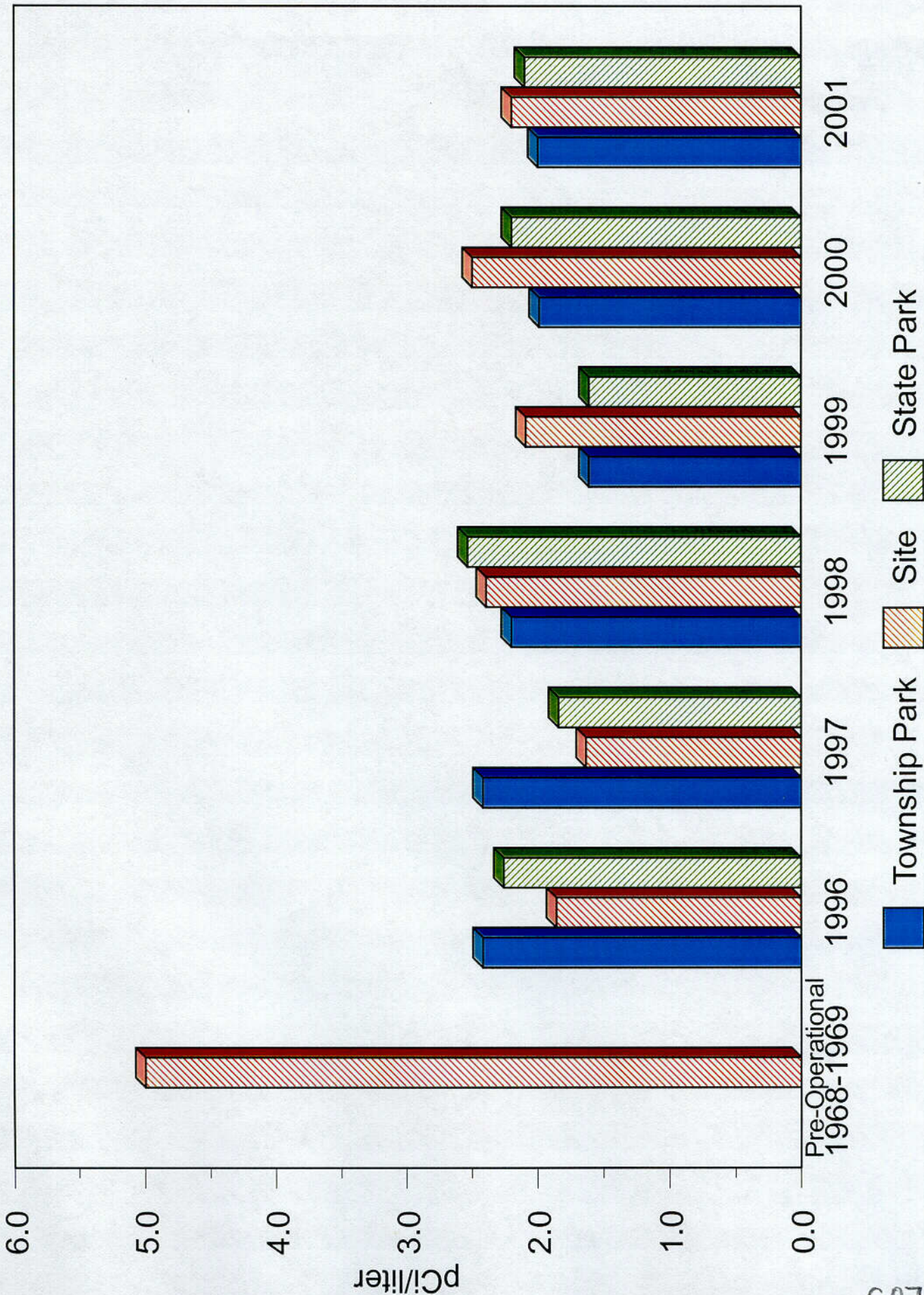
◆ Palisades Lake In ■ South Haven Raw ▲ Ludington × South Haven Treated

