ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9005010138 DOC.DATE: ~~89/12/31~~ NOTARIZED: NO DOCKET #
FACIL:STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
AUTH.NAME AUTHOR AFFILIATION
CONWAY,W.F. Arizona Public Service Co. (formerly Arizona Nuclear Power
RECIP.NAME RECIPIENT AFFILIATION

Environmental Rpt. See Rpt.

SUBJECT: "Annual Radiological Environ Operating Rept for 1989."
W/900424 ltr.

DISTRIBUTION CODE: IE25D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 96
TITLE: Environmental Monitoring Rept (per Tech Specs)

NOTES:
Standardized plant. 05000528
Standardized plant. 05000529
05000530

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD5 LA	3	3	PD5 PD	1	1
	PETERSON,S.	1	1	CHAN,T	1	1
INTERNAL:	ACRS	1	1	AEOD/DSP/TPAB	1	1
	IRM TECH ADV	1	1	NRR ROTHMAN,R	1	1
	NRR/DREP/PRPB11	2	2	NUDOCS-ABSTRACT	1	1
	REG FILE 01	1	1	RGN5 DRSS/RPB	1	1
	RGN5 FILE 02	1	1			
EXTERNAL:	EG&G SIMPSON,F	2	2	LPDR	1	1
	NRC PDR	1	1			
NOTES:		1	1			

R I D S / A D D S

R I D S / A D D S

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 21 ENCL 21

Enc 1

Arizona Public Service Company
P.O. BOX 53999 • PHOENIX, ARIZONA 85072-3999

WILLIAM F. CONWAY
EXECUTIVE VICE PRESIDENT
NUCLEAR

161-03125-WFC/JRP
April 24, 1990

Docket Nos. STN 50-528/529/530

Document Control Desk
U. S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D. C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Annual Radiological Environmental Operating Report
File: 90-005-419.05; 90-056-026

By copy of this letter, we are forwarding the Annual Radiological Environmental Operating Report for the Palo Verde Nuclear Generating Station. This report covers the operation of PVNGS Units 1, 2, and 3 during 1989, and is being submitted pursuant to Technical Specification 6.9.1.7.

Should you have any questions or concerns please call J. R. Provasoli at (602) 340-4160.

Sincerely,

WFC/JRP/jle
Attachments

cc: T. L. Chan
S. R. Peterson
J. B. Martin
D. H. Coe
A. C. Gehr (w/o attachments)
A. H. Gutterman (w/o attachments)

IE25
1/1

PALO VERDE NUCLEAR GENERATING STATION

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

1989

CONTENTS

FIGURES

TABLES

TABLES

Abstract

The operational radiological environmental monitoring program is an ongoing study conducted by the Radiation Measurements Facility at Arizona State University for the Palo Verde Nuclear Generating Station.

During 1989, samples were collected by the Palo Verde Nuclear Generating Station and Radiation Measurements Facility personnel. The following categories of samples were collected:

- broad leaf vegetation,
- fresh milk,
- groundwater,
- drinking water,
- surface water,
- airborne particulate and radioiodine,
- and sludge.

Thermoluminescent dosimeters were used to measure environmental gamma radiation.

All assays were performed by the Radiation Measurements Facility. Thermoluminescent dosimeters were issued and processed by the Palo Verde Nuclear Generating Station. Sludge and Water Reclamation Facility input water samples were collected by personnel from the Palo Verde Nuclear Generating Station.

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

1.0 Introduction

The Radiological Environmental Monitoring Program (REMP) was established for the Palo Verde Nuclear Generating Station (PVNGS) by the Arizona Nuclear Power Project (ANPP) in 1979. The program complies with federal requirements set forth by the U.S. Nuclear Regulatory Commission (U.S. NRC) to provide a complete environmental monitoring program for nuclear reactors. This report contains the measurements and findings for 1989. All bracketed numbers refer to references contained in section 12.

The objectives of the radiological environmental monitoring program are as follows: 1) to determine baseline radiation levels in the environs prior to plant operation and to compare the findings with measurements obtained during reactor operations; 2) to monitor potential critical pathways of radio-effluent to man; and 3) to determine radiological impacts on the environment caused by the operation of PVNGS.

Results from the REMP help to evaluate sources of elevated levels of radiation in the environment, e.g., atmospheric nuclear detonations or abnormal plant releases.

Results for the PVNGS pre-operational environmental monitoring program are presented in references 1-5.

The initial criticality of Unit One occurred May 25, 1985. Initial criticality for Units Two and Three were April 18, 1986 and October 25, 1987, respectively. PVNGS operational findings are presented in references 6-8. The Radiation Measurements Facility (RMF) radiological assessments for 1987 and 1988 are found in references 9 and 10.

This report contains the measurements and findings for 1989. All bracketed numbers refer to references contained in section 12 of this report.

2.0 Description of the Monitoring Program

The pre-operational radiological environmental monitoring program, which began in 1979, was performed by PVNGS and outside organizations. These organizations continued the program into the operational phase of PVNGS. In 1988, the RMF assumed responsibility for sample collection, assay, and data processing and the REMP annual report. TLD measurements, collection of sludge, water influent samples, and the land use census are conducted by PVNGS personnel.

2.1 The ASU Radiation Measurements Facility

In the spring of 1983, the RMF implemented a long-term independent radiological environmental assessment program for the PVNGS.

In July 1987, the RMF was certified as a vendor by the APS Vendor Quality Program and assumed responsibility for many of the environmental assessments performed in support of the nuclear power station.

