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FINAL  
MONTHLY PROGRESS REPORT  
TO  
CONSUMERS POWER COMPANY  
JACKSON, MICHIGAN

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

PREPARED AND SUBMITTED  
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PROJECT NO. 8022

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# PALISADES

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## PALISADES

### 1.0 INTRODUCTION

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

Data obtained in the program are well within the ranges previously encountered in the program and to be expected in the environmental media sampled.

For all gamma isotopic analyses, the spectrum is computer scanned 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. Unless noted otherwise, the less than value ("<") reported under "Other Gammas" is for Co-60 and may be higher or lower for other radionuclides.

All concentrations, except 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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## 20 LISTING OF MISSED SAMPLES

Sample Type	Location	Expected Collection Date	Reason
Liquid Radwaste	Palisades	January	Sample not collected.
Liquid Radwaste	Palisades	February	Sample not collected.
TLD	ST-11	May	TLD not received.
TLD	Control-1	May	TLD lost in the field.
Liquid Radwaste	Palisades	May	Sample not collected.
Liquid Radwaste	Palisades	July	Sample not collected.
Liquid Radwaste	Palisades	August	Sample not collected.
Liquid Radwaste	Palisades	September	Sample not collected.
TLD	ST-10	September	TLD lost in the field.
TLD	ST-24	September	TLD lost in the field.
TLD	ST-10	3rd Qtr.	TLD lost in the field.
TLD	ST-24	3rd Qtr.	TLD lost in the field.
Liquid Radwaste	Palisades	October	Sample not collected.
TLD	ST-10	Annual	TLD lost in the field.
TLD	ST-24	Annual	TLD lost in the field.
TLD	ST-33	Annual	TLD lost in the field.

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# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 1ST - Palisades

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	295	0.023±0.004	<0.028	07-05-92	275	0.016±0.003	<0.010
01-12-92	300	0.021±0.004	<0.037	07-12-92	278	0.019±0.004	<0.009
01-19-92	314	0.021±0.003	<0.025	07-19-92	280	0.014±0.003	<0.011
01-26-92	306	0.032±0.004	<0.034	07-26-92	283	0.013±0.003	<0.010
02-02-92	314	0.026±0.003	<0.033	08-02-92	278	0.015±0.003	<0.011
02-09-92	300	0.024±0.003	<0.033	08-09-92	278	0.014±0.002	<0.010
02-16-92	309	0.021±0.003	<0.035	08-16-92	278	0.013±0.003	<0.017
02-23-92	303	0.024±0.002	<0.035	08-23-92	280	0.019±0.003	<0.012
03-01-92	306	0.019±0.003	<0.035	08-30-92	295	0.014±0.003	<0.007
03-08-92	289	0.029±0.004	<0.039	09-06-92	278	0.021±0.003	<0.010
03-15-92	306	0.026±0.004	<0.030	09-13-92	280	0.015±0.003	<0.008
03-22-92	309	0.021±0.003	<0.031	09-20-92	283	0.025±0.004	<0.011
03-29-92	306	0.016±0.003	<0.027	09-27-92	286	0.017±0.004	<0.011
1st Qtr. mean ± s.d.		0.023±0.004	<0.039	3rd Qtr. mean ± s.d.		0.016±0.004	<0.017
04-05-92	295	0.014±0.003	<0.035	10-04-92	286	0.021±0.004	<0.021
04-12-92	297	0.017±0.002	<0.022	10-11-92	283	0.016±0.003	<0.011
04-19-92	300	0.013±0.003	<0.026	10-18-92	286	0.012±0.003	<0.013
04-26-92	297	0.013±0.003	<0.025	10-26-92	331	0.035±0.004	<0.008
05-03-92	297	0.023±0.004	<0.020	11-01-92	246	0.018±0.004	<0.011
05-10-92	292	0.018±0.003	<0.030	11-08-92	275	0.010±0.003	<0.023
05-17-92	289	0.024±0.003	<0.019	11-15-92	280	0.020±0.003	<0.010
05-24-92	292	0.014±0.003	<0.009	11-22-92	292	0.018±0.003	<0.016
05-31-92	300	0.012±0.003	<0.010	11-29-92	292	0.013±0.003	<0.015
06-07-92	283	0.017±0.004	<0.011	12-06-92	289	0.025±0.004	<0.011
06-14-92	278	0.012±0.003	<0.009	12-13-92	295	0.018±0.003	<0.015
06-21-92	286	0.012±0.003	<0.019	12-20-92	295	0.019±0.003	<0.011
06-28-92	286	0.014±0.002	<0.011	12-27-92	289	0.033±0.004	<0.010
2nd Qtr. mean ± s.d.		0.016±0.004	<0.035	4th Qtr. mean ± s.d.		0.020±0.007	<0.023

# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 2TH - Coloma (5 miles SSE)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	272	0.027±0.004	<0.031	07-05-92	269	0.015±0.004	<0.011
01-12-92	286	0.025±0.004	<0.038	07-12-92	266	0.017±0.004	<0.010
01-19-92	136	0.022±0.006	<0.058	07-19-92	269	0.018±0.003	<0.012
01-26-92	289	0.030±0.004	<0.036	07-26-92	278	0.010±0.003	<0.011
02-02-92	300	0.024±0.003	<0.035	08-02-92	272	0.014±0.003	<0.012
02-09-92	286	0.025±0.004	<0.035	08-09-92	269	0.015±0.002	<0.011
02-16-92	295	0.020±0.003	<0.037	08-16-92	266	0.010±0.003	<0.018
02-23-92	289	0.024±0.003	<0.036	08-23-92	266	0.018±0.003	<0.013
03-01-92	295	0.019±0.003	<0.036	08-30-92	283	0.014±0.003	<0.007
03-08-92	283	0.030±0.004	<0.040	09-06-92	258	0.021±0.004	<0.011
03-15-92	292	0.023±0.004	<0.031	09-13-92	266	0.013±0.003	<0.009
03-22-92	295	0.023±0.004	<0.032	09-20-92	269	0.027±0.004	<0.012
03-29-92	286	0.016±0.003	<0.029	09-27-92	275	0.008±0.003	<0.012
1st Qtr. mean ± s.d.		0.024±0.004	<0.058	3rd Qtr. mean ± s.d.		0.015±0.005	<0.018
04-05-92	289	0.014±0.003	<0.035	10-04-92	272	0.024±0.004	<0.022
04-12-92	289	0.018±0.002	<0.023	10-11-92	280	0.017±0.003	<0.011
04-19-92	283	0.014±0.003	<0.027	10-18-92	283	0.016±0.003	<0.013
04-26-92	286	0.010±0.003	<0.026	10-26-92	329	0.034±0.004	<0.008
05-03-92	286	0.019±0.004	<0.020	11-01-92	238	0.013±0.004	<0.011
05-10-92	280	0.018±0.003	<0.031	11-08-92	283	0.007±0.002	<0.022
05-17-92	280	0.023±0.003	<0.020	11-15-92	289	0.013±0.003	<0.009
05-24-92	278	0.017±0.003	<0.009	11-22-92	292	0.014±0.003	<0.016
05-31-92	283	0.022±0.003	<0.010	11-29-92	289	0.014±0.002	<0.015
06-07-92	278	0.016±0.004	<0.012	12-06-92	297	0.027±0.004	<0.011
06-14-92	266	0.014±0.003	<0.009	12-13-92	295	0.015±0.003	<0.015
06-21-92	258	0.010±0.003	<0.021	12-20-92	292	0.017±0.003	<0.011
06-28-92	269	0.012±0.002	<0.012	12-27-92	31 <sup>a</sup>	0.035±0.024	<0.090 <sup>b</sup>
2nd Qtr. mean ± s.d.		0.016±0.004	<0.035	4th Qtr. mean ± s.d.		0.019±0.009	<0.022

<sup>a</sup> Low volume due to no electricity at pump.

<sup>b</sup> LLD for I-131 not met due to low volume; result not included in mean ± s.d. calculation.

# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 3HS - Covert (5 miles SE)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	295	0.024±0.004	<0.028	07-05-92	275	0.015±0.003	<0.010
01-12-92	303	0.018±0.003	<0.036	07-12-92	275	0.012±0.003	<0.010
01-19-92	314	0.022±0.003	<0.025	07-19-92	275	0.010±0.003	<0.012
01-26-92	312	0.028±0.004	<0.033	07-26-92	278	0.010±0.003	<0.011
02-02-92	317	0.025±0.003	<0.033	08-02-92	272	0.014±0.003	<0.012
02-09-92	306	0.025±0.003	<0.032	08-09-92	275	0.020±0.003	<0.010
02-16-92	283	0.019±0.003	<0.039	08-16-92	275	0.013±0.003	<0.017
02-23-92	309	0.021±0.002	<0.034	08-23-92	275	0.020±0.003	<0.012
03-01-92	314	0.019±0.003	<0.034	08-30-92	289	0.016±0.003	<0.007
03-08-92	300	0.026±0.003	<0.038	09-06-92	266	0.026±0.004	<0.010
03-15-92	312	0.021±0.003	<0.029	09-13-92	275	0.015±0.003	<0.008
03-22-92	314	0.016±0.003	<0.03	09-20-92	278	0.023±0.004	<0.011
03-29-92	303	<u>0.016±0.003</u>	<u>&lt;0.028</u>	<u>09-27-92</u>	<u>280</u>	<u>0.010±0.003</u>	<u>&lt;0.012</u>
1st Qtr. mean ± s.d.		0.022±0.004	<0.039	3rd Qtr. mean ± s.d.		0.016±0.005	<0.017
04-05-92	306	0.016±0.003	<0.033	10-04-92	278	0.025±0.004	<0.022
04-12-92	303	0.016±0.002	<0.022	10-11-92	286	0.017±0.003	<0.011
04-19-92	300	0.017±0.003	<0.026	10-18-92	283	0.015±0.003	<0.013
04-26-92	300	0.010±0.003	<0.025	10-26-92	331	0.035±0.004	<0.008
05-03-92	300	0.020±0.004	<0.019	11-01-92	241	0.019±0.004	<0.011
05-10-92	295	0.019±0.003	<0.029	11-08-92	286	0.010±0.003	<0.002
05-17-92	295	0.023±0.003	<0.019	11-15-92	286	0.022±0.003	<0.009
05-24-92	292	0.014±0.003	<0.009	11-22-92	289	0.018±0.003	<0.016
05-31-92	300	0.016±0.003	<0.010	11-29-92	292	0.012±0.003	<0.015
06-07-92	283	0.016±0.003	<0.011	12-06-92	297	0.029±0.004	<0.011
06-14-92	269	0.015±0.003	<0.009	12-13-92	297	0.016±0.003	<0.015
06-21-92	275	0.010±0.003	<0.020	12-20-92	295	0.019±0.003	<0.011
06-28-92	275	<u>0.014±0.002</u>	<u>&lt;0.012</u>	<u>12-27-92</u>	<u>297</u>	<u>0.038±0.004</u>	<u>&lt;0.009</u>
2nd Qtr. mean ± s.d.		0.016±0.004	<0.033	4th Qtr. mean ± s.d.		0.021±0.008	<0.022

# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 4JS - Covert (3.5 miles ESE)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	272	0.026±0.004	<0.031	07-05-92	263	0.019±0.004	<0.011
01-12-92	280	0.027±0.004	<0.039	07-12-92	266	0.018±0.004	<0.010
01-19-92	286	0.020±0.003	<0.028	07-19-92	272	0.004±0.003	<0.012
01-26-92	280	0.022±0.003	<0.037	07-26-92	272	0.012±0.003	<0.011
02-02-92	297	0.025±0.004	<0.035	08-02-92	263	0.016±0.004	<0.012
02-09-92	283	0.030±0.004	<0.035	08-09-92	269	0.016±0.002	<0.011
02-16-92	292	0.019±0.003	<0.038	08-16-92	263	0.014±0.003	<0.018
02-23-92	286	0.024±0.003	<0.037	08-23-92	266	0.018±0.003	<0.013
03-01-92	295	0.021±0.003	<0.036	08-30-92	278	0.016±0.003	<0.007
03-08-92	280	0.006±0.002 <sup>a</sup>	<0.040	09-06-92	249	0.027±0.004	<0.011
03-15-92	289	0.024±0.004	<0.032	09-13-92	263	0.011±0.003	<0.009
03-22-92	292	0.022±0.004	<0.032	09-20-92	272	0.027±0.004	<0.012
03-29-92	286	0.018±0.003	<0.029	09-27-92	269	0.014±0.004	<0.012
1st Qtr. mean ± s.d.		0.022±0.006	<0.040	3rd Qtr. mean ± s.d.		0.016±0.006	<0.018
04-05-92	283	0.012±0.003	<0.036	10-04-92	272	0.019±0.004	<0.022
04-12-92	283	0.021±0.002	<0.023	10-11-92	269	0.018±0.003	<0.012
04-19-92	283	0.016±0.003	<0.027	10-18-92	272	0.019±0.003	<0.014
04-26-92	283	0.011±0.003	<0.026	10-26-92	320	0.039±0.004	<0.008
05-03-92	278	0.023±0.004	<0.021	11-01-92	232	0.021±0.004	<0.011
05-10-92	283	0.016±0.003	<0.030	11-08-92	269	0.009±0.003	<0.023
05-17-92	275	0.020±0.003	<0.020	11-15-92	272	0.022±0.003	<0.010
05-24-92	275	0.014±0.003	<0.009	11-22-92	272	0.018±0.004	<0.017
05-31-92	283	0.018±0.003	<0.010	11-29-92	275	0.014±0.002	<0.016
06-07-92	269	0.019±0.004	<0.012	12-06-92	269	0.029±0.004	<0.012
06-14-92	272	0.022±0.004	<0.009	12-13-92	278	0.021±0.003	<0.016
06-21-92	252	0.011±0.003	<0.021	12-20-92	278	0.019±0.003	<0.011
06-28-92	272	0.014±0.002	<0.012	12-27-92	275	0.038±0.004	<0.010
2nd Qtr. mean ± s.d.		0.017±0.004	<0.036	4th Qtr. mean ± s.d.		0.022±0.009	<0.023

<sup>a</sup> Filter light.



# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 5PR - Covert (3 miles E)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	280	0.028±0.004	<0.030	07-05-92	261	0.015±0.003	<0.011
01-12-92	289	0.025±0.004	<0.038	07-12-92	263	0.021±0.004	<0.010
01-19-92	297	0.021±0.003	<0.027	07-19-92	266	0.012±0.003	<0.012
01-26-92	295	0.032±0.004	<0.035	07-26-92	269	0.016±0.004	<0.011
02-02-92	303	0.025±0.003	<0.035	08-02-92	263	0.017±0.004	<0.012
02-09-92	292	0.028±0.004	<0.034	08-09-92	261	0.017±0.003	<0.011
02-16-92	297	0.018±0.003	<0.037	08-16-92	263	0.014±0.003	<0.018
02-23-92	280	0.018±0.002	<0.037	08-23-92	263	0.019±0.004	<0.013
03-01-92	300	0.020±0.003	<0.035	08-30-92	283	0.015±0.003	<0.009
03-08-92	275	0.024±0.004	<0.041	09-06-92	249	0.024±0.004	<0.011
03-15-92	295	0.025±0.004	<0.031	09-13-92	261	0.012±0.003	<0.009
03-22-92	297	0.021±0.004	<0.032	09-20-92	266	0.022±0.004	<0.012
03-29-92	292	0.018±0.003	<0.029	09-27-92	266	0.014±0.004	<0.022
1st Qtr. mean ± s.d.		0.023±0.004	<0.041	3rd Qtr. mean ± s.d.		0.017±0.004	<0.022
04-05-92	289	0.011±0.003	<0.035	10-04-92	266	0.024±0.004	<0.023
04-12-92	286	0.018±0.002	<0.023	10-11-92	266	0.015±0.003	<0.012
04-19-92	286	0.015±0.003	<0.027	10-18-92	269	0.015±0.003	<0.014
04-26-92	286	0.011±0.003	<0.026	10-26-92	314	0.033±0.004	<0.008
05-03-92	283	0.022±0.004	<0.021	11-01-92	229	0.018±0.004	<0.011
05-10-92	286	0.017±0.003	<0.030	11-08-92	263	0.010±0.003	<0.024
05-17-92	280	0.023±0.003	<0.020	11-15-92	266	0.018±0.003	<0.010
05-24-92	278	0.015±0.003	<0.009	11-22-92	278	0.016±0.003	<0.017
05-31-92	286	0.017±0.003	<0.010	11-29-92	278	0.012±0.002	<0.016
06-07-92	272	0.017±0.004	<0.012	12-06-92	275	0.031±0.004	<0.012
06-14-92	269	0.018±0.003	<0.009	12-13-92	280	0.018±0.003	<0.016
06-21-92	249	0.009±0.003	<0.022	12-20-92	283	0.017±0.003	<0.011
06-28-92	272	0.014±0.002	<0.012	12-27-92	278	0.036±0.004	<0.010
2nd Qtr. mean ± s.d.		0.016±0.004	<0.035	4th Qtr. mean ± s.d.		0.020±0.008	<0.024

# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 6RB - South Haven (4.75 mi NE)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	283	0.026±0.004	<0.030	07-05-92	263	0.015±0.004	<0.011
01-12-92	286	0.021±0.004	<0.038	07-12-92	269	0.014±0.003	<0.018
01-19-92	295	0.021±0.003	<0.027	07-19-92	272	0.016±0.003	<0.012
01-26-92	297	0.031±0.004	<0.035	07-26-92	272	0.013±0.003	<0.018
02-02-92	303	0.023±0.003	<0.035	08-02-92	269	0.013±0.003	<0.012
02-09-92	289	0.020±0.003	<0.034	08-09-92	269	0.014±0.002	<0.012
02-16-92	295	0.022±0.003	<0.037	08-16-92	269	0.014±0.003	<0.018
02-23-92	283	0.025±0.003	<0.037	08-23-92	275	0.018±0.003	<0.012
03-01-92	289	0.021±0.004	<0.037	08-30-92	289	0.017±0.003	<0.009
03-08-92	269	0.029±0.004	<0.042	09-06-92	255	0.022±0.004	<0.022
03-15-92	280	0.027±0.004	<0.033	09-13-92	278	0.006±0.003	<0.019
03-22-92	283	0.021±0.004	<0.033	09-20-92	275	0.027±0.004	<0.011
03-29-92	278	0.015±0.003	<0.030	09-27-92	278	0.014±0.004	<0.021
1st Qtr. mean ± s.d.		0.023±0.004	<0.042	3rd Qtr. mean ± s.d.		0.016±0.005	<0.022
04-05-92	269	0.012±0.004	<0.038	10-04-92	76 <sup>a</sup>	0.015±0.010	<0.049
04-12-92	272	0.017±0.002	<0.024	10-11-92	229	0.022±0.004	<0.014
04-19-92	283	0.016±0.003	<0.027	10-18-92	286	0.018±0.003	<0.013
04-26-92	286	0.010±0.003	<0.026	10-26-92	331	0.034±0.004	<0.008
05-03-92	283	0.022±0.004	<0.021	11-01-92	244	0.016±0.004	<0.011
05-10-92	283	0.017±0.003	<0.030	11-08-92	269	0.009±0.003	<0.025
05-17-92	286	0.019±0.003	<0.019	11-15-92	286	0.016±0.003	<0.009
05-24-92	283	0.015±0.003	<0.009	11-22-92	289	0.021±0.004	<0.016
05-31-92	289	0.018±0.003	<0.010	11-29-92	295	0.012±0.002	<0.015
06-07-92	272	0.012±0.003	<0.012	12-06-92	289	0.025±0.004	<0.012
06-14-92	275	0.019±0.003	<0.009	12-13-92	295	0.018±0.003	<0.010
06-21-92	244	0.009±0.003	<0.022	12-20-92	292	0.020±0.003	<0.011
06-28-92	275	0.012±0.002	<0.012	12-27-92	278	0.036±0.004	<0.010
2nd Qtr. mean ± s.d.		0.015±0.004	<0.038	4th Qtr. mean ± s.d.		0.020±0.008	<0.049

<sup>a</sup> Low volume due to sample pump failure.



# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 7SD - South Haven (7.5 miles NNE)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	178	0.028±0.005	<0.047	07-05-92	261	0.011±0.003	<0.009
01-12-92	255	0.027±0.004	<0.043	07-12-92	263	0.020±0.004	<0.018
01-19-92	278	<0.004 <sup>a</sup>	<0.028	07-19-92	261	0.011±0.003	<0.012
01-26-92	266	0.031±0.004	<0.039	07-26-92	269	0.014±0.003	<0.018
02-02-92	269	0.026±0.004	<0.039	08-02-92	263	0.012±0.003	<0.012
02-09-92	255	0.027±0.004	<0.039	08-09-92	263	0.012±0.002	<0.012
02-16-92	249	0.017±0.004	<0.044	08-16-92	263	0.014±0.003	<0.005
02-23-92	269	0.024±0.003	<0.039	08-23-92	263	0.015±0.003	<0.023
03-01-92	286	0.023±0.004	<0.037	08-30-92	283	0.014±0.003	<0.009
03-08-92	263	0.029±0.004	<0.043	09-06-92	249	0.023±0.004	<0.023
03-15-92	278	0.024±0.004	<0.033	09-13-92	266	0.015±0.003	<0.020
03-22-92	278	0.018±0.004	<0.034	09-20-92	269	0.023±0.004	<0.012
03-29-92	278	0.017±0.003	<0.030	09-27-92	269	0.014±0.004	<0.022
1st Qtr. mean ± s.d.		0.024±0.005	<0.047	3rd Qtr. mean ± s.d.		0.015±0.004	<0.023
04-05-92	278	0.013±0.004	<0.037	10-04-92	275	0.020±0.004	<0.014
04-12-92	283	0.018±0.002	<0.023	10-11-92	272	0.017±0.003	<0.012
04-19-92	275	0.017±0.004	<0.028	10-18-92	280	0.016±0.003	<0.013
04-26-92	278	0.011±0.003	<0.027	10-26-92	323	0.031±0.004	<0.008
05-03-92	278	0.021±0.004	<0.021	11-01-92	235	0.020±0.004	<0.011
05-10-92	278	0.017±0.003	<0.031	11-08-92	275	0.007±0.003	<0.024
05-17-92	275	0.023±0.003	<0.020	11-15-92	283	0.020±0.003	<0.017
05-24-92	278	0.018±0.003	<0.009	11-22-92	289	0.016±0.003	<0.007
05-31-92	286	0.014±0.003	<0.010	11-29-92	283	0.013±0.002	<0.009
06-07-92	272	0.016±0.004	<0.012	12-06-92	283	0.026±0.004	<0.012
06-14-92	269	0.020±0.003	<0.009	12-13-92	283	0.019±0.003	<0.010
06-21-92	258	0.013±0.003	<0.021	12-20-92	289	0.016±0.003	<0.011
06-28-92	272	0.013±0.002	<0.012	12-27-92	283	0.037±0.004	<0.010
2nd Qtr. mean ± s.d.		0.016±0.004	<0.037	4th Qtr. mean ± s.d.		0.020±0.008	<0.024

<sup>a</sup> Filter improperly installed.

# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 8SP - State Park (1 mile N)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	286	0.022±0.004	<0.029	07-05-92	263	0.020±0.004	<0.009
01-12-92	289	0.023±0.004	<0.038	07-12-92	263	0.020±0.004	<0.018
01-19-92	306	0.017±0.003	<0.026	07-19-92	266	0.012±0.003	<0.012
01-26-92	300	0.030±0.004	<0.035	07-26-92	272	0.012±0.003	<0.018
02-02-92	309	0.026±0.003	<0.034	08-02-92	263	0.014±0.004	<0.012
02-09-92	295	0.026±0.004	<0.034	08-09-92	263	0.016±0.002	<0.012
02-16-92	303	0.018±0.003	<0.036	08-16-92	263	0.017±0.004	<0.005
02-23-92	297	0.024±0.002	<0.035	08-23-92	266	0.020±0.004	<0.023
03-01-92	309	0.024±0.003	<0.034	08-30-92	283	0.016±0.003	<0.009
03-08-92	283	0.026±0.004	<0.040	09-06-92	252	0.026±0.004	<0.023
03-15-92	303	0.025±0.004	<0.030	09-13-92	275	0.014±0.003	<0.019
03-22-92	303	0.020±0.003	<0.031	09-20-92	258	0.025±0.004	<0.012
03-29-92	300	0.017±0.003	<0.028	09-27-92	269	0.011±0.004	<0.022
1st Qtr. mean ± s.d.		0.023±0.004	<0.040	3rd Qtr. mean ± s.d.		0.017±0.005	<0.023
04-05-92	292	0.011±0.003	<0.035	10-04-92	269	0.027±0.004	<0.014
04-12-92	295	0.017±0.002	<0.022	10-11-92	266	0.016±0.003	<0.012
04-19-92	297	0.014±0.003	<0.026	10-18-92	343	0.012±0.003	<0.011
04-26-92	292	0.012±0.003	<0.026	10-26-92	326 <sup>a</sup>	0.039±0.004	<0.008
05-03-92	292	0.023±0.004	<0.020	11-01-92	238	0.018±0.004	<0.011
05-10-92	289	0.016±0.003	<0.030	11-08-92	272	0.009±0.003	<0.025
05-17-92	275	0.021±0.003	<0.020	11-15-92	283	0.020±0.003	<0.017
05-24-92	278	0.017±0.003	<0.009	11-22-92	286	0.020±0.004	<0.007
05-31-92	286	0.018±0.003	<0.010	11-29-92	289	0.013±0.002	<0.009
06-07-92	269	0.016±0.004	<0.012	12-06-92	286	0.027±0.004	<0.012
06-14-92	272	0.017±0.003	<0.009	12-13-92	289	0.015±0.003	<0.010
06-21-92	241	0.009±0.003	<0.022	12-20-92	295	0.017±0.003	<0.011
06-28-92	269	0.014±0.002	<0.012	12-27-92	289	0.038±0.004	<0.010
2nd Qtr. mean ± s.d.		0.016±0.004	<0.035	4th Qtr. mean ± s.d.		0.021±0.009	<0.025

<sup>a</sup> Collection sheet data in error; corrected meter reading.

# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 9TP - Covert Township Park (1.5 miles S)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-05-92	286	0.030±0.004	<0.029	07-05-92	278	0.017±0.004	<0.008
01-12-92	295	0.023±0.004	<0.037	07-12-92	280	0.018±0.003	<0.017
01-19-92	303	0.020±0.003	<0.026	07-19-92	280 <sup>b</sup>	0.015±0.003	<0.011
01-26-92	300	0.031±0.004	<0.035	07-26-92	283	0.012±0.003	<0.017
02-02-92	312	0.028±0.004	<0.034	08-02-92	278	0.017±0.004	<0.011
02-09-92	297	0.024±0.003	<0.033	08-09-92	275	0.014±0.002	<0.011
02-16-92	303	0.022±0.003	<0.036	08-16-92	278	0.013±0.003	<0.005
02-23-92	300	0.024±0.002	<0.035	08-23-92	280	0.020±0.003	<0.022
03-01-92	312	0.020±0.003	<0.034	08-30-92	295	0.015±0.003	<0.008
03-08-92	286	0.027±0.004	<0.040	09-06-92	266	0.027±0.004	<0.022
03-15-92	297	0.016±0.003	<0.031	09-13-92	280	0.012±0.003	<0.019
03-22-92	306	0.020±0.003	<0.031	09-20-92	283	0.027±0.004	<0.011
03-29-92	306	<u>0.015±0.003</u>	<u>&lt;0.027</u>	<u>09-27-92</u>	<u>286</u>	<u>0.012±0.003</u>	<u>&lt;0.021</u>
1st Qtr. mean ± s.d.		0.023±0.005	<0.040	3rd Qtr. mean ± s.d.		0.017±0.005	<0.022
04-05-92	292	0.011±0.003	<0.035	10-04-92	289	0.024±0.004	<0.013
04-12-92	300	0.016±0.002	<0.022	10-11-92	283	0.018±0.003	<0.011
04-19-92	300	0.015±0.003	<0.026	10-18-92	286	0.015±0.003	<0.013
04-26-92	297	0.010±0.003	<0.025	10-26-92	337	0.034±0.004	<0.008
05-03-92	297	0.022±0.004	<0.020	11-01-92	246	0.015±0.004	<0.011
05-10-92	292	0.019±0.003	<0.030	11-08-92	280	0.008±0.003	<0.024
05-17-92	292	0.022±0.003	<0.019	11-09-92	292	0.024±0.003	<0.016
05-24-92	292	0.019±0.003	<0.009	11-22-92	292	0.021±0.004	<0.007
05-31-92	303	0.014±0.003	<0.009	11-29-92	300	0.011±0.002	<0.008
06-07-92	283	0.014±0.003	<0.011	12-06-92	289	0.025±0.004	<0.012
06-14-92	278	0.015±0.003	<0.009	12-13-92	300	0.016±0.003	<0.009
06-21-92	170 <sup>a</sup>	0.010±0.005	<0.032	12-20-92	297	0.022±0.003	<0.011
06-28-92	289	<u>0.013±0.002</u>	<u>&lt;0.011</u>	<u>12-27-92</u>	<u>303</u>	<u>0.005±0.002</u>	<u>&lt;0.009</u>
2nd Qtr. mean ± s.d.		0.015±0.004	<0.035	4th Qtr. mean ± s.d.		0.018±0.008	<<0.024

<sup>a</sup> 5 day collection; power out for two days.

# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 10GR - Grand Rapids (55 mi NNE)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-08-92	246	0.023±0.004	<0.010	07-08-92	280	0.012±0.003	<0.012
01-15-92	289	0.024±0.003	<0.054	07-15-92	283	0.010±0.003	<0.015
01-22-92	295	0.025±0.004	<0.045	07-22-92	278	0.016±0.003	<0.011
01-29-92	292	0.018±0.003	<0.049	07-29-92	272	0.018±0.003	<0.016
02-05-92	289	0.024±0.003	<0.047	08-05-92	278	0.014±0.004	<0.014
02-12-92	295	0.017±0.003	<0.051	08-12-92	283	0.016±0.004	<0.006
02-19-92	289	0.022±0.003	<0.046	08-19-92	283	0.017±0.003	<0.029
02-26-92	286	0.014±0.003	<0.033	08-26-92	272	0.020±0.004	<0.026
03-04-92	286	0.020±0.003	<0.047	09-02-92	275	0.015±0.003	<0.013
03-11-92	286	0.015±0.003	<0.044	09-09-92	272	0.012±0.004	<0.015
03-18-92	289	0.019±0.003	<0.034	09-16-92	272	0.022±0.004	<0.011
03-25-92	289	0.018±0.004	<0.038	09-23-92	269	0.016±0.004	<0.011
04-01-92	280	0.014±0.003	<0.053	09-30-92	280	0.016±0.003	<0.022
1st Qtr. mean ± s.d.		0.019±0.004	<0.053	3rd Qtr. mean ± s.d.		0.016±0.003	<0.029
04-08-92	280	0.016±0.003	<0.043	10-07-92	275	0.020±0.004	<0.017
04-15-92	201	0.023±0.004	<0.062	10-14-92	283	0.017±0.003	<0.017
04-22-92	280	0.006±0.003	<0.034	10-21-92	275	0.017±0.003	<0.015
04-29-92	289	0.010±0.003	<0.028	10-28-92	278	0.025±0.004	<0.031
05-06-92	283	0.016±0.003	<0.042	11-04-92	280	0.009±0.003	<0.014
05-13-92	286	0.017±0.003	<0.028	11-11-92	280	0.014±0.003	<0.024
05-20-92	286	0.017±0.003	<0.012	11-18-92	289	0.017±0.003	<0.009
05-27-92	289	0.020±0.003	<0.013	11-25-92	283	0.010±0.003	<0.013
06-04-92	323	0.018±0.003	<0.022	12-02-92	286	0.028±0.004	<0.019
06-10-92	238	0.016±0.004	<0.014	12-09-92	297	0.023±0.003	<0.013
06-17-92	269	0.023±0.004	<0.015	12-16-92	286	0.012±0.003	<0.011
06-24-92	280	0.016±0.003	<0.011	12-23-92	283	0.035±0.004	<0.014
07-01-92	278	0.018±0.004	<0.011	12-30-92	283	0.018±0.003	<0.015
2nd Qtr. mean ± s.d.		0.017±0.005	<0.062	4th Qtr. mean ± s.d.		0.019±0.007	<0.024

# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 11 KZ - Kalamazoo (35 miles E)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-08-92	255	0.031±0.004	<0.010	07-08-92	278	0.018±0.003	<0.012
01-16-92	337	0.024±0.003	<0.047	07-15-92	278	0.016±0.004	<0.015
01-22-92	266	0.031±0.004	<0.050	07-22-92	275	0.018±0.003	<0.011
01-29-92	292	0.029±0.004	<0.049	07-29-92	289	0.016±0.003	<0.015
02-05-92	300	0.026±0.003	<0.046	08-06-92	306	0.013±0.003	<0.013
02-12-92	309	0.019±0.003	<0.049	08-12-92	241	0.019±0.004	<0.008
02-19-92	295	0.020±0.003	<0.045	08-19-92	343	0.005±0.002 <sup>a</sup>	<0.024
02-26-92	300	0.021±0.003	<0.032	08-26-92	218	0.028±0.005	<0.033
03-04-92	295	0.025±0.004	<0.045	09-02-92	278	0.018±0.003	<0.013
03-11-92	278	0.015±0.003	<0.046	09-09-92	280	0.015±0.004	<0.014
03-20-92	399	0.023±0.003	<0.006	09-18-92	346	0.017±0.003	<0.008
03-25-92	221	0.024±0.004	<0.050	09-23-92	204	0.017±0.004	<0.015
04-01-92	286	<u>0.015±0.003</u>	<u>&lt;0.052</u>	<u>10-01-92</u>	<u>331</u>	<u>0.016±0.003</u>	<u>&lt;0.019</u>
1st Qtr. mean ± s.d.		0.023±0.005	<0.052	3rd Qtr. mean ± s.d.		0.017±0.005	<0.033
04-09-92	340	0.016±0.003	<0.035	10-07-92	252	0.026±0.004	<0.018
04-15-92	258	0.022±0.004	<0.048	10-14-92	292	0.021±0.002	<0.017
04-22-92	286	0.011±0.003	<0.033	10-21-92	303	0.021±0.003	<0.014
04-29-92	297	0.017±0.003	<0.028	10-28-92	286	0.039±0.004	<0.030
05-06-92	286	0.017±0.003	<0.042	11-04-92	300	0.018±0.003	<0.013
05-14-92	323	0.014±0.003	<0.025	11-11-92	348	0.014±0.003	<0.019
05-21-92	289	0.021±0.003	<0.012	11-18-92	252	0.019±0.004	<0.011
05-27-92	238	0.017±0.004	<0.016	11-25-92	303	0.014±0.003	<0.012
06-08-92	479	0.007±0.002	<0.006	12-02-92	295	0.009±0.002	<0.018
06-10-92	79	0.028±0.009	<0.042	12-09-92	323	0.020±0.003	<0.012
06-17-92	278	0.025±0.004	<0.014	12-16-92	295	0.016±0.003	<0.011
06-23-92	246	0.017±0.004	<0.012	12-23-92	300	0.036±0.004	<0.013
07-01-92	320	<u>0.021±0.003</u>	<u>&lt;0.010</u>	<u>12-30-92</u>	<u>312</u>	<u>0.025±0.003</u>	<u>&lt;0.014</u>
2nd Qtr. mean ± s.d.		0.018±0.006	<0.048	4th Qtr. mean ± s.d.		0.021±0.009	<0.030

<sup>a</sup> Disk placed off-center in filter holder.



# PALISADES

Table 1. Airborne particulates and iodine-131  
Collection: Weekly  
Units: pCi/m<sup>3</sup>  
Location: 12DG - Dowagiac (30 miles SSE)

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131	Date Collected	Volume (m <sup>3</sup> )	Gross Beta	I-131
01-06-92	413	0.034±0.003	<0.006	07-08-92	229	0.018±0.004	<0.015
01-08-92	71	0.045±0.012	<0.030	07-15-92	235	0.019±0.004	<0.016
01-15-92	246	0.029±0.004	<0.064	07-22-92	246	0.016±0.003	<0.012
01-22-92	255	0.037±0.005	<0.052	07-29-92	204	0.024±0.005	<0.021
01-29-92	249	0.027±0.004	<0.058	08-05-92	229	0.016±0.004	<0.017
02-05-92	249	0.028±0.004	<0.055	08-12-92	229	0.024±0.005	<0.008
02-12-92	252	0.022±0.004	<0.060	08-19-92	232	0.017±0.004	<0.035
02-19-92	244	0.024±0.004	<0.054	08-26-92	232	0.030±0.005	<0.031
02-26-92	244	0.020±0.004	<0.039	09-02-92	224	0.026±0.004	<0.016
03-04-92	244	0.028±0.004	<0.055	09-09-92	235	0.020±0.004	<0.017
03-11-92	244	0.024±0.004	<0.052	09-16-92	227	0.024±0.005	<0.013
03-18-92	246	0.023±0.004	<0.040	09-23-92	235	0.030±0.005	<0.013
03-25-92	249	0.026±0.004	<0.044	09-30-92	232	0.024±0.004	<0.027
04-01-92	241	0.016±0.004	<0.062				
1st Qtr. mean ± s.d.		0.027±0.007	<0.064	3rd Qtr. mean ± s.d.		0.022±0.005	<0.035
04-08-92	244	0.019±0.004	<0.049	10-07-92	232	0.032±0.005	<0.020
04-15-92	244	0.022±0.004	<0.051	10-14-92	235	0.026±0.004	<0.021
04-22-92	238	0.020±0.004	<0.040	10-21-92	241	0.029±0.004	<0.017
04-29-92	241	0.022±0.004	<0.034	10-28-92	232	0.048±0.005	<0.037
05-06-92	238	0.021±0.004	<0.050	11-04-92	232	0.018±0.004	<0.017
05-13-92	178	0.027±0.005	<0.045	11-11-92	238	0.017±0.004	<0.028
05-20-92	235	0.024±0.004	<0.015	11-19-92	207	0.028±0.004	<0.013
05-27-92	224	0.024±0.004	<0.017	11-25-92	224	0.021±0.004	<0.016
06-04-92	263	0.019±0.004	<0.027	12-02-92	224	0.032±0.004	<0.024
06-10-92	195	0.018±0.004	<0.017	12-09-92	229	0.031±0.004	<0.017
06-17-92	224	0.026±0.004	<0.018	12-16-92	224	0.023±0.004	<0.014
06-24-92	235	0.021±0.004	<0.013	12-23-92	249	0.052±0.005	<0.016
07-01-92	227	0.027±0.004	<0.014	12-30-92	269	0.033±0.004	<0.016
2nd Qtr. mean ± s.d.		0.022±0.003	<0.051	4th Qtr. mean ± s.d.		0.030±0.010	<0.037

# PALISADES

Table 2. Gamma Radiation, as measured by TLDs  
Exposure: Monthly  
Units: mR/30 days net<sup>a</sup>

	January	February	March
Date Placed	12-29-91	02-02-92	03-01-92
Date Removed	02-02-92	03-01-92	03-29-92
In-Transit (mR)	3.8±0.2	2.0±0.2	4.4±0.3
Location			
ST-01	3.2±0.3	4.6±0.2	3.8±0.5
ST-02	4.3±0.4	5.2±0.2	6.7±0.4
ST-03	3.9±0.3	4.4±0.3	5.2±0.8
ST-04	4.2±0.4	6.2±0.3	6.7±0.3
ST-05	3.9±0.4	4.5±0.3	5.6±0.6
ST-06	5.1±0.5	4.7±0.2	6.3±0.4
ST-07A	3.7±0.3	4.8±0.2	5.7±0.6
ST-08	3.7±0.4	4.4±0.2	2.9±0.3 <sup>e</sup>
ST-09	3.2±0.3	3.9±0.3	4.4±0.4
ST-10	5.6±0.5 <sup>b</sup>	5.0±0.2 <sup>c</sup>	4.0±0.7 <sup>f</sup>
ST-11	5.4±0.6 <sup>b</sup>	4.5±0.3 <sup>d</sup>	4.5±0.2 <sup>g</sup>
ST-12	3.8±0.5	5.0±0.2	5.0±0.6
ST-13	3.1±0.3	4.7±0.2	4.1±0.6
ST-14	2.3±0.2	3.6±0.2	3.4±0.5
ST-15	2.9±0.3	3.6±0.2	3.7±0.5
ST-16	2.0±0.3	4.0±0.2	2.7±0.3
ST-17	3.5±0.3	4.0±0.2	4.2±0.4
ST-18	3.0±0.3	4.4±0.2	4.3±0.7
ST-19	3.9±0.3	4.0±0.4	5.6±0.5
ST-20	3.5±0.2	4.0±0.2	5.0±0.9
ST-21	3.4±0.2	3.9±0.2	4.9±0.8
ST-22	2.2±0.2	2.1±0.2	3.0±0.3 <sup>h</sup>
ST-23	3.9±0.3	4.3±0.2	5.5±0.7
ST-24	3.4±0.3	3.5±0.2	4.1±0.4
ST-33	2.5±0.2	3.4±0.2	3.6±0.3
ST-34	2.7±0.3	3.5±0.2	3.2±0.5
ST-35	3.4±0.2	4.7±0.2	4.5±0.3
ST-36	2.6±0.2	3.6±0.2	5.2±0.3
ST-37	2.9±0.2	4.0±0.2	4.0±0.4
ST-38	2.4±0.3	3.7±0.2	3.4±0.4
Mean ± s.d.	3.4±0.9	4.2±0.7	4.5±1.1
Control 1	2.0±0.2	2.1±0.2	1.9±0.3 <sup>h</sup>
Control 2	1.9±0.2	2.2±0.2	1.9±0.3 <sup>h</sup>

<sup>a</sup> In-transit exposure has been subtracted from total exposure.