Lake Water Gross Beta 1996 to 2001



Palisades Well Water Gross Beta

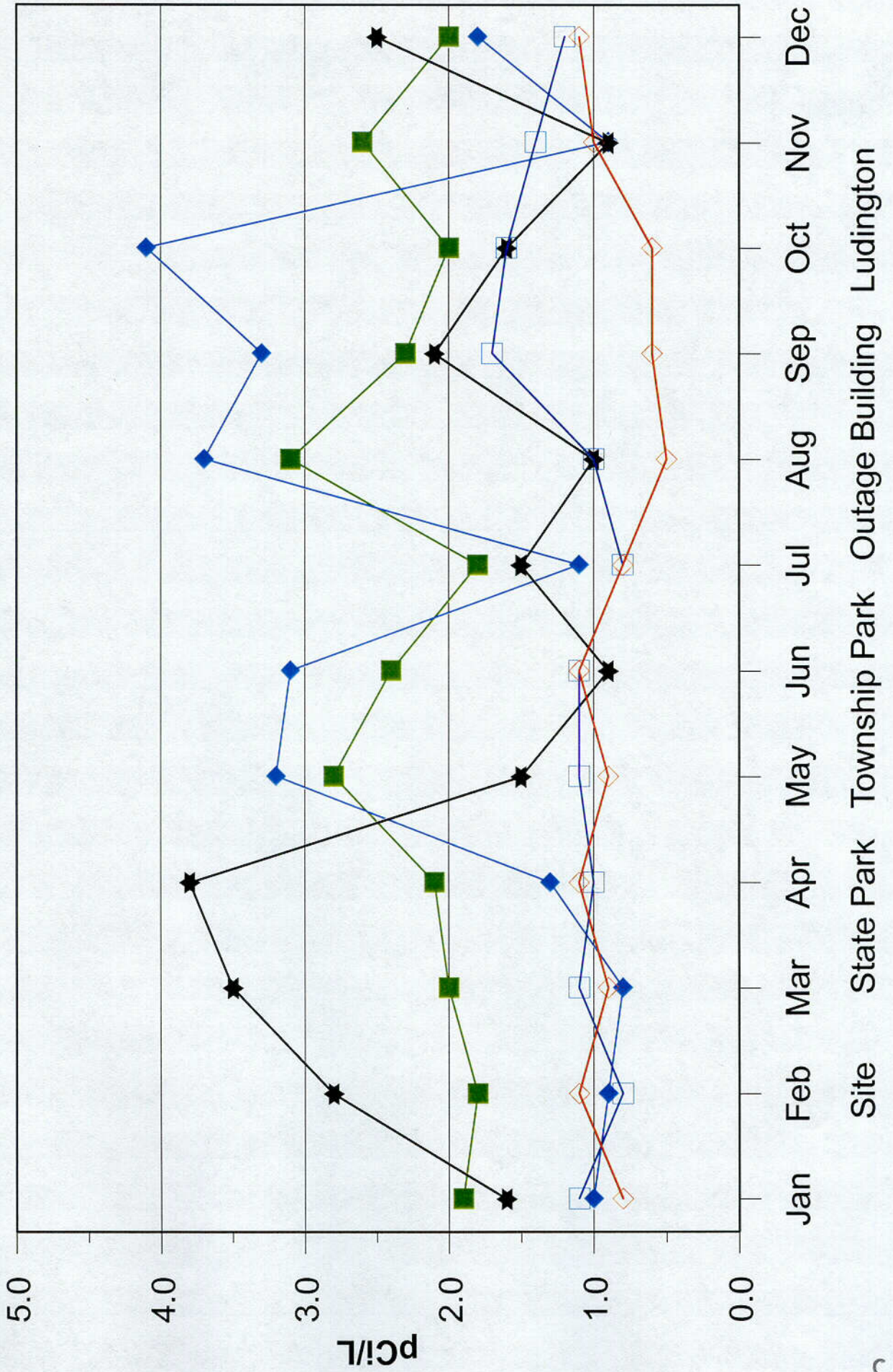
Pre-Operational vs. Operational



2001 Palisades Well Water Samples

Gross Beta pCi/L

Ludington Control vs Site, Outage Building, State Park and Township Park

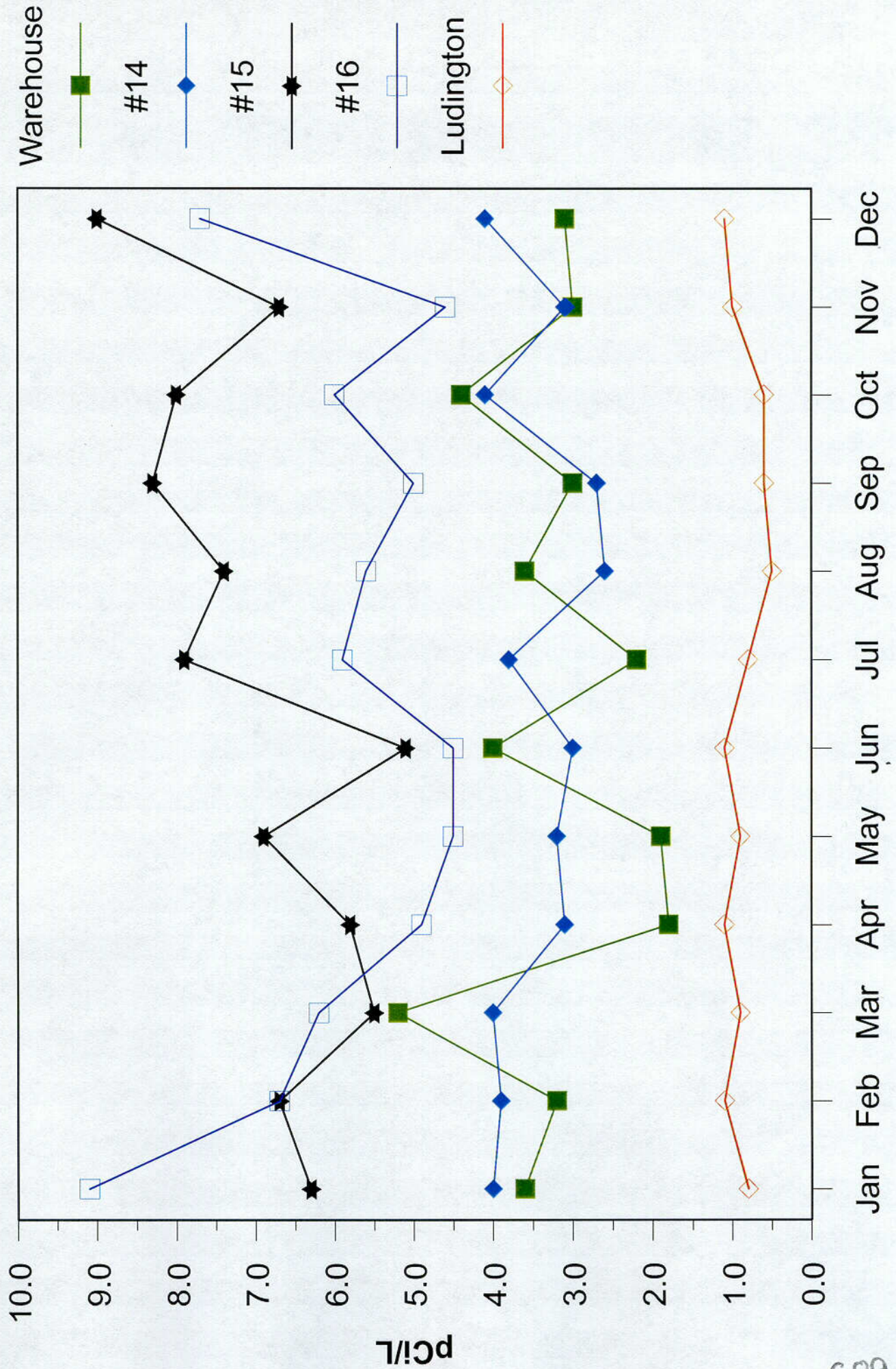


COB

2001 Palisades Well Water Samples

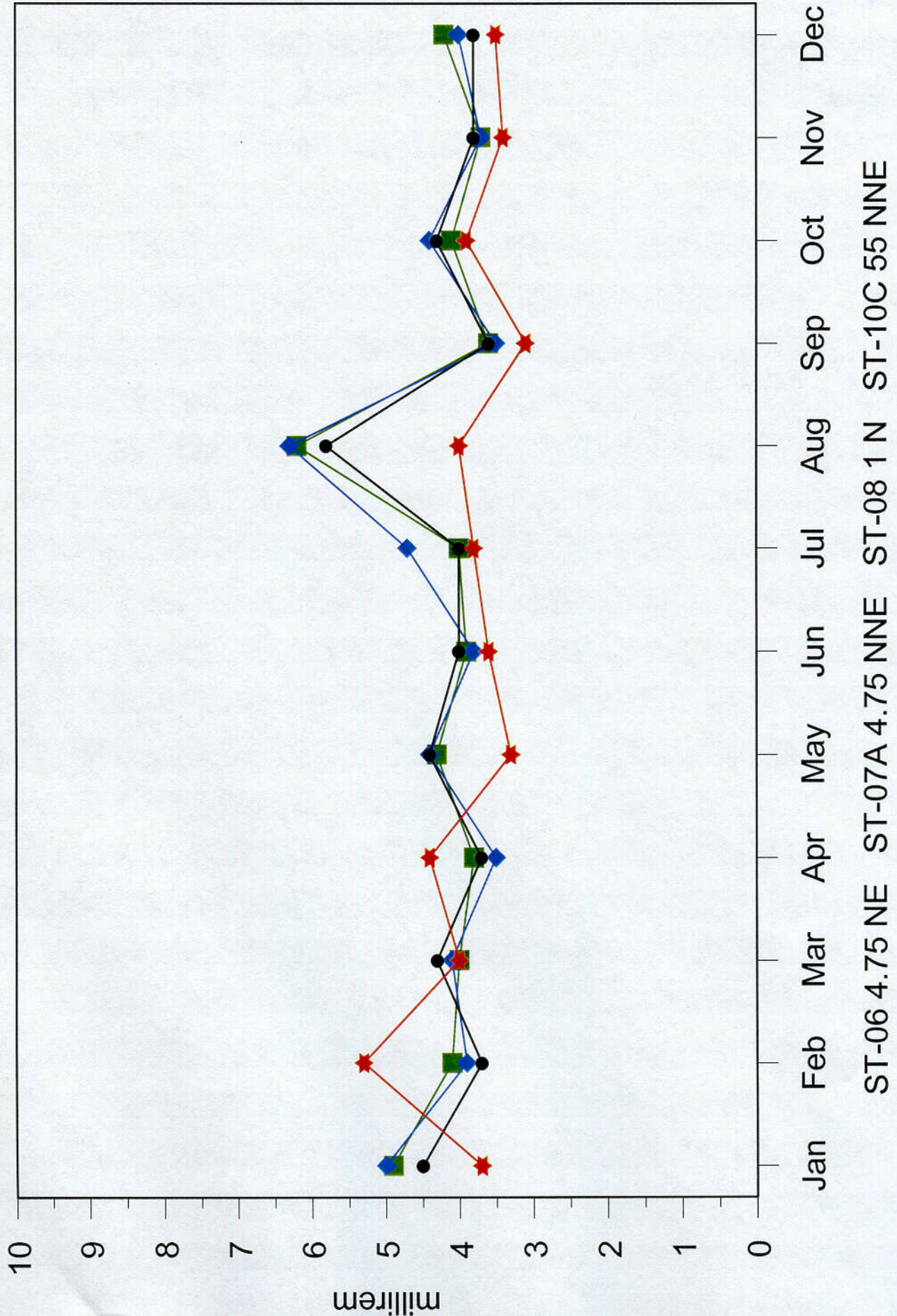
Gross Beta pCi/L

Ludington Control vs Warehouse, Well #14, Well #15 and Well #16



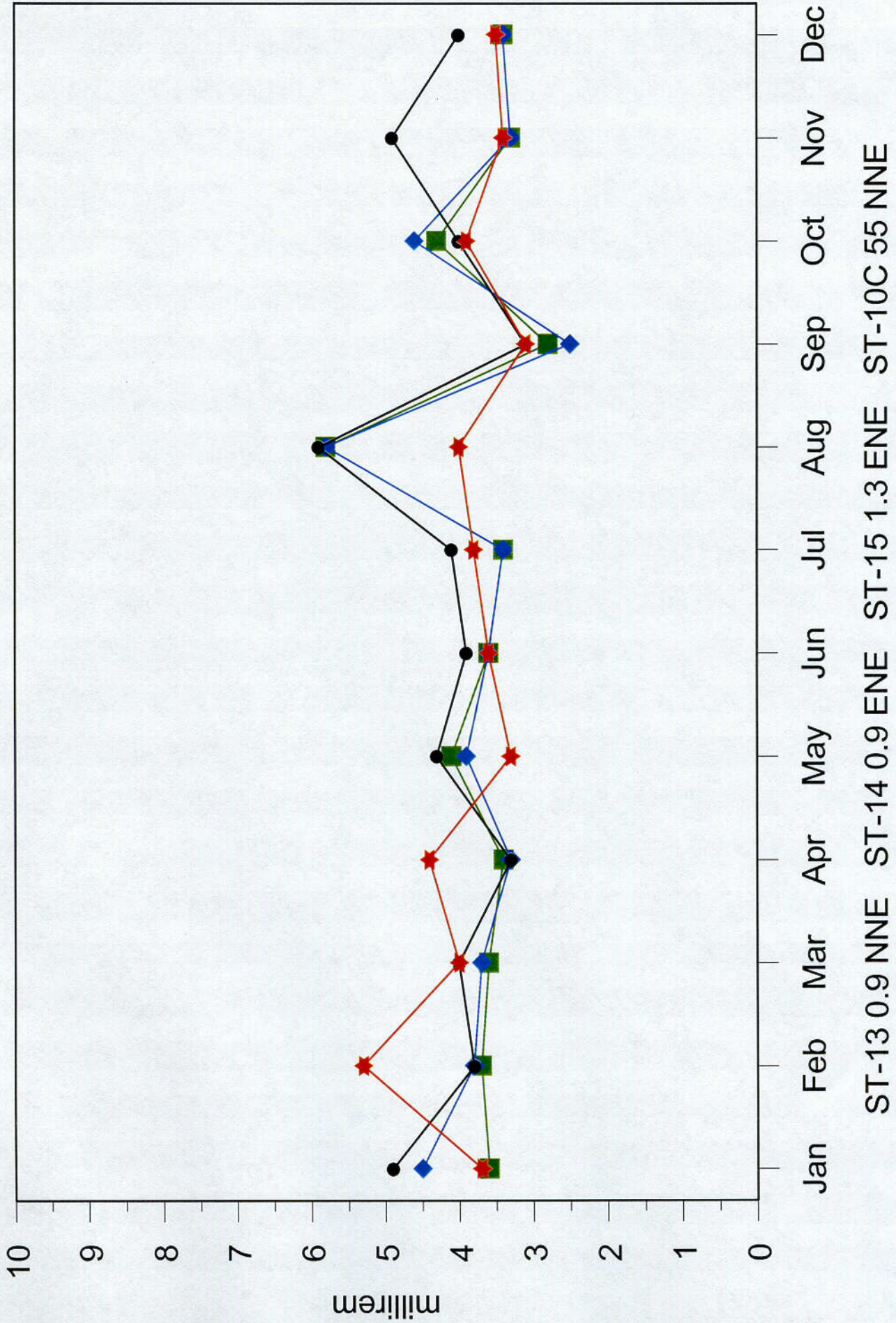
2001 Palisades TLDs

ST10 Control vs ST06, ST07A, ST08