<sup>b</sup> Placed 01-02-92; removed 01-31-92.

<sup>c</sup> Placed 01-31-92; removed 02-26-92.

<sup>d</sup> Placed 01-31-92; removed 02-27-92.

<sup>e</sup> Placed 03-01-92; removed 04-15-92.

<sup>f</sup> Placed 02-26-92; removed 04-01-92.

<sup>g</sup> Placed 02-27-92; removed 04-15-92.

<sup>h</sup> Removed 04-01-92.

# PALISADES

Table 2. Gamma Radiation, as measured by TLDs (continued)  
Exposure: Monthly  
Units: mR/30 days net<sup>a</sup>

	<u>April</u>	<u>May</u>	<u>June</u>
Date Placed	03-29-92	05-03-92	05-30-92
Date Removed	05-03-92	05-30-92	06-28-92
In-Transit (mR)	3.8±0.2	4.3±0.2	4.1±0.2
Location			
ST-01	3.4±0.3	3.6±0.3	4.1±0.7
ST-02	4.8±0.2	5.5±1.0	5.9±0.4
ST-03	4.3±0.3	4.5±0.4	5.5±0.3
ST-04	4.5±0.3	5.2±0.3	5.1±0.3
ST-05	4.2±0.2	4.6±0.4	5.1±0.3
ST-06	4.9±0.2	5.3±0.6	5.4±0.3
ST-07A	3.8±0.2	4.0±0.4	5.3±0.2
ST-08	4.0±0.2	4.1±0.5	4.4±0.4
ST-09	3.4±0.2	3.6±0.3	4.0±0.5
ST-10	3.7±0.3 <sup>b</sup>	3.7±0.5 <sup>e</sup>	3.7±0.4 <sup>h</sup>
ST-11	4.7±0.4 <sup>c</sup>	ND <sup>f</sup>	4.6±0.3 <sup>h</sup>
ST-12	3.7±0.3	4.2±0.4	4.3±0.3
ST-13	3.6±0.3	3.3±0.4	3.9±0.5
ST-14	2.9±0.2	2.5±0.2	3.4±0.2
ST-15	3.0±0.2	3.1±0.3	3.9±0.3
ST-16	3.8±0.2	1.9±0.3	4.1±0.3
ST-17	3.8±0.5	3.0±0.3	4.0±0.2
ST-18	3.5±0.2	3.5±0.5	4.2±0.3
ST-19	3.7±0.3	4.0±0.3	4.7±0.3
ST-20	3.6±0.3	4.8±0.3	4.2±0.4
ST-21	3.6±0.3	3.3±0.3	4.2±0.4
ST-22	4.3±0.5	2.1±0.3	2.7±0.3
ST-23	4.0±0.2	4.4±0.3	4.5±0.3
ST-24	2.7±0.2	4.2±0.3	4.0±0.2
ST-33	3.3±0.2	3.0±0.3	ND <sup>g</sup>
ST-34	3.3±0.3	2.2±0.3	3.6±0.3
ST-35	4.4±0.3	4.0±0.3	4.4±0.3
ST-36	3.6±0.3	2.5±0.2	3.5±0.2
ST-37	3.2±0.2	3.2±0.3	4.0±0.5
ST-38	3.5±0.2	2.4±0.3	3.6±0.3
Mean ± s.d.	3.8±0.6	3.6±1.0	4.3±0.7
Control 1	2.3±0.2 <sup>d</sup>	ND <sup>g</sup>	2.1±0.2
Control 2	2.2±0.3 <sup>d</sup>	2.4±0.3	2.1±0.2

<sup>a</sup> In-transit exposure has been subtracted from total exposure.

<sup>b</sup> Placed 04-02-92; removed 04-29-92.

<sup>c</sup> Placed 04-01-92; removed 05-04-92.

<sup>d</sup> Placed 04-01-92; removed 05-03-92.

<sup>e</sup> Placed 04-29-92; removed 05-28-92.

<sup>f</sup> ND = no data; wrong TLD collected.

<sup>g</sup> ND = no data; TLD lost in the field.

<sup>h</sup> ND = placed 05-28-92; removed 07-1-92



## PALISADES

Table 2. Gamma Radiation, as measured by TLDs (continued)  
Exposure: Monthly Units: mR/30 days net<sup>a</sup>

	July	August	September
Date Placed	06-28-92	08-02-92	08-30-92
Date Removed	08-02-92	08-30-92	10-04-92
In-Transit (mR)	1.8±0.2	4.0±0.2	4.0±0.3
Location			
ST-01	4.3±0.2	4.5±0.4	3.5±0.3
ST-02	6.6±0.3	5.8±0.4	7.0±0.4
ST-03	5.0±0.3	4.9±0.3	4.7±0.4
ST-04	5.3±0.2	5.3±0.2	4.6±0.4
ST-05	5.3±0.3	5.0±0.3	5.0±0.6
ST-06	5.6±0.3	5.9±0.3	5.6±0.3
ST-07A	4.9±0.2	5.1±0.4	4.3±0.4
ST-08	5.3±0.3	4.8±0.4	4.1±0.3
ST-09	4.5±0.2	3.9±0.2	4.6±0.4
ST-10	5.3±0.3 <sup>b</sup>	4.6±0.3 <sup>d</sup>	ND <sup>c</sup>
ST-11	3.2±0.1 <sup>cg</sup>	5.2±0.2 <sup>e</sup>	5.2±0.5 <sup>f</sup>
ST-12	5.2±0.3	4.9±0.5	5.3±0.6
ST-13	4.1±0.2	4.2±0.3	3.6±0.3
ST-14	3.9±0.2	3.9±0.4	3.5±0.3
ST-15	4.0±0.3	4.4±0.4	3.7±0.4
ST-16	3.7±0.3	4.5±0.3	3.4±0.3
ST-17	4.3±0.3	4.6±0.3	3.9±0.3
ST-18	4.5±0.2	4.5±0.3	3.7±0.3
ST-19	5.2±0.2	4.8±0.3	4.3±0.3
ST-20	5.2±0.3	4.6±0.3	4.3±0.6
ST-21	4.7±0.3	4.7±0.3	4.4±0.3
ST-22	3.0±0.3	2.9±0.2	2.3±0.3
ST-23	5.4±0.3	5.4±0.2	5.3±0.5
ST-24	4.9±0.2	4.6±0.3	ND <sup>c</sup>
ST-33	4.9±0.3	4.2±0.2	3.4±0.3
ST-34	4.0±0.3	4.2±0.2	3.0±0.2
ST-35	5.3±0.2	5.2±0.4	4.3±0.4
ST-36	4.1±0.2	4.1±0.3	4.0±0.3
ST-37	4.1±0.2	3.7±0.3	3.9±0.4
ST-38	<u>3.8±0.2</u>	<u>4.2±0.3</u>	<u>3.7±0.3</u>
Mean ± s.d.	4.7±0.7	4.6±0.6	4.2±0.9
Control 1	1.3±0.2	2.0±0.2	0.9±0.3
Control 2	2.2±0.2	2.1±0.2	2.1±0.3

<sup>a</sup> In-transit exposure has been subtracted from total exposure.<sup>f</sup> Placed 09-02-92; removed 10-05-

<sup>b</sup> Placed 07-01-92; removed 07-31-92.

<sup>g</sup> TLD found. Placed 07-01-92; removed 10-05-92;

<sup>c</sup> ND= No Data, TLD lost in the field.

96 days in the field; result prorated for 30 days.

<sup>d</sup> Placed 7-31-92; removed 9-2-92.

<sup>e</sup> Placed 7-28-92; removed 9-2-92.

# PALISADES

Table 2. Gamma Radiation, as measured by TLDs (continued)  
Exposure: Monthly Units: mR/30 days net<sup>a</sup>

	<u>October</u>	<u>November</u>	<u>December</u>
Date Placed	10-04-92	11-01-92	11-29-92
Date Removed	11-01-92	11-29-92	01-03-93
In-Transit (mR)	3.6±0.2	4.2±0.2	5.2±0.2
Location			
ST-01	3.9±0.7	3.8±0.2	3.1±0.3
ST-02	4.4±0.3	5.5±0.3	4.9±0.2
ST-03	4.4±0.5	4.6±0.3	4.6±0.2
ST-04	4.0±0.3	5.2±0.3	4.9±0.2
ST-05	4.1±0.5	5.1±0.4	4.8±0.4
ST-06	4.5±0.3	5.4±0.2	4.6±0.3
ST-07A	4.1±0.4	4.0±0.2	4.6±0.2
ST-08	5.9±0.4	4.2±0.2	4.6±0.4
ST-09	4.4±0.4	3.7±0.2	3.9±0.2
ST-10	3.8±0.3 <sup>b</sup>	3.3±0.2 <sup>d</sup>	4.8±0.3 <sup>g</sup>
ST-11	4.7±0.4 <sup>c</sup>	4.7±0.3 <sup>e</sup>	5.5±0.4 <sup>g</sup>
ST-12	4.0±0.6	4.0±0.3	4.6±0.3
ST-13	3.3±0.3	4.4±0.3	3.8±0.2
ST-14	3.0±0.3	2.7±0.3	3.3±0.2
ST-15	3.1±0.3	3.9±0.3	3.7±0.2
ST-16	3.3±0.3	4.7±0.4	4.0±0.2
ST-17	2.9±0.2	4.1±0.2	3.3±0.3
ST-18	3.2±0.3	3.6±0.2	4.1±0.2
ST-19	3.5±0.3	5.0±0.3	4.3±0.4
ST-20	3.3±0.3	4.4±0.3	4.1±0.3
ST-21	3.5±0.3	4.2±0.2	4.2±0.3
ST-22	1.6±0.3	3.4±0.4	2.5±0.4
ST-23	4.4±0.4	4.9±0.4	3.4±0.3
ST-24	3.5±0.2	3.5±0.2	4.4±0.3
ST-33	4.2±0.4	3.9±0.3	4.7±0.3
ST-34	4.0±0.5	3.9±0.3	4.1±0.2
ST-35	3.9±0.2	4.4±0.3 <sup>f</sup>	4.3±0.2
ST-36	2.7±0.2	3.9±0.2	3.4±0.2
ST-37	4.2±0.4	4.4±0.4	3.4±0.2
ST-38	<u>3.0±0.2</u>	<u>4.0±0.3</u>	<u>3.7±0.2</u>
Mean ± s.d.	3.8±0.8	4.2±0.7 <sup>f</sup>	4.1±0.7
Control 1	1.8±0.3	2.5±0.3	2.1±0.3
Control 2	1.8±0.3	2.1±0.3	2.1±0.3

<sup>a</sup> In-transit exposure has been subtracted from total exposure.

<sup>b</sup> Placed 09-30-92; removed 10-30-92.

<sup>g</sup> Placed 11-30-92; removed 12-31-92.

<sup>c</sup> Placed 10-05-92; removed 10-29-92.

<sup>d</sup> Placed 10-30-92; removed 11-30-92.

<sup>e</sup> Placed 10-29-92; removed 11-30-92.

<sup>f</sup> Corrected data.

# PALISADES

Table 3. Gamma Radiation, as measured by TLDs  
Exposure: Quarterly  
Units: mR/91 days net<sup>a</sup>

	<u>1st Qtr.</u>	<u>2nd Qtr.</u>	<u>3rd Qtr.</u>	<u>4th Qtr.</u>
Date Placed	12-29-91	03-29-92	06-28-92	10-04-92
Date Removed	03-29-92	06-28-92	10-04-92	01-03-93
In-Transit (mR)	4.9±0.6	3.6±0.6	4.8±0.7	5.1±0.6
Location				
ST-01	12.6±0.8	11.9±0.6	12.9±0.7	10.9±0.7
ST-02	17.5±0.9	16.8±0.7	19.2±0.7	15.4±0.6
ST-03	13.6±0.7	13.3±0.6	15.3±0.6	12.9±0.7
ST-04	15.4±0.6	13.7±0.6	16.4±0.9	13.4±0.7
ST-05	15.0±0.6	13.6±0.6	16.2±0.8	12.9±0.7
ST-06	17.0±0.8	16.1±0.7	17.9±0.7	14.7±0.7
ST-07A	13.8±1.0	11.5±0.6	13.9±0.7	11.0±0.6
ST-08	10.7±0.6 <sup>b</sup>	11.5±0.7	13.2±0.8	11.4±0.6
ST-09	13.3±1.1	10.9±0.7	13.4±0.8	10.0±0.7
ST-10	12.6±1.1 <sup>b</sup>	11.1±0.6 <sup>d,e</sup>	ND <sup>g</sup>	10.8±0.7 <sup>i</sup>
ST-11	14.1±0.6 <sup>b</sup>	10.4±1.0 <sup>f</sup>	15.5±0.7 <sup>h</sup>	13.3±0.7 <sup>j</sup>
ST-12	13.0±0.7	12.7±0.6	14.0±0.7	12.1±0.7
ST-13	9.4±0.8	11.5±0.7	9.6±0.7	11.0±0.7
ST-14	10.7±0.7	10.5±0.6	11.3±0.6	10.0±0.6
ST-15	10.4±0.7	10.4±0.6	10.9±0.7	9.8±0.7
ST-16	10.1±0.8	10.8±0.6	11.0±0.6	10.9±0.6
ST-17	11.9±0.7	11.0±0.6	12.2±0.8	10.2±0.7
ST-18	12.0±0.7	10.6±0.7	12.6±0.7	10.0±0.7
ST-19	12.9±1.2	12.7±0.7	13.8±0.7	11.7±0.7
ST-20	12.2±0.7	12.1±0.6	13.2±0.7	11.3±0.6
ST-21	12.1±0.7	11.4±0.6	12.9±0.7	10.8±0.7
ST-22	6.7±0.7	6.2±0.6	6.2±0.8	5.7±0.7
ST-23	12.9±1.2	12.8±0.6	12.5±0.7	11.1±0.7
ST-24	12.1±0.7	11.2±0.7	ND <sup>g</sup>	11.1±0.7
ST-33	9.9±0.6	11.1±0.8	11.0±0.6	10.9±0.7
ST-34	10.0±0.6	10.7±0.7	10.6±0.7	10.9±0.6
ST-35	13.2±0.7	14.2±0.7	13.7±0.6	13.1±0.7
ST-36	9.6±0.7	11.4±0.7	9.9±0.7	10.8±0.7
ST-37	11.8±0.7	11.8±0.6	12.2±0.7	11.4±0.7
ST-38	10.1±0.8	11.0±0.7	10.3±0.8	10.1±0.7
Mean ± s.d.	12.2±2.3	11.8±1.9	12.9±2.7	11.3±1.8
Control 1	6.2±0.6	6.5±0.6 <sup>d</sup>	6.7±0.7	5.9±0.7
Control 2	3.6±0.7 <sup>c</sup>	6.5±0.7 <sup>d</sup>	4.0±0.7	5.8±0.7

<sup>a</sup> In-transit exposure has been subtracted from total exposure.

<sup>b</sup> Placed 01-02-92; removed 04-01-92.

<sup>c</sup> Unreliable reading; card appears to have been damaged.

<sup>d</sup> Placed 04-01-92.

<sup>e</sup> Removed 07-01-92.

<sup>f</sup> Placed 04-01-92; removed 05-28-92.

<sup>g</sup> ND = No Data; TLD lost in the field.

<sup>h</sup> Placed 07-01-92; removed 10-05-92.

<sup>i</sup> Placed 09-30-92; removed 12-31-92.

<sup>j</sup> Placed 10-05-92; removed 01-16-92.

## PALISADES

Table 4. Gamma Radiation, as measured by TLDs  
 Exposure: Yearly  
 Units: mR/365 days net<sup>a</sup>

Date Placed	12-29-91
Date Removed	01-03-93
In-Transit (mR)	2.3±2.5
Location	
ST-01	50.0±2.4
ST-02	69.9±2.6
ST-03	56.7±2.5
ST-04	58.1±2.4
ST-05	60.3±2.6
ST-06	66.4±2.6
ST-07A	52.6±2.5
ST-08	51.2±2.6
ST-09	47.9±2.6
ST-10	ND <sup>a</sup>
ST-11	56.4±2.6
ST-12	52.8±2.5
ST-13	46.8±2.5
ST-14	42.0±2.4
ST-15	42.6±2.7
ST-16	47.1±2.5
ST-17	44.3±2.5
ST-18	47.1±2.5
ST-19	51.4±2.5
ST-20	47.2±2.6
ST-21	52.5±2.5
ST-22	25.1±2.5
ST-23	56.4±2.4
ST-24	ND <sup>b</sup>
ST-33	ND <sup>b</sup>
ST-34	48.8±2.4
ST-35	59.0±2.4
ST-36	47.1±2.6
ST-37	48.8±2.6
ST-38	46.8±2.6
Mean ± s.d.	50.9±8.5
Control 1	24.6±2.4
Control 2	24.8±2.4

<sup>a</sup> In-transit exposure has been subtracted from total exposure.

<sup>b</sup> ND - TLD missing

<sup>c</sup> Placed 01-02-92; removed 01-06-93.

# PALISADES

Table 5. Lake Water, Intake and Discharge  
Collection: Monthly Composites of daily collections  
Units: pCi/L

1992 Compositing Period	Lab Code	Gross Alpha	Gross Beta	Tritium
<u>Required LLD</u>		<u>1.0</u>	<u>4.0</u>	<u>500</u>
<u>Intake</u>				
January	PALW-4454	<1.0	1.8±0.5	169±92
February	4770	<0.4	2.6±0.3	<180
March	5265	<0.3	2.2±0.3	<165
April	5621	<0.9	1.7±0.5	96±93
May	6015	<0.5	2.3±0.3	<170
June	6482	<0.8	2.4±0.5	155±88
July	6931	<0.3	1.9±0.3	<188
August	7275	<1.0	2.1±0.5	<185
September	7630	<0.4	2.0±0.3	<168
October	8165	0.8±0.3	2.6±0.3	103±91
November	8344	<0.1	2.0±0.6	183±91 <sup>b</sup>
December	8778	0.4±0.3	2.2±0.3	<164
<u>Discharge</u>				
January	PALW-4455	<0.9	2.4±0.6	144±91
February	4771	<0.4	2.2±0.3	<180
March	5266	<0.4	2.1±0.3	4701±199 <sup>a</sup>
April	5622	<0.9	2.2±0.6	132±67
May	6016	<0.5	2.2±0.3	148±90
June	6483	<0.2	2.6±0.5	2148±148
July	6932	<0.4	3.2±0.3	<188
August	7276	0.6±0.3	2.3±0.3	<185
September	7631	<0.4	2.1±0.3	3152±175
October	8166	0.6±0.3	2.7±0.3	<175
November	8345	<0.4	2.2±0.3	<176
December	8779	<0.4	2.0±0.3	3203±171

<sup>a</sup> Analysis was repeated; result of reanalysis 5028±147 pCi/L.

<sup>b</sup> Corrected data.

# PALISADES

Table 5. Lake Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Ludington Intake (Control)

Sample Description and Concentration					Required LLD
Date Collected Lab Code	01-31-92 PALW-4527	02-29-92 PALW-4822	03-31-92 PALW-5370	04-30-92 PALW-5670	
Gross Alpha	<1.0	<0.7	<0.4	<0.5	1.0
Gross Beta	2.1±0.5	1.4±0.6	1.9±0.3	2.0±0.3	4.0
Sr-89	<0.8	<0.7	<0.7	<1.0	5.0
Sr-90	<0.5	<0.5	<0.6	<0.6	1.0
H-3	188±93	96±93	103±88	<170	500
Date Collected Lab Code	05-31-92 PALW-6010	07-01-92 PALW-6467	07-31-92 PALW-6828	08-31-92 PALW-7428	
Gross Alpha	<0.3	<0.6	<0.5	<0.4	1.0
Gross Beta	1.4±0.3	1.9±0.5	1.6±0.3	2.2±0.3	4.0
Sr-89	<0.9	<0.9	<0.9	<0.7	5.0
Sr-90	<0.4	0.9±0.4	0.9±0.4	<0.5	1.0
H-3	<170	155±89	114±94	105±95	500
Date Collected Lab Code	09-30-92 PALW-7636	10-31-92 PALW-8115	11-30-92 PALW-8468	01-04-93 PALW-8981	
Gross Alpha	<0.5	0.8±0.4	<0.5	<0.4	1.0
Gross Beta	1.9±0.3	3.5±0.4	2.1±0.3	2.1±0.3	4.0
Sr-89	<0.9	<1.3	<0.8	<0.7	5.0
Sr-90	0.9±0.3	0.6±0.4	<0.5	<0.6	1.0
H-3	<178	<175	<176	<171	500

# PALISADES

Table 6. Lake Water, Drinking  
Collection: Monthly Composites of daily collections  
Units: pCi/L

1992 Compositing Period	South Haven Municipal System				
	Treated			Raw	
	Lab Code	Gross Beta	H-3	Lab Code	Gross Beta
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>		<u>4.0</u>
January	PALW-4460	2.3±0.6	158±91	PALW-4461	2.1±0.6
February	4773	1.3±0.6	<183	4774	1.6±0.6
March	5263	1.3±0.6	<165	5264	1.9±0.3
April	5619	2.2±0.6	125±94	5620	2.2±0.6
May	6012	1.7±0.5	<170	6013,4	2.1±0.4
June	6479,80	2.1±0.4	147±66	6481	2.2±0.5
July	6929	2.0±0.3	<188	6930	1.8±0.3
August	7127	2.0±0.5	174±95	7128	2.0±0.5
September	7831	2.6±0.5	<171	7832	2.0±0.5
October	8123	2.3±0.3	96±91	8124	1.8±0.6
November	8357	2.6±0.6	<168	8356	1.8±0.6
December	8874	2.4±0.4	<170	8873	2.4±0.4



# PALISADES

Table 7. Well Water  
Collection: Monthly  
Units: pCi/L

1992 Collection Period	Lab Code	Gross Beta	H-3	Lab Code	Gross Beta	H-3
<u>Required LLD</u>		<u>4.0</u>	<u>500</u>		<u>4.0</u>	<u>500</u>
	<u>Site Wells No. 2 and 3 (Domestic)</u>			<u>State Park</u>		
January	PAWW-4456	0.9±0.5	158±91	PAWW-4186,7	0.9±0.2	<180
February	4772	<0.9	<183	4457,8	1.2±0.4	181±64
March	5267,8	0.8±0.4	148±65	4775,6	0.8±0.2	83±66
April	5623	1.6±0.6	110±94	5255	1.1±0.7	<165
May	6017	1.0±0.5	260±95	5625,6	0.8±0.3	113±66
June	6484	1.2±0.5	340±101	6020	3.5±0.5	<171
July	6933	1.1±0.3	<185	6472	3.9±0.5	<167
August	7273	2.0±0.6	<185	6922	3.4±0.3	<181
September	7632,3	1.2±0.3	163±64	7272	2.3±0.3	<185
October	8167	1.2±0.6	<175	7829	3.5±0.5	<174
November	8347,8	1.2±1.0	<176	8126	<1.3	<176
December	8780	1.1±0.3	<164	8349	<1.0	178±89
	<u>Township Park</u>					
January	PAWW-4188	2.3±0.3	<180			
February	4459	2.3±0.6	146±90			
March	4777	3.4±0.3	111±96			
April	5256,7	2.2±0.5	<165			
May	5627	2.1±0.5	<170			
June	6021	1.8±0.5	<171			
July	6473	1.6±0.5	<167			
August	6923	1.8±0.3	<181			
September	7125	2.4±0.3	<185			
October	7830	1.7±0.5	<174			
November	8125	1.5±0.7	<168			
December	8350	2.5±0.6	<179			



# PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Ludington (Control)

Sample Description and Concentration					Required LLD
Date Collected	01-31-92	02-29-92	03-31-92	04-30-92	
Lab Code	PAWW-4528	FAWW-4823	PAWW-5371	PAWW-5671	
Gross Alpha	<0.5	<0.9	<0.5	<0.5	1.0
Gross Beta	<0.8	<0.9	<0.4	<0.4	4.0
Sr-89	<1.2	<0.8	<0.8	<1.0	5.0
Sr-90	<0.9	<0.6	<0.5	<0.6	1.0
H-3	160±92	<179	<170	<170	500
Date Collected	05-31-92	07-01-92	07-31-92	08-31-92	
Lab Code	PAWW-6011	PAWW-6468	PAWW-6829	PAWW-7429	
Gross Alpha	<0.5	0.6±0.3	<0.5	<0.6	
Gross Beta	<0.4	<1.0	<0.4	<0.4	
Sr-89	<1.2	<0.9	<0.8	<0.8	
Sr-90	<0.8	<0.6	<0.5	<0.4	
H-3	<170	<166	<180	<184	
Date Collected	09-30-92	10-31-92	11-30-92	01-04-93	
Lab Code	PAWW-7637	PAWW-8116	PAWW-8469	PAWW-8982	
Gross Alpha	<0.6	<0.6	<0.6	<0.6	1.0
Gross Beta	<0.4	0.8±0.3	<0.4	0.4±0.3	4.0
Sr-89	<1.1	<2.4	<0.9	<0.9	5.0
Sr-90	<0.5	<0.7	<0.5	<0.5	1.0
H-3	<168	<175	<176	<171	500

PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Warehouse (Site Well #7)

Sample Description and Concentration				Required LLD
Date Collected Lab Code	01-14-92 PAWW-4184	02-10-92 PAWW-4526	03-04-92 PAWW-4781	
Gross Beta	6.2±0.5 <sup>b</sup>	6.6±0.6 <sup>b</sup>	6.5±0.8 <sup>b</sup>	4.0
Sr-89	<0.9	<0.6	<0.5	5.0
Sr-90	1.3±0.5	1.6±0.5	1.5±0.4	1.0
H-3	<180	<168	<174	500
I-131	<0.3	<0.3	<0.3	1.0
Cs-134	<7.8	<4.1	<5.0	15.0
Cs-137	<6.9	<4.1	<4.1	18.0
Other Gammas <sup>a</sup>	<7.5	<5.4	<4.0	15.0
Date Collected Lab Code	04-06-92 PAWW-5261	05-05-92 PAWW-5631	06-08-92 PAWW-6025	
Gross Beta	6.2±1.0 <sup>b</sup>	5.4±1.0 <sup>b</sup>	6.4±0.9 <sup>b</sup>	4.0
Sr-89	<0.6	<0.7	<0.9	5.0
Sr-90	1.8±0.4	1.7±0.4	1.2±0.4	1.0
H-3	<165	<170	<171	500
I-131	<0.4	<0.4	<0.2	1.0
Cs-134	<4.5	<5.3	<5.1	15.0
Cs-137	<4.5	<5.2	<5.3	18.0
Other Gammas <sup>a</sup>	<4.8	<5.5	<5.0	15.0

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated at request of Palisades: results of reanalysis

PAWW-4184	6.1±0.9	PAWW-6025	6.9±0.9
4526	4.9±0.8		
4781	7.4±1.0		
5261	5.9±0.5		
5631	6.0±0.6		

# PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Warehouse (Site Well #7)

Sample Description and Concentration				Required LLD
Date Collected Lab Code	07-07-92 PAWW-6477	08-11-92 PAWW-6927	09-01-92 PAWW-7126	
Gross Beta	5.5±0.8 <sup>b</sup>	5.7±0.8 <sup>b</sup>	8.5±0.5 <sup>b</sup>	4.0
Sr-89	<1.3	<1.0	<0.9	5.0
Sr-90	2.1±0.5	1.9±0.5	1.5±0.4	1.0
H-3	<167	115±94	132±94	500
I-131	<0.3	<0.4	<0.5	1.0
Cs-134	<6.0	<2.2	<3.1	15.0
Cs-137	<6.5	<2.1	<5.2	18.0
Other Gammas <sup>a</sup>	<6.3	<2.2	<5.1	15.0
Date Collected Lab Code	10-06-92 PAWW-7627	11-21-92 PAWW-8121	12-02-92 PAWW-8352	
Gross Beta	5.5±0.8 <sup>b</sup>	5.4±0.8 <sup>b</sup>	0.9±0.6 <sup>b</sup>	4.0
Sr-89	<0.8	<0.9	<0.9	5.0
Sr-90	1.3±0.4	1.6±0.4	<0.5	1.0
H-3	<178	<180	<179	500
I-131	<1.7 <sup>c</sup>	<0.2	<0.3	1.0
Cs-134	<4.8	<5.2	<4.6	15.0
Cs-137	<4.1	<4.9	<4.8	18.0
Other Gammas <sup>a</sup>	<4.1	<5.3	<4.8	15.0
<sup>a</sup> See Introduction.				
<sup>b</sup> Analysis was repeated; result of reanalysis:				
	PAWW-6477	7.1±1.0	-7627	7.4±0.9
<sup>c</sup> LLD not reached due to delay in sample analysis.				
	-6927	6.6±1.0	-8121	6.2±0.9
	-7126	6.6±0.9	-8352	0.9±0.3

# PALISADES

Table 7. Well Water (continued)  
 Collection: Monthly  
 Units: pCi/L  
 Location: Outage Building (Site Wells # 11, 12 and 13)

Sample Description and Concentration				Required LLD
Date Collected Lab Code	01-14-92 PAWW-4185	02-05-92 PAWW-4451	03-04-92 PAWW-4782	
Gross Beta	1.0±0.3	<1.2	1.1±0.5	4.0
Sr-89	<0.7	<0.6	<0.5	5.0
Sr-90	<0.4	<0.5	<0.4	1.0
H-3	<180	240±93	<174	500
I-131	<0.3	<0.4	<0.3	1.0
Cs-134	<5.4	<3.3	<7.0	15.0
Cs-137	<4.5	<4.1	<6.4	18.0
Other Gammas <sup>a</sup>	<4.0	<3.8	<6.3	15.0

Date Collected Lab Code	04-06-92 PAWW-5262	05-05-92 PAWW-5632	06-08-92 PAWW-6026	
Gross Beta	1.0±0.5	1.3±0.7	<0.9	4.0
Sr-89	<0.7	<0.9	<0.8	5.0
Sr-90	<0.4	<0.5	<0.6	1.0
H-3	<165	110±94	<171	500
I-131	<0.3	<0.4	<0.2	1.0
Cs-134	<4.0	<6.3	<5.9	15.0
Cs-137	<3.7	<5.3	<5.3	18.0
Other Gammas <sup>a</sup>	<4.3	<7.9	<6.4	15.0

<sup>a</sup> See Introduction.

# PALISADES

Table 7. Well Water (continued)  
 Collection: Monthly  
 Units: pCi/L  
 Location: Outage Building (Site Wells # 11, 12 and 13)

Sample Description and Concentration				Required LLD
Date Collected Lab Code	07-07-92 PAWW-6478	08-11-92 PAWW-6928	09-09-92 PAWW-7271	
Gross Beta	<0.9	<0.9	<0.9	4.0
Sr-89	<1.5	<0.9	<1.5	5.0
Sr-90	<0.6	<0.4	<0.6	1.0
H-3	263±98	127±95	124±94	500
I-131	<0.3	<0.3	<0.4	1.0
Cs-134	<4.1	<1.8	<5.9	15.0
Cs-137	<4.2	<1.6	<5.0	18.0
Other Gammas <sup>a</sup>	<6.1	<1.6	<6.0	15.0
Date Collected Lab Code	10-06-92 PAWW-7826,7	11-18-92 PAWW-8122	12-02-92 PAWW-8351	
Gross Beta	<1.2	0.70±0.5	6.1±0.8 <sup>b</sup>	4.0
Sr-89	<1.0	<1.6	<0.8	5.0
Sr-90	<0.6	<0.8	1.9±0.5	1.0
H-3	<176	<180	<179	500
I-131	<0.7	<0.2	<0.2	1.0
Cs-134	<4.0	<4.3	<3.8	15.0
Cs-137	<4.1	<4.5	<3.3	18.0
Other Gammas <sup>a</sup>	<4.9	<4.2	<3.6	15.0

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated; result of reanalysis: PAWW-8351 6.7±0.9

# PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Site Well #14

Sample Description and Concentration				Required LLD
Date Collected Lab Code	01-14-92 PAWW-4181	02-10-92 PAWW-4525	03-04-92 PAWW-4778	
Gross Beta	6.5±0.5 <sup>b</sup>	4.1±0.8 <sup>b</sup>	5.9±0.8 <sup>b</sup>	4.0
Sr-89	<0.8	<0.6	<1.0	5.0
Sr-90	<0.5	<0.5	<0.5	1.0
H-3	<181	178±91	<174	500
Cs-134	<5.4	<6.6	<6.7	15.0
Cs-137	<4.4	<4.8	<5.8	18.0
Other Gammas <sup>a</sup>	<4.6	<4.0	<9.3	15.0
Date Collected Lab Code	04-06-92 PAWW-5258	05-05-92 PAWW-5628	06-08-92 PAWW-6022	
Gross Beta	4.5±0.7 <sup>b</sup>	3.9±0.9	3.3±0.7	4.0
Sr-89	<0.6	<0.9	<0.9	5.0
Sr-90	0.6±0.3	<0.5	<0.6	1.0
H-3	<165	<170	<171	500
Cs-134	<3.7	<4.6	<4.0	15.0
Cs-137	<3.8	<4.7	<4.0	18.0
Other Gammas <sup>a</sup>	<4.2	<4.1	<5.5	15.0

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated at request of Palisades: results of reanalysis

PAWW-4181	5.4±0.8	PAWW-5258	4.2±0.4
4525	3.6±0.9		
4778	4.0±0.8		



# PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Site Well #14

Sample Description and Concentration				Required LLD
Date Collected	07-07-92	08-11-92	09-09-92	
Lab Code	PAWW-6474	PAWW-6924	PAWW-7268	
Gross Beta	5.7±0.7 <sup>b</sup>	6.9±0.8 <sup>b</sup>	2.9±0.6	4.0
Sr-89	<0.8	<0.9	<1.7	5.0
Sr-90	<0.5	<0.4	<0.6	1.0
H-3	<167	178±95	185	500
Cs-134	<4.7	<4.7	<5.9	15.0
Cs-137	<4.4	<4.7	<6.0	18.0
Other Gammas <sup>a</sup>	<4.0	<4.2	<6.4	15.0
Date Collected	10-06-92	11-18-92	12-02-92	
Lab Code	PAWW-7828	PAWW-8117	PAWW-8353	
Gross Beta	1.6±0.7	1.3±0.9 <sup>c</sup>	11.2±1.0 <sup>b</sup>	4.0
Sr-89	<1.4	<1.0	<1.4	5.0
Sr-90	<0.7	<0.5	<0.6	1.0
H-3	<174	<178	<178	500
Cs-134	<5.0	<3.8	<4.9	15.0
Cs-137	<4.4	<3.8	<4.6	18.0
Other Gammas <sup>a</sup>	<4.8	<3.9	<5.3	15.0

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated; result of reanalysis: PAWW-6474 3.6±0.8

<sup>c</sup> Average of two repeated analysis. -6924 6.7±0.9  
-8353 11.6±0.9

# PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Site Well #15

Sample Description and Concentration				Required LLD
Date Collected Lab Code	01-14-92 PAWW-4182	02-05-92 PAWW-4449	03-04-92 PAWW-4779	
Gross Beta	3.8±0.4	5.0±0.9 <sup>b</sup>	5.6±0.8 <sup>b</sup>	4.0
Sr-89	<0.8	<0.7	<0.6	5.0
Sr-90	<0.5	<0.5	0.8±0.3	1.0
H-3	<181	<169	<174	500
Cs-134	<8.0	<6.2	<6.6	15.0
Cs-137	<7.0	<5.2	<6.4	18.0
Other Gammas <sup>a</sup>	<8.2	<4.9	<7.9	15.0
Date Collected Lab Code	04-06-92 PAWW-5259	05-05-92 PAWW-5629	06-08-92 PAWW-6023	
Gross Beta	5.0±0.9 <sup>b</sup>	3.3±0.8	5.1±0.8 <sup>b</sup>	4.0
Sr-89	<0.4	<0.9	<0.6	5.0
Sr-90	<0.4	0.9±0.4	<0.4	1.0
H-3	<165	<170	<171	500
Cs-134	<5.0	<4.2	<3.7	15.0
Cs-137	<4.8	<5.0	<3.9	18.0
Other Gammas <sup>a</sup>	<4.3	<5.9	<4.7	15.0

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated at request of Palisades: results of reanalysis

PAWW-4449	3.9±0.7	PAWW-6023	4.4±0.7
4779	4.8±0.8		
5259	4.8±0.4		

# PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Site Well #15

Sample Description and Concentration				Required LLD
Date Collected Lab Code	07-07-92 PAWW-6475	08-11-92 PAWW-6925	09-09-92 PAWW-7269	
Gross Beta	6.8±0.7 <sup>b</sup>	4.0±0.7	5.6±0.7 <sup>b</sup>	4.0
Sr-89	<1.4	<0.9	<1.0	5.0
Sr-90	0.9±0.4	<0.4	<0.5	1.0
H-3	<167	<188	<185	500
Cs-134	<4.3	<4.3	<6.3	15.0
Cs-137	<4.1	<4.1	<6.3	18.0
Other Gammas <sup>a</sup>	<4.3	<3.9	<7.4	15.0
Date Collected Lab Code	10-06-92 PAWW-7628	11-18-92 PAWW-8118	12-02-92 PAWW-8354	
Gross Beta	7.2±0.5 <sup>b</sup>	6.2±1.3 <sup>c</sup>	7.6±0.9 <sup>b</sup>	4.0
Sr-89	<1.2	<1.0	<1.1	5.0
Sr-90	0.8±0.4	<0.5	1.2±0.5	1.0
H-3	<178	<178	<179	500
Cs-134	<4.0	<5.9	<4.9	15.0
Cs-137	<4.2	<6.7	<5.1	18.0
Other Gammas <sup>a</sup>	<3.9	<6.4	<5.0	15.0

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated; result of reanalysis: PAWW-6475 6.0±0.8

<sup>c</sup> Average of two repeated analysis.  
-7269 3.5±0.6  
-7628 7.0±0.5  
-8354 6.8±0.5

# PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Site Well #16

Sample Description and Concentration				Required LLD
Date Collected Lab Code	01-14-92 PAWW-4183	02-05-92 PAWW-4450	03-04-92 PAWW-4780	
Gross Beta	5.3±0.4 <sup>b</sup>	4.2±0.8 <sup>b</sup>	5.2±0.7 <sup>b</sup>	4.0
Sr-89	<0.7	<0.7	<0.8	5.0
Sr-90	<0.5	<0.6	<0.6	1.0
H-3	<181	<169	<174	500
Cs-134	<6.1	<6.1	<6.4	15.0
Cs-137	<7.1	<6.6	<6.4	18.0
Other Gammas <sup>a</sup>	<7.8	<7.1	<7.8	15.0
Date Collected Lab Code	04-06-92 PAWW-5260	05-05-92 PAWW-5630	06-08-92 PAWW-6024	
Gross Beta	4.8±0.8 <sup>b</sup>	4.5±0.9 <sup>b</sup>	4.7±0.7 <sup>b</sup>	4.0
Sr-89	<0.6	<0.9	<0.7	5.0
Sr-90	<0.5	<0.6	<0.5	1.0
H-3	95±90	<170	<171	500
Cs-134	<3.5	<4.9	<3.9	15.0
Cs-137	<4.0	<4.0	<4.1	18.0
Other Gammas <sup>a</sup>	<4.9	<4.7	<4.4	15.0

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated at request of Palisades: results of reanalysis

PAWW-4183	3.7±0.7	PAWW-5630	3.7±0.5
4450	4.0±0.9	6024	3.6±0.4
4780	5.3±1.0		
5260	3.9±0.4		

PALISADES

Table 7. Well Water (continued)  
Collection: Monthly  
Units: pCi/L  
Location: Site Well #16

Sample Description and Concentration				Required LLD
Date Collected Lab Code	07-07-92 PAWW-6476	08-11-92 PAWW-6926	09-09-92 PAWW-7270	
Gross Beta	5.1±0.7 <sup>b</sup>	4.0±0.7	3.9±0.7	4.0
Sr-89	<1.7	<1.1	<0.9	5.0
Sr-90	<0.7	<0.5	<0.5	1.0
H-3	<167	<188	<185	500
Cs-134	<5.6	<2.1	<4.7	15.0
Cs-137	<5.8	<2.1	<5.6	18.0
Other Gammas <sup>a</sup>	<5.4	<2.2	<6.2	15.0
Date Collected Lab Code	10-06-92 PAWW-7629	11-21-92 PAWW-8119,20	12-02-92 PAWW-8355	
Gross Beta	4.5±0.7	5.3±1.0 <sup>b</sup>	4.6±0.8	4.0
Sr-89	<1.0	<0.9	<1.0	5.0
Sr-90	0.6±0.3	0.3±0.4	<0.7	1.0
H 3	<178	<168	<177	500
Cs-134	<4.6	<5.9	<3.7	15.0
Cs-137	<4.4	<6.0	<4.7	18.0
Other Gammas <sup>a</sup>	<4.4	<6.5	<3.8	15.0

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated; result of reanalysis: PAWW-6476 3.7±0.7  
-8119,20 5.0±1.0

# PALISADES

Table 8. In-Plant Water  
Collection: Monthly Composite  
Units: pCi/L  
Location: Turbine Sump

Sample Description and Concentration				Required LLD
Collection Period Lab Code	January PACW-4452	February PACW-4768	March PACW-5269	
Gross Alpha	<0.8	<0.3	<0.5	1.0
Gross Beta	2.0±0.5	2.5±0.3	3.6±0.3	1.0
Sr-89	<0.6	<0.8	<0.8	5.0
Sr-90	0.6±0.3	<0.6	<0.5	1.0
H-3	1466±134	1156±129	1505±133	500
Cs-137	<2.2	<2.6	<4.0	10
Other Gammas <sup>a</sup>	<2.2	<3.3	<3.6	10
Collection Period Lab Code	April PACW-5669	May PACW-6019	June PACW-6486	
Gross Alpha	<0.3	<0.4	1.0±0.4	1.0
Gross Beta	1.7±0.3	0.9±0.4	2.0±0.6	1.0
Sr-89	<1.0	<0.9	<1.5	5.0
Sr-90	<0.6	<0.5	<0.7	1.0
H-3	30301±337 <sup>b</sup>	9899±277	4782±204	500
Cs-137	<3.7	<2.2	<1.8	10
Other Gammas <sup>a</sup>	<4.0	<2.1	<1.8	10

<sup>a</sup> See Introduction.

<sup>b</sup> Analysis was repeated; result of reanalysis 33432±1961 pCi/L.

# PALISADES

Table 8. In-Plant Water  
Collection: Monthly Composite  
Units: pCi/L  
Location: Turbine Sump

Sample Description and Concentration				Required LLD
Collection Period Lab Code	July PACW-6935	August PACW-7277,8	September PACW-7635	
Gross Alpha	0.5±0.2	<0.3	0.5±0.2	1.0
Gross Beta	1.4±0.3	1.9±0.2	2.6±0.3	1.0
Sr-89	<1.5	<0.6	<1.0	5.0
Sr-90	<0.6	<0.3	<0.5	1.0
H-3	3227±178	2226±110	2115±152	500
Cs-137	<1.3	<2.6	<4.5	10
Other Gammas <sup>a</sup>	<1.4	<2.7	<4.4	10
Collection Period Lab Code	October PACW-8169,70	November PACW-8343	December PACW-8782	
Gross Alpha	0.5±0.1	<0.6	<0.2	1.0
Gross Beta	1.3±0.2	3.7±0.6	1.0±0.2	1.0
Sr-89	<1.8	<0.8	<0.9	5.0
Sr-90	<0.7	<0.5	<0.8	1.0
H-3	2436±111	2268±152	2375±153	500
Cs-137	<3.3	<4.2	<4.1	10
Other Gammas <sup>a</sup>	<3.8	<4.4	<4.2	10

<sup>a</sup> See Introduction.



# PALISADES

Table 8. In-Plant Water  
Collection: Monthly Composite  
Units: pCi/L  
Location: Service Water

Sample Description and Concentration				Required LLD
Collection Period Lab Code	January PACW-4453	February PACW-4769	March PACW-5270	
Gross Alpha	<0.7	<0.5	<0.6	1.0
Gross Beta	0.9±0.4	2.1±0.3	0.9±0.3	1.0
Sr-89	<0.8	<0.6	<0.8	5.0
Sr-90	<0.6	0.6±0.3	<0.5	1.0
H-3	120±90	<183	97±90	500
Cs-137	<1.9	<2.6	<3.2	10
Other Gammas <sup>a</sup>	<1.8	<2.6	<3.4	10
Collection Period Lab Code	April PACW-5624	May PACW-6018	June PACW-6485	
Gross Alpha	<0.4	<1.0	<0.7	1.0
Gross Beta	2.5±0.3	2.2±0.5	2.9±0.6	1.0
Sr-89	<1.0	<0.6	<1.1	5.0
Sr-90	1.2±0.4	0.5±0.2	<0.5	1.0
H-3	<170	167±91	208±96	500
Cs-137	<2.3	<2.1	<2.8	10
Other Gammas <sup>a</sup>	<2.6	<2.9	<2.6	10

<sup>a</sup> See Introduction.

# PALISADES

Table 8. In-Plant Water  
Collection: Monthly Composite  
Units: pCi/L  
Location: Service Water

Sample Description and Concentration				Required LLD
Collection Period Lab Code	July PACW-6934	August PACW-7274	September PACW-7634	
Gross Alpha	0.7±0.3	<0.4	<0.4	1.0
Gross Beta	2.1±0.3	2.3±0.3	2.7±0.3	1.0
Sr-89	<1.0	<0.9	<0.9	5.0
Sr-90	1.0±0.4	<0.5	<0.5	1.0
H-3	<188	<185	<178	500
Cs-137	<1.7	<3.3	<2.9	10
Other Gammas <sup>a</sup>	<2.1	<3.0	<3.0	10
Collection Period Lab Code	October PACW-8168	November PACW-8346	December PACW-8781	
Gross Alpha	<0.4	<0.4	<0.4	1.0
Gross Beta	2.3±0.3	2.3±0.3	2.3±0.3	1.0
Sr-89	<1.8	<1.2	<0.8	5.0
Sr-90	<0.6	<0.5	<0.7	1.0
H-3	<175	<166	<164	500
Cs-137	<4.5	<2.7	<3.7	10
Other Gammas <sup>a</sup>	<3.7	<3.0	<3.7	10

<sup>a</sup> See Introduction.

# PALISADES

Table 9. Milk  
Collection: Monthly  
Units: pCi/L  
Location: GH - Glen Hessey Farm

Sample Description and Concentration					Required LLD
Date Collected Lab Code	01-14-92 PAMI-7353	02-04-92 PAMI-7414	03-04-92 PAMI-7483	04-07-92 PAMI-7574	
I-131	<0.2	<0.2	<0.2	<0.3	1.0
Sr-89	<0.5	<0.6	<0.5	<0.6	5.0
Sr-90	3.1±0.6	2.6±0.5	2.0±0.5	3.4±0.6	1.0
K-40	1320±141	1260±110	1220±150	1340±150	—
Cs-134	<4.3	<4.4	<6.2	<6.7	15.0
Cs-137	<3.9	<4.7	<8.1	<7.0	18.0
Ba-La-140	<4.5	<5.1	<6.0	<8.0	15.0
Date Collected Lab Code	05-05-92 PAMI-7662	06-07-92 PAMI-7838	07-06-92 PAMI-8017	08-11-92 PAMI-8243	
I-131	<0.3	<0.3	<0.2	<0.5	1.0
Sr-89	<0.5	<1.0	<0.9	<1.6	5.0
Sr-90	2.8±0.5	2.5±0.7	2.8±0.6	3.8±1.2	1.0
K-40	1260±130	1390±120	1190±150	1320±100	—
Cs-134	<5.5	<4.2	<6.8	<4.3	15.0
Cs-137	<5.6	<4.6	<7.2	<4.4	18.0
Ba-La-140	<10.8	<7.1	<12.7	<11.3	15.0
Date Collected Lab Code	09-02-92 PAMI-8322	10-06-92 PAMI-8534	11-09-92 PAMI-8695	12-02-92 PAMI-8731	
I-131	<0.4	<0.4	<0.2	<0.2	1.0
Sr-89	<1.7	<0.9	<0.8	<0.9	5.0
Sr-90	3.4±0.9	2.8±0.6	3.4±0.6	3.1±0.7	1.0
K-40	1290±150	1250±140	1396±120	1380±160	—
Cs-134	<4.4	<4.9	<4.4	<3.6	15.0
Cs-137	<5.2	<5.3	<4.9	<5.3	18.0
Ba-La-140	<7.7	<10.1	<7.7	<7.1	15.0

## PALISADES

Table 9. Milk  
 Collection: Monthly  
 Units: pCi/L  
 Location: KK - Kenneth Kemp Farm

Sample Description and Concentration					Required LLD
Date Collected Lab Code	01-13-92 PAMI-7355	02-03-92 PAMI-7412,3	03-04-92 PAMI-7479,80	04-07-92 PAMI-7575	
I-131	<0.2	<0.2	<0.2	<0.3	1.0
Sr-89	<0.5	<0.6	<0.5	<0.6	5.0
Sr-90	4.8±0.7	3.2±0.4	2.5±0.3	2.9±0.7	1.0
K-40	1240±140	1300±100	1280±70	1240±150	—
Cs-134	<6.0	<7.1	<4.1	<6.7	15.0
Cs-137	<7.6	<7.5	<4.2	<8.1	18.0
Ba-La-140	<8.8	<8.2	<5.7	<8.9	15.0
Date Collected Lab Code	05-04-92 PAMI-7665	06-05-92 PAMI-7835	07-06-92 PAMI-8014	08-11-92 PAMI-8246	
I-131	<0.2	<0.3	<0.3	<0.5	1.0
Sr-89	<0.6	<0.8	<0.8	<1.1	5.0
Sr-90	2.8±0.6	2.0±0.7	3.0±0.6	2.9±0.6	1.0
K-40	1270±110	1130±140	1400±160	1170±110	—
Cs-134	<5.2	<4.6	<6.2	<4.9	15.0
Cs-137	<5.6	<5.7	<7.3	<5.0	18.0
Ba-La-140	<9.8	<10.5	<8.9	<13.4	15.0
Date Collected Lab Code	09-02-92 PAMI-8320	10-05-92 PAMI-8531	11-09-92 PAMI-8693	12-02-92 PAMI-8729	
I-131	<0.4	<0.3	<0.2	<0.2	1.0
Sr-89	<1.6	<0.8	<0.9	<0.8	5.0
Sr-90	2.4±1.1	2.3±0.6	4.0±0.7	2.7±0.6	1.0
K-40	1210±150	1330±130	1287±142	1380±130	—
Cs-134	<4.4	<8.4	<3.6	<5.9	15.0
Cs-137	<6.0	<6.1	<5.5	<6.9	18.0
Ba-La-140	<8.6	<9.5	<10.5	<9.7	15.0

# PALISADES

Table 9. Milk  
Collection: Monthly  
Units: pCi/L  
Location: WS - William Shine Farm

Sample Description and Concentration					Required LLD
Date Collected Lab Code	01-14-92 PAMI-7352	02-04-92 PAMI-7415	03-04-92 PAMI-7482	04-07-92 PAMI-7572	
I-131	<0.2	<0.2	<0.2	<0.3	1.0
Sr-89	<0.5	<0.8	<0.6	<0.5	5.0
Sr-90	2.4±0.5	2.0±0.5	2.4±0.5	1.5±0.5	1.0
K-40	1220±140	1300±160	1240±110	1390±140	—
Cs-134	<5.0	<5.3	<4.8	<4.9	15.0
Cs-137	<5.1	<5.2	<4.7	<6.0	18.0
Ba-La-140	<4.6	<6.0	<5.6	<4.7	15.0
Date Collected Lab Code	05-05-92 PAMI-7663	06-07-92 PAMI-7837	07-06-92 PAMI-8016	08-11-92 PAMI-8244	
I-131	<0.2	<0.3	<0.3	<0.4	1.0
Sr-89	<0.5	<0.9	<1.3	<0.9	5.0
Sr-90	1.5±0.4	2.3±0.8	2.0±0.8	2.5±0.7	1.0
K-40	1140±150	1360±110	1200±150	1380±120	—
Cs-134	<7.0	<5.0	<6.7	<5.3	15.0
Cs-137	<6.5	<4.8	<7.0	<6.4	18.0
Ba-La-140	<13.8	<7.8	<7.1	<14.0	15.0
Date Collected Lab Code	09-02-92 PAMI-8321	10-06-92 PAMI-8533	11-09-92 PAMI-8694	12-02-92 PAMI-8730	
I-131	<0.4	<0.4	<0.2	<0.2	1.0
Sr-89	<0.8	<0.9	<1.2	<0.8	5.0
Sr-90	3.1±0.7	1.8±0.5	2.9±0.6	2.7±0.6	1.0
K-40	1180±140	1190±140	1417±107	1420±160	—
Cs-134	<5.5	<4.2	<4.0	<4.2	15.0
Cs-137	<5.6	<5.5	<4.8	<5.6	18.0
Ba-La-140	<11.7	<8.1	<9.5	<7.0	15.0

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Table 9. Milk  
Collection: Monthly  
Units: pCi/L  
Location: FC - Frank Crnkovich Farm

Sample Description and Concentration					Required LLD
Date Collected Lab Code	01-14-92 PAMI-7354	02-04-92 PAMI-7416	03-04-92 PAMI-7481	04-07-92 PAMI-7573	
I-131	<0.2	<0.2	<0.3	<0.3	1.0
Sr-89	<0.5	<0.7	<0.8	<0.5	5.0
Sr-90	3.9±0.6	3.5±0.5	2.3±0.5	2.4±0.5	1.0
K-40	1280±100	1180±120	1120±130	1160±100	—
Cs-134	<3.4	<5.2	<4.5	<4.6	15.0
Cs-137	<4.6	<5.6	<5.4	<4.4	18.0
Ba-La-140	<4.0	<5.7	<4.9	<3.9	15.0
Date Collected Lab Code	05-05-92 PAMI-7664	06-07-92 PAMI-7836	07-06-92 PAMI-8015	08-11-92 PAMI-8245	
I-131	<0.2	<0.3	<0.2	<0.5	1.0
Sr-89	<0.6	<0.8	<0.8	<1.0	5.0
Sr-90	2.2±0.5	3.5±1.0	4.0±0.6	2.9±0.7	1.0
K-40	1160±120	1300±110	1440±160	1340±50	—
Cs-134	<5.6	<3.8	<6.8	<1.6	15.0
Cs-137	<5.6	<4.4	<6.9	<1.8	18.0
Ba-La-140	<8.6	<6.7	<10.7	<10.7	15.0
Date Collected Lab Code	09-02-92 PAMI-8323	10-06-92 PAMI-8532	11-09-92 PAMI-8696	12-02-92 PAMI-8732	
I-131	<0.4	<0.3	<0.2	<0.2	1.0
Sr-89	<1.1	<0.9	<0.8	<0.6	5.0
Sr-90	3.8±1.1	3.4±0.8	6.3±0.8	5.6±0.8	1.0
K-40	1020±140	1410±160	1006±121	1560±130	—
Cs-134	<4.4	<6.4	<3.6	<3.8	15.0
Cs-137	<5.8	<6.9	<5.0	<5.1	18.0
Ba-La-140	<6.0	<11.0	<7.7	<4.3	15.0

## PALISADES

Table 10. Food Crops. Collection: Semiannually at time of harvest. Units: pCi/g wet

Sample Description and Concentration					Required LLD
Location	Jerry Sarno Farm	Jerry Sarno Farm	Jerry Sarno Farm	Jerry Sarno Farm	
Date Collected	08-24-92	08-24-92	08-24-92	08-24-92	
Sample Collected	Peaches	Pears	Apples	Plums	
Lab Code	PAVE-1422	PAVE-1423	PAVE-1424	PAVE-1425	
Gross Beta	1.43±0.06	0.99±0.04	0.62±0.02	1.60±0.07	1.0
Sr-89	<0.002	<0.001	<0.001	<0.003	0.025
Sr-90	0.002±0.001	<0.001	0.002±0.001	<0.002	0.005
I-131	<0.031	<0.019	<0.028	<0.026	0.06
Mn-54	<0.016	<0.012	<0.019	<0.014	0.08
Co-58	<0.018	<0.013	<0.018	<0.014	0.08
Co-60	<0.015	<0.012	<0.021	<0.013	0.05
Fe-59	<0.038	<0.036	<0.041	<0.028	0.1
Zn-65	<0.043	<0.026	<0.042	<0.028	0.1
Zr-Nb-95	<0.030	<0.019	<0.026	<0.023	0.1
Cs-134	<0.018	<0.010	<0.013	<0.014	0.08
Cs-137	<0.017	<0.012	<0.015	<0.012	0.08
Ba-La-140	<0.022	<0.011	<0.028	<0.016	0.1
Location	Jerry Sarno Farm	Paul Rood Farm	Paul Rood Farm	Paul Rood Farm	
Date Collected	08-26-92	09-09-92	09-15-92	09-15-92	
Sample Collected	Blueberries	Blueberries	Apples	Plums	
Lab Code	PAVE-1468	PAVE-1478	PAVE-1479	PAVE-1480	
Gross Beta	0.68±0.02	0.67±0.03	0.35±0.02	1.57±0.06	1.0
Sr-89	<0.002	<0.003	<0.004	<0.002	0.025
Sr-90	0.003±0.001	0.004±0.001	<0.001	<0.001	0.005
I-131	<0.033	<0.059	<0.056	<0.039	0.06
Mn-54	<0.008	<0.008	<0.010	<0.012	0.08
Co-58	<0.009	<0.008	<0.012	<0.012	0.08
Co-60	<0.007	<0.007	<0.010	<0.017	0.05
Fe-59	<0.020	<0.022	<0.027	<0.030	0.1
Zn-65	<0.016	<0.016	<0.024	<0.032	0.1
Zr-Nb-95	<0.016	<0.015	<0.020	<0.024	0.1
Cs-134	<0.006	<0.005	<0.011	<0.011	0.08
Cs-137	<0.008	<0.007	<0.010	<0.012	0.08
Ba-La-140	<0.020	<0.015	<0.027	<0.039	0.1



## PALISADES

Table 10. Food Crops. Collection: Semiannually at time of harvest. Units: pCi/g wet

Sample Description and Concentration			Required LLD
Location	Paul Rood Farm	Jerry Sarno Farm	
Date Collected	09-15-92	10-06-92	
Sample Collected	Pears	Grapes	
Lab Code	PAVE-1481,2	PAVE-1511	
Gross Beta	0.88±0.02	1.77±0.08	1.0
Sr-89	<0.003 <sup>a</sup>	<0.002	0.025
Sr-90	0.002±0.001 <sup>a</sup>	0.003±0.001	0.005
I-131	<0.054	<0.015	0.06
Mn-54	<0.008	<0.014	0.08
Co-58	<0.010	<0.013	0.08
Co-60	<0.008	<0.016	0.05
Fe-59	<0.029	<0.035	0.1
Zn-65	<0.018	<0.039	0.1
Zr-Nb-95	<0.017	<0.026	0.1
Cs-134	<0.006	<0.012	0.08
Cs-137	<0.007	<0.014	0.08
Ba-La-140	<0.034	<0.021	0.1
Location			
Date Collected			
Sample Collected			
Lab Code			
Gross Beta			1.0
Sr-89			0.025
Sr-90			0.005
I-131			0.06
Mn-54			0.08
Co-58			0.08
Co-60			0.05
Fe-59			0.1
Zn-65			0.1
Zr-Nb-95			0.1
Cs-134			0.08
Cs-137			0.08
Ba-La-140			0.1

NOTE: Page 47 is intentionally left out.

<sup>a</sup> Result of single analysis; not enough sample to duplicate.

# PALISADES

Table 11. Fish  
Collection: Semiannually  
Units: pCi/g wet

Sample Description and Concentration						Required LLD
Ludington Pumped Storage Plant (Control)						
Location						
Date Collected	07-28-92	07-28-92	07-28-92	07-28-92	07-28-92	
Sample Type	Shiners	Sucker	Alewives	Brown Trout	Perch	
Lab Code	PAF-1830	PAF-1831	PAF-1832	PAF-1833	PAF-1834	
Gross Beta	2.17±0.12	2.99±0.11	2.41±0.12	3.00±0.09	1.57±0.13	1.0
Sr-89	<0.006	<0.008	<0.002	<0.007	<0.007	0.025
Sr-90	0.007±0.002	<0.004	<0.001	<0.003	0.007±0.002	0.005
Mn-54	<0.012	<0.016	<0.017	<0.014	<0.020	0.13
Co-58	<0.023	<0.030	<0.027	<0.026	<0.030	0.13
Co-60	<0.011	<0.016	<0.016	<0.009	<0.020	0.13
Fe-59	<0.072	<0.094	<0.094	<0.11	<0.12	0.26
Zn-65	<0.039	<0.049	<0.045	<0.037	<0.049	0.26
Zr-Nb-95	<0.050	<0.053	<0.054	<0.041	<0.062	0.1
Cs-134	<0.012	<0.015	<0.018	<0.011	<0.015	0.13
Cs-137	<0.010	<0.014	<0.015	0.058±0.019	0.035±0.015	0.15
Ba-La-140	<0.012 <sup>a</sup>	<0.013 <sup>a</sup>	<0.013 <sup>a</sup>	<0.011 <sup>a</sup>	<0.016 <sup>a</sup>	0.1
Ludington Pumped Storage Plant (Control)						
Location						
Date Collected	07-28-92	11-06-92	11-06-92	11-06-92	11-06-92	
Sample Type	Perch	Rainbow Trout	Rainbow Trout	Sucker	Brown Trout	
Lab Code	PAF-1835,6	PAF-1958	PAF-1959	PAF-1960	PAF-1961,2	
Gross Beta	3.13±0.10	2.83±0.10	3.81±0.12	2.71±0.10	3.77±0.11	1.0
Sr-89	<0.008 <sup>b</sup>	<0.006	<0.004	<0.005	<0.005 <sup>b</sup>	0.025
Sr-90	0.008±0.003 <sup>b</sup>	<0.002	<0.002	<0.002	<0.002 <sup>b</sup>	0.005
Mn-54	<0.019	<0.009	<0.025	<0.007	<0.006	0.13
Co-58	<0.026	<0.011	<0.030	<0.010	<0.007	0.13
Co-60	<0.015	<0.010	<0.023	<0.008	<0.007	0.13
Fe-59	<0.10	<0.035	<0.080	<0.028	<0.022	0.26
Zn-65	<0.037	<0.023	<0.054	<0.020	<0.016	0.26
Zr-Nb-95	<0.049	<0.022	<0.060	<0.017	<0.014	0.1
Cs-134	<0.013	<0.008	<0.020	<0.007	<0.006	0.13
Cs-137	0.070±0.013	0.040±0.006	<0.021	0.014±0.005	0.075±0.016	0.15
Ba-La-140	<0.010 <sup>a</sup>	<0.087	<0.1	<0.073	<0.052	0.1

<sup>a</sup> LLD at time of counting.

<sup>b</sup> Result of single analysis; not enough sample to duplicate.

## PALISADES

Table 11. Fish (continued)

Sample Description and Concentration				Required LLD
Location	<u>Palisades Discharge</u>			
Date Collected	07-15-92	07-15-92	07-15-92	
Sample Type	Carp	Steelhead	Shad	
Lab Code	PAF-1799	PAF-1800	PAF-1801	
Gross Beta	2.05±0.07	1.82±0.08	2.08±0.10	1.0
Sr-89	<0.007	<0.008	<0.014	0.025
Sr-90	<0.003	<0.004	<0.005	0.005
Mn-54	<0.026	<0.020	<0.030	0.13
Co-58	<0.025	<0.030	<0.037	0.13
Co-60	<0.028	<0.028	<0.035	0.13
Fe-59	<0.087	<0.074	<0.095	0.26
Zn-65	<0.072	<0.064	<0.060	0.26
Zr-Nb-95	<0.050	<0.048	<0.032	0.1
Cs-134	<0.023	<0.020	<0.026	0.13
Cs-137	<0.031	0.052±0.018	<0.030	0.15
Ba-La-140	<0.067	<0.10	<0.049	0.1
Location	<u>Palisades Discharge</u>			
Date Collected	07-15-92	07-15-92	07-15-92	
Sample Type	Sucker	Freshwater Drum	Shiners	
Lab Code	PAF-1802	PAF-1803	PAF-1804	
Gross Beta	2.40±0.09	2.31±0.09	1.92±0.10	1.0
Sr-89	<0.012	<0.006	<0.020	0.025
Sr-90	<0.005	<0.002	0.007±0.005	0.005
Mn-54	<0.028	<0.022	<0.023	0.13
Co-58	<0.033	<0.026	<0.029	0.13
Co-60	<0.040	<0.028	<0.023	0.13
Fe-59	<0.083	<0.083	<0.062	0.26
Zn-65	<0.065	<0.056	<0.053	0.26
Zr-Nb-95	<0.060	<0.041	<0.047	0.1
Cs-134	<0.028	<0.021	<0.020	0.13
Cs-137	<0.027	<0.027	<0.020	0.15
Ba-La-140	<0.053	<0.10	<0.098	0.1

NOTE: Page 50 is intentionally left out.

# PALISADES

Table 11. Fish (continued)

Sample Description and Concentration					Required LLD
Location	<u>Palisades Discharge</u>				
Date Collected	10-28-92	10-28-92	10-28-92	10-28-92	
Sample Type	Lake Trout	White Sucker	Steelhead	Coho Salmon	
Lab Code	PAF-1947	PAF-1948	PAF-1949	PAF-1950	
Gross Beta	2.86±0.10	2.52±0.09	2.90±0.13	2.79±0.09	1.0
Sr-89	<0.012	<0.003	<0.004	<0.004	0.025
Sr-90	0.007±0.004	<0.004	<0.003	<0.002	0.005
Mn-54	<0.009	<0.010	<0.008	<0.007	0.13
Co-58	<0.011	<0.012	<0.010	<0.009	0.13
Co-60	<0.010	<0.010	<0.008	<0.007	0.13
Fe-59	<0.028	<0.029	<0.026	<0.022	0.26
Zn-65	<0.026	<0.028	<0.021	<0.020	0.26
Zr-Nb-95	<0.021	<0.020	<0.018	<0.016	0.1
<sup>134</sup> Sr	<0.009	<0.008	<0.008	<0.008	0.13
<sup>137</sup> Sr	0.082±0.009	<0.009	0.050±0.006	0.057±0.006	0.15
Ba-La-140	<0.029	<0.031	<0.027	<0.020	0.1
Date Collected	10-28-92				
Sample Type	Walleye				
Lab Code	PAF-1951				
Gross Beta	0.93±0.06				1.0
Sr-89	<0.006				0.025
Sr-90	0.004±0.002				0.005
Mn-54	<0.016				0.13
Co-58	<0.019				0.13
Co-60	<0.017				0.13
Fe-59	<0.043				0.26
Zn-65	<0.043				0.26
Zr-Nb-95	<0.033				0.1
Cs-134	<0.018				0.13
Cs-137	<0.016				0.15
Ba-La-140	<0.048				0.1

## PALISADES

Table 12. Algae  
Collection: Semiannually  
Units : pCi/g wet

Sample Description and Concentration			Required LLD
Location	<u>Ludington (Control)</u>		
Date Collected	07-28-92	11-05-92	
Lab Code	PASL-338	PASL-363	
Gross Beta	3.88±0.44	1.30±0.13	1.0
Sr-89	<0.018	<0.008	0.025
Sr-90	<0.005	0.0087±0.0024	0.005
Mn-54	<0.021	<0.031	0.13
Co-58	<0.022	<0.039	0.13
Co-60	<0.020	<0.034	0.13
Fe-59	<0.055	<0.093	0.26
Zn-65	<0.050	<0.071	0.26
Zr-Nb-95	<0.041	<0.056	0.1
Cs-134	<0.018	<0.028	0.13
Cs-137	<0.018	<0.029	0.15
Ba-La-140	<0.058	<0.032 <sup>a</sup>	0.1
Location	<u>Palisades Discharge</u>		
Date Collected			
Lab Code			
Gross Beta			1.0
Sr-89			0.025
Sr-90			0.005
Mn-54			0.13
Co-58			0.13
Co-60			0.13
Fe-59			0.26
Zn-65			0.26
Zr-Nb-95			0.1
Cs-134			0.13
Cs-137			0.15
Ba-La-140			0.1

<sup>a</sup> LLD at time of counting.

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Table 13. Bottom Sediments  
Collection: Semiannually  
Units: pCi/g dry

Sample Description and Concentration				Required LLD
Location	<u>Ludington (Control)</u>			
Date Collected	07-28-92	11-06-92	11-06-92	
Lab Code	PABS-1167	PABS-1245	PABS-1246	
Gross Beta	4.64±2.71	12.06±1.38	11.84±1.46	1.0
Sr-89	<0.008	<0.011	<0.010	0.025
Sr-90	<0.004	<0.004	<0.005	0.005
Mn-54	<0.007	<0.014	<0.011	0.08
Co-58	<0.010	<0.018	<0.016	0.08
Co-60	<0.009	<0.018	<0.014	0.05
Fe-59	<0.029	<0.054	<0.045	0.1
Zn-65	<0.017	<0.033	<0.028	0.1
Zr-Nb-95	<0.017	<0.033	<0.030	0.1
Cs-134	<0.005	<0.011	<0.009	0.15
Cs-137	0.12±0.008	0.025±0.012	0.029±0.009	0.18
Ba-La-140	<0.045	<0.099	<0.083	0.1
Location	<u>South Haven</u>			
Date Collected	07-15-92	10-28-92		
Lab Code	PABS-1153	PABS-1226		
Gross Beta	7.78±1.43	8.49±1.77		1.0
Sr-89	<0.012	<0.012		0.025
Sr-90	<0.004	<0.004		0.005
Mn-54	<0.006	<0.007		0.08
Co-58	<0.009	<0.008		0.08
Co-60	<0.008	<0.010		0.05
Fe-59	<0.032	<0.024		0.1
Zn-65	<0.018	<0.020		0.1
Zr-Nb-95	<0.018	<0.015		0.1
Cs-134	<0.005	<0.007		0.15
Cs-137	0.019±0.005	<0.006		0.18
Ba-La-140	<0.093	<0.051		0.1

## PALISADES

Table 13. Bottom Sediments (continued)

Sample Description and Concentration			Required LLD
Location	<u>South Property (0.8 mi.)</u>		
Date Collected	07-15-92	10-28-92	
Lab Code	PABS-1155	PABS-1228	
Gross Beta	3.8±1.6	5.12±1.72	1.0
Sr-89	<0.009	<0.009	0.025
Sr-90	<0.004	<0.004	0.005
Mn-54	<0.016	<0.006	0.08
Co-58	<0.020	<0.007	0.08
Co-60	<0.018	<0.007	0.05
Fe-59	<0.056	<0.016	0.1
Zn-65	<0.032	<0.013	0.1
Zr-Nb-95	<0.036	<0.013	0.1
Cs-134	<0.012	<0.004	0.15
Cs-137	0.026±0.013	0.019±0.006	0.18
Ba-La-140	<0.10	<0.021	0.1
Location	<u>North Property (0.8 mi.)</u>		
Date Collected	07-15-92	10-28-92	
Lab Code	PABS-1154	PABS-1227	
Gross Beta	5.57±1.31	6.21±1.29	1.0
Sr-89	<0.013	<0.012	0.025
Sr-90	<0.004	<0.005	0.005
Mn-54	<0.004	<0.008	0.08
Co-58	<0.006	<0.010	0.08
Co-60	<0.005	<0.010	0.05
Fe-59	<0.021	<0.026	0.1
Zn-65	<0.010	<0.020	0.1
Zr-Nb-95	<0.011	<0.016	0.1
Cs-134	<0.003	<0.006	0.15
Cs-137	0.012±0.005	0.020±0.007	0.18
Ba-La-140	<0.081	<0.026	0.1



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Table 13. Bottom Sediments (continued)

Sample Description and Concentration			Required LLD
Location	<u>Palisades Discharge</u>		
Date Collected	07-15-92	10-28-92	
Lab Code	PABS-1156,7	PABS-1229	
Gross Beta	5.08±0.84	6.96±0.87	1.0
Sr-89	<0.013	<0.014	0.025
Sr-90	<0.004	<0.005	0.005
Mn-54	<0.004	<0.005	0.08
Co-58	<0.007	<0.006	0.08
Co-60	<0.005	<0.007	0.05
Fe-59	<0.022	<0.015	0.1
Zn-65	<0.013	<0.015	0.1
Zr-Nb-95	<0.013	<0.011	0.1
Cs-134	<0.005	<0.007	0.15
Cs-137	0.014±0.003	0.017±0.003	0.18
Ba-La-140	<0.087	<0.036	0.1
Location			
Date Collected			
Sample Type			
Lab Code			
Gross Beta			1.0
Sr-89			0.025
Sr-90			0.005
Mn-54			0.08
Co-58			0.08
Co-60			0.05
Fe-59			0.1
Zn-65			0.1
Zr-Nb-95			0.1
Cs-134			0.15
Cs-137			0.18
Ba-La-140			0.1

## PALISADES

Table 14.1. Liquid Radwaste  
 Collection: Monthly Composite  
 Units:  $\mu\text{Ci}/\text{ml}$ , except Pu-239 (pCi/L)

Sample Description and Concentration			
Collection Period	January	February	March
Lab Code	NS <sup>a</sup>	NS	PARW-444
Gross alpha	—	—	<1.1 E-09
Sr-89	—	—	6.8±2.4 E-09
Sr-90	—	—	2.8±0.8 E-09
H-3	—	—	4.0 E-02
Pu-239	—	—	<0.2
Cr-51	—	—	<6.4 E-08
Mn-54	—	—	3.6±0.1 E-07
Fe-59	—	—	<1.6 E-08
Co-58	—	—	1.3±0.1 E-07
Co-60	—	—	4.6±0.1 E-07
Zn-65	—	—	<1.5 E-08
Zr-95	—	—	<1.3 E-08
Nb-95	—	—	<8.3 E-09
Ag-110m	—	—	4.3±0.6 E-08
Sb-124	—	—	<7.3 E-09
Cs-134	—	—	1.1±0.6 E-08
Cs-137	—	—	3.2±0.1 E-07
Ba-140	—	—	<3.8 E-08
La-140	—	—	<5.8 E-09
Ce-141	—	—	<1.3 E-08
Ce-144	—	—	<4.6 E-08

<sup>a</sup> NS = no sample; sample not collected.

# PALISADES

Table 14.1.. Liquid Radwaste (continued)

Sample Description and Concentration			
Collection Period	April	May	June
Lab Code	PARW-446	NS <sup>a</sup>	PARW-461
Gross alpha	<0.6 E-09	—	<1.1 E-09
Sr-89	<3.1 E-09	—	<1.3 E-09
Sr-90	3.4±1.3 E-09	—	9.3±1.7 E-09
H-3	2.0±0.1 E-05	—	1.1±0.1 E-01
Pu-239	<0.1	—	<0.1
Cr-51	<6.3 E-08	—	<1.7 E-07
Mn-54	2.4±0.1 E-07	—	6.8±0.2 E-07
Fe-59	<1.5 E-08	—	<3.6 E-08
Co-58	<7.3 E-09	—	1.5±0.1 E-06
Co-60	2.2±0.1 E-07	—	1.2±0.1 E-06
Zn-65	<1.1 E-08	—	<2.5 E-08
Zr-95	<1.1 E-08	—	<2.4 E-08
Nb-95	<7.8 E-09	—	<1.7 E-08
Ag-110m	<5.4 E-09	—	<3.2 E-08
Sb-124	<8.4 E-09	—	<1.7 E-08
Cs-134	<4.8 E-09	—	1.4±0.1 E-07
Cs-137	1.4±0.4 E-08	—	1.7±0.1 E-06
Ba-140	<4.6 E-08	—	<2.2 E-07
La-140	<7.6 E-09	—	<2.8 E-08
Ce-141	<1.3 E-08	—	<2.4 E-08
Ce-144	<4.1 E-08	—	<5.6 E-08

<sup>a</sup> NS = no sample; sample not collected.

## PALISADES

Table 14.1 Liquid Radwaste (continued)

Sample Description and Concentration			
Collection Period	July	August	September
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>
Gross alpha	-	-	-
Sr-89	-	-	-
Sr-90	-	-	-
H-3	-	-	-
Pu-239	-	-	-
Cr-51	-	-	-
Mn-54	-	-	-
Fe-59	-	-	-
Co-58	-	-	-
Co-60	-	-	-
Zn-65	-	-	-
Zr-95	-	-	-
Nb-95	-	-	-
Ag-110m	-	-	-
Sb-124	-	-	-
Cs-134	-	-	-
Cs-137	-	-	-
Ba-140	-	-	-
La-140	-	-	-
Ce-141	-	-	-
Ce-144	-	-	-

<sup>a</sup> NS= no sample; sample not collected.

## PALISADES

Table 14.1 Liquid Radwaste (continued)

Sample Description and Concentration			
Collection Period	October	November	December
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	PARW-485
Gross alpha	-	-	<1.3 E-09
Sr-89	-	-	<1.7 E-09
Sr-90	-	-	1.3±0.2 E-09
H-3	-	-	1.5±0.1 E-01
Pu-239	-	-	<0.3
Cr-51	-	-	<8.4 E-08
Mn-54	-	-	3.2±1.0 E-08
Fe-59	-	-	<2.2 E-08
Co-58	-	-	6.5±0.2 E-07
Co-60	-	-	8.8±2.3 E-07
Zn-65	-	-	<2.2 E-08
Zr-95	-	-	<1.6 E-08
Nb-95	-	-	<1.0 E-08
Ag-110m	-	-	1.6±0.9 E-08
Sb-124	-	-	<1.3 E-08
Cs-134	-	-	1.5±0.1 E-07
Cs-137	-	-	2.0±0.3 E-06
Ba-140	-	-	<5.9 E-08
La-140	-	-	<1.0 E-08
Ce-141	-	-	<1.2 E-08
Ce-144	-	-	<4.4 E-08

<sup>a</sup> NS= no sample; sample not collected.