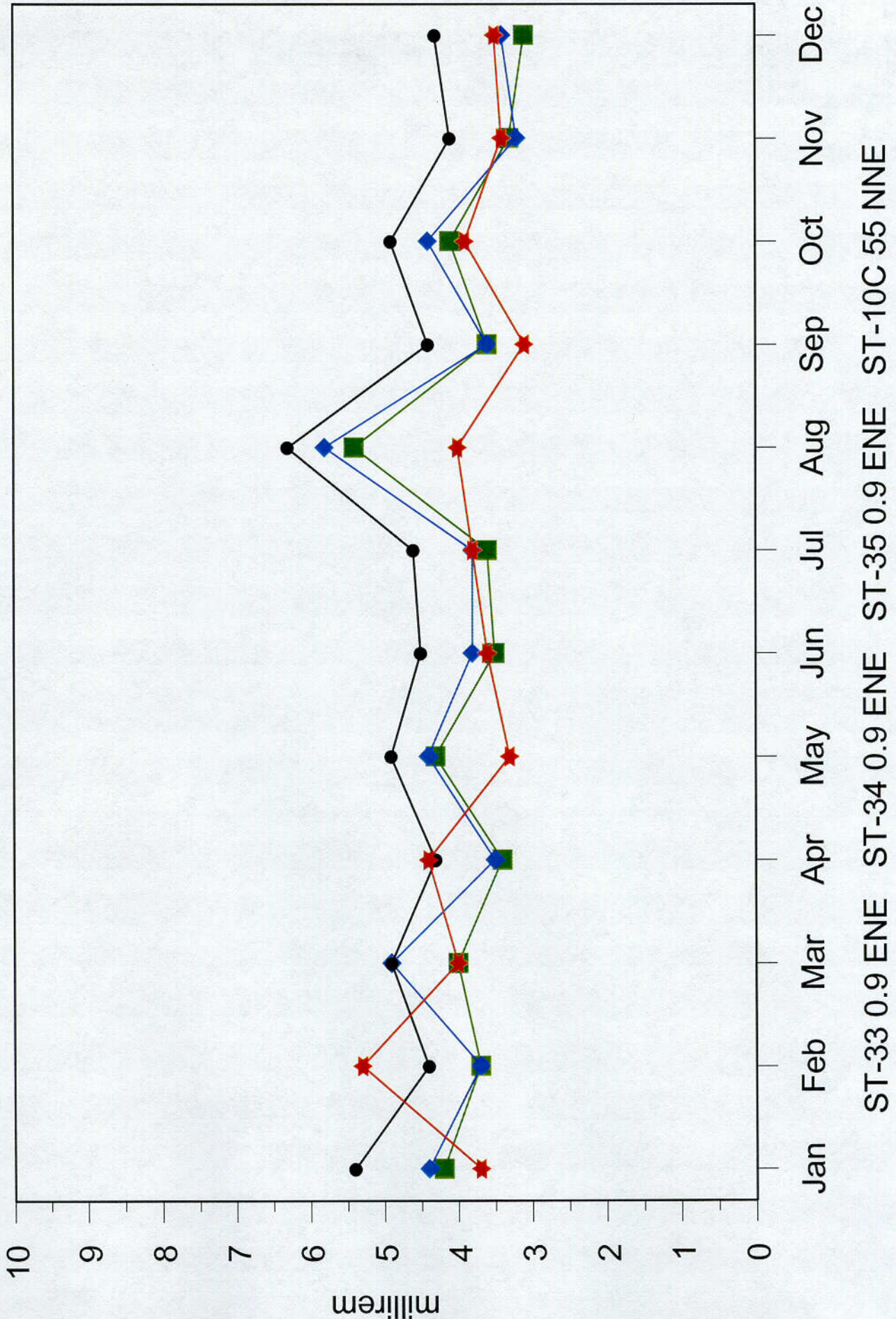
2001 Palisades TLDs

ST10 Control vs ST13, ST14, ST15



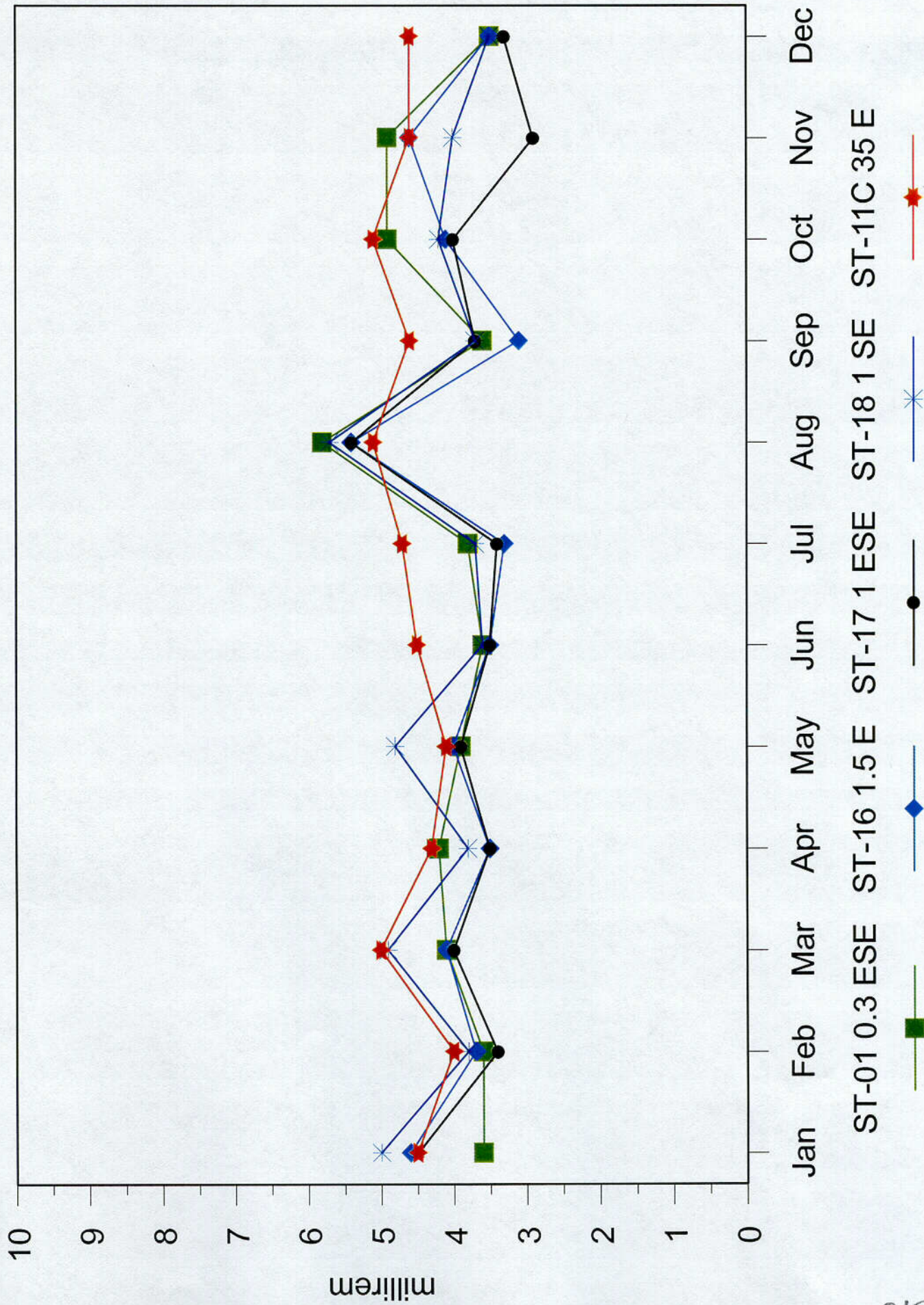
2001 Palisades TLDs

ST10 Control vs ST33, ST34, ST35



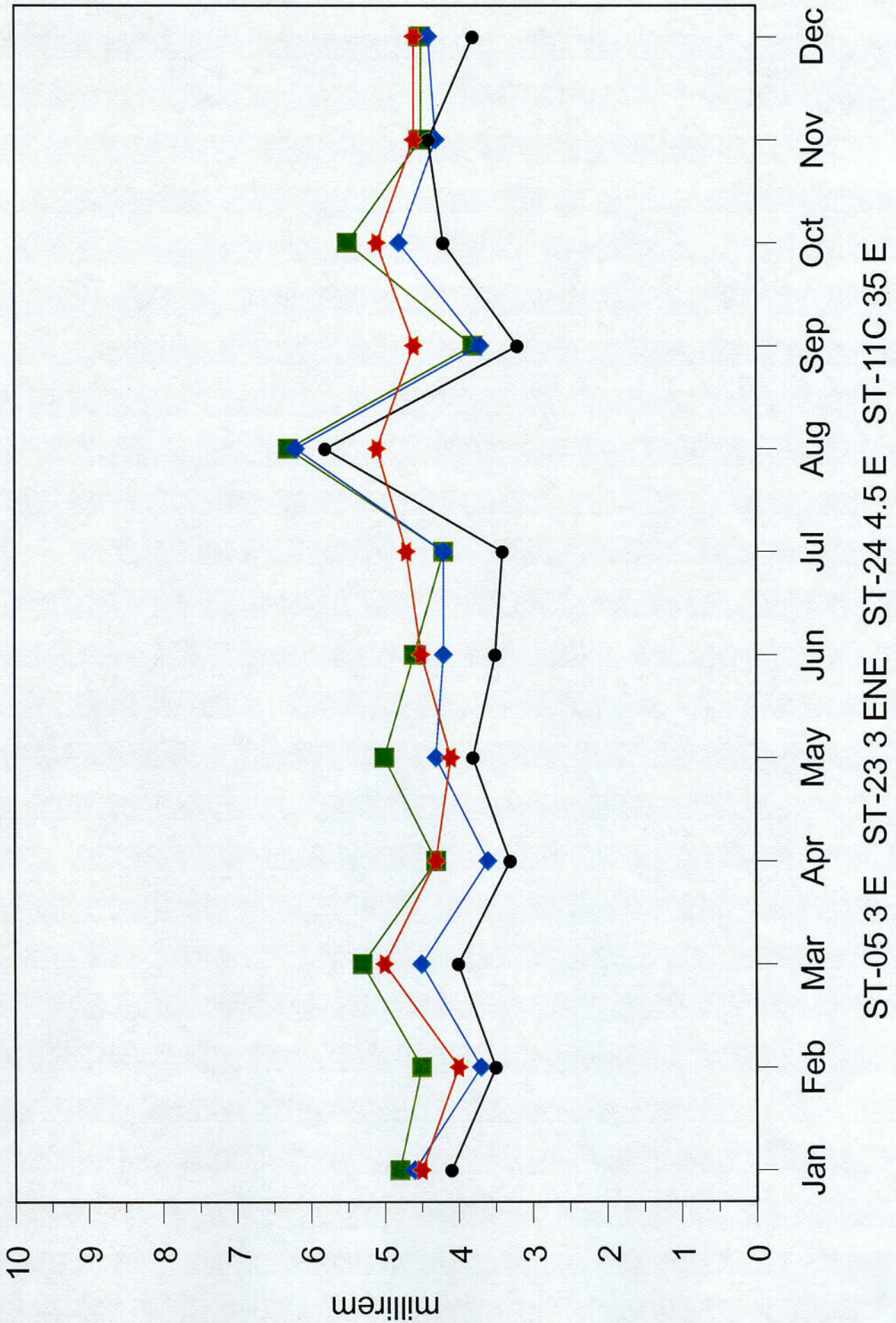
2001 Palisades TLDs