## PALISADES

Table 14.2 Stack Filters  
 Collection: Monthly Composite  
 Units: pCi/composite

1992 Collection Period	Lab Code	Gross Alpha	Sr-89	Sr-90	Pu-239
January	PASP-436	10.7±1.1	3.2±2.4	<1.8	<0.5
February	439	2.3±0.6	<2.7	4.6±1.5	<0.2
March	445	7.9±1.2	<5.7	<3.8	<0.9
April	447	3.8±0.6	<4.5	7.0±2.1	<0.2
May	455	4.2±1.0	<6.0	<4.0	<0.1
June	460	1.9±0.5	<3.6	<3.6	<0.3
July	464	2.8±0.6	<4.0	5.6±1.8	<0.1
August	465	1.7±0.5	<2.9	<2.3	<0.1
September	470	2.5±0.6	9.3±5.5	<2.4	<0.3
October	477	2.2±0.5	3.4±2.9	<1.9	<0.3
November	479	1.5±0.5	18.0±4.9	5.9±1.8	<0.2
December	484	2.4±0.5	<2.2	<1.9	<0.2

Palisades

Table 14.3. Special Samples - NRC Split Samples  
Units: Strontium - pCi/L  
Fe-55 - pCi/mL  
Tritium - pCi/mL

Sample Description	Collection Date	Lab Code	Sr-89	Sr-90
T-91				

Table 14.4. Special Samples - Reactor Water  
Units: uCi/mL

Description	Collection Date	Lab Code	Sr-89	Sr-90
E-Bar PCS	05-28-92	456	<1.0 E-06	<7.0 E-07
	11-30-92	480	8.7±1.8 E-06	3.6±0.7 E-07

Table 14.5. Special Samples - Steam Generator Blowdown  
Units: pCi/L

Sample Description	Collection Date	Lab Code	Gross Alpha	Sr-89	Sr-90
Hot Well					
A S/G + BS/G					
Hot Well					
A S/G + BS/G					



## APPENDIX A

### INTERLABORATORY COMPARISON PROGRAM RESULTS

NOTE: TIML participates in intercomparison studies administered by U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. The results are reported in Appendix A. Also reported are results of in-house spikes and blanks. Appendix A is updated twice a year; the complete Appendix is included in January and July monthly reports only. Please refer to January and July reports for information.

January, 1993

## Appendix A

### Interlaboratory Comparison Program Results

Teledyne Isotopes Midwest Laboratory (formerly Hazleton Environmental Sciences) 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 the laboratory's analytical procedures and to alert it to 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, air filters, and food samples during the period January 1988 through December 1992. This program has been conducted by the U.S. Environmental Protection Agency Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, Las Vegas, Nevada.

The results in Table A-2 were obtained for thermoluminescent dosimeters (TLDs) during the period 1976, 1977, 1979, 1980, 1984, and 1985-86 through participation in the Second, Third, Fourth, Fifth, Seventh, and Eighth International Intercomparison of Environmental Dosimeters under the sponsorships listed in Table A-2. Also Teledyne testing results are listed.

Table A-3 lists results of the analyses on in-house spiked samples.

Table A-4 lists results of the analyses on in-house "blank" samples.

Attachment B lists acceptance criteria for "spiked" samples.

Addendum to Appendix A provides explanation for out-of-limit results.

Table A-1. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and Teledyne Isotopes Midwest Laboratory results for milk, water, air filters, and food samples, 1988 through 1992.<sup>a</sup>

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-521	Water	Jan 1988	Sr-89	27.3 $\pm$ 5.0	30.0 $\pm$ 5.0	21.3-38.7
			Sr-90	15.3 $\pm$ 1.2	15.0 $\pm$ 1.5	12.4-17.6
STW-523	Water	Jan 1988	Gr. alpha	2.3 $\pm$ 1.2	4.0 $\pm$ 5.0	0.0-12.7
			Gr. beta	7.7 $\pm$ 1.2	8.0 $\pm$ 5.0	0.0-16.7
STF-524	Food	Jan 1988	Sr-89	44.0 $\pm$ 4.0	46.0 $\pm$ 5.0	37.3-54.7
			Sr-90	53.0 $\pm$ 2.0	55.0 $\pm$ 2.8	50.2-59.8
			I-131	102.3 $\pm$ 4.2	102.0 $\pm$ 10.2	84.3-119.7
			Cs-137	95.7 $\pm$ 6.4	91.0 $\pm$ 5.0	82.3-99.7
			K	1011 $\pm$ 158	1230 $\pm$ 62	1124-1336
STW-525	Water	Feb 1988	Co-60	69.3 $\pm$ 2.3	69.0 $\pm$ 5.0	60.3-77.7
			Zn-65	99.0 $\pm$ 3.4	94.0 $\pm$ 9.4	77.7-110.3
			Ru-106	92.7 $\pm$ 14.4	105.0 $\pm$ 10.5	86.8-123.2
			Cs-134	61.7 $\pm$ 8.0	64.0 $\pm$ 5.0	55.3-72.7
			Cs-137	99.7 $\pm$ 3.0	94.0 $\pm$ 5.0	85.3-102.7
STW-526	Water	Feb 1988	H-3	3453 $\pm$ 103	3327 $\pm$ 362	2700-3954
STW-527	Water	Feb 1988	Uranium	3.0 $\pm$ 0.0	3.0 $\pm$ 6.0	0.0-13.4
STM-528	Milk	Feb 1988	I-131	4.7 $\pm$ 1.2	4.0 $\pm$ 0.4	3.3-4.7
STW-529	Water	Mar 1988	Ra-226	7.1 $\pm$ 0.6	7.6 $\pm$ 1.1	5.6-9.6
			Ra-228	NA <sup>e</sup>	7.7 $\pm$ 1.2	5.7-9.7
STW-530	Water	Mar 1988	Gr. alpha	4.3 $\pm$ 1.2	6.0 $\pm$ 5.0	0.0-14.7
			Gr. beta	13.3 $\pm$ 1.3	13.0 $\pm$ 5.0	4.3-21.7
STAF-531	Air Filter	Mar 1988	Gr. alpha	21.0 $\pm$ 2.0	20.0 $\pm$ 5.0	11.3-28.7
			Gr. beta	48.0 $\pm$ 0.0	50.0 $\pm$ 5.0	41.3-58.7
			Sr-90	16.7 $\pm$ 1.2	17.0 $\pm$ 1.5	14.4-19.6
			Cs-137	18.7 $\pm$ 1.3	16.0 $\pm$ 5.0	7.3-24.7
STW-532	Water	Apr 1988	I-131	9.0 $\pm$ 2.0	7.5 $\pm$ 0.8	6.2-8.8

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-533 534	Water (Blind)	Apr 1988				
	Sample A		Gr. alpha	ND <sup>f</sup>	46.0 $\pm$ 11.0	27.0-65.0
			Ra-226	ND	6.4 $\pm$ 1.0	4.7-8.1
			Ra-228	ND	5.6 $\pm$ 0.8	4.2-7.0
			Uranium	6.0 $\pm$ 6.0	6.0 $\pm$ 6.0	0.0-16.4
	Sample B		Gr. beta	ND	57.0 $\pm$ 5.0	48.3-65.7
			Sr-89	3.3 $\pm$ 1.2	5.0 $\pm$ 5.0	0.0-13.7
			Sr-90	5.3 $\pm$ 1.2	5.0 $\pm$ 1.5	2.4-7.6
			Co-60	63.3 $\pm$ 1.3	50.0 $\pm$ 5.0	41.3-58.7
			Cs-134	7.7 $\pm$ 1.2	7.0 $\pm$ 5.0	0.0-15.7
			Cs-137	8.3 $\pm$ 1.2	7.0 $\pm$ 5.0	0.0-15.7
	Urine	Apr 1988	H-3	6483 $\pm$ 155	6202 $\pm$ 620	5128-7276
STW-536	Water	Apr 1988	Sr-89	14.7 $\pm$ 1.3	20.0 $\pm$ 5.0	11.3-28.7
			Sr-90	20.0 $\pm$ 2.0	20.0 $\pm$ 1.5	17.4-22.6
STW-538	Water	Jun 1988	Cr-51	331.7 $\pm$ 13.0	302.0 $\pm$ 30.0	250.0-354.0
			Co-60	16.0 $\pm$ 2.0	15.0 $\pm$ 5.0	6.3-23.7
			Zn-65	107.7 $\pm$ 11.4	101.0 $\pm$ 10.0	83.7-118.3
			Ru-106	191.3 $\pm$ 11.0	195.0 $\pm$ 20.0	60.4-229.6
			Cs-134	18.3 $\pm$ 4.6	20.0 $\pm$ 5.0	11.3-28.7
			Cs-137	26.3 $\pm$ 1.2	25.0 $\pm$ 5.0	16.3-33.7
STW-539	Water	Jun 1988	H-3	5586 $\pm$ 92	5565 $\pm$ 557	4600-6530
STM-541	Milk	Jun 1988	Sr-89	33.7 $\pm$ 11.4	40.0 $\pm$ 5.0	31.3-48.7
			Sr-90	55.3 $\pm$ 5.8	60.0 $\pm$ 3.0	54.8-65.2
			I-131	103.7 $\pm$ 3.1	94.0 $\pm$ 9.0	78.4-109.6
			Cs-137	52.7 $\pm$ 3.1	51.0 $\pm$ 5.0	42.3-59.7
			K	1587 $\pm$ 23	1600 $\pm$ 80	1461-1739
STW-542	Water	Jul 1988	Gr. alpha	8.7 $\pm$ 4.2	15.0 $\pm$ 5.0	6.3-23.7
			Gr. beta	5.3 $\pm$ 1.2	4.0 $\pm$ 5.0	0.0-12.7
STF-543	Food	Jul 1988	Sr-89	ND <sup>f</sup>	33.0 $\pm$ 5.0	24.3-41.7
			Sr-90	ND	34.0 $\pm$ 2.0	30.5-37.5
			I-131	115.0 $\pm$ 5.3	107.0 $\pm$ 11.0	88.0-126.0
			Cs-137	52.7 $\pm$ 6.4	49.0 $\pm$ 5.0	40.3-57.7
			K	1190 $\pm$ 66	1240 $\pm$ 62	1133-1347

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-544	Water	Aug 1988	I-131	80.0 $\pm$ 0.0	76.0 $\pm$ 8.0	62.1-89.9
STW-545	Water	Aug 1988	Pu-239	11.0 $\pm$ 0.2	10.2 $\pm$ 1.0	8.5-11.9
STW-546	Water	Aug 1988	Uranium	6.0 $\pm$ 0.0	6.0 $\pm$ 6.0	0.0-16.4
STAF-547	Air Filter	Aug 1988	Gr. alpha	8.0 $\pm$ 0.0	8.0 $\pm$ 5.0	0.0-16.7
			Gr. beta	26.3 $\pm$ 1.2	29.0 $\pm$ 5.0	20.3-37.7
			Sr-90	8.0 $\pm$ 2.0	8.0 $\pm$ 1.5	5.4-10.6
			Cs-137	13.0 $\pm$ 2.0	12.0 $\pm$ 5.0	3.3-20.7
STW-548	Water	Sep 1988	Ra-226	9.3 $\pm$ 0.5	8.4 $\pm$ 2.6	6.2-10.6
			Ra-228	5.8 $\pm$ 0.4	5.4 $\pm$ 1.6	4.0-6.8
STW-549	Water	Sep 1988	Gr. alpha	7.0 $\pm$ 2.0	8.0 $\pm$ 5.0	0.0-16.7
			Gr. beta	11.3 $\pm$ 1.2	10.0 $\pm$ 5.0	1.3-18.7
STW-550	Water	Oct 1988	Cr-51	252.0 $\pm$ 14.0	251.0 $\pm$ 25.0	207.7-294.3
			Co-60	26.0 $\pm$ 2.0	25.0 $\pm$ 5.0	16.3-33.7
			Zn-65	158.3 $\pm$ 10.2	151.0 $\pm$ 15.0	125.0-177.0
			Ru-106	153.0 $\pm$ 9.2	152.0 $\pm$ 15.0	126.0-178.0
			Cs-134	28.7 $\pm$ 5.0	25.0 $\pm$ 5.0	16.3-33.7
			Cs-137	16.3 $\pm$ 1.2	15.0 $\pm$ 5.0	6.3-23.7
STW-551	Water	Oct 1988	H-3	2333 $\pm$ 127	2316 $\pm$ 350	1710-2927
STW-552 553	Water (Blind)	Oct 1988				
	Sample A		Gr. alpha	38.3 $\pm$ 8.0	41.0 $\pm$ 10.0	23.7-58.3
			Ra-226	4.5 $\pm$ 0.5	5.0 $\pm$ 0.8	3.6-6.4
			Ra-228	4.4 $\pm$ 0.6	5.2 $\pm$ 0.8	3.6-6.4
			Uranium	4.7 $\pm$ 1.2	5.0 $\pm$ 6.0	0.0-15.4
	Sample B		Gr. beta	51.3 $\pm$ 3.0	54.0 $\pm$ 5.0	45.3-62.7
			Sr-89	3.7 $\pm$ 1.2	11.0 $\pm$ 5.0	2.3-19.7
			Sr-90	10.7 $\pm$ 1.2	10.0 $\pm$ 1.5	7.4-12.6
			Cs-134	15.3 $\pm$ 2.3	15.0 $\pm$ 5.0	6.3-23.7
			Cs-137	16.7 $\pm$ 1.2	15.0 $\pm$ 5.0	6.3-23.7

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STM-554	Milk	Oct 1988	Sr-89	40.3 $\pm$ 7.0	40.0 $\pm$ 5.0	31.3-48.7
			Sr-90	51.0 $\pm$ 2.0	60.0 $\pm$ 3.0	54.8-65.2
			I-131	94.0 $\pm$ 3.4	91.0 $\pm$ 9.0	75.4-106.6
			Cs-137	45.0 $\pm$ 4.0	50.0 $\pm$ 5.0	41.3-58.7
			K	1500 $\pm$ 45	1600 $\pm$ 80	1461-1739
STU-555	Urine	Nov 1988	H-3	3030 $\pm$ 209	3025 $\pm$ 359	2403-3647
STW-556	Water	Nov 1988	Gr. alpha	9.0 $\pm$ 3.5	9.0 $\pm$ 5.0	0.3-17.7
			Gr. beta	9.7 $\pm$ 1.2	9.0 $\pm$ 5.0	0.3-17.7
STW-557	Water	Dec 1988	I-131	108.7 $\pm$ 3.0	115.0 $\pm$ 12.0	94.2-135.8
STW-559	Water	Jan 1989	Sr-89	40.0 $\pm$ 8.7	40.0 $\pm$ 5.0	31.3-48.7
			Sr-90	24.3 $\pm$ 3.1	25.0 $\pm$ 1.5	22.4-27.6
STW-560	Water	Jan 1989	Pu-239	5.8 $\pm$ 1.1	4.2 $\pm$ 0.4	3.5-4.9
STW-561	Water	Jan 1989	Gr. alpha	7.3 $\pm$ 1.2	8.0 $\pm$ 5.0	0.0-16.7
			Gr. beta	5.3 $\pm$ 1.2	4.0 $\pm$ 5.0	0.0-12.7
STW-562	Water	Feb 1989	Cr-51	245 $\pm$ 46	235 $\pm$ 24	193.4-276.6
			Co-60	10.0 $\pm$ 2.0	10.0 $\pm$ 5.0	1.3-18.7
			Zn-65	170 $\pm$ 10	159 $\pm$ 16	139.2-186.7
			Ru-106	181 $\pm$ 7.6	178 $\pm$ 18	146.8-209.2
			Cs-134	9.7 $\pm$ 3.0	10.0 $\pm$ 5.0	1.3-18.7
			Cs-137	11.7 $\pm$ 1.2	10.0 $\pm$ 5.0	1.3-18.7
STW-563	Water	Feb 1989	I-131	109.0 $\pm$ 4.0	06.0 $\pm$ 11.0	86.9-125.1
STW-564	Water	Feb 1989	H-3	2820 $\pm$ 20	2754 $\pm$ 356	2137-3371
STW-565	Water	Mar 1989	Ra-226	4.2 $\pm$ 0.3	4.9 $\pm$ 0.7	3.7-6.1
			Ra-228	1.9 $\pm$ 1.0	1.7 $\pm$ 0.3	1.2-2.2
STW-566	Water	Mar 1989	U	5.0 $\pm$ 0.0	5.0 $\pm$ 6.0	0.0-15.4
STAF-567	Air Filter	Mar 1989	Gr. alpha	21.7 $\pm$ 1.2	21.0 $\pm$ 5.0	12.3-29.7
			Gr. beta	68.3 $\pm$ 4.2	62.0 $\pm$ 5.0	53.3-70.7
			Sr-90	20.0 $\pm$ 2.0	20.0 $\pm$ 1.5	17.4-22.6
			Cs-137	21.3 $\pm$ 1.2	20.0 $\pm$ 5.0	11.3-28.7



Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>			
				TIML Result ±2σ <sup>c</sup>	EPA Result <sup>d</sup> 1s, N=1	Control Limits	
STW-568 569	Water (Blind)	Apr 1989					
	Sample A		Gr. alpha	22.7±2.3	29.0±7.0	16.9-41.2	
			Ra-226	3.6±0.6	3.5±0.5	2.6-4.4	
			Ra-228	2.6±1.0	3.6±0.5	2.7-4.5	
			U	3.0±0.0	3.0±6.0	0.0-13.4	
	Sample B		Gr. beta	52.3±6.1	57.0±5.0	43.3-65.7	
			Sr-89	9.3±5.4	8.0±5.0	0.0-16.7	
			Sr-90	7.0±0.0	8.0±1.5	5.4-10.6	
			Cs-134	21.0±5.2	20.0±5.0	11.3-28.7	
			Cs-137	23.0±2.0	20.0±5.0	11.3-28.7	
	STM-570		Milk	Sr-89	26.0±10.0	39.0±5.0	30.3-47.7
				Sr-90	45.7±4.2	55.0±3.0	49.8-60.2
				Cs-137	54.0±6.9	50.0±5.0	41.3-58.7
				K-40	1521±208	1600±80	1461-1739
STW-5718	Water	May 1989	Sr-89	<0.7	6.0±5.0	0.0-14.7	
		Sr-90	5.0±1.0	6.0±1.5	3.4-8.6		
STW-572	Water	May 1989	Gr. alpha	24.0±2.0	30.0±8.0	16.1-43.9	
			Gr. beta	49.3±15.6	50.0±5.0	41.3-58.7	
STW-573	Water	Jun 1989	Ba-133	50.7±1.2	49.0±5.0	40.3-57.7	
			Co-60	31.3±2.3	31.0±5.0	22.3-39.7	
			Zn-65	167±10	165±17	135.6-194.4	
			Ru-106	123±9.2	128±13	105.5-150.5	
			Cs-134	40.3±1.2	39±5	30.3-47.7	
			Cs-137	22.3±1.2	20±5	11.3-28.7	
STW-574	Water	Jun 1989	H-3	4513±136	4503±450	3724-5282	
STW-575	Water	Jul 1989	Ra-226	16.8±3.1	17.7±2.7	13.0-22.4	
			Ra-228	13.8±3.7	18.3±2.7	13.6-23.0	
STW-576	Water	Jul 1989	U	40.3±1.2	41.0±6.0	30.6±51.4	
STW-577	Water	Aug 1989	I-131	84.7±5.8	83.0±8.0	69.1-96.9	
STAF-579	Air Filter	Aug 1989	Gr. alpha	6.0±0.0	6.0±5.0	0.0-14.7	
			Cs-137	10.3±2.3	10.0±5.0	1.3-18.7	



Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-580	Water	Sep 1989	Sr-89	14.7 $\pm$ 1.2	14.0 $\pm$ 5.0	5.3-22.7
			Sr-90	9.7 $\pm$ 1.2	10.0 $\pm$ 1.5	7.4-12.6
STW-581	Water	Sep 1989	Gr. alpha	5.0 $\pm$ 0.0	4.0 $\pm$ 5.0	0.0-12.7
			Gr. beta	8.7 $\pm$ 2.3	6.0 $\pm$ 5.0	0.0-14.7
STW-583	Water	Oct 1989	Ba-133	60.3 $\pm$ 10.0	59.0 $\pm$ 6.0	48.6-69.4
			Co-60	29.0 $\pm$ 4.0	30.0 $\pm$ 5.0	21.1-38.7
			Zn-65	132.3 $\pm$ 6.0	129.0 $\pm$ 13.0	106.5-151.5
			Ru-106	155.3 $\pm$ 6.1	161.0 $\pm$ 16.0	133.3-188.7
			Cs-134	30.7 $\pm$ 6.1	29.0 $\pm$ 5.0	20.3-37.7
			Cs-137	66.3 $\pm$ 4.6	59.0 $\pm$ 5.0	50.3-67.7
STW-584	Water	Oct 1989	H-3	3407 $\pm$ 150	3496 $\pm$ 364	2866-126
STW-585 586	Water (Blind)	Oct 1989				
	Sample A		Gr. alpha	41.7 $\pm$ 9.4	49.0 $\pm$ 12.0	28.2-69.8
			Ra-226	7.9 $\pm$ 0.4	8.4 $\pm$ 1.3	6.2-10.6
			Ra-228	4.4 $\pm$ 0.8	4.1 $\pm$ 0.6	3.1-5.1
			U	12.0 $\pm$ 0.0	12.0 $\pm$ 6.0	1.6-22.4
	Sample B		Gr. beta	31.7 $\pm$ 2.3	32.0 $\pm$ 5.0	23.3-40.7
			Sr-89	13.3 $\pm$ 4.2	15.0 $\pm$ 5.0	6.3-23.7
			Sr-90	7.0 $\pm$ 2.0	7.0 $\pm$ 3.0	4.4-9.6
			Cs-134	5.0 $\pm$ 0.0	5.0 $\pm$ 5.0	0.0-13.7
			Cs-137	7.0 $\pm$ 0.0	5.0 $\pm$ 5.0	0.0-13.7
STW-587	Water	Nov 1989	Ra-226	7.9 $\pm$ 0.4	8.7 $\pm$ 1.3	6.4-11.0
			Ra-228	8.9 $\pm$ 1.2	9.3 $\pm$ 1.2	6.9-11.7
STW-588	Water	Nov 1989	U	15.0 $\pm$ 0.0	15.0 $\pm$ 6.0	4.6-25.4
STW-589	Water	Jan 1990	Sr-89	22.7 $\pm$ 5.0	25.0 $\pm$ 5.0	16.3-33.7
			Sr-90	17.3 $\pm$ 1.2	20.0 $\pm$ 1.5	17.4-22.6
STW-591	Water	Jan 1990	Gr. alpha	10.3 $\pm$ 3.0	12.0 $\pm$ 5.0	3.3-20.7
			Gr. beta	12.3 $\pm$ 1.2	12.0 $\pm$ 5.0	3.3-20.7

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-592	Water	Jan 1990	Co-60	14.7 $\pm$ 2.3	15 $\pm$ 5.0	6.3-23.7
			Zn-65	135.0 $\pm$ 6.9	139.0 $\pm$ 14.0	114.8-163.2
			Ru-106	133.3 $\pm$ 13.4	139.0 $\pm$ 14.0	114.8-163.2
			Cs-134	17.3 $\pm$ 1.2	18.0 $\pm$ 5.0	9.3-26.7
			Cs-137	19.3 $\pm$ 1.2	18.0 $\pm$ 5.0	9.3-26.7
			Ba-133	78.0 $\pm$ 0.0	74.0 $\pm$ 7.0	61.9-86.1
STW-593	Water	Feb 1990	H-3	4827 $\pm$ 83	4976 $\pm$ 498	4113-5839
STW-594	Water	Mar 1990	Ra-226	5.0 $\pm$ 0.2	4.9 $\pm$ 0.7	4.1-5.7
			Ra-228	13.5 $\pm$ 0.7	12.7 $\pm$ 1.9	9.4-16.0
STW-595	Water	Mar 1990	U	4.0 $\pm$ 0.0	4.0 $\pm$ 6.0	0.0-14.4
STAF-596	Air Filter	Mar 1990	Gr. alpha	7.3 $\pm$ 1.2	5.0 $\pm$ 5.0	0.0-13.7
			Gr. beta	34.0 $\pm$ 0.0	31.0 $\pm$ 5.0	22.3-39.7
			Sr-90	10.0 $\pm$ 0.0	10.0 $\pm$ 1.5	7.4-12.6
			Cs-137	9.3 $\pm$ 1.2	10.0 $\pm$ 5.0	1.3-18.7
STW-597 598	Water (Blind)	Apr 1990				
	Sample A		Gr. alpha	81.0 $\pm$ 3.5	90.0 $\pm$ 23.0	50.1-129.9
			Ra-226	4.9 $\pm$ 0.4	5.0 $\pm$ 0.8	3.6-6.4
			Ra-228	10.6 $\pm$ 0.3	10.2 $\pm$ 1.5	7.6-12.8
			U	18.7 $\pm$ 3.0	20.0 $\pm$ 6.0	9.6-30.4
	Sample B		Gr. beta	51.0 $\pm$ 10.1	52.0 $\pm$ 5.0	43.3-60.7
			Sr-89	9.3 $\pm$ 1.2	10.0 $\pm$ 5.0	1.3-18.7
			Sr-90	10.3 $\pm$ 3.1	10.0 $\pm$ 1.5	8.3-11.7
			Cs-134	16.0 $\pm$ 0.0	15.0 $\pm$ 5.0	6.3-23.7
			Cs-137	19.0 $\pm$ 2.0	15.0 $\pm$ 5.0	6.3-23.7
STM-599	Milk	Apr 1990	Sr-89	21.7 $\pm$ 3.1	23.0 $\pm$ 5.0	14.3-31.7
			Sr-90	21.0 $\pm$ 7.0	23.0 $\pm$ 5.0	14.3-31.7
			I-131	98.7 $\pm$ 1.2	99.0 $\pm$ 10.0	81.7-116.3
			Cs-137	26.0 $\pm$ 6.0	24.0 $\pm$ 5.0	15.3-32.7
			K	1300.0 $\pm$ 69.2	1550.0 $\pm$ 78.0	1414.7-1685.3
STW-600	Water	May 1990	Sr-89	6.0 $\pm$ 2.0	7.0 $\pm$ 5.0	0.0-15.7
			Sr-90	6.7 $\pm$ 1.2	7.0 $\pm$ 5.0	0.0-15.7
STW-601	Water	May 1990	Gr. alpha	11.0 $\pm$ 2.0	22.0 $\pm$ 6.0	11.6-32.4
			Gr. beta	12.3 $\pm$ 1.2	15.0 $\pm$ 5.0	6.3-23.7

Table A-1 (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-602	Water	Jun 1990	Co-60	25.3 $\pm$ 2.3	24.0 $\pm$ 5.0	15.3-32.7
			Zn-65	155.0 $\pm$ 10.6	148.0 $\pm$ 15.0	130.6-165.4
			Ru-106	202.7 $\pm$ 17.2	210.0 $\pm$ 21.0	173.6-246.4
			Cs-134	23.7 $\pm$ 1.2	24.0 $\pm$ 5.0	18.2-29.8
			Cs-137	27.7 $\pm$ 3.1	25.0 $\pm$ 5.0	16.3-33.7
			Ba-133	100.7 $\pm$ 8.1	99.0 $\pm$ 10.0	81.7-116.3
STW-603	Water	Jun 1990	H-3	2927 $\pm$ 306	2933 $\pm$ 358	2312-3554
STW-604	Water	Jul 1990	Ra-226	11.8 $\pm$ 0.9	12.1 $\pm$ 1.8	9.0-15.2
			Ra-228	4.1 $\pm$ 1.4	5.1 $\pm$ 1.3	2.8-7.4
STW-605	Water	Jul 1990	U	20.3 $\pm$ 1.7	20.8 $\pm$ 3.0	15.6-26.0
STW-606	Water	Aug 1990	I-131	43.0 $\pm$ 1.2	39.0 $\pm$ 6.0	28.6-49.4
STW-607	Water	Aug 1990	Pu-239	10.0 $\pm$ 1.7	9.1 $\pm$ 0.9	7.5-10.7
STAF-608	Air Filter	Aug 1990	Gr. alpha	14.0 $\pm$ 0.0	10.0 $\pm$ 5.0	1.3-18.7
			Gr. beta	65.3 $\pm$ 1.2	62.0 $\pm$ 5.0	53.3-70.7
			Sr-90	19.0 $\pm$ 6.9	20.0 $\pm$ 5.0	11.3-28.7
			Cs-137	19.0 $\pm$ 2.0	20.0 $\pm$ 5.0	11.3-28.7
STW-609	Water	Sep 1990	Sr-89	9.0 $\pm$ 2.0	10.0 $\pm$ 5.0	1.3-18.7
			Sr-90	9.0 $\pm$ 2.0	9.0 $\pm$ 5.0	0.3-17.7
STW-610	Water	Sep 1990	Gr. alpha	8.3 $\pm$ 1.2	10.0 $\pm$ 5.0	1.3-18.7
			Gr. beta	10.3 $\pm$ 1.2	10.0 $\pm$ 5.0	1.3-18.7
STM-611	Milk	Sep 1990	Sr-89	11.7 $\pm$ 3.1	16.0 $\pm$ 5.0	7.3-24.7
			Sr-90	15.0 $\pm$ 0.0	20.0 $\pm$ 5.0	11.3-28.7
			I-131	63.0 $\pm$ 6.0	58.0 $\pm$ 6.0	47.6-68.4
			Cs-137	20.0 $\pm$ 2.0	20.0 $\pm$ 5.0	11.3-28.7
			K	1673.3 $\pm$ 70.2	1700.0 $\pm$ 85.0	1552.5-1847.5
STW-612	Water	Oct 1990	Co-60	20.3 $\pm$ 3.1	20.0 $\pm$ 5.0	11.3-28.7
			Zn-65	115.3 $\pm$ 12.2	115.0 $\pm$ 12.0	94.2-135.8
			Ru-106	152.0 $\pm$ 8.0	151.0 $\pm$ 15.0	125.0-177.0
			Cs-134	11.0 $\pm$ 0.0	12.0 $\pm$ 5.0	3.3-20.7
			Cs-137	14.0 $\pm$ 2.0	12.0 $\pm$ 5.0	3.3-20.7
			Ba-133	116.7 $\pm$ 9.9	110.0 $\pm$ 11.0	90.9-129
STW-613	Water	Oct 1990	H-3	7167 $\pm$ 330	7203 $\pm$ 720	5954-8452

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-614 615	Water	Oct 1990				
	Sample A		Gr. alpha	68.7 $\pm$ 7.2	62.0 $\pm$ 16.0	34.2-89.8
			Ra-226	12.9 $\pm$ 0.3	13.6 $\pm$ 2.0	10.1-17.1
			Ra-228	4.2 $\pm$ 0.6	5.0 $\pm$ 1.3	2.7-7.3
			U	10.4 $\pm$ 0.6	10.2 $\pm$ 3.0	5.0-15.4
	Sample B		Gr. beta	55.0 $\pm$ 8.7	53.0 $\pm$ 5.0	44.3-61.7
			Sr-89	15.7 $\pm$ 2.9	20.0 $\pm$ 5.0	11.3-28.7
			Sr-90	12.0 $\pm$ 2.0	15.0 $\pm$ 5.0	6.3-23.7
			Cs-134	9.0 $\pm$ 1.7	7.0 $\pm$ 5.0	0.0-15.7
			Cs-137	7.7 $\pm$ 1.2	5.0 $\pm$ 5.0	0.0-13.7
STW-616	Water	Nov 1990	Ra-226	6.8 $\pm$ 1.0	7.4 $\pm$ 1.1	5.5-9.3
			Ra-228	5.3 $\pm$ 1.7	7.7 $\pm$ 1.9	4.4-11.0
STW-6178	Water	Nov 1990	U	35.0 $\pm$ 0.4	35.5 $\pm$ 3.6	29.3-41.7
STW-618	Water	Jan 1991	Sr-89	4.3 $\pm$ 1.2	5.0 $\pm$ 5.0	0.0-13.7
			Sr-90	4.7 $\pm$ 1.2	5.0 $\pm$ 5.0	0.0-13.7
STW-619	Water	Jan 1991	Pu-239	3.6 $\pm$ 0.2	3.3 $\pm$ 0.3	2.8-3.8
STW-620	Water	Jan 1991	Gr. alpha	6.7 $\pm$ 3.0	5.0 $\pm$ 5.0	0.0-13.7
			Gr. beta	6.3 $\pm$ 1.2	5.0 $\pm$ 5.0	0.0-13.7
STW-621	Water	Feb 1991	Co-60	41.3 $\pm$ 8.4	40.0 $\pm$ 5.0	31.3-48.7
			Zn-65	166.7 $\pm$ 19.7	149.0 $\pm$ 15.0	123.0-175.0
			Ru-106	209.7 $\pm$ 18.6	186.0 $\pm$ 19.0	153.0-219.0
			Cs-134	9.0 $\pm$ 2.0	8.0 $\pm$ 5.0	0.0-16.7
			Cs-137	9.7 $\pm$ 1.2	8.0 $\pm$ 5.0	0.0-16.7
			Ba-133	85.7 $\pm$ 9.2	75.0 $\pm$ 8.0	61.1-88.9
STW-622	Water	Feb 1991	I-131	81.3 $\pm$ 6.1	75.0 $\pm$ 8.0	61.1-88.9
STW-623	Water	Feb 1991	H-3	4310.0 $\pm$ 144.2	4418.0 $\pm$ 442.0	3651.2-5184.8
STW-624	Water	Mar 1991	Ra-226	31.4 $\pm$ 3.2	31.8 $\pm$ 4.8	23.5-40.1
			Ra-228	ND <sup>h</sup>	21.1 $\pm$ 5.3	11.9-30.3
STW-625	Water	Mar 1991	U	6.7 $\pm$ 0.4	7.6 $\pm$ 3.0	2.4-12.8

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>				
				TIML Result ±2σ <sup>c</sup>	EPA Result <sup>d</sup> 1s, N=1	Control Limits		
STAF-626	Air Filter	Mar 1991	Gr. alpha	38.7±1.2	25.0±6.0	14.6-35.4		
			Gr. beta	130.0±4.0	124.0±6.0	113.6-134.4		
			Sr-90	35.7±1.2	40.0±5.0	31.3-48.7		
			Cs-137	33.7±4.2	40.0±5.0	31.3-48.7		
STW-627 628	Water	Apr 1991	Sample A	Gr. alpha	51.0±6.0	54.0±14.0	29.7-78.3	
			Ra-226	7.0±0.8	8.0±1.2	5.9-10.1		
			Ra-228	9.7±1.9	15.2±3.8	8.6-21.8		
			U	27.7±2.4	29.8±3.0	24.6-35.0		
	Sample B	Gr. beta	93.3±6.4	115.0±17.0	85.5-144.5			
		Sr-89	21.0±3.5	28.0±5.0	19.3-36.7			
		Sr-90	23.0±0.0	26.0±5.0	17.3-34.7			
		Cs-134	27.3±1.2	24.0±5.0	15.3-32.7			
		Cs-137	29.0±2.0	25.0±5.0	16.3-33.7			
		STM-629	Milk	Apr 1991	Sr-89	24.0±8.7	32.0±5.0	23.3-40.7
					Sr-90	28.0±2.0	32.0±5.0	23.3-40.7
					I-131	65.3±14.7	60.0±6.0	49.6-70.4
Cs-137	54.7±11.0				49.0±5.0	40.3-57.7		
K	1591.7±180.1	1650.0±83.0	1506.0-1794.0					
STW-630	Water	May 1991	Sr-89	40.7±2.3	39.0±5.0	30.3-47.7		
			Sr-90	23.7±1.2	24.0±5.0	15.3-32.7		
STW-631	Water	May 1991	Gr. alpha	27.7±5.8	24.0±6.0	13.6-34.4		
			Gr. beta	46.0±0.0	46.0±5.0	37.3-54.7		
STW-632	Water	Jun 1991	Co-60	11.3±1.2	10.0±5.0	1.3-18.7		
			Zn-65	119.3±16.3	108.0±11.0	88.9-127.1		
			Ru-106	162.3±19.0	149.0±15.0	123.0-175.0		
			Cs-134	15.3±1.2	15.0±5.0	6.3-23.7		
			Cs-137	16.3±1.2	14.0±5.0	5.3-22.7		
			Ba-133	74.0±6.9	62.0±6.0	51.6-72.4		
STW-633	Water	Jun 1991	H-3	13470.0±385.8	12480.0±1248.0	10314.8-14645.2		
STW-634	Water	Jul 1991	Ra-226	14.9±0.4	15.9±2.4	11.7-20.1		
			Ra-228	17.6±1.8	16.7±4.2	9.4-24.0		

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-635	Water	Jul 1991	U	12.8 $\pm$ 0.1	14.2 $\pm$ 3.0	9.0-19.4
STW-636	Water	Aug 1991	I-131	19.3 $\pm$ 1.2	20.0 $\pm$ 6.0	9.6-30.4
STW-637	Water	Aug 1991	Pu-239	21.4 $\pm$ 0.5	19.4 $\pm$ 1.9	16.1-22.7
STAF-638	Air Filter	Aug 1991	Gr. alpha	33.0 $\pm$ 2.0	25.0 $\pm$ 6.0	14.6-35.4
			Gr. beta	88.7 $\pm$ 1.2	92.0 $\pm$ 10.0	80.4-103.6
			Sr-90	27.0 $\pm$ 4.0	30.0 $\pm$ 5.0	21.3-38.7
			Cs-137	26.3 $\pm$ 1.2	30.0 $\pm$ 5.0	21.3-38.7
STW-639	Water	Sep 1991	Sr-89	47.0 $\pm$ 10.4	49.0 $\pm$ 5.0	40.3-57.7
			Sr-90	24.0 $\pm$ 2.0	25.0 $\pm$ 5.0	16.3-33.7
STW-640	Water	Sep 1991	Gr. alpha	12.0 $\pm$ 4.0	10.0 $\pm$ 5.0	1.3-18.7
			Gr. beta	20.3 $\pm$ 1.2	20.0 $\pm$ 5.0	11.3-28.7
STM-641	Milk	Sep 1991	Sr-89	20.3 $\pm$ 5.0	25.0 $\pm$ 5.0	16.3-33.7
			Sr-90	19.7 $\pm$ 3.1	25.0 $\pm$ 5.0	16.3-33.7
			I-131	130.7 $\pm$ 16.8	108.0 $\pm$ 11.0	88.9-127.1
			Cs-137	33.7 $\pm$ 3.2	30.0 $\pm$ 5.0	21.3-38.7
			K	1743.3 $\pm$ 340.8	1740.0 $\pm$ 87.0	1589.1-1890.9
STW-642	Water	Oct 1991	Co-60	29.7 $\pm$ 1.2	29.0 $\pm$ 5.0	20.3-37.7
			Zn-65	75.7 $\pm$ 8.3	73.0 $\pm$ 7.0	60.9-85.1
			Ru-106	196.3 $\pm$ 15.1	199.0 $\pm$ 20.0	164.3-233.7
			Cs-134	9.7 $\pm$ 1.2	10.0 $\pm$ 5.0	1.3-18.7
			Cs-137	11.0 $\pm$ 2.0	10.0 $\pm$ 5.0	1.3-18.7
			Ba-133	94.7 $\pm$ 3.1	98.0 $\pm$ 10.0	80.7-115.3
STW-643	Water	Oct 1991	H-3	2640.0 $\pm$ 156.2	2454.0 $\pm$ 352.0	1843.3-3064.7
STW-644 645	Water Sample A	Oct 1991	Gr. alpha	73.0 $\pm$ 13.1	82.0 $\pm$ 21.0	45.6-118.4
			Ra-226	20.9 $\pm$ 2.0	22.0 $\pm$ 3.3	16.3-27.7
			Ra-228	19.6 $\pm$ 2.3	22.2 $\pm$ 5.6	12.5-31.9
			U	13.5 $\pm$ 0.6	13.5 $\pm$ 3.0	8.3-18.7
	Sample B		Gr. beta	55.3 $\pm$ 3.1	65.0 $\pm$ 10.0	47.7-82.3
			Sr-89	9.7 $\pm$ 3.1	10.0 $\pm$ 5.0	1.3-18.7
			Sr-90	8.7 $\pm$ 1.2	10.0 $\pm$ 5.0	1.3-18.7
			Co-60	20.3 $\pm$ 1.2	20.0 $\pm$ 5.0	11.3-28.7
			Cs-134	9.0 $\pm$ 5.3	10.0 $\pm$ 5.0	1.3-18.7
			Cs-137	14.7 $\pm$ 5.0	11.0 $\pm$ 5.0	2.3-19.7



Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-646	Water	Nov 1991	Ra-226	5.6 $\pm$ 1.2	6.5 $\pm$ 1.0	4.8-8.2
			Ra-228	9.6 $\pm$ 0.5	8.1 $\pm$ 2.0	4.6-11.6
STW-647	Water	Nov 1991	U	24.7 $\pm$ 2.3	24.9 $\pm$ 3.0	19.7-30.1
STW-648	Water	Jan 1992	Sr-89	42.7 $\pm$ 6.4	51.0 $\pm$ 5.0	42.3-59.7
			Sr-90	18.3 $\pm$ 3.1	20.0 $\pm$ 5.0	11.3-28.7
STW-649	Water	Jan 1992	Pu-239	16.1 $\pm$ 0.8	16.8 $\pm$ 1.7	13.9-19.7
STW-650	Water	Jan 1992	Gr. alpha	23.7 $\pm$ 9.2	30.0 $\pm$ 8.0	16.1-43.9
			Gr. beta	27.7 $\pm$ 4.2	30.0 $\pm$ 5.0	21.3-38.7
STW-651	Water	Feb 1992	I-131	60.3 $\pm$ 4.2	59.0 $\pm$ 6.0	48.6-69.4
STW-652	Water	Feb 1992	Co-60	40.3 $\pm$ 5.0	40.0 $\pm$ 5.0	31.3-48.7
			Zn-65	148.0 $\pm$ 15.0	150.7 $\pm$ 6.1	122.0-174.0
			Ru-106	188.7 $\pm$ 28.8	203.0 $\pm$ 20.0	168.3-237.7
			Cs-134	31.7 $\pm$ 4.2	31.0 $\pm$ 5.0	22.3-39.7
			Cs-137	51.0 $\pm$ 3.4	49.0 $\pm$ 5.0	40.3-57.7
			Ba-133	79.0 $\pm$ 3.4	76.0 $\pm$ 8.0	62.1-89.9
STW-653	Water	Feb 1992	H-3	7714.0 $\pm$ 119.6	7904.0 $\pm$ 790.0	6533.4-9274.6
STW-654	Water	Mar 1992	Ra-226	9.0 $\pm$ 0.4	10.1 $\pm$ 1.5	7.5-12.7
			Ra-228	18.8 $\pm$ 0.6	15.5 $\pm$ 3.9	8.7-22.3
STW-655	Water	Mar 1992	Ru-222 <sup>i</sup>			
STW-656	Water	Mar 1992	U	25.1 $\pm$ 1.9	25.3 $\pm$ 3.0	20.1-30.5
STW-657	Water	Mar 1992	Ru-222 <sup>i</sup>			
STAF-658	Air Filter	Mar 1992	Gr. alpha	7.0 $\pm$ 0.0	7.0 $\pm$ 5.0	0.0-15.7
			Gr. beta	39.3 $\pm$ 1.6	41.0 $\pm$ 5.0	32.3-49.7
			Sr-90	13.7 $\pm$ 1.6	15.0 $\pm$ 5.0	6.3-23.7
			Cs-137	10.0 $\pm$ 0.0	10.0 $\pm$ 5.0	1.3-18.7
STW-659 660	Water Sample A	Apr 1992	Gr. alpha	35.7 $\pm$ 6.1	40.0 $\pm$ 10.0	22.7-57.3
			Ra-226	12.7 $\pm$ 1.2	14.9 $\pm$ 2.2	11.1-18.7
			Ra-228	14.5 $\pm$ 2.1	14.0 $\pm$ 3.5	7.9-20.1
			U	3.9 $\pm$ 0.2	4.0 $\pm$ 3.0	0.0-9.2



Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-659 660	Water Sample B	Apr 1992	Gr. beta	113.0 $\pm$ 7.2	140.0 $\pm$ 21.0	103.6-176.4
			Sr-89	12.3 $\pm$ 4.2	15.0 $\pm$ 5.0	6.3-23.7
			Sr-90	15.0 $\pm$ 1.2	17.0 $\pm$ 5.0	8.3-25.7
			Co-60	61.0 $\pm$ 4.0	56.0 $\pm$ 5.0	47.3-64.7
			Cs-134	24.3 $\pm$ 1.2	24.0 $\pm$ 5.0	15.3-32.7
			Cs-137	24.0 $\pm$ 2.0	22.0 $\pm$ 5.0	13.3-30.7
STM-661	Milk	Apr 1992	Sr-89	25.3 $\pm$ 7.6	38.0 $\pm$ 5.0	29.3-46.7
			Sr-90	24.3 $\pm$ 3.1	29.0 $\pm$ 5.0	20.3-37.7
			I-131	78.7 $\pm$ 9.5	78.0 $\pm$ 8.0	64.1-91.9
			Cs-137	39.3 $\pm$ 2.3	39.0 $\pm$ 5.0	30.3-47.7
			K	1610.0 $\pm$ 72.1	1710.0 $\pm$ 86.0	1560.8-1859.2
STW-662	Water	May 1992	Sr-89	24.0 $\pm$ 4.0	29.0 $\pm$ 5.0	20.3-37.7
			Sr-90	6.7 $\pm$ 1.2	8.0 $\pm$ 5.0	0.0-16.7
STM-663	Water	May 1992	Gr. alpha	12.3 $\pm$ 2.1	15.0 $\pm$ 5.0	6.3-23.7
			Gr. beta	46.0 $\pm$ 5.0	44.0 $\pm$ 5.0	35.3-52.7
STW-664	Water	Jun 1992	Co-60	20.3 $\pm$ 1.2	20.0 $\pm$ 5.0	11.3-28.7
			Zn-65	103.3 $\pm$ 10.6	99.0 $\pm$ 10.0	81.7-116.3
			Ru-106	142.7 $\pm$ 23.7	141.0 $\pm$ 14.0	116.7-165.3
			Cs-134	14.3 $\pm$ 2.3	15.0 $\pm$ 5.0	6.3-23.7
			Cs-137	15.0 $\pm$ 2.0	15.0 $\pm$ 5.0	6.3-23.7
			Ba-133	92.7 $\pm$ 11.0	98.0 $\pm$ 10.0	80.7-115.3
STW-665	Water	Jun 1992	H-3	2153.3 $\pm$ 144.6	2125.0 $\pm$ 347.0	1523.0-2727.0
STW-666	Water	July 1992	Ra-226	22.3 $\pm$ 2.2	24.9 $\pm$ 3.7	18.5-31.3
			Ra-228	16.7 $\pm$ 3.1	16.7 $\pm$ 4.2	9.4-24.0
STW-667	Water	July 1992	U	3.6 $\pm$ 0.3	4.0 $\pm$ 3.0	0.0-9.2
STW-668	Water	August 1992	I-131	47.0 $\pm$ 3.5	45.0 $\pm$ 6.0	34.6-55.4
STW-669	Water	August 1992	Pu-239	8.5 $\pm$ 0.9	9.0 $\pm$ 0.9	7.4-10.6
STAF-670	Air Filter	August 1992	Gr. alpha	25.7 $\pm$ 1.2	30.0 $\pm$ 8.0	16.1-43.9
			Gr. beta	69.0 $\pm$ 2.0	69.0 $\pm$ 10.0	51.7-86.3
			Sr-90	26.0 $\pm$ 4.0	25.0 $\pm$ 5.0	16.3-33.7
			Cs-137	16.0 $\pm$ 0.0	18.0 $\pm$ 5.0	9.3-26.7

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-671	Water	Sept. 1992	Sr-89	16.0 $\pm$ 4.0	20.0 $\pm$ 5.0	11.3-28.7
			Sr-90	14.3 $\pm$ 3.1	15.0 $\pm$ 5.0	6.3-23.7
STW-672	Water	Sept. 1992	Gr. alpha	43.0 $\pm$ 13.1	45.0 $\pm$ 11.0	25.9-64.1
			Gr. beta	41.3 $\pm$ 18.6	50.0 $\pm$ 5.0	41.3-58.7
STM-673	Milk	Sept. 1992	Sr-89	11.0 $\pm$ 3.5	15.0 $\pm$ 5.0	6.3-23.7
			Sr-90	12.7 $\pm$ 1.2	15.0 $\pm$ 5.0	6.3-23.7
			I-131	109.7 $\pm$ 19.4	100.0 $\pm$ 10.0	82.7-117.3
			Cs-137	14.0 $\pm$ 3.5	15.0 $\pm$ 5.0	6.3-23.7
			K	1540.0 $\pm$ 103.9	1750.0 $\pm$ 88.0	1597.3-1902.7
STW-674	Water	Oct. 1992	Co-60	11.3 $\pm$ 2.3	10.0 $\pm$ 5.0	1.3-18.7
			Zn-65	169.7 $\pm$ 25.0	148.0 $\pm$ 15.0	122.0-174.0
			Ru-106	170.1 $\pm$ 2.3	175.0 $\pm$ 18.0	143.8-206.2
			Cs-134	9.7 $\pm$ 2.3	8.0 $\pm$ 5.0	0.0-16.7
			Cs-137	9.7 $\pm$ 1.2	8.0 $\pm$ 5.0	0.0-16.7
			Ba-133	80.3 $\pm$ 9.0	74.0 $\pm$ 7.0	61.9-86.1
STW-675	Water	Oct. 1992	H-3	5896.7 $\pm$ 136.2	5962.0 $\pm$ 596.0	4928.0-6996.0
STW-676 -677	Water	Oct. 1992	Gr. alpha	24.7 $\pm$ 5.0	29.0 $\pm$ 7.0	16.9-41.1
			Ra-226	7.1 $\pm$ 0.4	7.4 $\pm$ 1.1	5.5-9.3
			Ra-228	11.5 $\pm$ 1.0	10.0 $\pm$ 2.5	5.7-14.3
			U	9.7 $\pm$ 0.5	10.2 $\pm$ 3.0	5.0-15.4
	Sample B		Gr. beta	42.7 $\pm$ 8.1	53.0 $\pm$ 10.0	35.7-70.3
			Sr-89	6.7 $\pm$ 1.2	8.0 $\pm$ 5.0	0.0-16.7
			Sr-90	10.0 $\pm$ 2.0	10.0 $\pm$ 5.0	1.3-18.7
			Co-60	15.0 $\pm$ 2.0	15.0 $\pm$ 5.0	6.3-23.7
			Cs-134	5.7 $\pm$ 1.2	5.0 $\pm$ 5.0	0.0-13.7
			Cs-137	8.0 $\pm$ 2.0	8.0 $\pm$ 5.0	0.0-16.7

Table A-1. (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L <sup>b</sup>		
				TIML Result $\pm 2\sigma^c$	EPA Result <sup>d</sup> 1s, N=1	Control Limits
STW-678	Water	Nov. 1992	Ra-226	7.5 $\pm$ 0.8	7.5 $\pm$ 1.1	5.6-9.4
			Ra-228	5.8 $\pm$ 0.7	5.0 $\pm$ 1.3	2.7-7.3
STW-679	Water	Nov. 1992	U	15.5 $\pm$ 1.1	15.2 $\pm$ 3.0	10.0-20.4

<sup>a</sup> Results obtained by Teledyne Isotopes Midwest Laboratory as a participant in the environmental sample crosscheck program operated by the Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency (EPA), Las Vegas, Nevada.

<sup>b</sup> 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; and food, which is in mg/kg.

<sup>c</sup> Unless otherwise indicated, the TIML results are given as the mean  $\pm$  2 standard deviations for three determinations.

<sup>d</sup> USEPA results are presented as the known values and expected laboratory precision (1s, 1 determination) and control limits as defined by EPA.

<sup>e</sup> NA = Not analyzed.

<sup>f</sup> ND = No data; not analyzed due to relocation of lab.

<sup>g</sup> Sample was analyzed but the results not submitted to EPA because deadline was missed (all data on file).

<sup>h</sup> ND = No data; sample lost during analyses.

<sup>i</sup> ND = No data; special EPA testing.

Table A-2. Crosscheck program results, thermoluminescent dosimeters (TLDs).

Lab Code	TLD Type	Measurement	mR		
			Teledyne Result $\pm 2\sigma^a$	Known Value	Average $\pm 2\sigma^d$ (All Participants)
<u>2nd International Intercomparison<sup>b</sup></u>					
115-2	CaF <sub>2</sub> :Mn Bulb	Field	17.0 $\pm$ 1.9	17.1	16.4 $\pm$ 7.7
		Lab	20.8 $\pm$ 4.1	21.3	18.8 $\pm$ 7.6
<u>3rd International Intercomparison<sup>e</sup></u>					
115-3	CaF <sub>2</sub> :Mn Bulb	Field	30.7 $\pm$ 3.2	34.9 $\pm$ 4.8	31.5 $\pm$ 3.0
		Lab	89.6 $\pm$ 6.4	91.7 $\pm$ 14.6	86.2 $\pm$ 24.0
<u>4th International Intercomparison<sup>f</sup></u>					
115-4	CaF <sub>2</sub> :Mn Bulb	Field	14.1 $\pm$ 1.1	14.1 $\pm$ 1.4	16.0 $\pm$ 9.0
		Lab (Low)	9.3 $\pm$ 1.3	12.2 $\pm$ 2.4	12.0 $\pm$ 7.4
		Lab (High)	40.4 $\pm$ 1.4	45.8 $\pm$ 9.2	43.9 $\pm$ 13.2
<u>5th International Intercomparison<sup>g</sup></u>					
115-5A	CaF <sub>2</sub> :Mn Bulb	Field	31.4 $\pm$ 1.8	30.0 $\pm$ 6.0	30.2 $\pm$ 14.6
		Lab at beginning	77.4 $\pm$ 5.8	75.2 $\pm$ 7.6	75.8 $\pm$ 40.4
		Lab at the end	96.6 $\pm$ 5.8	88.4 $\pm$ 8.8	90.7 $\pm$ 31.2
115-5B	LiF-100 Chips	Field	30.3 $\pm$ 4.8	30.0 $\pm$ 6.0	30.2 $\pm$ 14.6
		Field at beginning	81.1 $\pm$ 7.4	75.2 $\pm$ 7.6	75.8 $\pm$ 40.4
		Lab at the end	85.4 $\pm$ 11.7	88.4 $\pm$ 8.8	90.7 $\pm$ 31.2
<u>7th International Comparison<sup>h</sup></u>					
115-7A	LiF-100 Chips	Field	75.4 $\pm$ 2.6	75.8 $\pm$ 6.0	75.1 $\pm$ 29.8
		Lab (Co-60)	80.0 $\pm$ 3.5	79.9 $\pm$ 4.0	77.9 $\pm$ 27.6
		Lab (Cs-137)	66.6 $\pm$ 2.5	75.0 $\pm$ 3.8	73.0 $\pm$ 22.2

Table A-2. Crosscheck program results, thermoluminescent dosimeters (TLDs).

Lab Code	TLD Type	Measurement	mR		
			Teledyne Result $\pm 2\sigma^a$	Known Value	Average $\pm 2\sigma^d$ (All Participants)
115-7B	CaF <sub>2</sub> :Mn Bulbs	Field	71.5 $\pm$ 2.6	75.8 $\pm$ 6.0	75.1 $\pm$ 29.8
		Lab (Co-60)	84.8 $\pm$ 6.4	79.9 $\pm$ 4.0	77.9 $\pm$ 27.6
		Lab (Cs-137)	78.8 $\pm$ 1.6	75.0 $\pm$ 3.8	73.0 $\pm$ 22.2
115-7C	CaSO <sub>4</sub> :Dy Cards	Field	76.8 $\pm$ 2.7	75.8 $\pm$ 6.0	75.1 $\pm$ 29.8
		Lab (Co-60)	82.5 $\pm$ 3.7	79.9 $\pm$ 4.0	77.9 $\pm$ 27.6
		Lab (Cs-137)	79.0 $\pm$ 3.2	75.0 $\pm$ 3.8	73.0 $\pm$ 22.2
<u>8th International Intercomparison<sup>i</sup></u>					
115-8A	LiF-100 Chips	Field Site 1	29.5 $\pm$ 1.4	29.7 $\pm$ 1.5	28.9 $\pm$ 12.4
		Field Site 2	11.3 $\pm$ 0.8	10.4 $\pm$ 0.5	10.1 $\pm$ 9.06
		Lab (Cs-137)	13.7 $\pm$ 0.9	17.2 $\pm$ 0.9	16.2 $\pm$ 6.8
115-8B	CaF <sub>2</sub> :Mn Bulbs	Field Site 1	32.3 $\pm$ 1.2	29.7 $\pm$ 1.5	28.9 $\pm$ 12.4
		Field Site 2	9.0 $\pm$ 1.0	10.4 $\pm$ 0.5	10.1 $\pm$ 9.0
		Lab (Cs-137)	15.8 $\pm$ 0.9	17.2 $\pm$ 0.9	16.2 $\pm$ 6.8
115-8C	CaSO <sub>4</sub> :Dy Cards	Field Site 1	32.2 $\pm$ 0.7	29.7 $\pm$ 1.5	28.9 $\pm$ 12.4
		Field Site 2	10.6 $\pm$ 0.6	10.4 $\pm$ 0.5	10.1 $\pm$ 9.0
		Lab (Cs-137)	18.1 $\pm$ 0.8	17.2 $\pm$ 0.9	16.2 $\pm$ 6.8
<u>Teledyne Testing</u>					
89-1	LiF-100 Chips	Lab	21.0 $\pm$ 0.4	22.4	—
89-2	Teledyne CaSO <sub>4</sub> :Dy Cards	Lab	20.9 $\pm$ 1.0	20.3	—

Table A-2. (continued)

Lab Code	TLD Type	Measurement	mR		
			Teledyne Result $\pm 2\sigma^a$	Known Value	Average $\pm 2\sigma^d$ (All Participants)
<u>Teledyne Testing</u>					
90-1 <sup>k</sup>	Teledyne CaSO <sub>4</sub> :Dy Cards	Lab	20.6 $\pm$ 1.4	19.6	—
90-2 <sup>l</sup>	Teledyne CaSO <sub>4</sub> :Dy Cards	Lab	100.8 $\pm$ 4.3	100.0	—
91-1 <sup>m</sup>	Teledyne CaSO <sub>4</sub> :Dy Cards	Lab	33.4 $\pm$ 2.0	32.0	—
			55.2 $\pm$ 4.7	58.8	—
			87.8 $\pm$ 6.2	85.5	—
92-1 <sup>n</sup>	LiF-100 Chips	Lab	11.1 $\pm$ 0.2	10.7	—
			25.6 $\pm$ 0.5	25.4	—
			46.4 $\pm$ 0.5	46.3	—
92-2 <sup>o</sup>	Teledyne CaSO <sub>4</sub> :Dy Cards	Lab (Reader #1)	20.1 $\pm$ 0.1	20.1	—
			40.6 $\pm$ 0.1	40.0	—
			60.0 $\pm$ 1.3	60.3	—
		Lab (Reader #2)	20.3 $\pm$ 0.3	20.1	—
			39.2 $\pm$ 0.3	40.0	—
			60.7 $\pm$ 0.4	60.3	—

<sup>a</sup> Lab result given is the mean  $\pm 2$  standard deviations of three determinations.

<sup>b</sup> Second International Intercomparison of Environmental Dosimeters conducted in April of 1976 by the Health and Safety Laboratory (HASL), New York, New York, and the School of Public Health of the University of Texas, Houston, Texas.

<sup>c</sup> Value determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.

<sup>d</sup> Mean  $\pm 2$  standard deviations of results obtained by all laboratories participating in the program.

<sup>e</sup> Third International Intercomparison of Environmental Dosimeters conducted in summer of 1977 by Oak Ridge National Laboratory and the School of Public Health of the University of Texas, Houston, Texas.

<sup>f</sup> Fourth International Intercomparison of Environmental Dosimeters conducted in summer of 1979 by the School of Public Health of the University of Texas Houston, Texas.

<sup>g</sup> Fifth International Intercomparison of Environmental Dosimeters conducted in fall of 1980 at Idaho Falls, Idaho and sponsored by the School of Public Health of the University of Texas, Houston, Texas and Environmental Measurements Laboratory, New York, New York, U.S. Department of Energy.

Table A-2. (continued)

Lab Code	TLD Type	Measurement	mR	
			Teledyne Result $\pm 2\sigma^a$	Known Value Average $\pm 2\sigma^d$ (All Participants)

## Footnotes (continued)

- <sup>h</sup> Seventh International Intercomparison of Environmental Dosimeters conducted in the spring and summer of 1984 at Las Vegas, Nevada, and sponsored by the U.S. Department of Energy, The U.S. Nuclear Regulatory Commission, and the U.S. Environmental Protection Agency.
- <sup>i</sup> Eighth International Intercomparison of Environmental Dosimeters conducted in the fall and winter of 1985-1986 at New York, New York, and sponsored by the U.S. Department of Energy.
- <sup>j</sup> Chips were submitted in September 1989 and cards were submitted in November 1989 to Teledyne Isotopes, Inc., Westwood, NJ for irradiation.
- <sup>k</sup> Cards were irradiated by Teledyne Isotopes, Inc., Westwood, NJ on June 19, 1990.
- <sup>l</sup> Cards were irradiated by Dosimetry Associates, Inc., Northville, MI on October 30, 1990.
- <sup>m</sup> Irradiated cards were provided by Teledyne Isotopes, INC., Westwood, NJ. Irradiated on October 8, 1991.
- <sup>n</sup> Chips were irradiated by Teledyne Isotopes, Inc., Westwood, NJ on February 26, 1992.
- <sup>o</sup> Cards were irradiated by Teledyne Isotopes, Inc., Westwood, NJ on April 1, 1992.



Table A-3. In-house spiked samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L		
				TIML Result 2s, n=3 <sup>a</sup>	Known Activity	Expected Precision 1s, n=3 <sup>a</sup>
QC-MI-16	Milk	Feb 1988	Sr-89	31.8±4.7	31.7±6.0	8.7
			Sr-90	25.5±2.7	27.8±3.5	5.2
			I-131	26.4±0.5	23.2±5.0	10.4
			Cs-134	23.8±2.3	24.2±6.0	8.7
			Cs-137	26.5±0.8	25.1±6.0	8.7
QC-MI-17	Milk	Feb 1988	I-131	10.6±1.2	14.3±1.6	10.4
QC-W-35	Water	Feb 1988	I-131	9.7±1.1	11.6±1.1	10.4
QC-W-36	Water	Mar 1988	I-131	10.5±1.3	11.6±1.0	10.4
QC-W-37	Water	Mar 1988	Sr-89	17.1±2.0	19.8±8.0	8.7
			Sr-90	18.7±0.9	17.3±5.0	5.2
QC-MI-18	Milk	Mar 1988	I-131	33.2±2.3	26.7±5.0	10.4
			Cs-134	31.3±2.1	30.2±5.0	8.7
			Cs-137	29.9±1.4	26.2±5.0	8.7
QC-W-38	Water	Apr 1988	I-131	17.1±1.1	14.2±5.0	10.4
QC-W-39	Water	Apr 1988	H-3	4439±31	4176±500	724
QC-W-40	Water	Apr 1988	Co-60	23.7±0.5	26.1±4.0	8.7
			Cs-134	25.4±2.6	29.2±4.5	8.7
			Cs-137	26.6±2.3	26.2±4.0	8.7
QC-W-41	Water	Jun 1988	Gr. alpha	12.3±0.4	13.1±5.0	8.7
			Gr. beta	22.6±1.0	20.1±5.0	8.7
QC-MI-19	Milk	Jul 1988	Sr-89	15.1±1.6	16.4±5.0	8.7
			Sr-90	18.0±0.6	18.3±5.0	5.2
			I-131	88.4±4.9	86.6±8.0	10.4
			Cs-137	22.7±0.8	20.8±6.0	8.7
QC-W-42	Water	Sep 1988	Sr-89	48.5±3.3	50.8±8.0	8.7
			Sr-90	10.9±1.0	11.4±3.5	5.2
QC-W-43	Water	Oct 1988	Co-60	20.9±3.2	21.4±3.5	8.7
			Cs-134	38.7±1.6	38.0±6.0	8.7
			Cs-137	19.0±2.4	21.0±3.5	8.7
QC-W-44	Water	Oct 1988	I-131	22.2±0.6	23.3±3.5	10.4

Table A-3. In-house spiked samples(continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L		
				TIML Result 2s, n=3 <sup>a</sup>	Known Activity	Expected Precision 1s, n=3 <sup>a</sup>
QC-W-45	Water	Oct 1988	H-3	4109±43	4153±500	724
QC-MI-20	Milk	Oct 1988	I-131	59.8±0.9	60.6±9.0	10.4
			Cs-134	49.6±1.8	48.6±7.5	8.7
			Cs-137	25.8±4.6	24.7±4.0	8.7
QC-W-46	Water	Dec 1988	Gr. alpha	11.5±2.3	15.2±5.0	8.7
			Gr. beta	26.5±2.0	25.7±5.0	8.7
QC-MI-21	Milk	Jan 1989	Sr-89	25.5±10.3	34.0±10.0	8.7
			Sr-90	28.3±3.2	27.1±3.0	5.2
			I-131	540±13	550±20	10.4
			Cs-134	24.5±2.6	22.6±5.5	8.7
			Cs-137	24.0±0.6	20.5±5.0	8.7
QC-W-47	Water	Mar 1989	Sr-89	15.2±3.8	16.1±5.0	8.7
			Sr-90	16.4±1.7	16.9±3.0	5.2
QC-MI-22	Milk	Apr 1989	I-131	36.3±1.1	37.2±5.0	10.4
			Cs-134	20.8±2.8	20.7±8.0	8.7
			Cs-137	22.2±2.4	20.4±8.0	8.7
QC-W-48	Water	Apr 1989	Co-60	23.5±2.0	25.1±8.0	8.7
			Cs-134	24.2±1.1	25.9±8.0	8.7
			Cs-137	23.6±1.2	23.0±8.0	8.7
QC-W-49	Water	Apr 1989	I-131	37.2±3.7	37.2±5.0	10.4
QC-W-50	Water	Apr 1989	H-3	3011±59	3089±500	724
QC-W-51	Water	Jun 1989	Gr. alpha	13.0±1.8	15.0±5.0	8.7
			Gr. beta	26.0±1.2	25.5±8.0	8.7
QC-MI-23	Milk	Jul 1989	Sr-89	19.4±6.5	22.0±10.0	8.7
			Sr-90	27.6±3.5	28.6±3.0	5.2
			I-131	46.8±3.2	43.4±5.0	10.4
			Cs-134	27.4±1.8	28.3±6.0	8.7
			Cs-137	24.1±1.8	20.8±6.0	8.7
QC-MI-24	Milk	Aug 1989	Sr-89	25.4±2.7	27.2±10.0	8.7
			Sr-90	46.0±1.1	47.8±9.6	5.2
QC-W-52	Water	Sep 1989	I-131	9.6±0.3	9.7±1.9	10.4

Table A-3. In-house spiked samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L		
				TIML Result 2s, n=3 <sup>a</sup>	Known Activity	Expected Precision 1s, n=3 <sup>a</sup>
QC-W-53	Water	Sep 1989	I-131	19.0±0.2	20.9±4.2	10.4
QC-W-54	Water	Sep 1989	Sr-89	25.8±4.6	24.7±4.0	8.7
			Sr-90	26.5±5.3	29.7±5.0	5.2
QC-MI-25	Milk	Oct 1989	I-131	70.0±3.3	73.5±20.0	10.4
			Cs-134	22.1±2.6	22.6±8.0	8.7
			Cs-137	29.4±1.5	27.5±8.0	8.7
QC-W-55	Water	Oct 1989	I-131	33.3±1.3	35.3±10.0	10.4
QC-W-56	Water	Oct 1989	Co-60	15.2±0.9	17.4±5.0	8.7
			Cs-134	22.1±4.4	18.9±8.0	8.7
			Cs-137	27.2±1.2	22.9±8.0	8.7
QC-W-57	Water	Oct 1989	H-3	3334±22	3379±500	724
QC-W-58	Water	Nov 1989	Sr-89	10.9±1.4 <sup>d</sup>	11.1±1.0 <sup>d</sup>	8.7
			Sr-90	10.4±1.0 <sup>d</sup>	10.3±1.0 <sup>d</sup>	5.2
QC-W-59	Water	Nov 1989	Sr-89	101.0±6.0 <sup>d</sup>	104.1±10.5 <sup>d</sup>	18.0
			Sr-90	98.0±3.0 <sup>d</sup>	95.0±10.0 <sup>d</sup>	16.4
QC-W-60	Water	Dec 1989	Gr. alpha	10.8±1.1	10.6±4.0	8.7
			Gr. beta	11.6±0.5	11.4±4.0	8.7
QC-MI-26	Milk	Jan 1990	Cs-134	19.3±1.0	20.8±8.0	8.7
			Cs-137	25.2±1.2	22.8±8.0	8.7
QC-MI-27	Milk	Feb 1990	Sr-90	18.0±1.6	18.8±5.0	5.2
QC-MI-28	Milk	Mar 1990	I-131	63.8±2.2	62.6±6.0	10.8
QC-MI-61	Water	Apr 1990	Sr-89	17.9±5.5	23.1±5.7	8.7
			Sr-90	19.4±2.5	23.5±5.2	5.2
QC-MI-29	Milk	Apr 1990	I-131	90.7±9.2	82.5±8.5	10.4
			Cs-134	18.3±1.0	19.7±5.0	8.7
			Cs-137	20.3±1.0	18.2±5.0	8.7
QC-W-62	Water	Apr 1990	Co-60	8.7±0.4	9.4±5.0	8.7
			Cs-134	20.0±0.2	19.7±5.0	8.7
			Cs-137	28.7±1.4	22.7±5.0	8.7

Table A-3. In-house spiked samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L		
				TIML Result 2s, n=3 <sup>e</sup>	Known Activity	Expected Precision 1s, n=3 <sup>a</sup>
QC-W-63	Water	Apr 1990	I-131	63.5±8.0	66.0±6.7	11.4
QC-W-64	Water	Apr 1990	H-3	1941±130	1826.0±350.0	724
QC-W-65	Water	Jun 1990	Ra-226	6.4±0.2	6.9±1.0	1.8
QC-W-66	Water	Jun 1990	U	6.2±0.2	6.0±6.0	10.4
QC-MI-30	Milk	Jul 1990	Sr-89	12.8±0.4	18.4±10.0	8.7
			Sr-90	18.2±1.4	18.7±6.0	5.2
			Cs-134	46.0±1.3	49.0±5.0	8.7
			Cs-137	27.6±1.3	25.3±5.0	8.7
QC-W-68	Water	Jun 1990	Gr. alpha	9.8±0.3	10.6±6.0	8.7
			Gr. beta	11.4±0.6	11.3±7.0	8.7
QC-MI-31	Milk	Aug 1990	I-131	68.8±1.6	61.4±12.3	10.4
QC-W-69	Water	Sep 1990	Sr-89	17.7±1.6	19.2±10.0	8.7
			Sr-90	13.9±1.6	17.4±10.0	5.2
QC-MI-32	Milk	Oct 1990	I-131	34.8±0.2	32.4±6.5	8.7
			Cs-134	25.8±1.2	27.3±10.0	8.7
			Cs-137	25.3±2.0	22.4±10.0	8.7
QC-W-70	Water	Oct 1990	H-3	2355±59	2276±455	605
QC-W-71	Water	Oct 1990	I-131	55.9±0.9	51.8±10.4	10.4
QC-W-73	Water	Oct 1990	Co-60	18.3±2.7	16.8±5.0	8.7
			Cs-134	28.3±2.3	27.0±5.0	8.7
			Cs-137	22.7±1.3	22.4±5.0	8.7
QC-W-74	Water	Dec 1990	Gr. alpha	21.4±1.0	26.1±6.5	11.3
			Gr. beta	25.9±1.0	22.3±5.6	8.7

<sup>a</sup> n=3 unless noted otherwise.<sup>b</sup> n=2<sup>c</sup> n=1<sup>d</sup> Concentration in pCi/mL

Table A-3. In-house spiked samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L		
				TIML Result 2s, n=1 <sup>e</sup>	Known Activity	Expected Precision 1s, n=1 <sup>e</sup>
QC-MI-33	Milk	Jan 1991	Sr-89	20.7±3.3	21.6±5.0	5.0
			Sr-90	19.0±1.4	23.0±3.0	3.0
			Cs-134	22.2±1.7	19.6±5.0	5.0
			Cs-137	26.1±1.6	22.3±5.0	5.0
QC-MI-34	Milk	Feb 1991	I-131	40.7±1.8	40.1±6.0	6.0
QC-W-75	Water	Mar 1991	Sr-89	18.8±1.5	23.3±5.0	5.0
			Sr-90	16.0±0.8	17.2±3.0	3.0
QC-W-76	Water	Apr 1991	I-131	56.5±1.7	59.0±5.9	5.9
QC-W-77	Water	Apr 1991	Co-60	16.4±2.2	15.7±5.0	5.0
			Cs-134	23.8±2.5	22.6±5.0	5.0
			Cs-137	25.0±2.4	21.1±5.0	5.0
QC-W-78	Water	Apr 1991	H-3	4027±188	4080±408	408
QC-MI-35	Milk	Apr 1991	I-131	48.0±0.8	49.2±6.0	6.0
			Cs-134	19.2±2.0	22.6±5.0	5.0
			Cs-137	22.8±2.2	22.1±5.0	5.0
QC-W-79	Water	Jun 1991	Gr. alpha	7.4±0.7	7.8±5.0	5.0
			Gr. beta	11.0±0.7	11.0±5.0	5.0
QC-MI-36	Milk	Jul 1991	Sr-89	28.1±2.1	34.0±10.0	5.0
			Sr-90	11.6±0.7	11.5±3.0	3.0
			I-131	14.4±1.9	18.3±5.0	5.0
			Cs-137	34.3±3.0	35.1±5.0	5.0
QC-W-80	Water	Oct 1991	Sr-89	27.4±6.9	24.4±5.0	5.0
			Sr-90	11.7±1.4	14.1±5.0	3.0
QC-W-81	Water	Oct 1991	I-131	19.1±0.7	20.6±4.2	6.0
QC-W-82	Water	Oct 1991	Co-60	22.6±2.7	22.1±5.0	5.0
			Cs-134	15.5±1.8	17.6±5.0	5.0
			Cs-137	17.5±2.1	17.6±5.0	5.0
QC-W-83	Water	Oct 1991	H-3	4639±137	4382±438	438
QC-MI-37	Milk	Oct 1991	I-131	23.6±3.2	25.8±5.0	6.0
			Cs-134	22.7±2.8	22.1±5.0	5.0
			Cs-137	38.3±3.0	35.1±5.0	5.0
QC-W-84	Water	Dec 1991	Gr. alpha	6.2±0.6	7.8±5.0	5.0
			Gr. beta	11.0±0.7	11.0±5.0	5.0



Table A-3. In-house spiked samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L		
				TIML Result 2s, n=1 <sup>e</sup>	Known Activity	Expected Precision 1s, n=1 <sup>e</sup>
QC-MI-39	Milk	Jan 1992	Sr-89	21.6±6.5	31.2±10.0	5.0
			Sr-90	38.7±1.8	42.3±8.5	4.2
			I-131	76.8±0.9	83.7±16.0	8.4
			Cs-134	42.1±5.7	49.4±10.0	5.0
			Cs-137	55.2±6.4	53.0±10.0	5.0
QC-W-85	Water	Mar 1992	Sr-89	26.2±3.1	32.0±10.0	5.0
			Sr-90	24.4±1.4	28.0±6.0	3.0
QC-W-86	Water	Apr 1992	H-3	4080±190	4027±403	403
QC-W-87	Water	Apr 1992	I-131	33.5±0.6	33.2±12.0	6.0
QC-W-88	Water	Apr 1992	Co-60	17.5±2.7	19.7±10.0	5.0
			Cs-134	28.9±2.5	33.5±10.0	5.0
			Cs-137	41.0±3.0	38.9±10.0	5.0
QC-MI-40	Milk	Apr 1992	Cs-134	58.0±2.6	55.9±10.0	5.0
			Cs-137	43.7±3.0	38.9±10.0	5.0
QC-W-41	Milk	Apr 1992	I-131	50.3±0.8	55.9±11.2	5.6
QC-W-89	Water	Jun 1992	Gr. alpha	15.3±0.8	13.6±10.0	5.0
			Gr. beta	17.2±0.9	17.6±10.0	5.0
QC-MI-42	Milk	Aug. 1992	Sr-89	41.4±5.9	51.2±10.2	5.0
			Sr-90	48.9±2.5	51.9±10.4	5.2
			Cs-134	20.1±2.8	20.2±10.0	5.0
			Cs-137	26.2±2.7	26.1±10.0	5.0
QC-W-90	Water	Sept. 1992	Sr-89	6.7±3.4	12.6±10.0	5.0
			Sr-90	16.1±1.4	15.6±6.0	3.0
QC-W-91	Water	Oct. 1992	I-131	34.9±2.2	34.9±10.0	6.0
QC-W-92	Water	Oct. 1992	Co-60	11.4±1.9	9.2±10.0	5.0
			Cs-134	18.7±2.3	14.3±10.0	5.0
			Cs-137	14.1±1.8	15.0±10.0	5.0

Table A-3. In-house spiked samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L		
				TIML Result 2s, n=1 <sup>e</sup>	Known Activity	Expected Precision 1s, n=1 <sup>e</sup>
QC-W-93	Water	Oct. 1992	H-3	3704±186	3904±390	367
QC-W-94	Water	Oct. 1992	H-3	14,925±339	15,616±1,562	1562
QC-W-95	Water	Oct. 1992	I-131	64.2±2.7	67.2±10.0	6.7
QC-MI-43	Milk	Oct. 1992	I-131	19.9±1.0	21.5±6.0	6.0
			Cs-134	14.2±3.4	12.7±10.0	5.0
			Cs-137	14.1±5.2	17.1±10.0	5.0
QC-MI-44	Milk	Oct. 1992	I-131	36.1±1.2	43.0±10.0	6.0
			Cs-134	28.2±4.0	25.4±10.0	5.0
			Cs-137	38.8±5.1	34.2±10.0	5.0

<sup>e</sup> Starting in January 1991, all determinations are single.