ST11 Control vs ST01, ST16, ST17, ST18



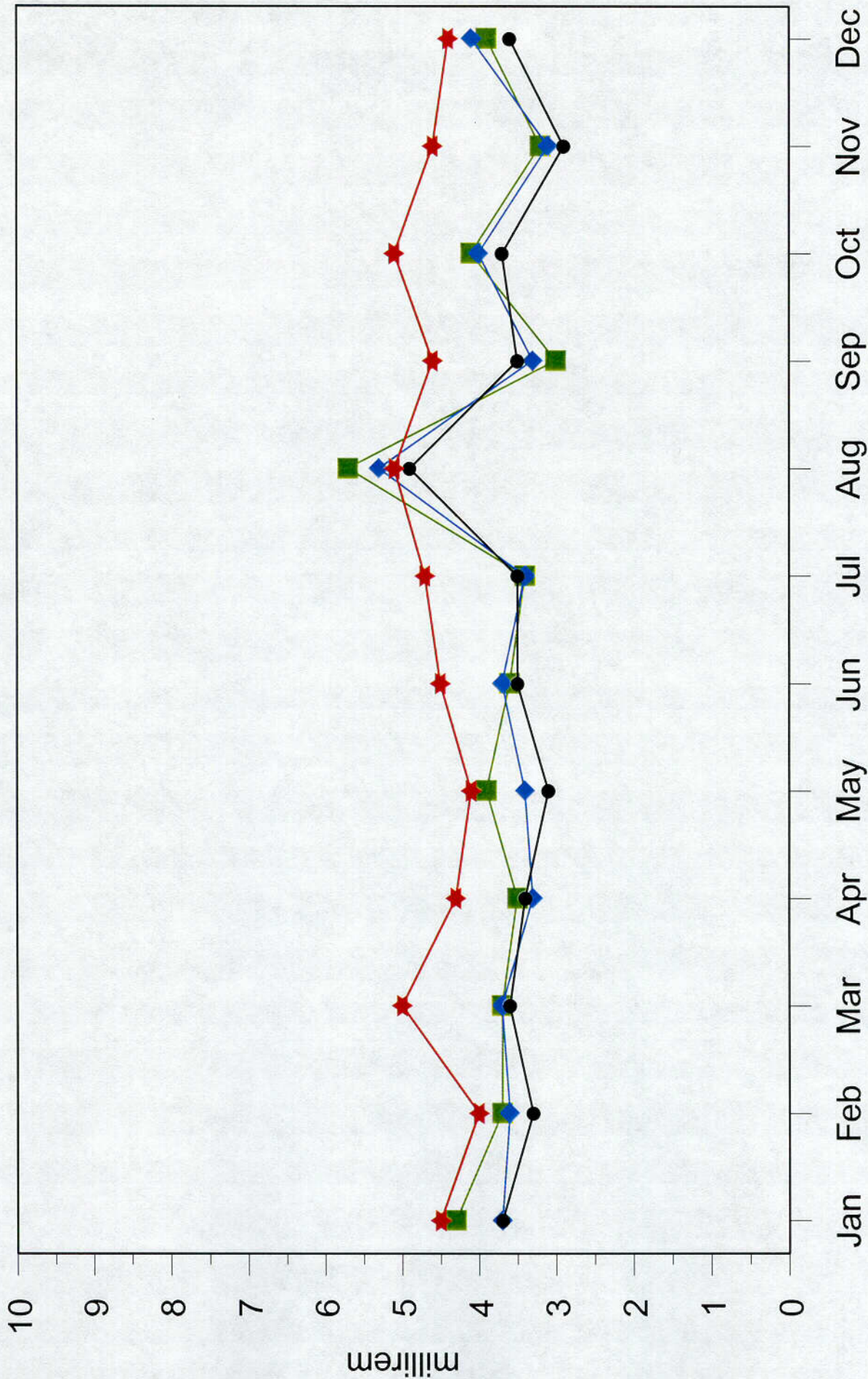
2001 Palisades TLDs

ST11 Control vs ST05, ST23, ST24



2001 Palisades TLDs

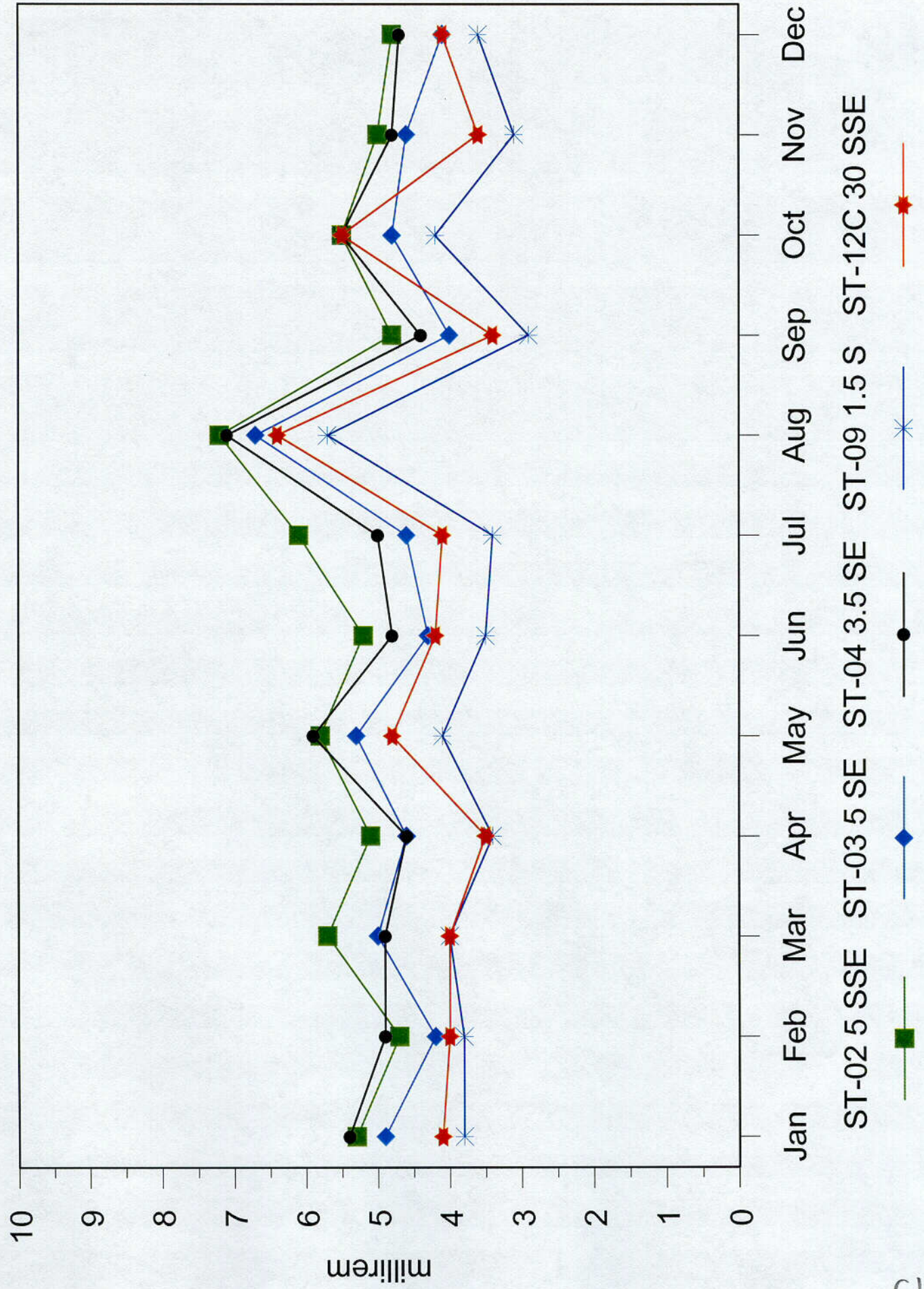
ST11 Control vs ST36, ST37, ST38



ST-36 0.9 E ST-37 0.9 E ST-38 0.9 ESE ST-11C 35 E