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

Lab Code	Sample Type	Date Collected	Analysis	Concentration (pCi/L)	
				Results (4.66 $\sigma$ )	Acceptance Criteria (4.66 $\sigma$ )
SPS-5386	Milk	Jan 1988	I-131	<0.1	<1
SPW-5448	"Dead" Water	Jan 1988	H-3	<177	<300
SPS-5615	Milk	Mar 1988	Cs-134	<2.4	<10
			Cs-137	<2.5	<10
			I-131	<0.3	<1
			Sr-89	<0.4	<5
			Sr-90	2.4 $\pm$ 0.5 <sup>a</sup>	<1
SPS-5650	D.I. Water	Mar 1988	Th-228	<0.3	<1
			Th-230	<0.04	<1
			Th-232	<0.05	<1
			U-234	<0.03	<1
			U-235	<0.03	<1
			U-238	<0.03	<1
			Am-241	<0.06	<1
			Cm-241	<0.01	<1
			Pu-238	<0.08	<1
			Pu-240	<0.02	<1
SPS-6090	Milk	Jul 1988	Sr-89	<0.5	<1
			Sr-90	1.8 $\pm$ 0.5	<1
			I-131	<0.4	<1
			Cs-137	<0.4	<10
SPW-6209	Water	Jul 1988	Fe-55	<0.8	<1
SPW-6292	Water	Sep 1988	Sr-89	<0.7	<5
			Sr-90	<0.7	<1
SPS-6477	Milk	Oct 1988	I-131	<0.2	<1
			Cs-134	<6.1	<10
			Cs-137	<5.9	<10
SPW-6478	Water	Oct 1988	I-131	<0.2	<1
SPW-6479	Water	Oct 1988	Co-60	<5.7	<10
			Cs-134	<3.7	<10
			Cs-137	<4.3	<10
SPW-6480	Water	Oct 1988	H-3	<170	<300

Table A-4. In-house "blank" samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration (pCi/L)	
				Results (4.66 $\sigma$ )	Acceptance Criteria (4.66 $\sigma$ )
SPW-6625	Water	Dec 1988	Cr. alpha Gr. beta	<0.7 <1.9	<1 <4
SPS-6723	Milk	Jan 1989	Sr-89	<0.6	<5
			Sr-90	1.9 $\pm$ 0.5 <sup>a</sup>	<1
			I-131	<0.2	<1
			Cs-134	<4.3	<10
			Cs-137	<4.4	<10
SPW-6877	Water	Mar 1989	Sr-89	<0.4	<5
			Sr-90	<0.6	<1
SPS-6963	Milk	Apr 1989	I-131	<0.3	<1
			Cs-134	<5.9	<10
			Cs-137	<6.2	<10
SPW-7561	Water	Apr 1989	H-3	<150	<300
SPW-7207	Water	Jun 1989	Ra-226	<0.2	<1
			Ra-228	<0.6	<1
SPS-7208	Milk	Jun 1989	Sr-89	<0.6	<5
			Sr-90	2.1 $\pm$ 0.5 <sup>a</sup>	<1
			I-131	<0.3	<1
			Cs-134	<6.4	<10
			Cs-137	<7.2	<10
SPW-7588	Water	Jun 1989	Gr. alpha	<0.2	<1
			Gr. beta	<1.0	<4
SPS-7322	Milk	Aug 1989	Sr-89	<1.4	<5
			Sr-90	4.8 $\pm$ 1.0 <sup>a</sup>	<1
			I-131	<0.2	<1
			Cs-134	<6.9	<10
			Cs-137	<8.2	<10
SPW-7559	Water	Sep 1989	Sr-89	<2.0	<5
			Sr-90	<0.7	<1
SPW-7560	Water	Oct 1989	I-131	<0.1	<1
SPW-7562	Water	Oct 1989	H-3	<140	<300

Table A-4. In-house "blank" samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration (pCi/L)	
				Results (4.66 $\sigma$ )	Acceptance Criteria (4.66 $\sigma$ )
SPS-7605	Milk	Nov 1989	I-131	<0.2	<1
			Cs-134	<8.6	<10
			Cs-137	<10	<10
SPW-7971	Water	Dec 1989	Gr. alpha	<0.4	<1
			Gr. beta	<0.8	<4
SPW-8039	Water	Jan 1990	Ra-226	<0.2	<1
SPS-8040	Milk	Jan 1990	Sr-89	<0.8	<5
			Sr-90	<1.0	<1
SPS-8208	Milk	Jan 1990	Sr-89	<0.8	<5
			Sr-90	1.6 $\pm$ 0.5 <sup>a</sup>	<1
			Cs-134	<3.6	<10
			Cs-137	<4.7	<10
SPS-8312	Milk	Feb 1990	Sr-89	<0.3	<5
			Sr-90	1.2 $\pm$ 0.3 <sup>a</sup>	<1
SPW-8312A	Water	Feb 1990	Sr-89	<0.6	<5
			Sr-90	<0.7	<5
SPS-8314	Milk	Mar 1990	I-131	<0.3	<1
SPS-8510	Milk	May 1990	I-131	<0.2	<1
			Cs-134	<4.6	<10
			Cs-137	<4.8	<10
SPW-8511A	Water	May 1990	H-3	<200	<300
SPS-8600	Milk	Jul 1990	Sr-89	<0.8	<5
			Sr-90	1.7 $\pm$ 0.6 <sup>a</sup>	<1
			I-131	<0.3	<1
			Cs-134	<5.0	<10
			Cs-137	<7.0	<10
SPM-8877	Milk	Aug 1990	I-131	<0.2	<1
SPW-8925	Water	Aug 1990	H-3	<200	<300

Table A-4. In-house "blank" samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration (pCi/L)	
				Results (4.66 $\sigma$ )	Acceptance Criteria (4.66 $\sigma$ )
SPW-8926	Water	Aug 1990	Gr. alpha	<0.3	<1
			Gr. beta	<0.7	<4
SPW-8927	Water	Aug 1990	U-234	<0.01	<1
			U-235	<0.02	<1
			U-238	<0.01	<1
SPW-8928	Water	Aug 1990	Mn-54	<4.0	<10
			Co-58	<4.1	<10
			Co-60	<2.4	<10
			Cs-134	<3.3	<10
			Cs-137	<3.7	<10
SPW-8929	Water	Aug 1990	Sr-89	<1.4	<5
			Sr-90	<0.6	<1
SPW-69	Water	Sep 1990	Sr-89	<1.8	<5
			Sr-90	<0.8	<1
SPW-106	Water	Oct 1990	H-3	<180	<300
			I-131	<0.3	<1
SPM-107	Milk	Oct 1990	I-131	<0.4	<1
			Cs-134	<3.3	<10
			Cs-137	<4.3	<10
SPW-370	Water	Oct 1990	Mn-54	<1.7	<10
			Co-58	<2.6	<10
			Co-60	<1.6	<10
			Cs-134	<1.7	<10
			Cs-137	<1.8	<10
SPW-372	Water	Dec 1990	Gr. alpha	<0.3	<1
			Gr. beta	<0.8	<4
SPS-406	Milk	Jan 1991	Sr-89	<0.4	<5
			Sr-90	1.8 $\pm$ 0.4 <sup>a</sup>	<1
			Cs-134	<3.7	<10
			Cs-137	<5.2	<10
SPS-421	Milk	Feb 1991	I-131	<0.3	<1
SPW-451	Water	Feb 1991	Ra-226	<0.1	<1
			Ra-228	<0.9	<1

Table A-4. In-house "blank" samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration (pCi/L)	
				Results (4.66 $\sigma$ )	Acceptance Criteria (4.66 $\sigma$ )
SPW-514	Water	Mar 1991	Sr-89	<1.1	<5
			Sr-90	<0.9	<1
SPW-586	Water	Apr 1991	I-131	<0.2	<1
			Co-60	<2.5	<10
			Cs-134	<2.4	<10
			Cs-137	<2.2	<10
SPS-587	Milk	Apr 1991	I-131	<0.2	<1
			Cs-134	<1.7	<10
			Cs-137	<1.9	<10
SPW-837	Water	Jun 1991	Gr. alpha	<0.6	<1
			Gr. beta	<1.1	<4
SPM-953	Milk	Jul 1991	Sr-89	<0.7	<5
			Sr-90	$0.4 \pm 0.3^a$	<1
			I-131	<0.2	<1
			Cs-137	<4.9	<10
SPM-1236	Milk	Oct 1991	I-131	<0.2	<1
			Cs-134	<3.7	<10
			Cs-137	<4.6	<10
SPW-1254	Water	Oct 1991	Sr-89	<2.8	<5
			Sr-90	<0.7	<1
SPW-1256	Water	Oct 1991	I-131	<0.4	<1
			Co-60	<3.6	<10
			Cs-134	<4.0	<10
			Cs-137	<3.6	<10
SPW-1259	Water	Oct 1991	H-3	<160	<300
SPW-1444	Water	Dec 1991	Gr. alpha	<0.4	<1
			Gr. beta	<0.8	<4
SPM-1578	Milk	Jan 1992	Sr-89	<0.5	<5
			Sr-90	$1.3 \pm 0.4^a$	<1
			I-131	<0.2	<1
			Cs-134	<7.2	<10
			Cs-137	<8.0	<10

Table A-4. In-house "blank" samples (continued)

Lab Code	Sample Type	Date Collected	Analysis	Concentration (pCi/L)	
				Results (4.66 $\sigma$ )	Acceptance Criteria (4.66 $\sigma$ )
SPW-1860	Water	Mar 1992	Sr-89	<0.6	<5
			Sr-90	<0.4	<1
SPW-2067	Water	Apr 1992	H-3	<168	<300
SPW-2114	Water	Apr 1992	C-14	<1.0	<200
SPW-2119	Milk	Apr 1992	Co-60	<6.3	<10
			Cs-134	<4.5	<10
			Cs-137	<5.4	<10
SPW-2126	Water	Apr 1992	I-131	<0.2	<1
SPM-2133	Milk	Apr 1992	I-131	<0.2	<1
SPW-2220	Water	May 1992	Co-60	<2.1	<10
			Cs-134	<2.1	<10
			Cs-137	<2.3	<10
SPW-2369	Water	Jun 1992	Gr. alpha	<0.4	<1
			Gr. beta	<0.8	<4
SPM-2500	Milk	Aug 1992	I-131	<0.4	<1
			Sr-89	<1.2	<5
			Sr-90	<0.9	<1
SPW-2666	Water	Sept. 1992	Sr-89	<0.8	<5
			Sr-90	<0.5	<1
SPW-2828	Water	Oct. 1992	Co-60	<4.8	<10
			Cs-134	<6.0	<10
			Cs-137	<6.1	<10
			I-131	<0.3	<1
			H-3	<177	<300
SPM-2829	Milk	Oct. 1992	Co-60	<9.3	<10
			Cs-134	<6.4	<10
			Cs-137	<7.2	<10
SPW-3212	Water	Oct 1992	Ra-228	<1.0	<1
SPW-3057	Water	NOv. 1992	Ra-226	<0.03	<1
SPW-3294	Water	Dec. 1992	Gr. alpha	<0.4	<1
			Gr. beta	<0.8	<4

<sup>a</sup> Low level of Sr-90 concentration in milk (1-5 pCi/L) is not unusual.

ATTACHMENT B

## ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES<sup>a</sup>

Analysis	Level	One Standard Deviation for Single Determination
Gamma Emitters	5 to 100 pCi/liter or kg >100 pCi/liter or kg	5 pCi/liter 5% of known value
Strontium-89 <sup>b</sup>	5 to 50 pCi/liter or kg >50 pCi/liter or kg	5 pCi/liter 10% of known value
Strontium-90 <sup>b</sup>	2 to 30 pCi/liter or kg >30 pCi/liter or kg	3.0 pCi/liter 10% of known value
Potassium	>0.1 g/liter or kg	5% of known value
Gross alpha	<20 pCi/liter >20 pCi/liter	5 pCi/liter 25% of known value
Gross beta	<100 pCi/liter >100 pCi/liter	5 pCi/liter 5% of known value
Tritium	<4,000 pCi/liter >4,000 pCi/liter	1s = (pCi/liter) = 169.85 x (known) .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 <sup>b</sup>	<55 pCi/liter >55 pCi/liter	6 pCi/liter 10% of known value
Uranium-238, Nickel-64 <sup>b</sup> , Technetium-99 <sup>b</sup>	<35 pCi/liter >35 pCi/liter	6 pCi/liter 15% of known value
Iron-55 <sup>b</sup>	50 to 100 pCi/liter >100 pCi/liter	10 pCi/liter 10% of known value

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

<sup>b</sup> TIML limit.



# ADDENDUM TO APPENDIX A

The following is an explanation of the reasons why certain samples were outside the control limit specified by the Environmental Protection Agency for the Interlaboratory Comparisons Program starting January 1988.

Lab Code	Analysis	TIML Result (pCi/L) <sup>a</sup>	EPA Control Limit (pCi/L) <sup>a</sup>	Explanation
STF-524	K	1010.7±158.5 <sup>b</sup>	1123.5-1336.5 <sup>b</sup>	Error in transference of data. Correct data was 1105±33 mg/kg. Results in the past have been within the limits and TIML will monitor the situation in the future.
STW-532	I-131	9.0±2.0	6.2-8.8	Sample recounted after 12 days. The average result was 8.8±1.7 pCi/L (within EPA control limits). The sample was recounted in order to check the decay. Results in the past have been within the limits and TIML will continue to monitor the situation in the future.
STW-534	Co-60	63.3±1.3	41.3-58.7	High level of Co-60 was due to contamination of beaker. Beaker was discarded upon discovery of contamination and sample was recounted. Recount results were 53.2±3.6 and 50.9±2.4 pCi/L.
STM-554	Sr-90	51.0±2.0	54.8-65.2	The cause of low result was due to very high fat content of milk. It should be noted that 63% of all participants failed this test. Also, the average for all participants was 54.0 pCi/L before the Grubb and 55.8 pCi/L after the Grubb.
STW-560	Pu-239	5.8±1.1	3.5-4.9	The cause of high results is not known though it is suspected that the standard was not properly calibrated by supplier and is under investigation. New Pu-236 standard was obtained and will be used for the next test.
STW-568	Ra-228	2.6±1.0	2.7-4.5	The cause of low results is not known. Next EPA cross check results were within the control limits. No further action is planned.

ADDENDUM TO APPENDIX A (continued)

Lab Code	Analysis	TIML Result (pCi/L) <sup>a</sup>	EPA Control Limit (pCi/L) <sup>a</sup>	Explanation
STM-570	Sr-89	26.0±10.0	30.3-47.7	The cause of low results was falsely high recovery due to suspected incomplete calcium removal. Since EPA sample was used up, internal spike was prepared and analyzed. The results were within control limits (See table A-3, sample QC-MI-24). No further action is planned.
	Sr-90	45.7±4.2	49.8-60.2	
STW-589	Sr-90	17.3±1.2	17.4-22.6	Sample was reanalyzed in triplicate; results of reanalyses were 18.8±1.5 pCi/L. No further action is planned.
STM-599	K	1300.0±69.2 <sup>c</sup>	1414.7-1685.3 <sup>c</sup>	Sample was reanalyzed in triplicate. Results of reanalyses were 1421.7±95.3 mg/L. The cause of low results was using wrong volume.
STW-601	Gr. alpha	11.0±2.0	11.6-32.4	Sample was reanalyzed in triplicate. Results of reanalyses were 13.4±1.0 pCi/L.
STAF-626	Gr. alpha	38.7±1.2	14.6-35.4	The cause of high results is the difference in geometry between standard used in the TIML lab and EPA filter.
STW-632	Ba-133	74.0±6.9	51.6-72.4	Sample was reanalyzed. Results of the reanalyses were 63.8±6.9 pCi/L within EPA limit.
STM-641	I-131	130.7±16.8	88.9-127.1	The cause of high result is unknown. In-house spike sample was prepared with activity of I-131 68.3±6.8 pCi/L. Result of the analysis was 69.1±9.7 pCi/L.
STM-661	Sr-89	25.3±7.6	29.3-46.7	The cause of low result is unknown. Data was checked for errors. The in-house spike sample was prepared with activity of Sr-89 41.0±10.0 pCi/L. Result of the analysis was 37.2±3.6 pCi/L.

ADDENDUM TO APPENDIX A (continued)

Lab Code	Analysis	TIML Result (pCi/L) <sup>a</sup>	EPA Control Limit (pCi/L) <sup>a</sup>	Explanation
STM-673	K	1540.0±103.9 <sup>c</sup>	1597.3-1902.7	Activity was calculated using the wrong volume (3.5 L), instead of 3.25 L. Correction for volume resulted in a value of 1660.0±110.1 mg/L; within EPA control limits.

<sup>a</sup> Reported in pCi/L unless otherwise noted.

<sup>c</sup> Concentrations are reported in mg/L.

## 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;

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

In cases where the activity is found to be below the lower limit of detection  $L$  it is reported as

$$<L$$

where  $L$  = the lower limit of detection based on  $4.66\sigma$  uncertainty for a background sample.

### 3.0. Duplicate analyses

3.1 Individual results:  $x_1 \pm s_1$   
 $x_1 \pm s_2$

Reported result:  $x \pm s$

where  $x = (1/2) (x_1 \pm x_2)$

$$s = (1/2) \sqrt{s_1^2 + s_2^2}$$

3.2. Individual results:  $<L_1$   
 $<L_2$

Reported result:  $<L$

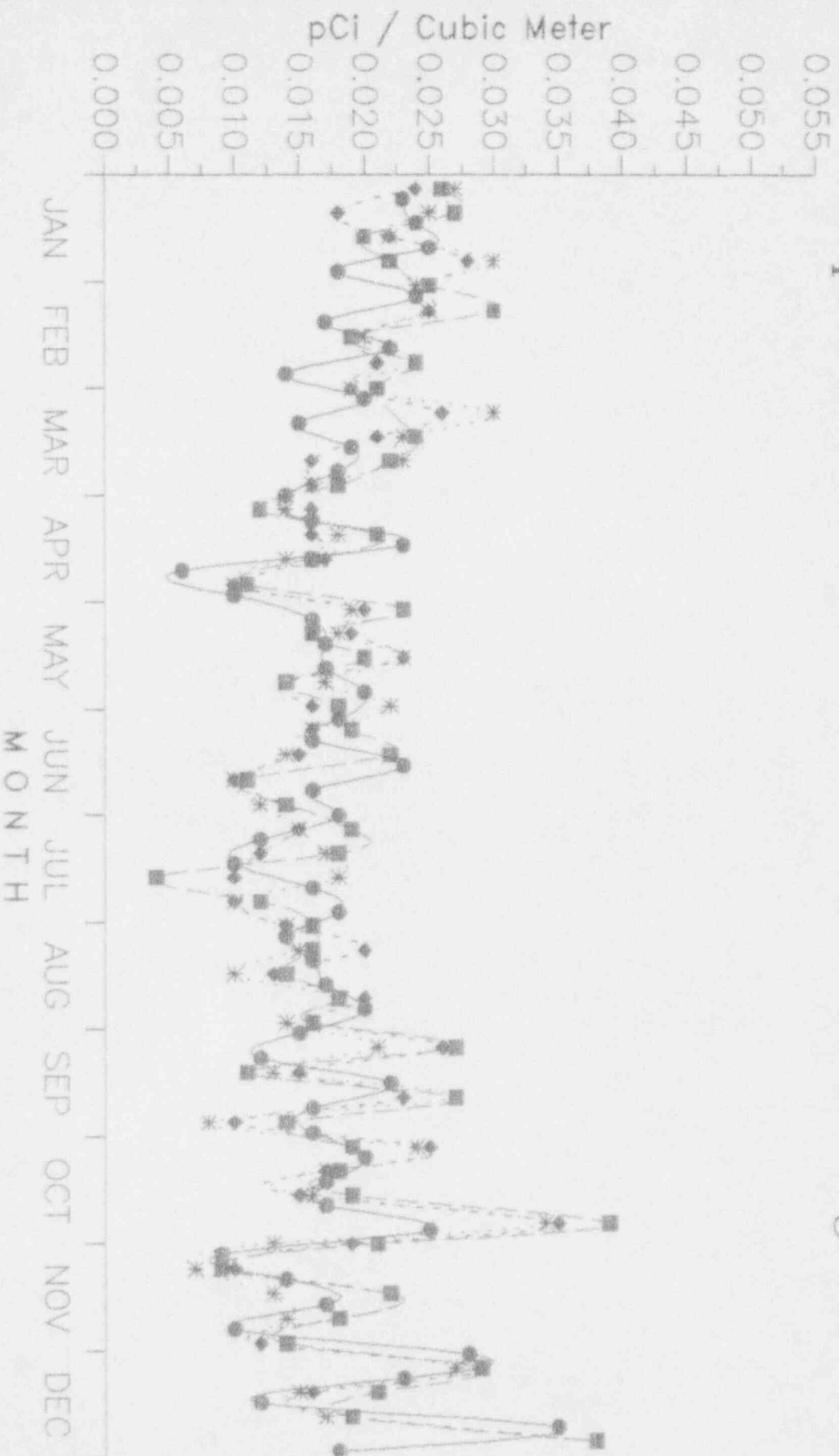
where  $L$  = lower of  $L_1$  and  $L_2$

3.3. Individual results:  $x \pm s$   
 $<L$

Reported result:  $x \pm s$  if  $x \geq L$ ;  
 $<L$  otherwise

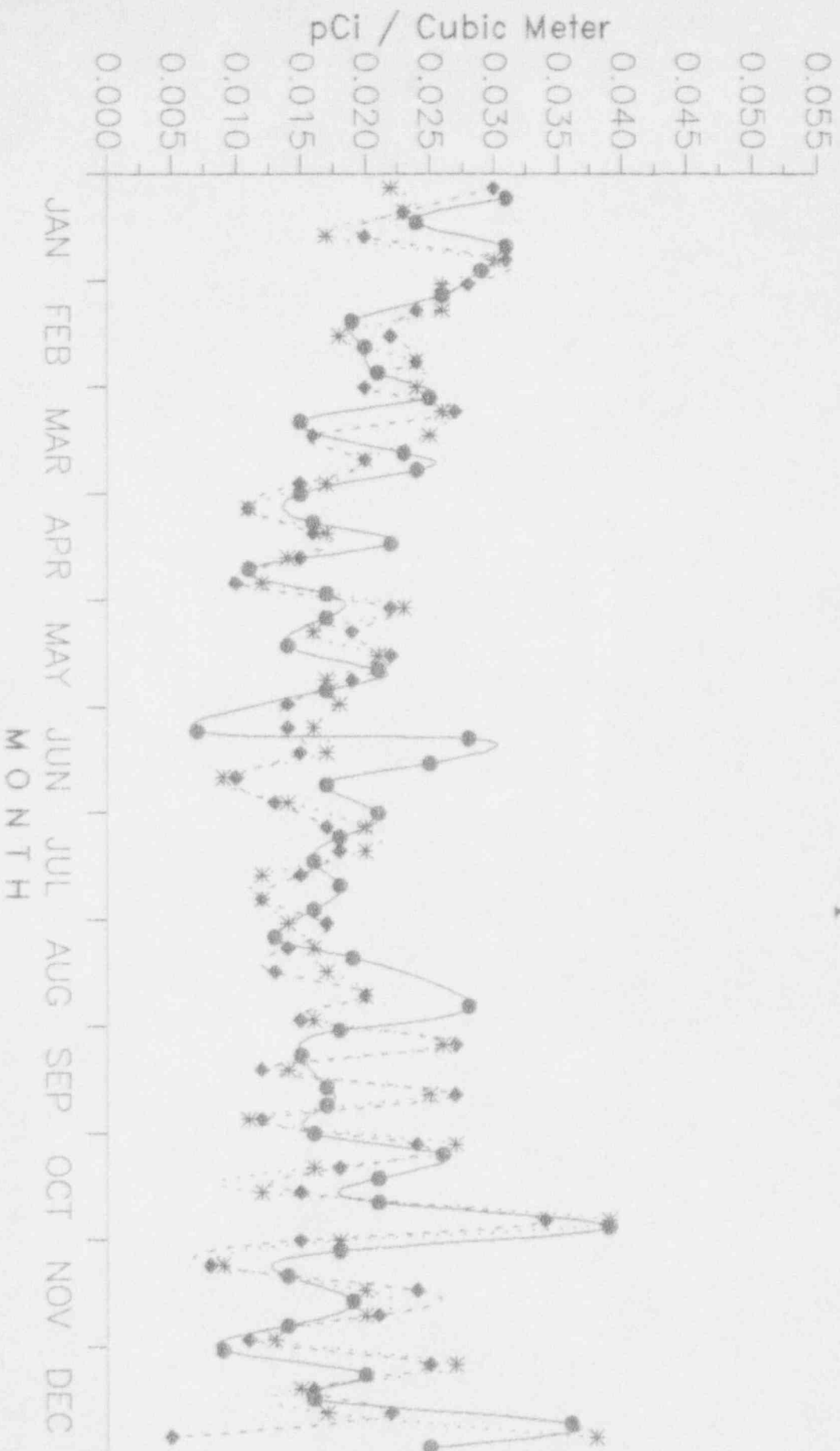
# 1992 PALISADES AIR PARTICULATE Weekly Gross Beta

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



# 1992 PALISADES AIR PARTICULATE Weekly Gross Beta

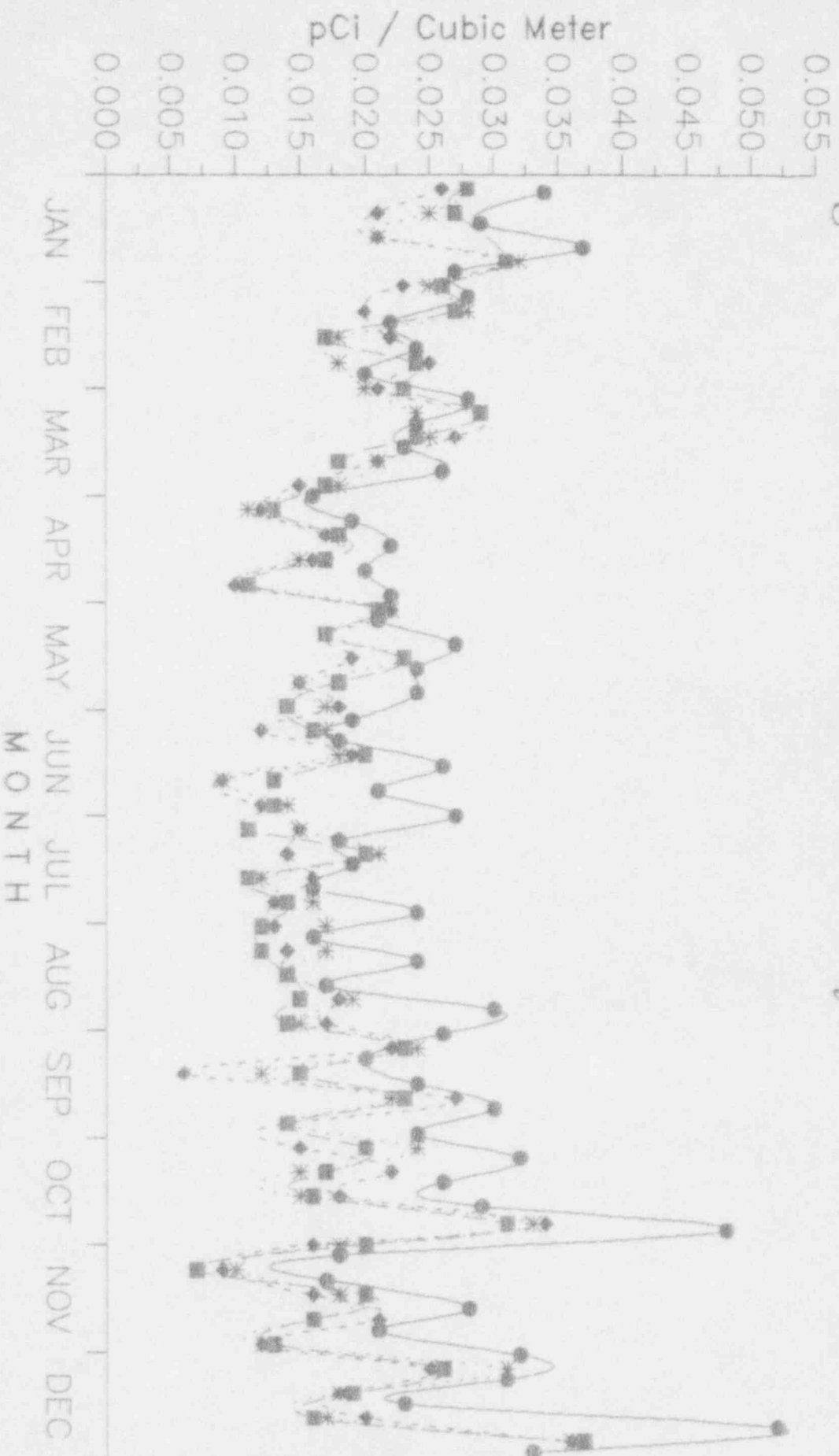
## Kalamazoo-Control vs Township Park, State Park





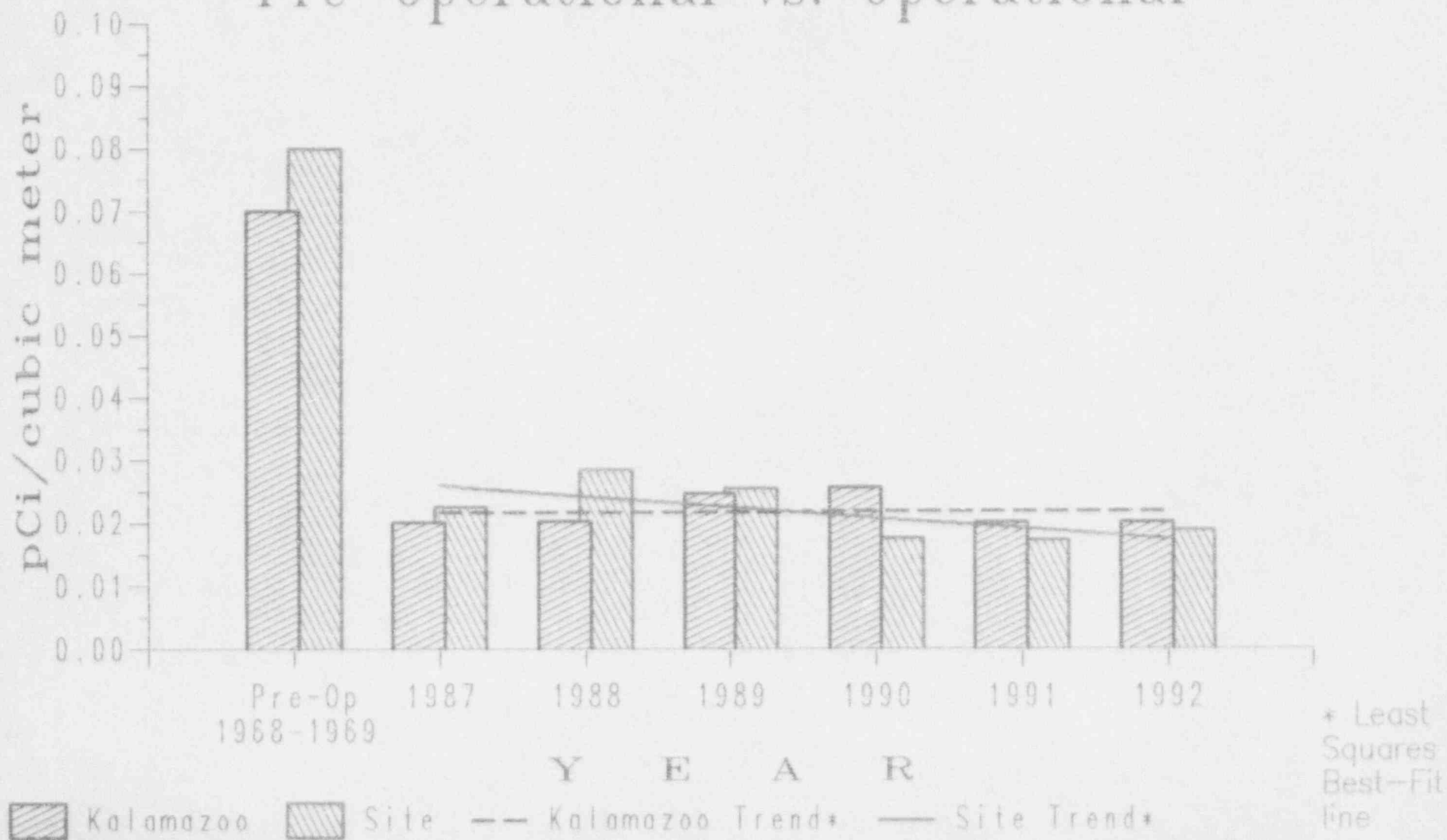
# 1992 PALISADES AIR PARTICULATE Weekly Gross Beta

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



\* P Rood 3 E - ♦ R Bus 4.75 NE - ■ Sh Dairy 7.5 NNE - ● Dowagiac-C 39 SSE

# Palisades Air Particulate Gross Beta Pre-Operational vs. Operational

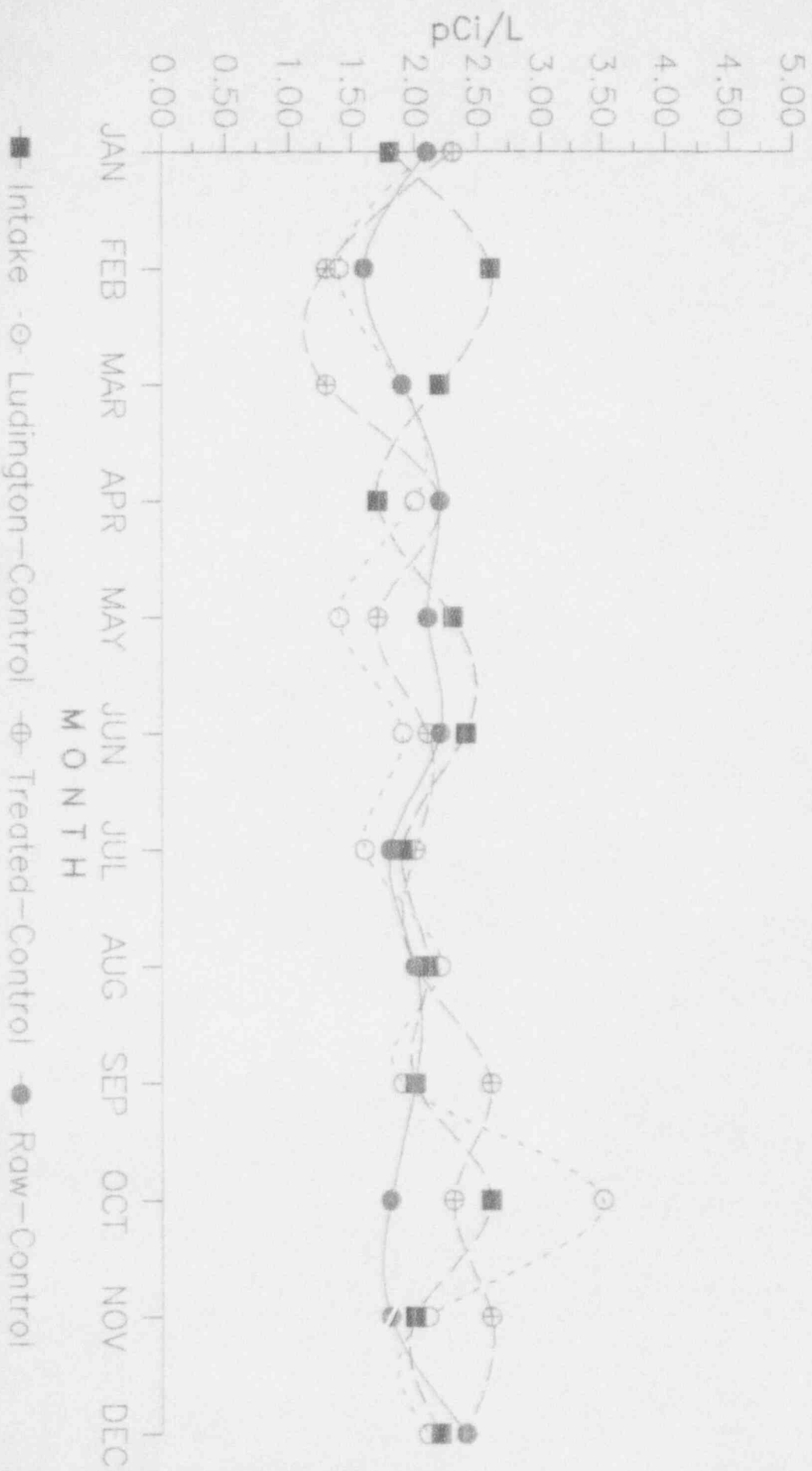


# 1992 PALISADES LAKE WATER SAMPLES

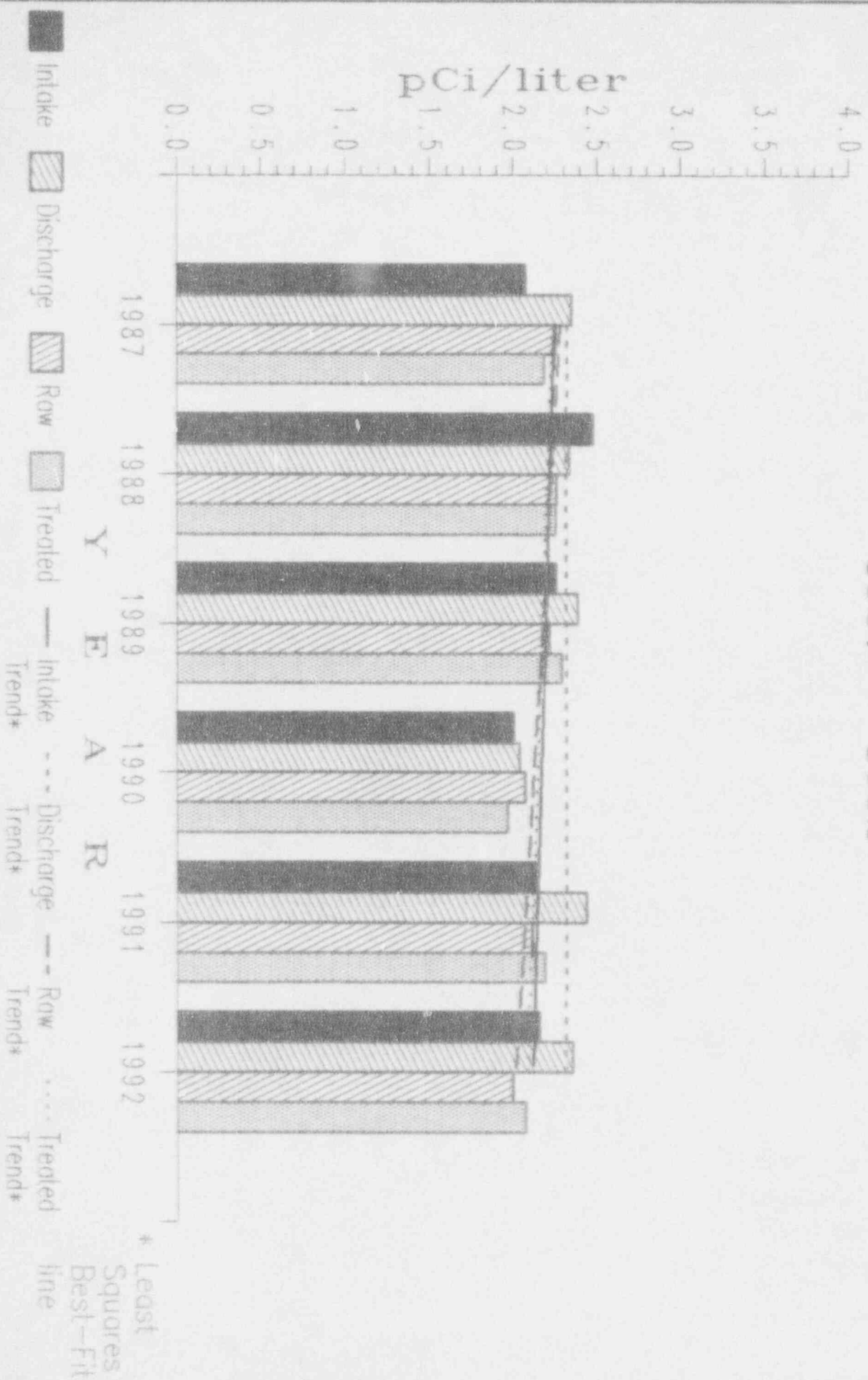
## Gross Beta pCi/L

### Ludington & South Haven

### Treated & Raw—Controls vs Intake



# Palisades Lake Water Gross Beta 1987 - 1992



# 1992 PALISADES WELL WATER SAMPLES

## Gross Beta pCi/L

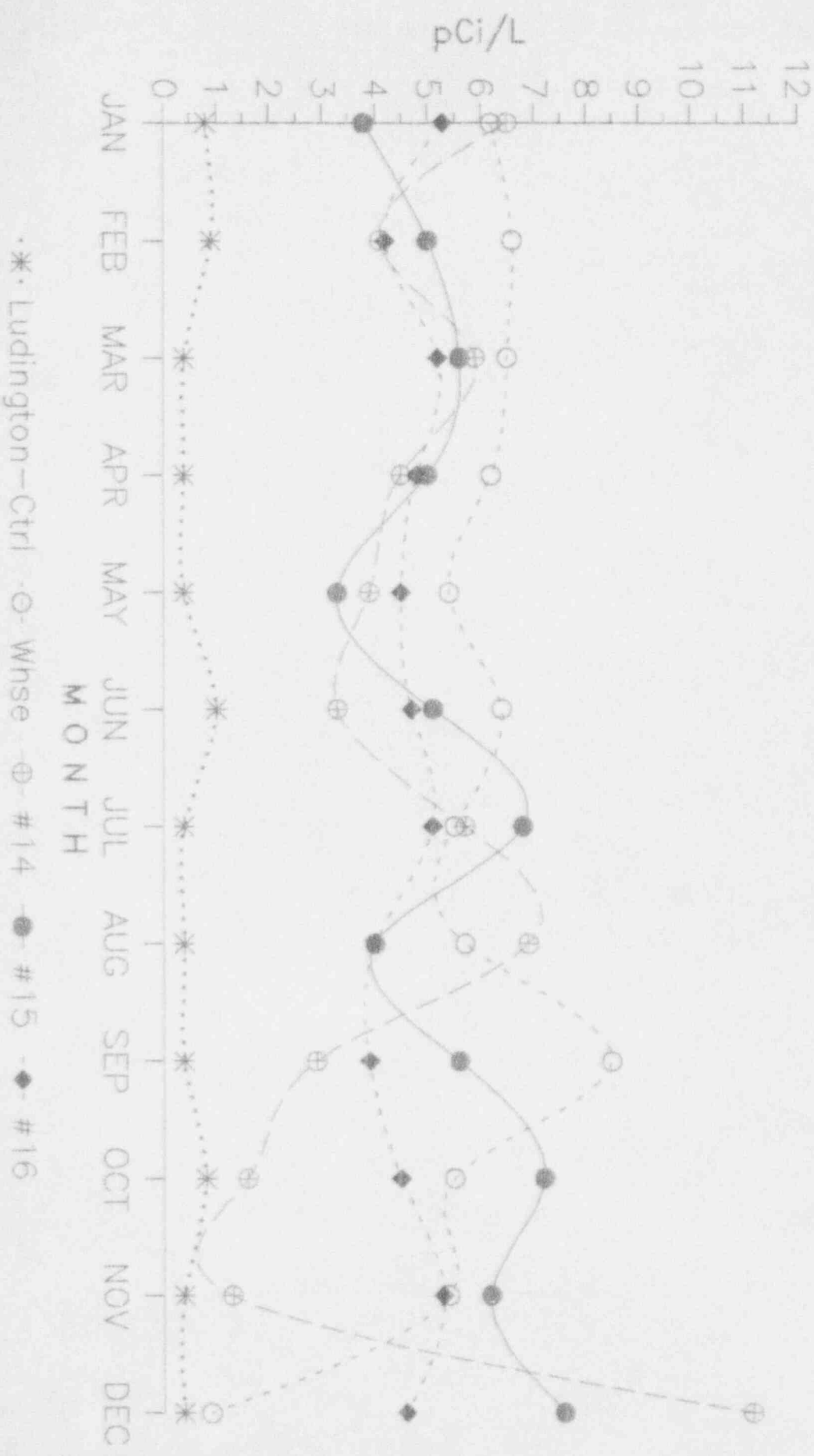
### Ludington-Control vs Township Park, State Park, Site and Outage Building