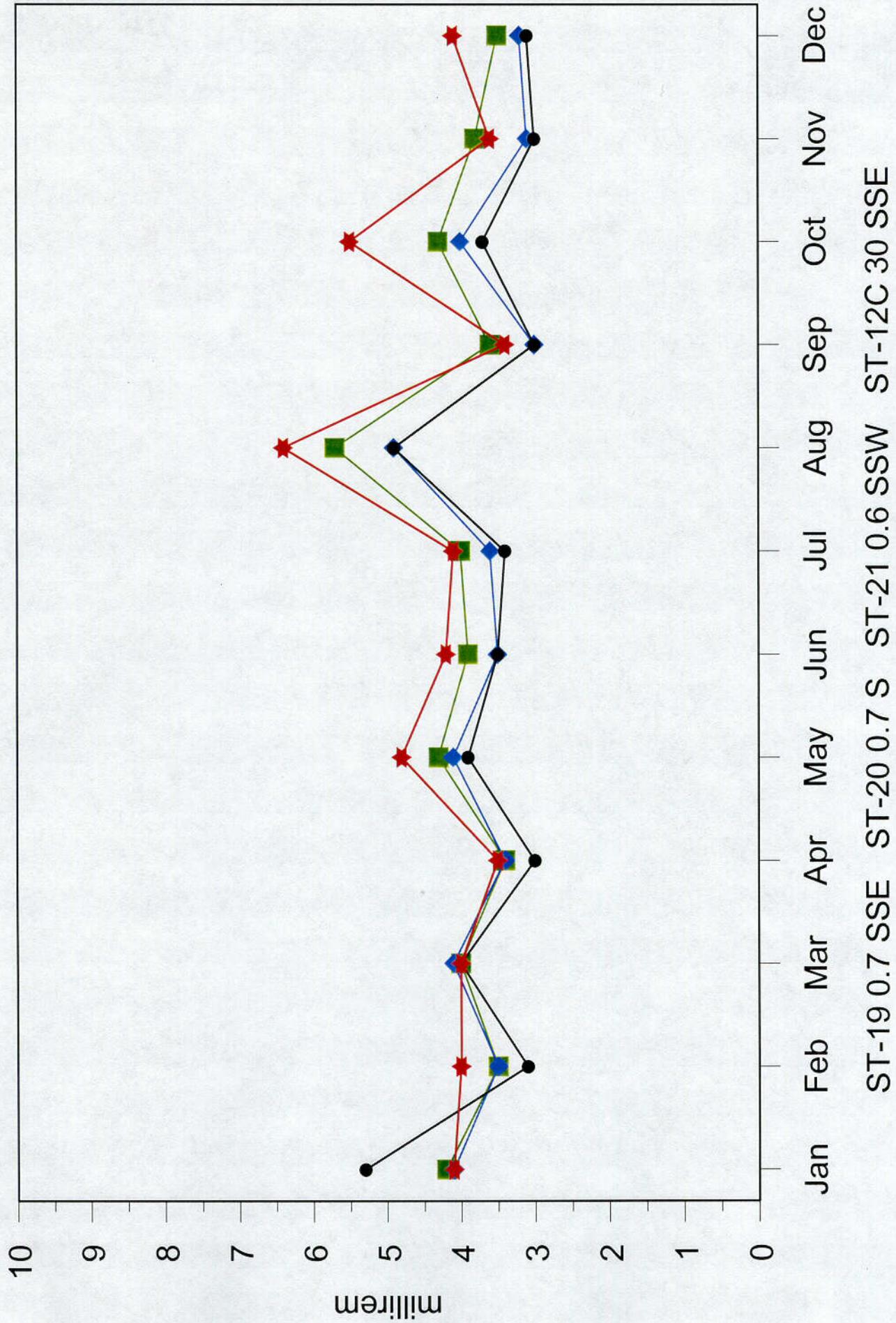
2001 Palisades TLDs

ST12 Control vs ST02, ST03, ST04, ST09



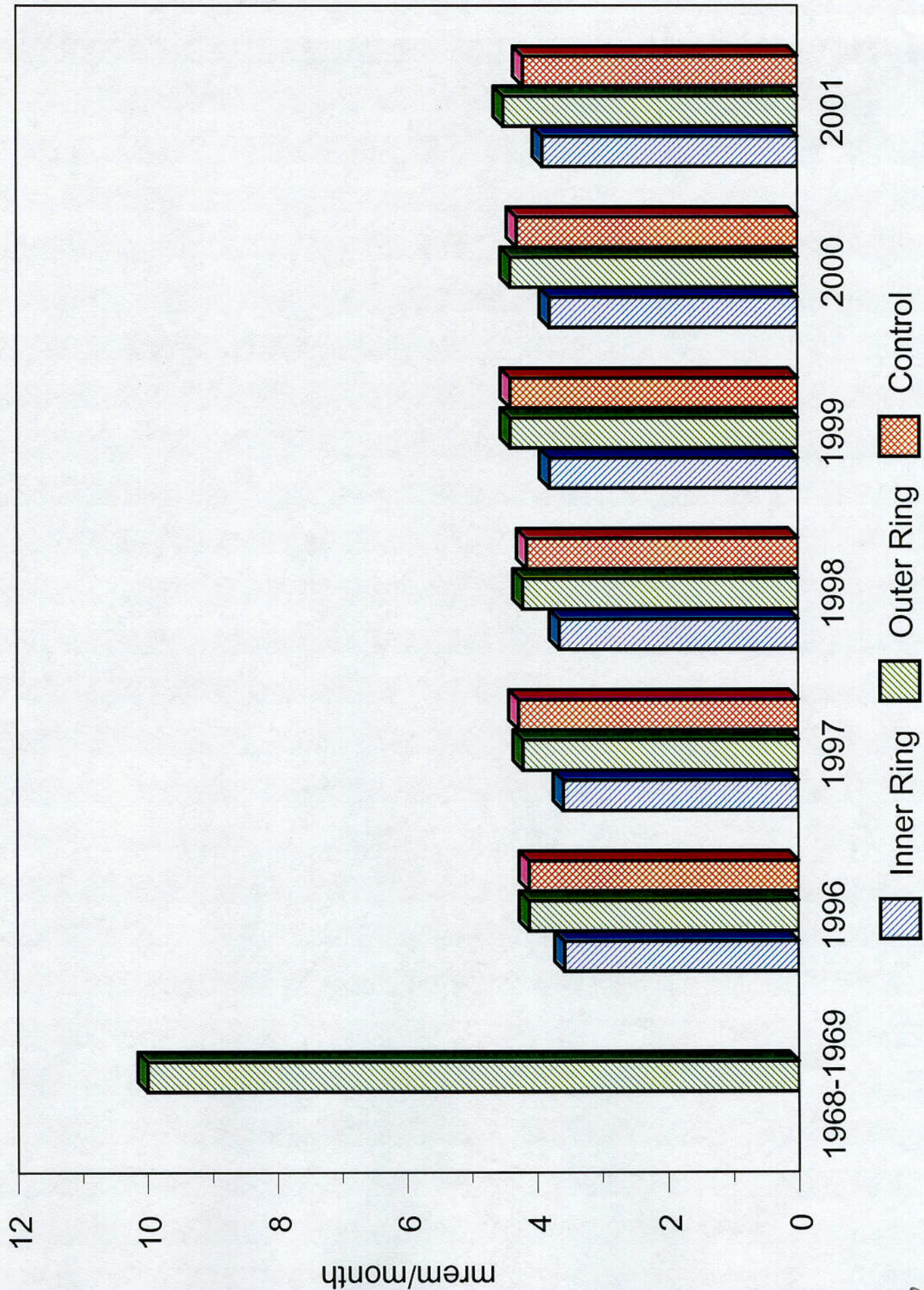
2001 Palisades TLDs

ST12 Control vs ST19, ST20, ST21

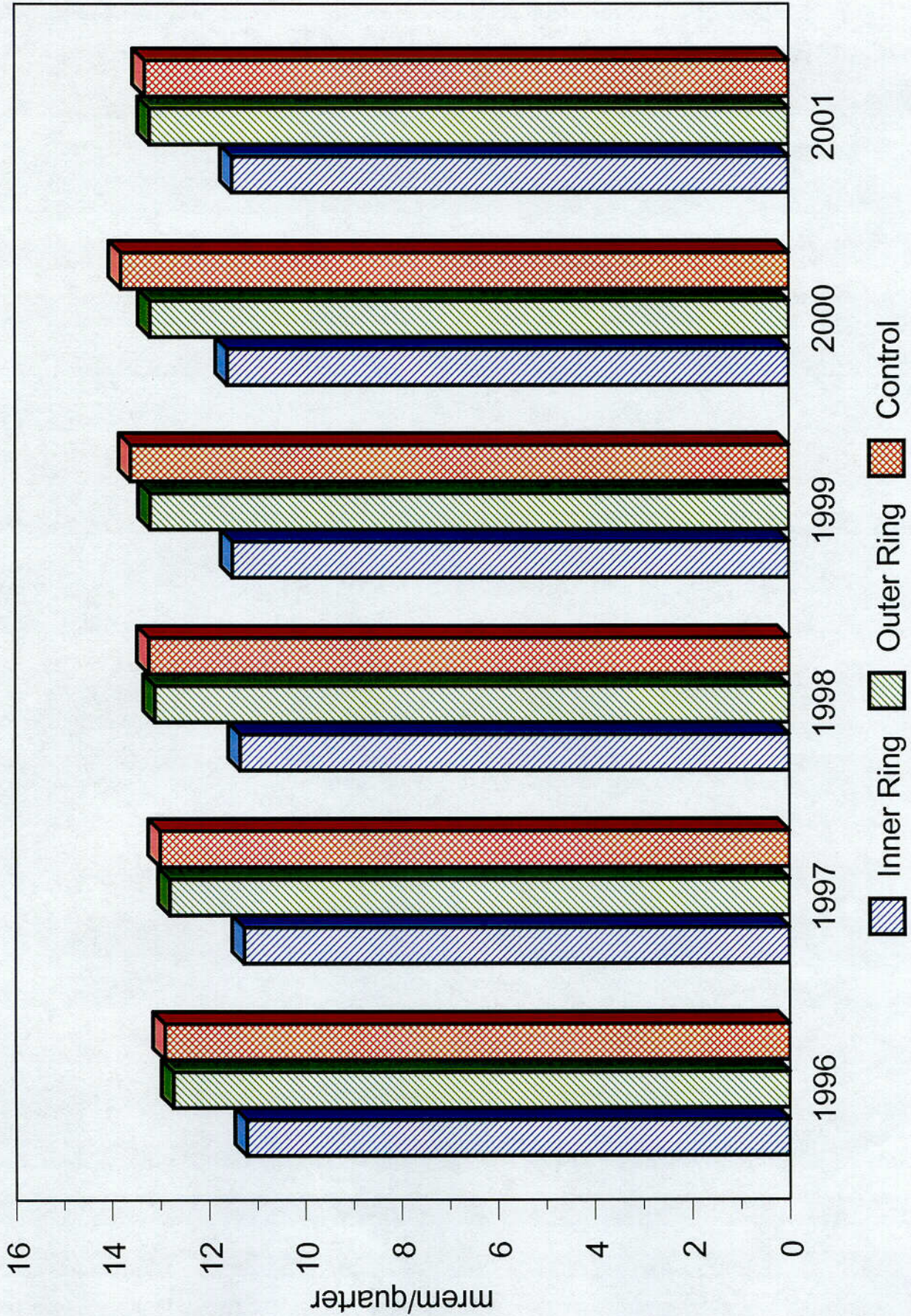


Palisades Monthly Thermoluminescent Dosimeters

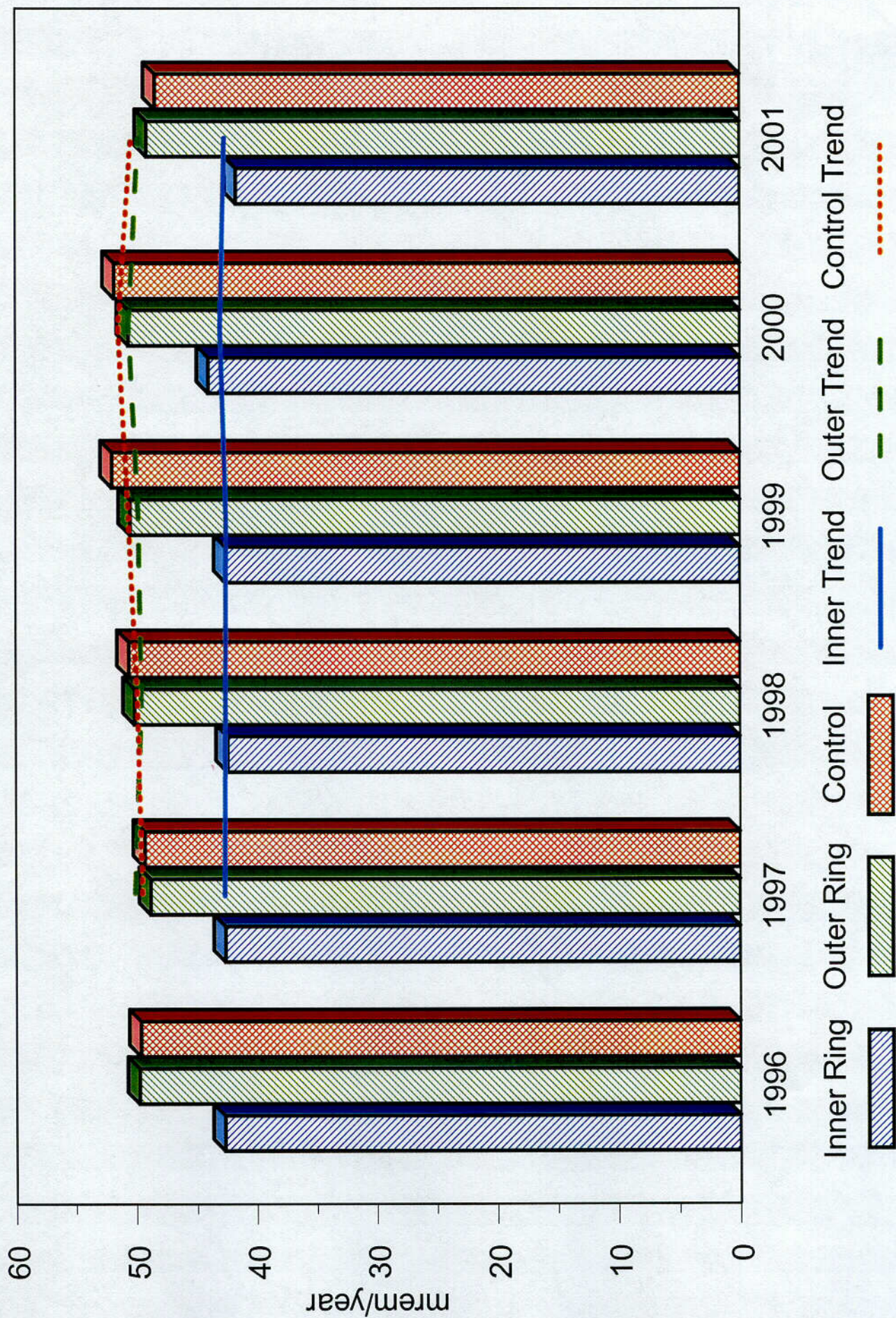
Pre-Operational vs. Operational



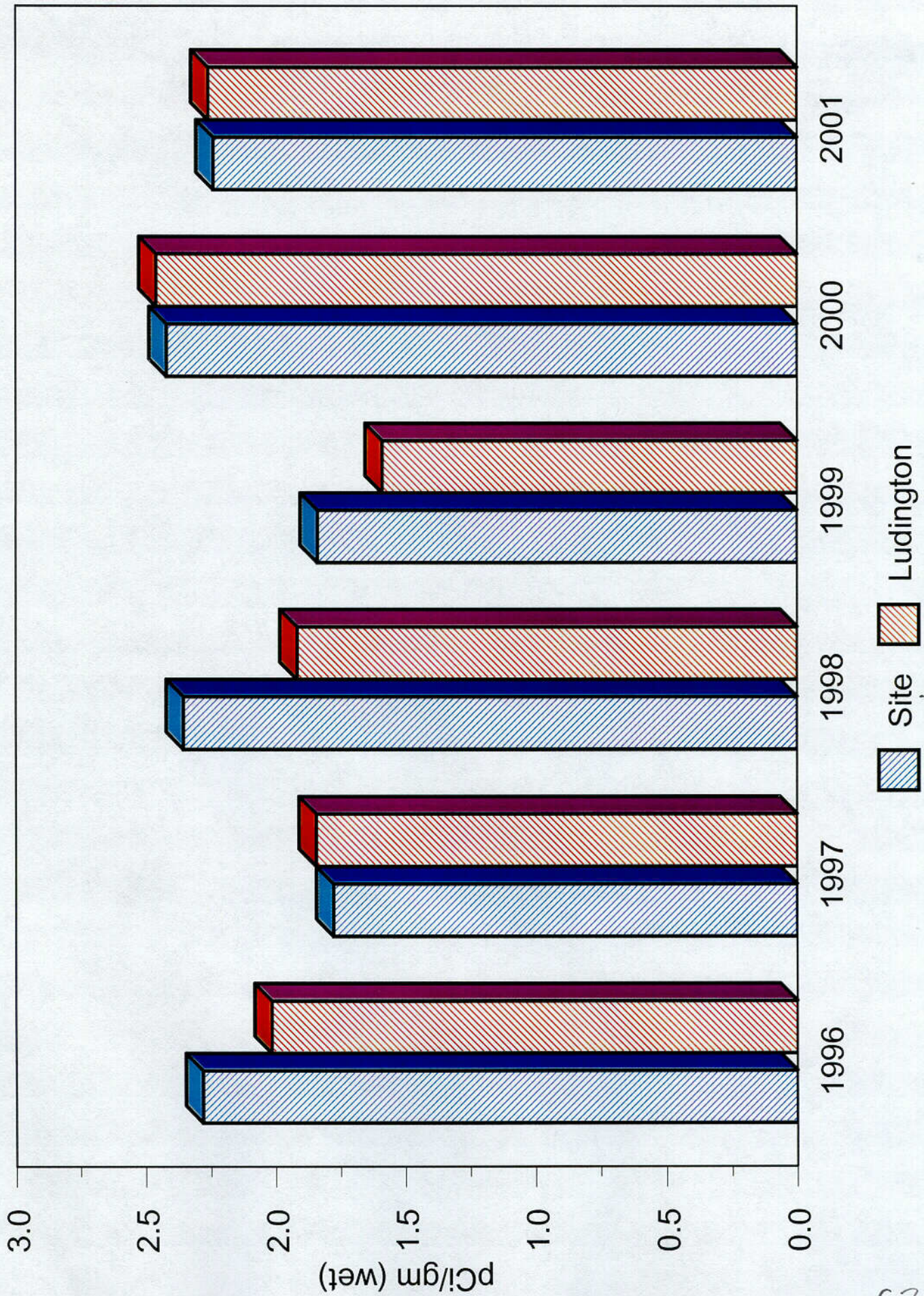
Palisades Quarterly Thermoluminescent Dosimeters 1996 - 2001



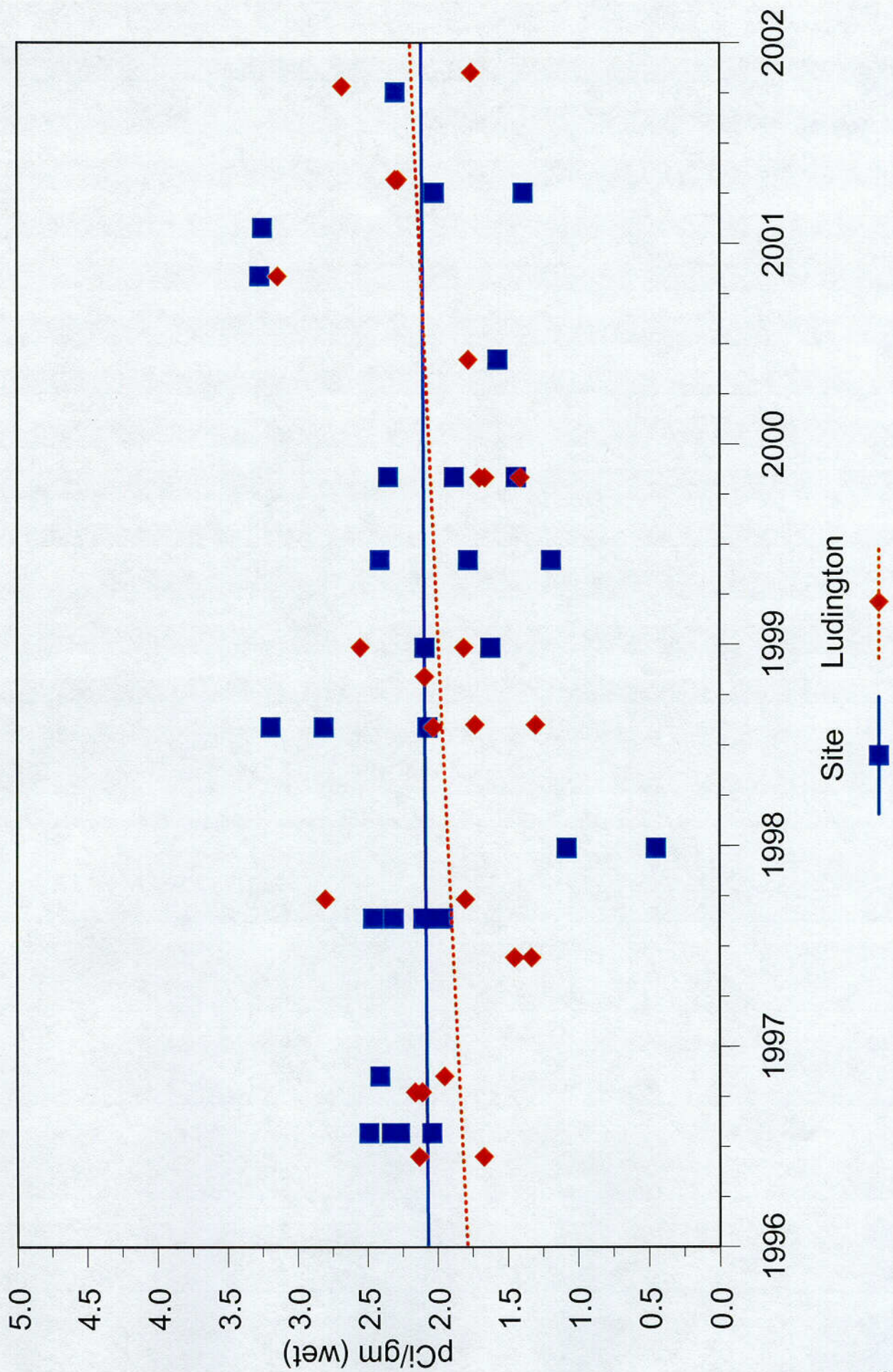
Palisades Annual Thermoluminescent Dosimeters 1996-2001