# 1992 PALISADES WELL WATER SAMPLES

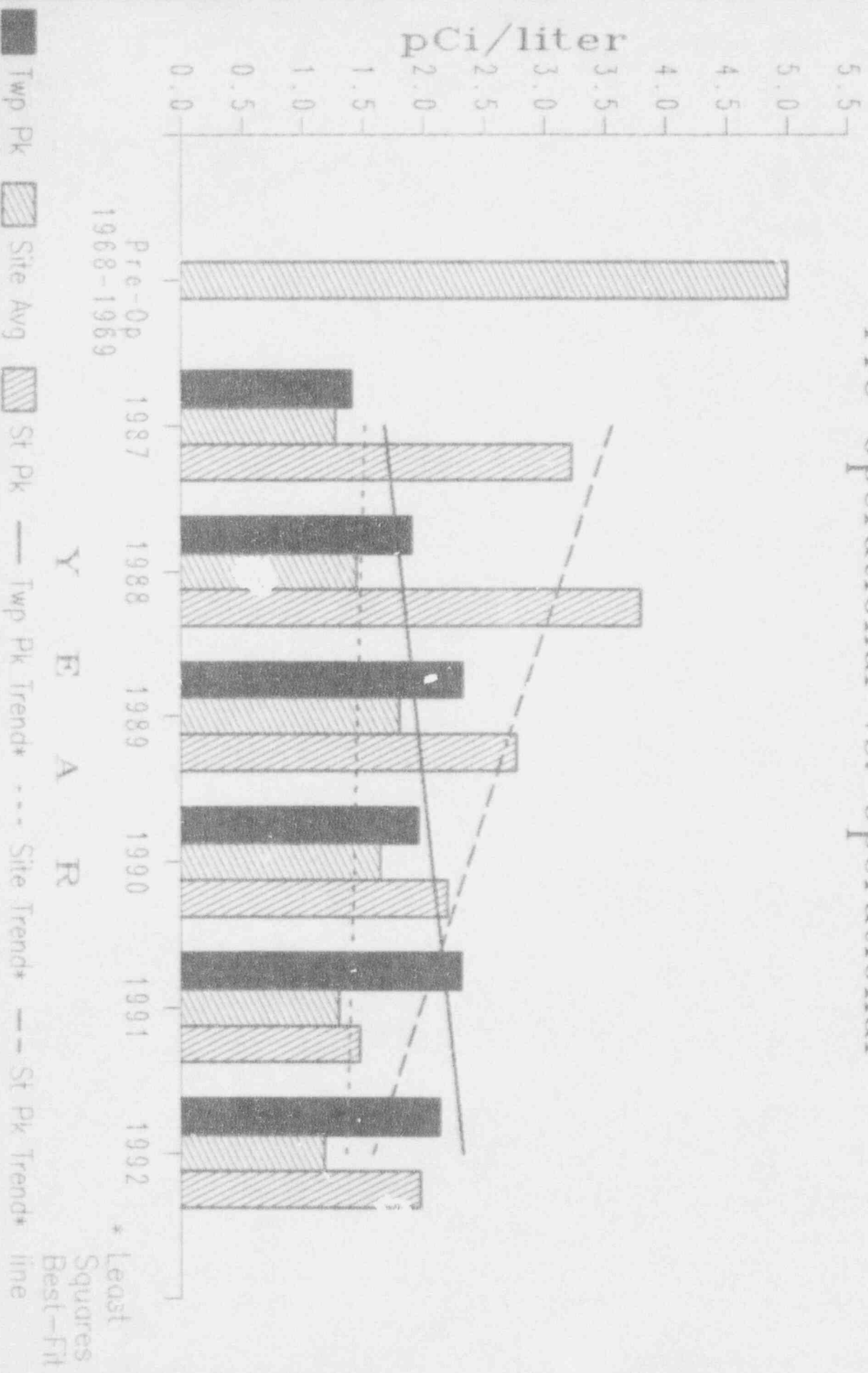
## Gross Beta pCi/L

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





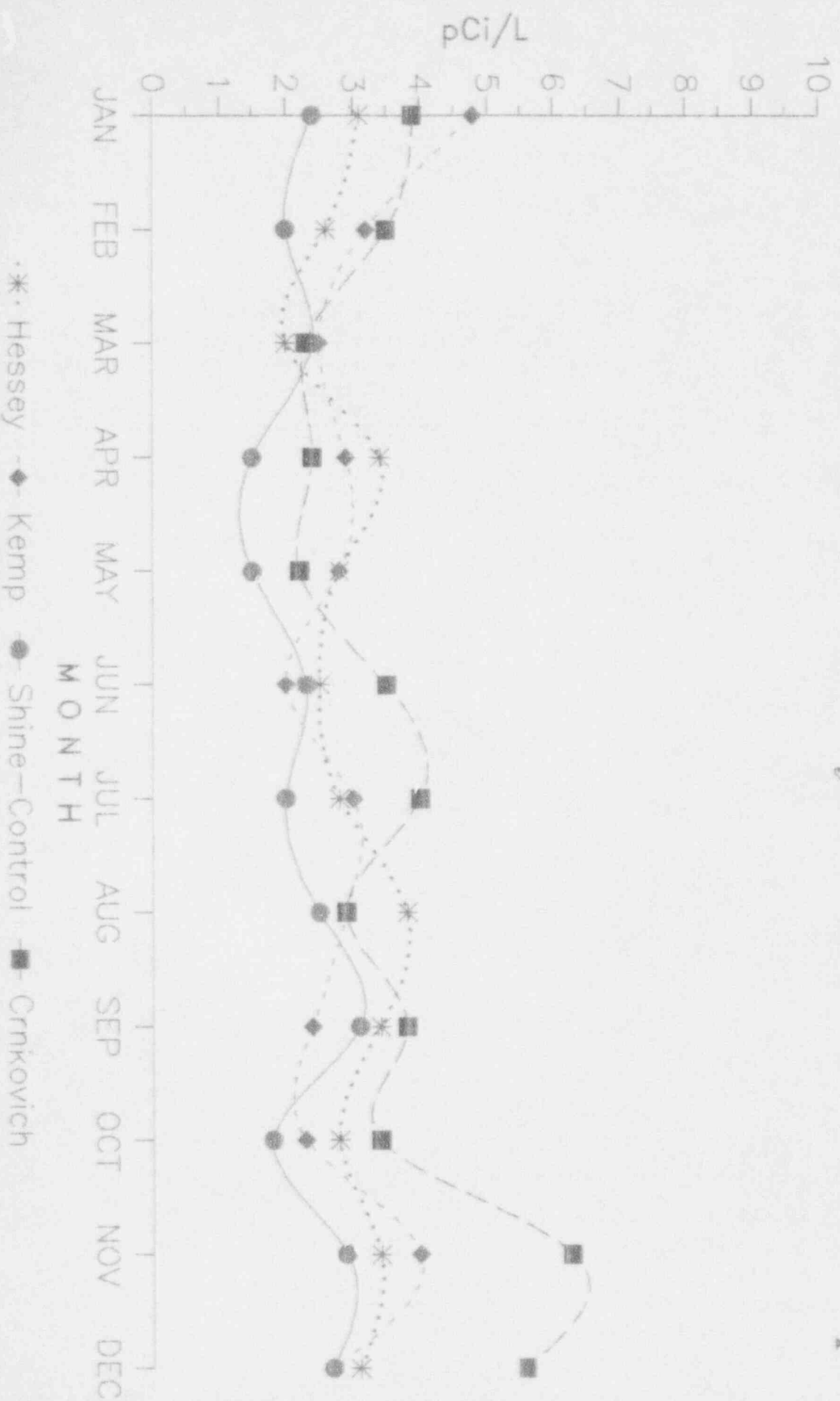
# Palisades Well Water Gross Beta Pre-Operational vs. Operational



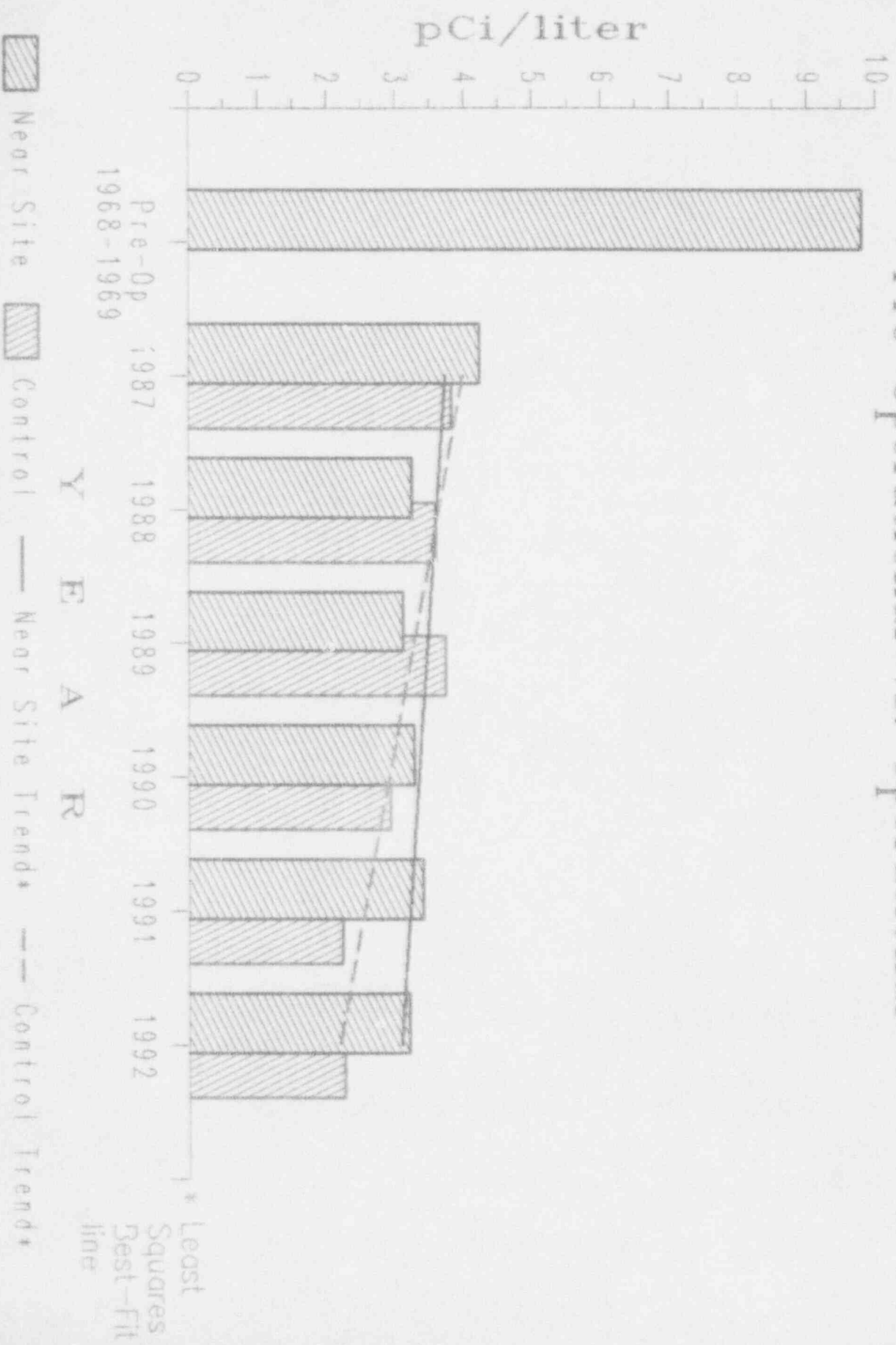


# 1992 PALISADES MILK SAMPLES Sr-90 pCi/L

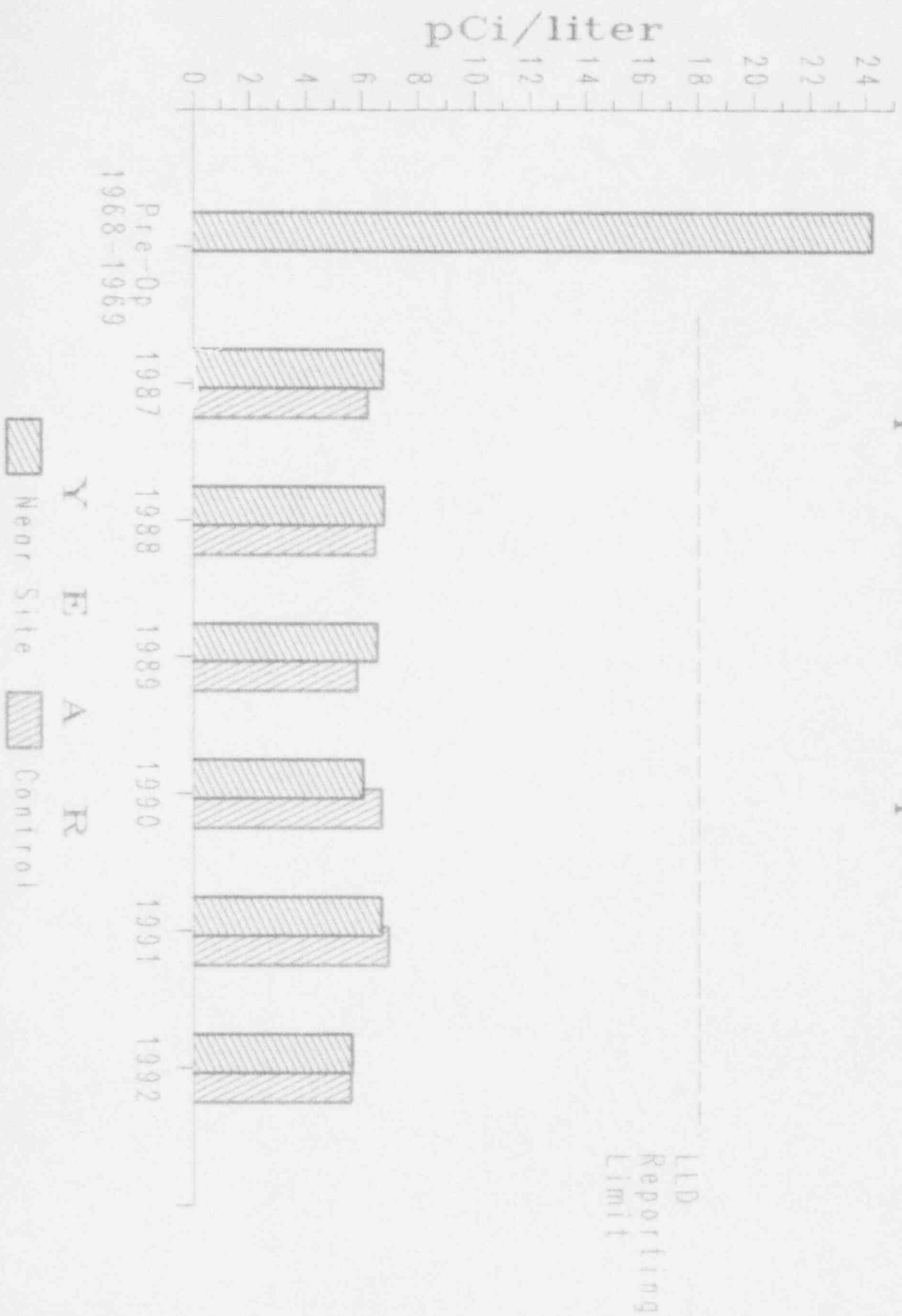
## Shine-Control vs Hessey, Crnkovich, Kemp



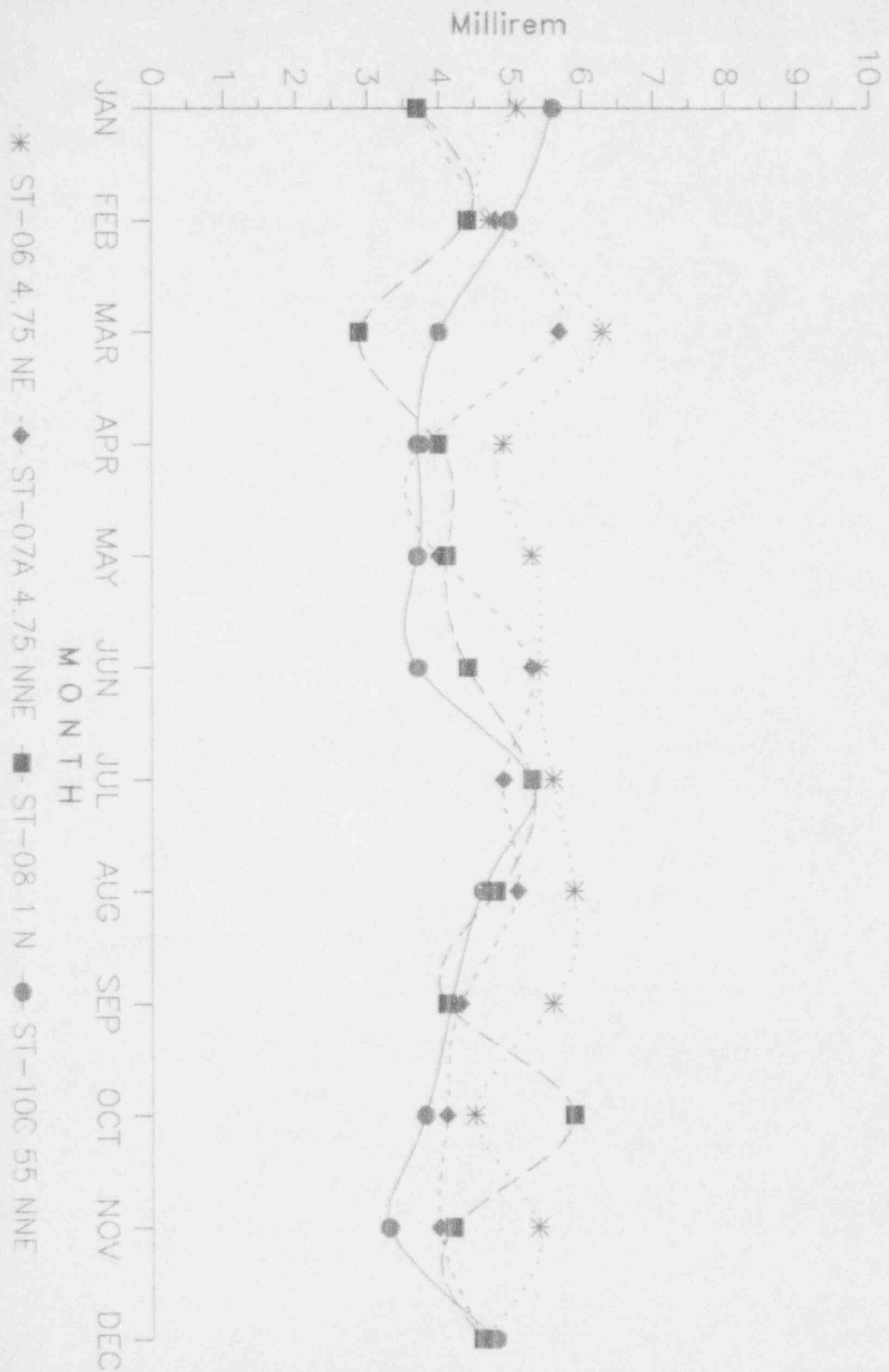
# Palisades Milk Sr-90 Pre-Operational vs. Operational



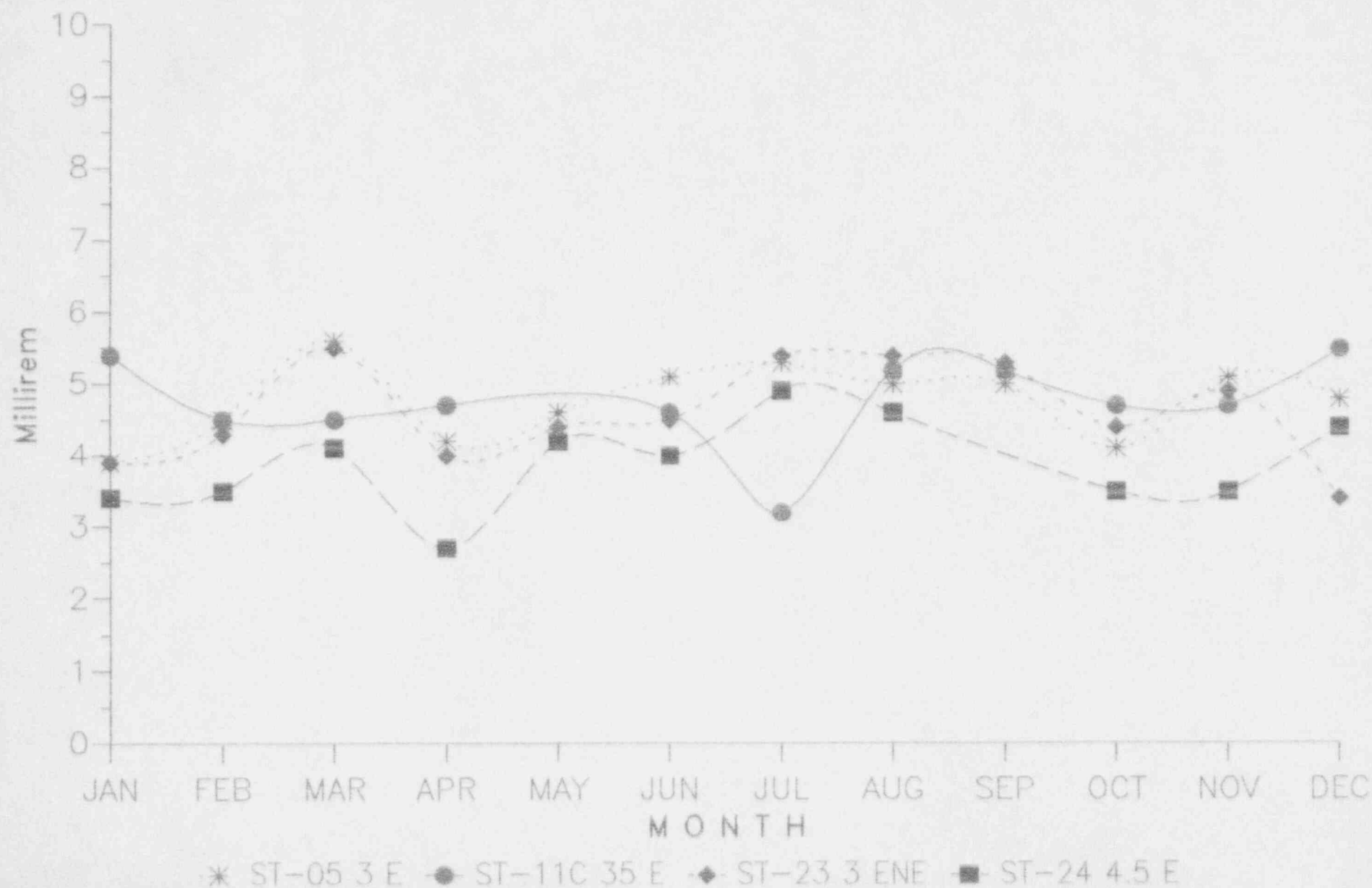
# Palisades Milk Cs-137 Pre-Operational vs. Operational



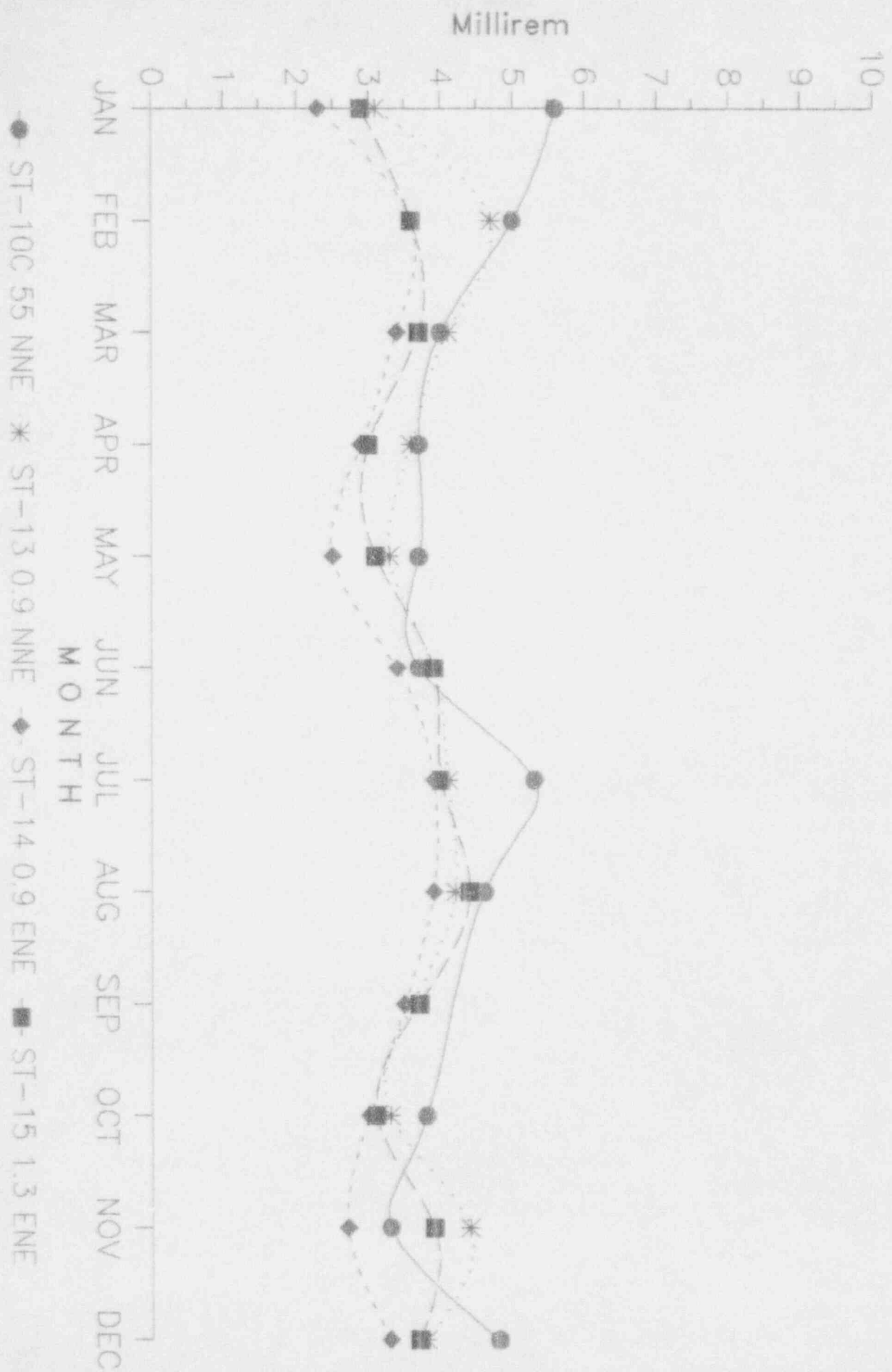
# 1992 PALISADES TLD'S ST10 Control vs ST06, ST07A, ST08



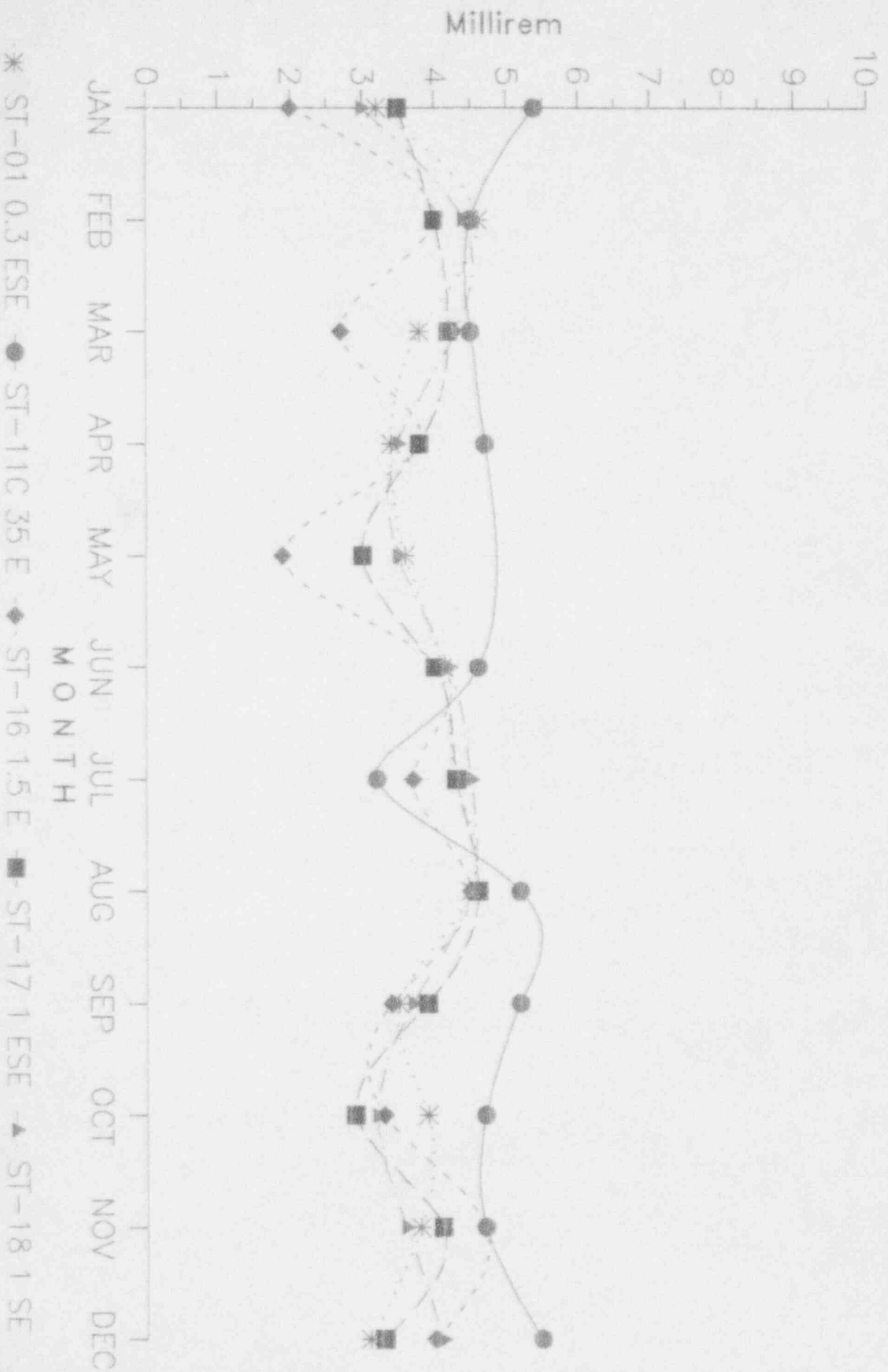
# 1992 PALISADES TLD's ST11 Control vs ST05, ST23, ST24



# 1992 PALISADES TLD's ST10 Control vs ST13, ST14, ST15

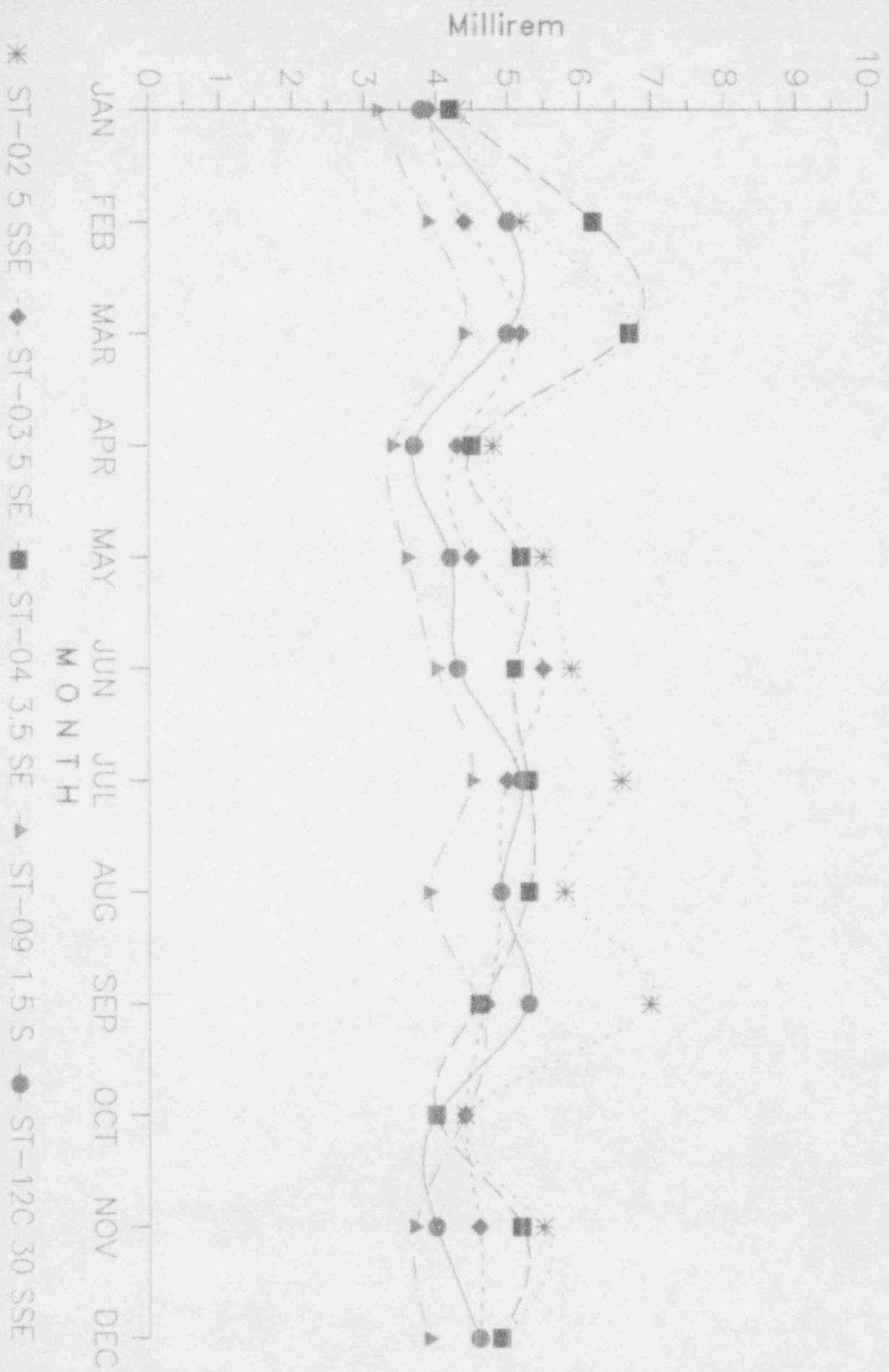


# 1992 PALISADES TLD'S ST11 Control vs ST01, ST16, ST17, ST18

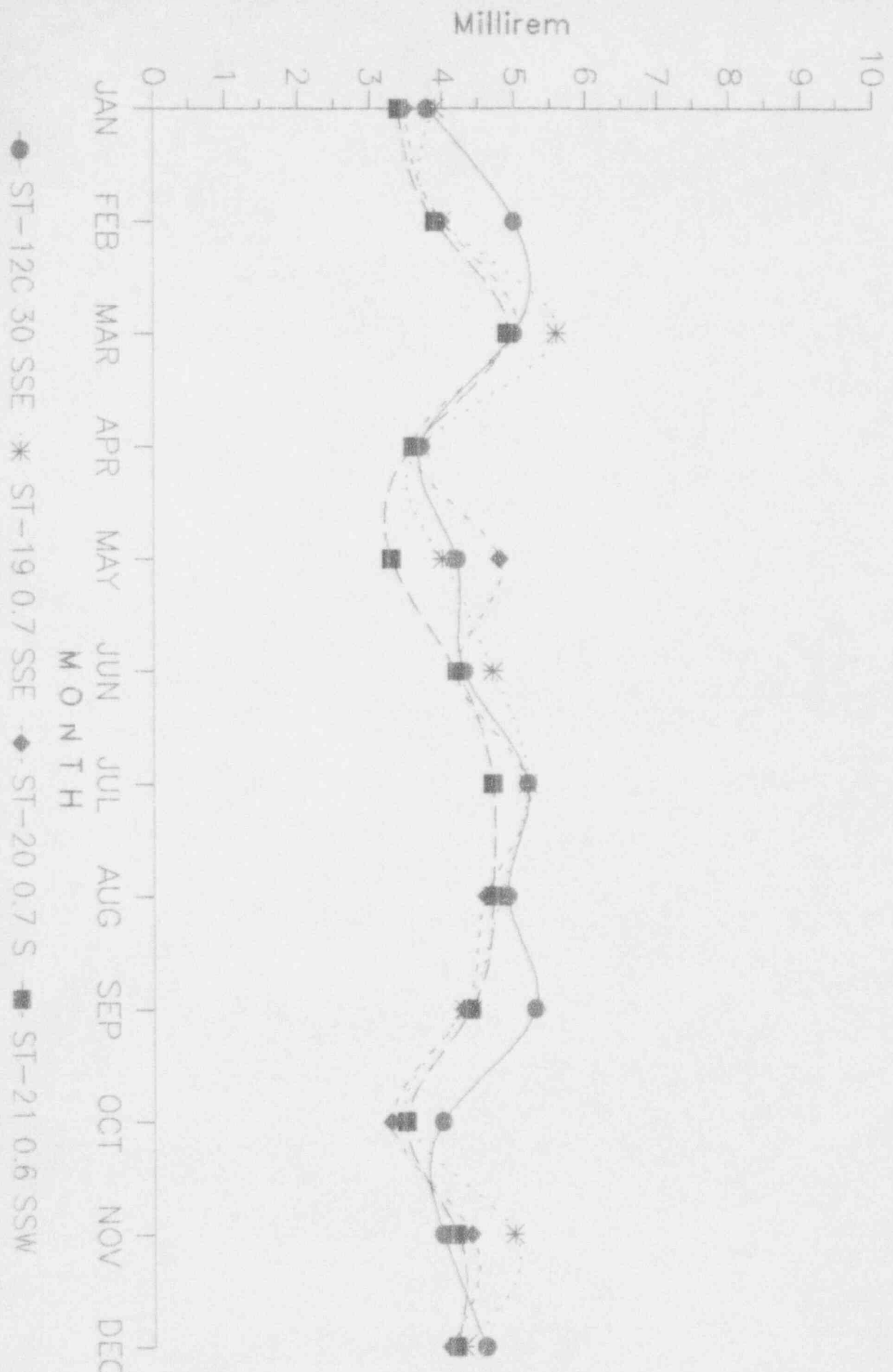




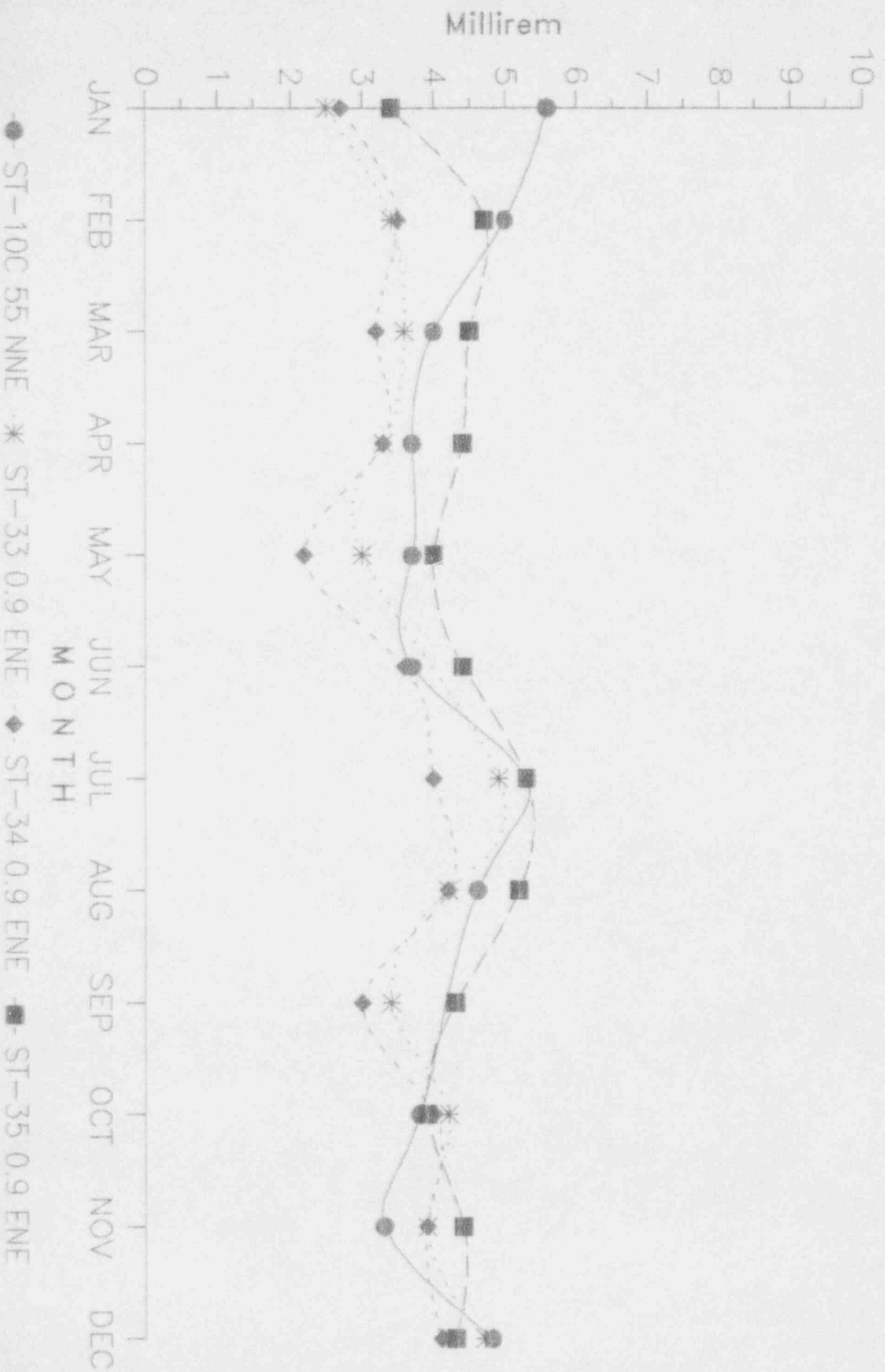
# 1992 PALISADES TLD'S ST12 Control vs ST02, ST03, ST04, ST09