Palisades Fish Gross Beta 1996-2001

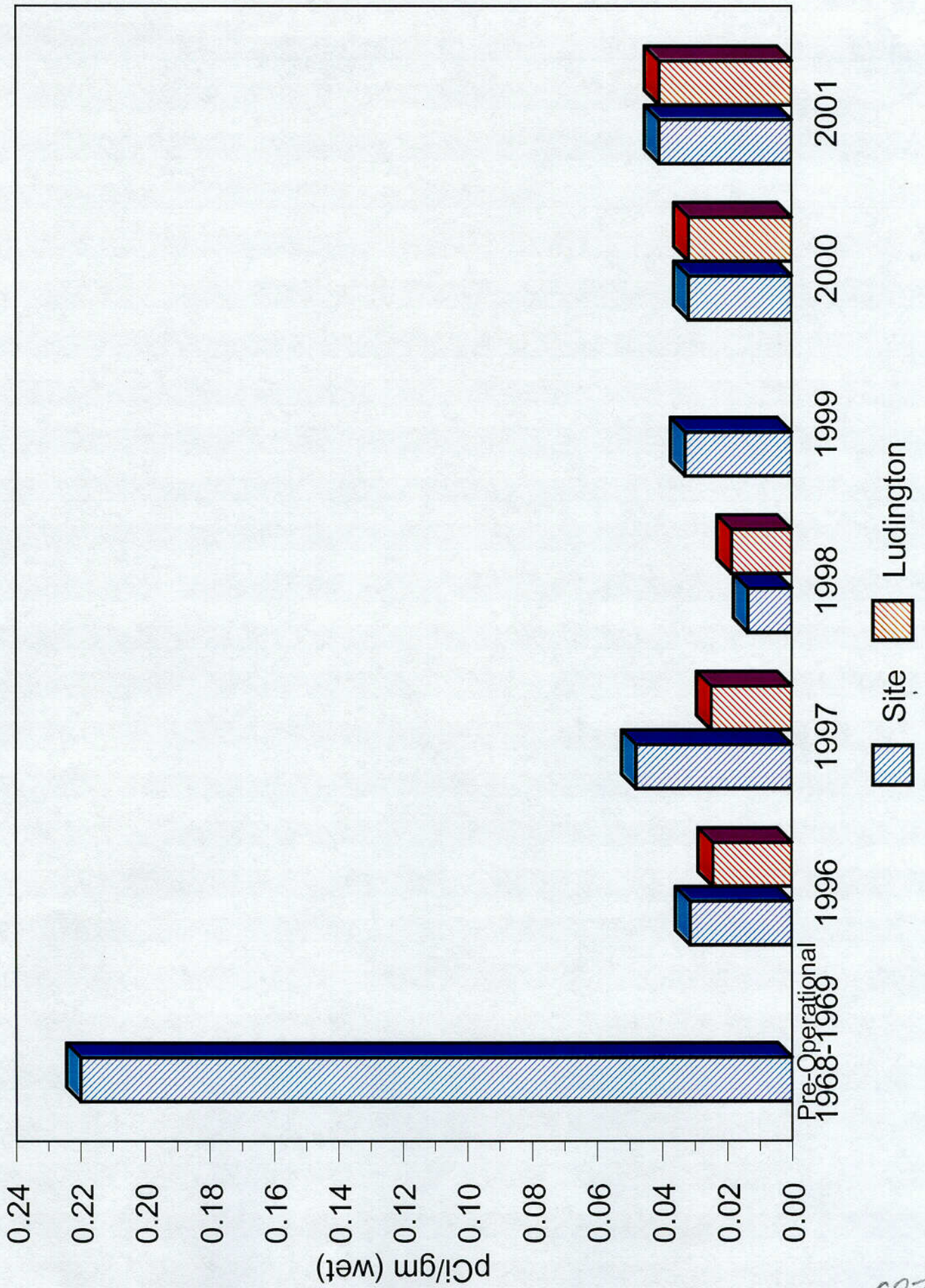


Palisades Fish Gross Beta 1996-2001

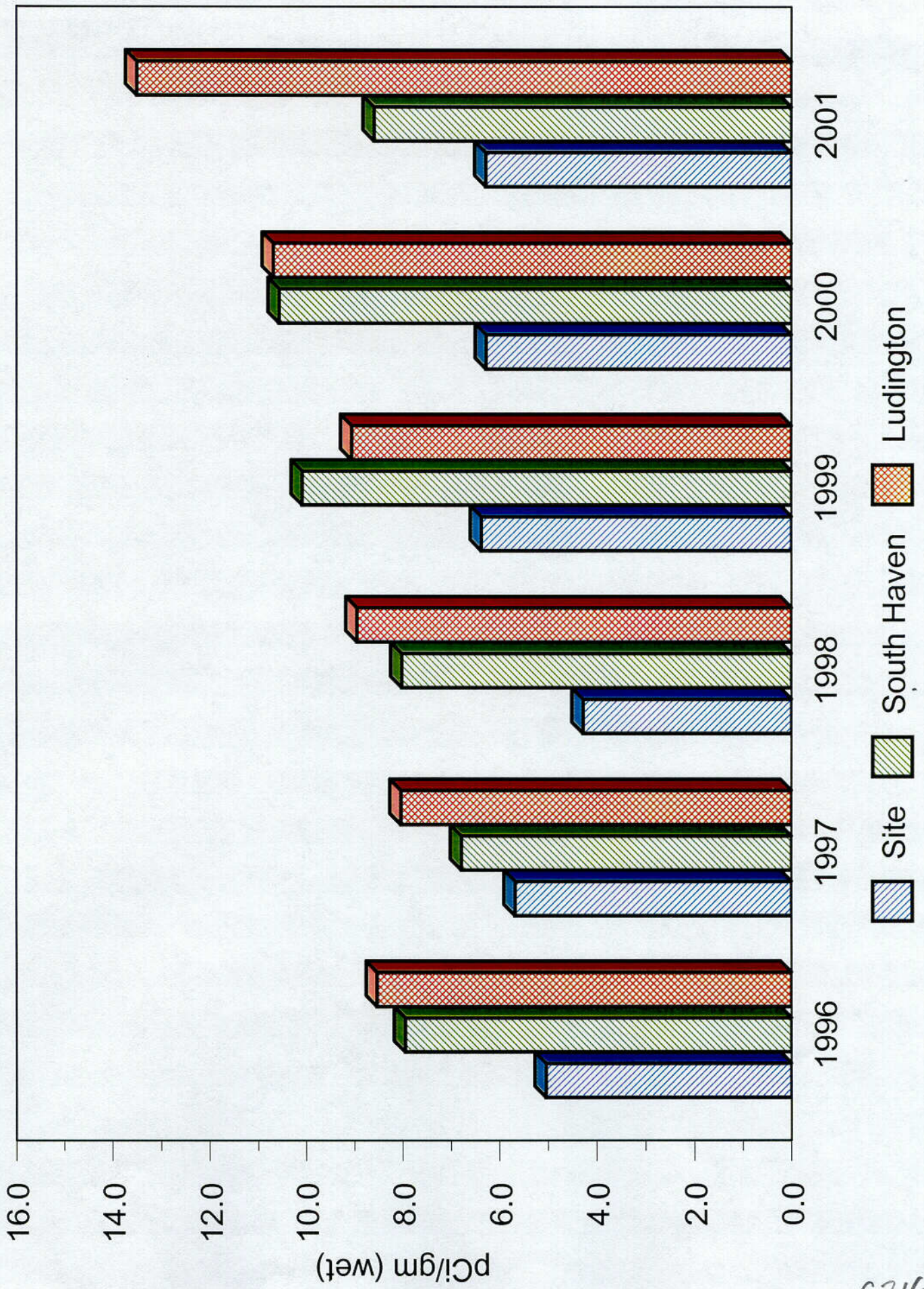


Palisades Fish Cs-137

Pre-Operational vs. Operational



Palisades Sediment Gross Beta 1996-2001



Palisades Sediment Gross Beta 1996-2001