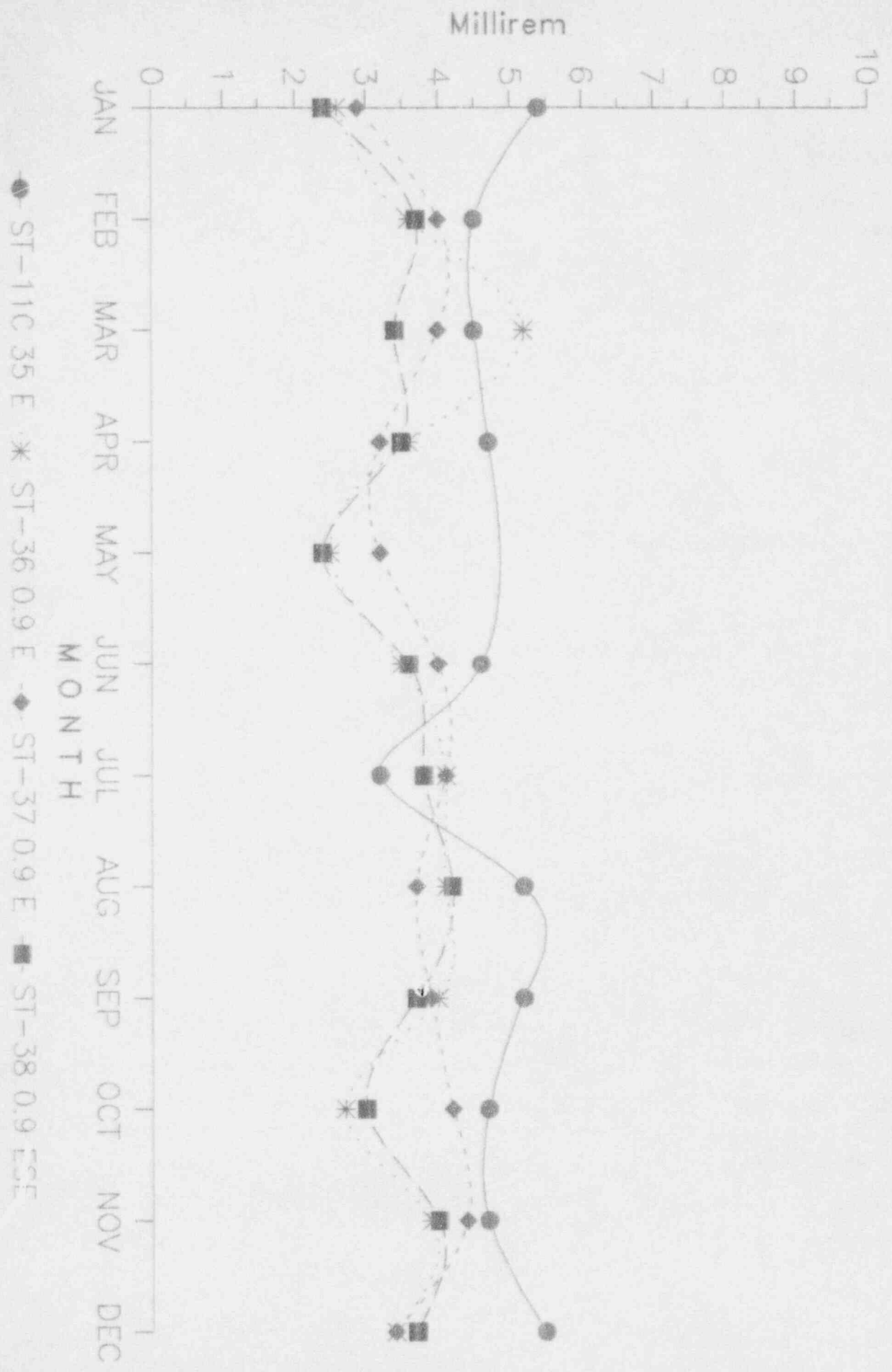
# 1992 PALISADES TLD'S ST12 Control vs ST19, ST20, ST21



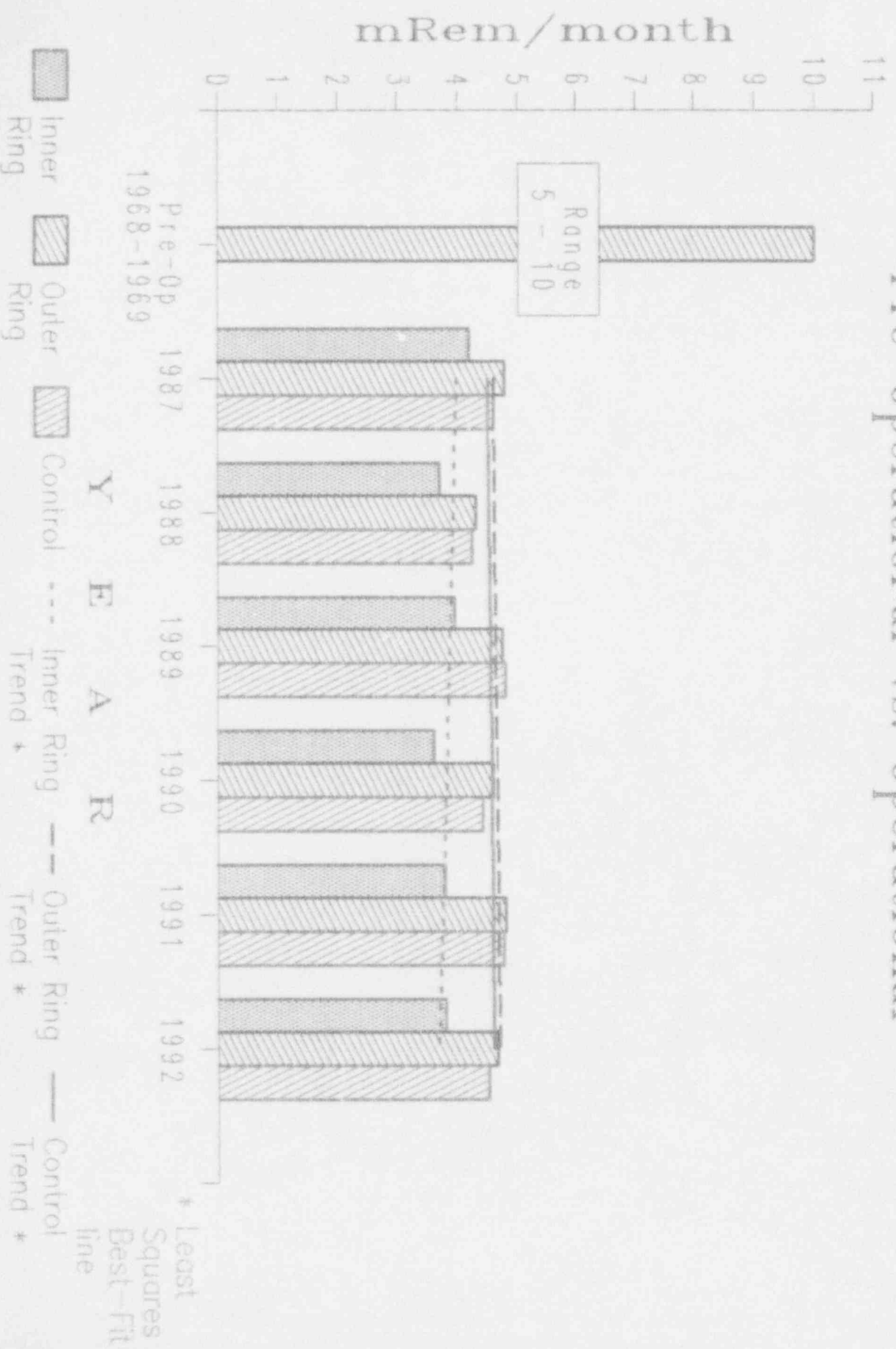
# 1992 PALISADES TLD'S ST10 Control vs ST33, ST34, ST35



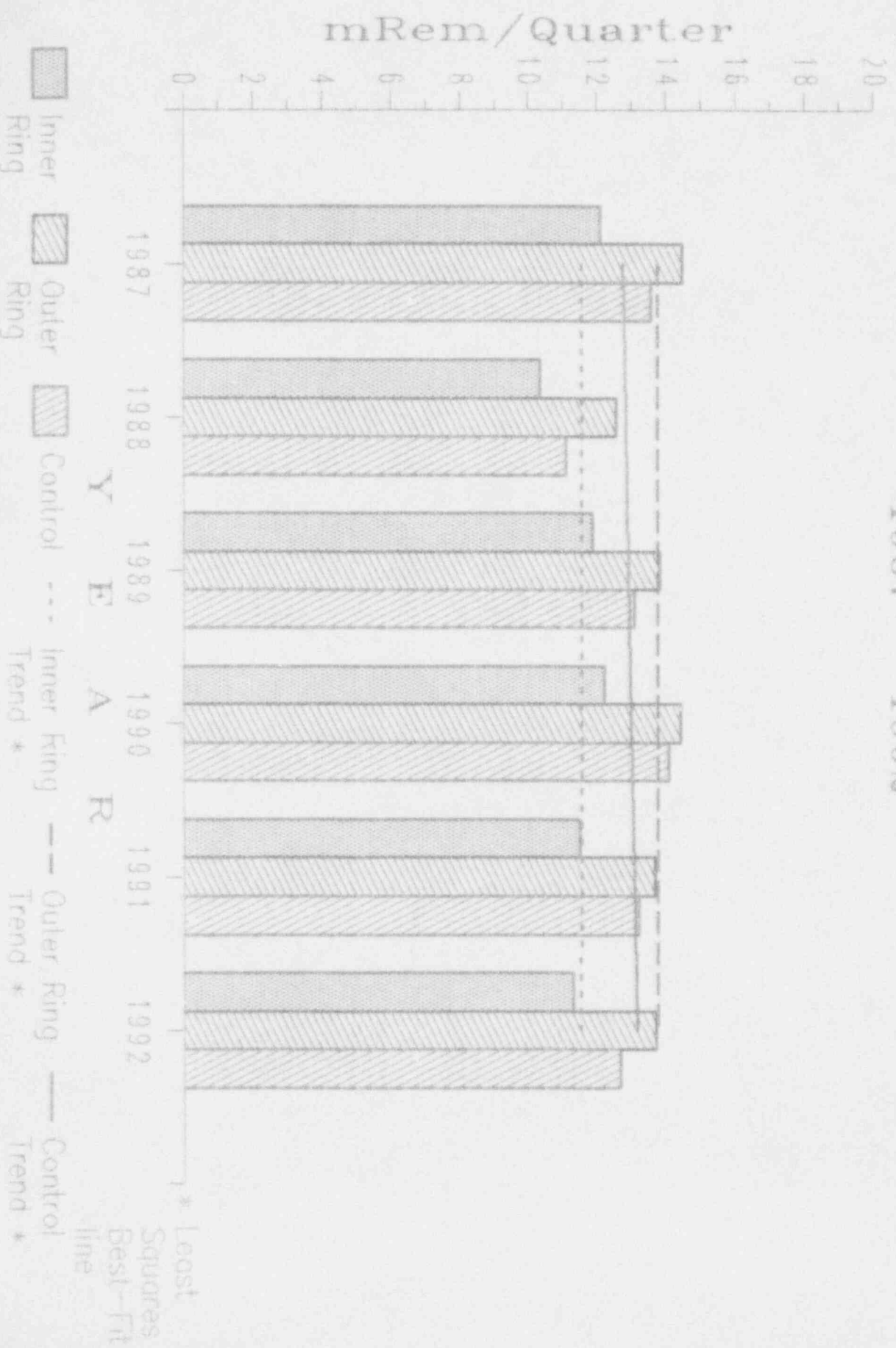
# 1992 PALISADES TLD's ST11 Control vs ST36, ST37, ST38



# Palisades Monthly Thermoluminescent Dosimeters Pre-Operational vs. Operational

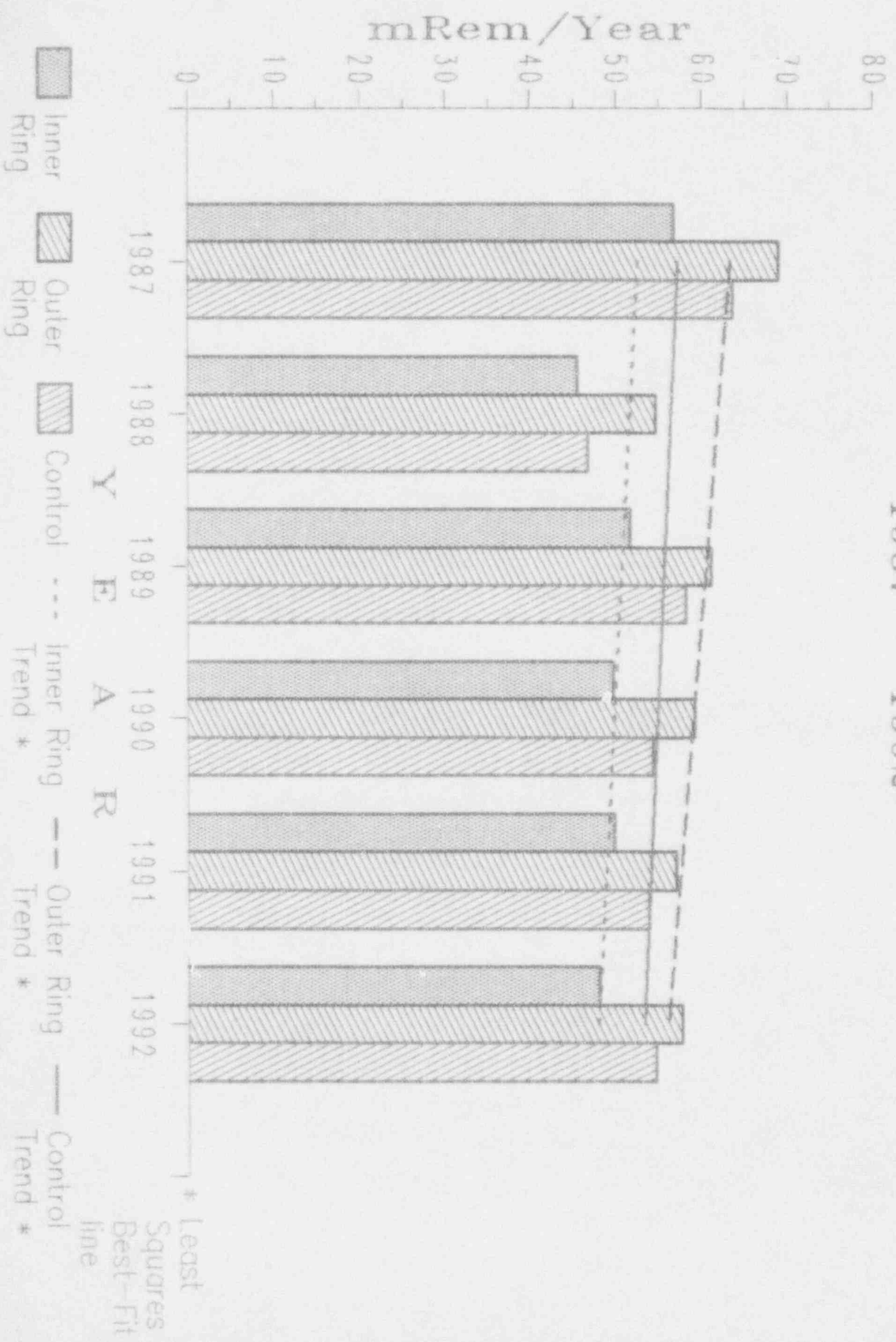


# Palisades Quarterly Thermoluminescent Dosimeters 1987 - 1992



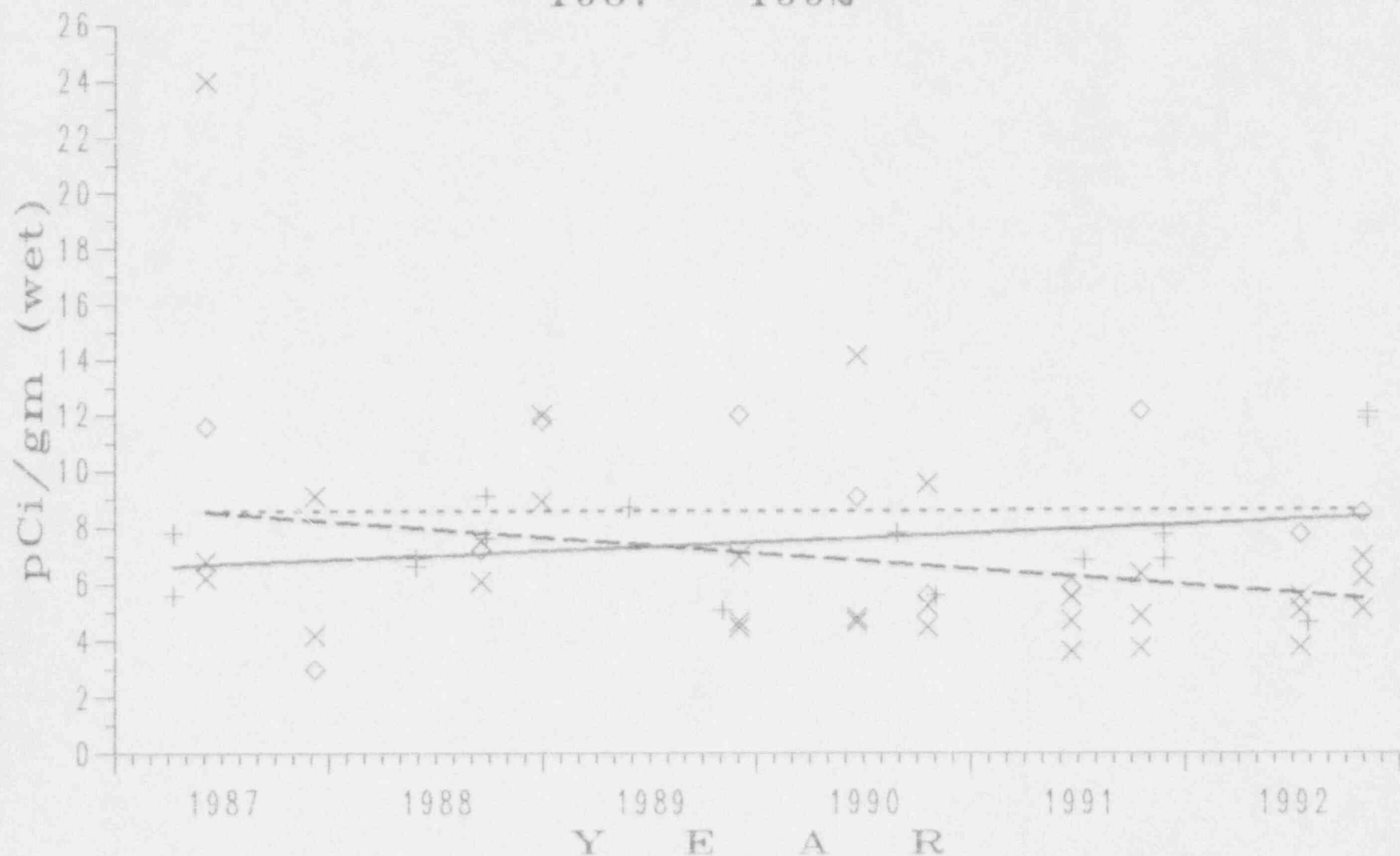


# Palisades Annual Thermoluminescent Dosimeters 1987 - 1992



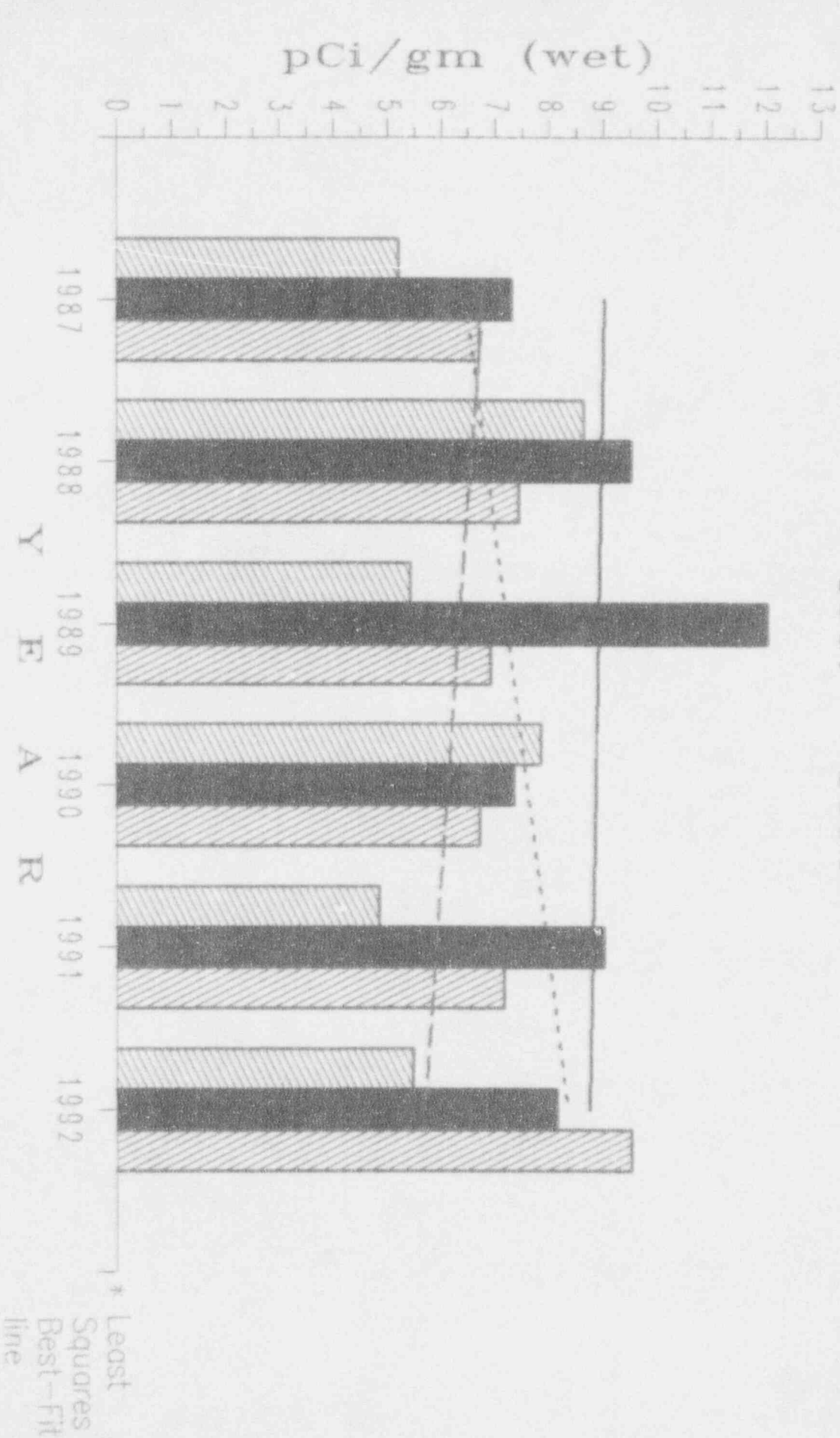


# Palisades Sediments Gross Beta 1987 - 1992



X Site    ◇ S. Haven    + Ludington    -- Site    ---- S. Haven    — Ludington

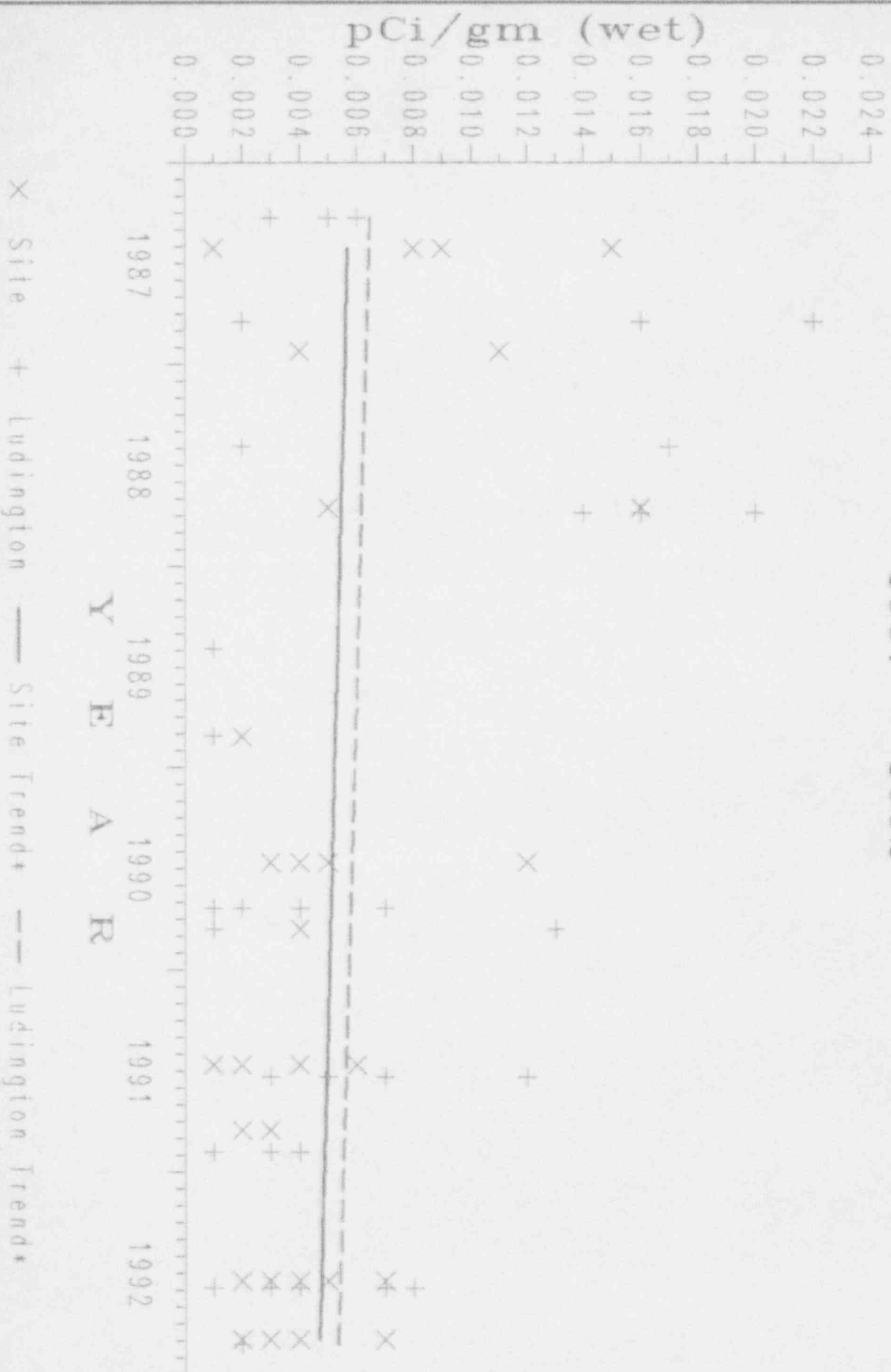
# Palisades Sediments Gross Beta 1987 - 1992



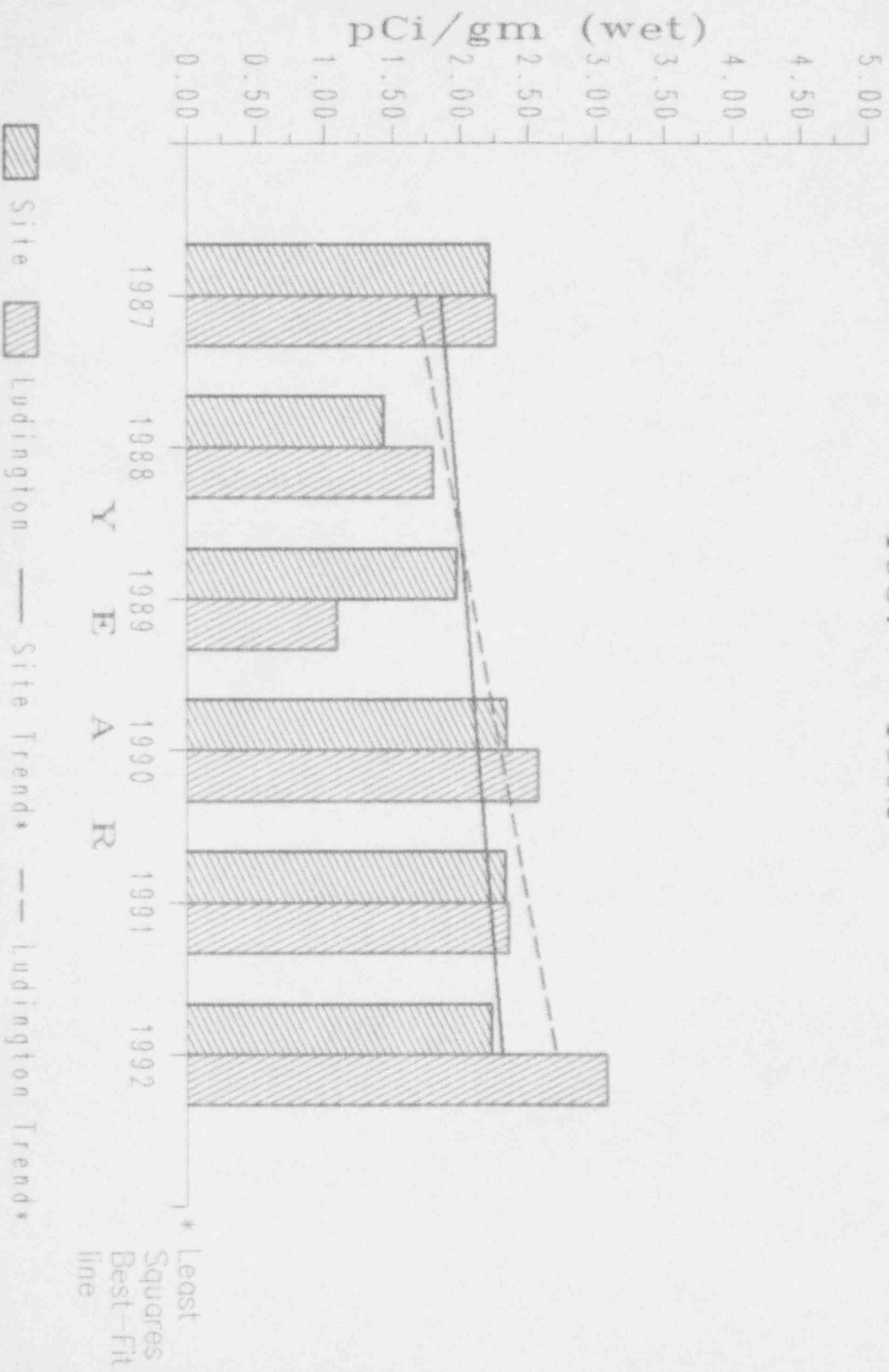
## 1987 - 1992



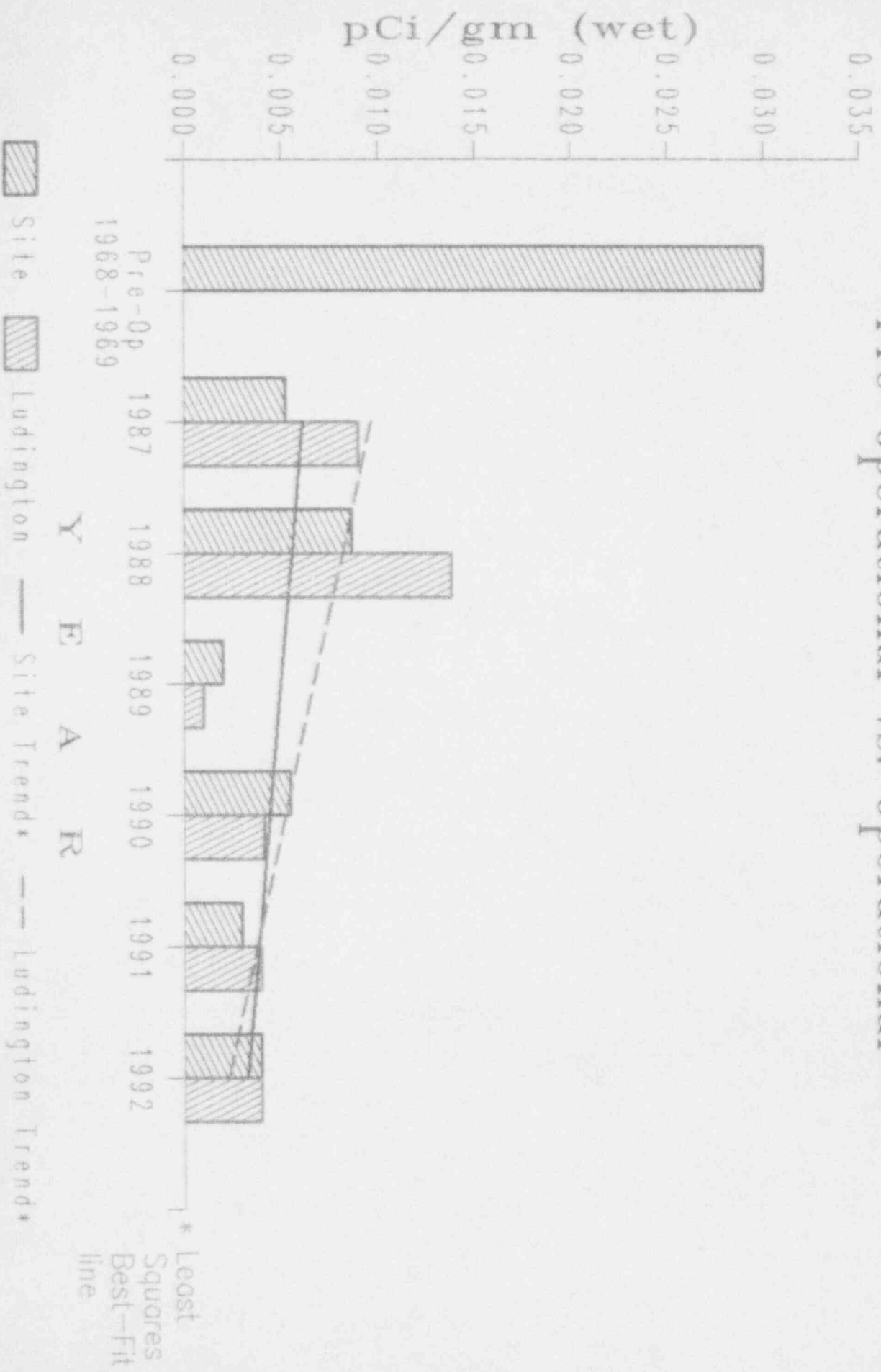
# Palisades Fish Sr-90 1987 - 1992



# Palisades Fish Cross Beta 1987 - 1992



# Palisades Fish Sr-90 Pre-Operational vs. Operational



# Palisades Fish Cs-137 Pre-Operational vs. Operational