RMF staff are trained and certified to perform routine sampling of air, surface and ground water, drinking water, milk and vegetation. In accordance with the RMF Quality Assurance Program, all samples are collected using PVNGS procedures and analyzed using written and approved RMF procedures. Annual audits of the program are conducted by the APS Vendor Quality Organization.

To provide the highest quality results, the RMF participates in radiochemistry intercomparison programs with the United States Environmental Protection Agency (USEPA) and the Canadian Department of Health and Welfare, Bureau of Radiation and Medical Devices (BRMD).

2.2 1989 PVNGS Radiological Monitoring Program

The assessment program consists of routine measurements of background gamma radiation and of radionuclide concentrations in media such as air, groundwater, drinking water, surface water, fresh milk, vegetation, and sludge.

Samples were collected by PVNGS or RMF personnel at the monitoring sites shown in Figures 2.1 and 2.2. The specific sample types, sampling locations, and sampling frequencies as set forth in Palo Verde Nuclear Generating Station Technical Specifications [11] are presented in Tables 2.1 and 2.2. Other samples not required by reference 11 were processed in accordance with contractual obligations or written requests from PVNGS.

Background gamma radiation measurements are performed using thermoluminescent dosimetry at fifty locations by PVNGS.

2.3 Radiological Monitoring Program Changes for 1990

2.3.1 In January 1989, bi-weekly composites of weekly grab samples commenced for drinking water.

2.3.2 In March 1989, gross beta analysis was changed to quarterly for surface water.

2.3.3 In April 1989, four corner composite sampling commenced on the evaporation ponds.

2.3.4 In June 1989, the day of the week that water sample collection took place changed from Wednesday to Tuesday. Sr-90 was not required on residence wells. Gross beta, Sr-90, and I-131 analysis were not required for on-site wells. Gross beta was no longer required on Water Reclamation Facility influent samples.

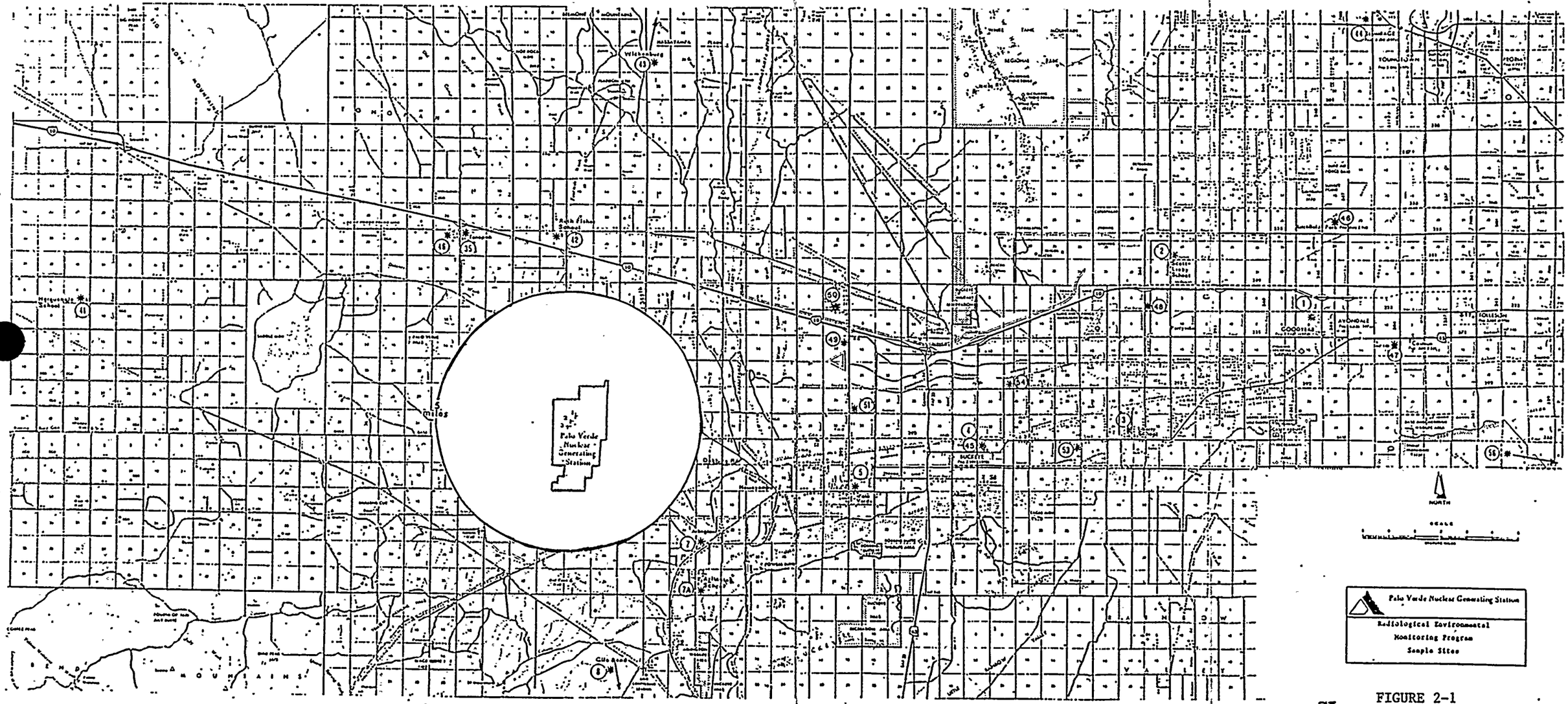
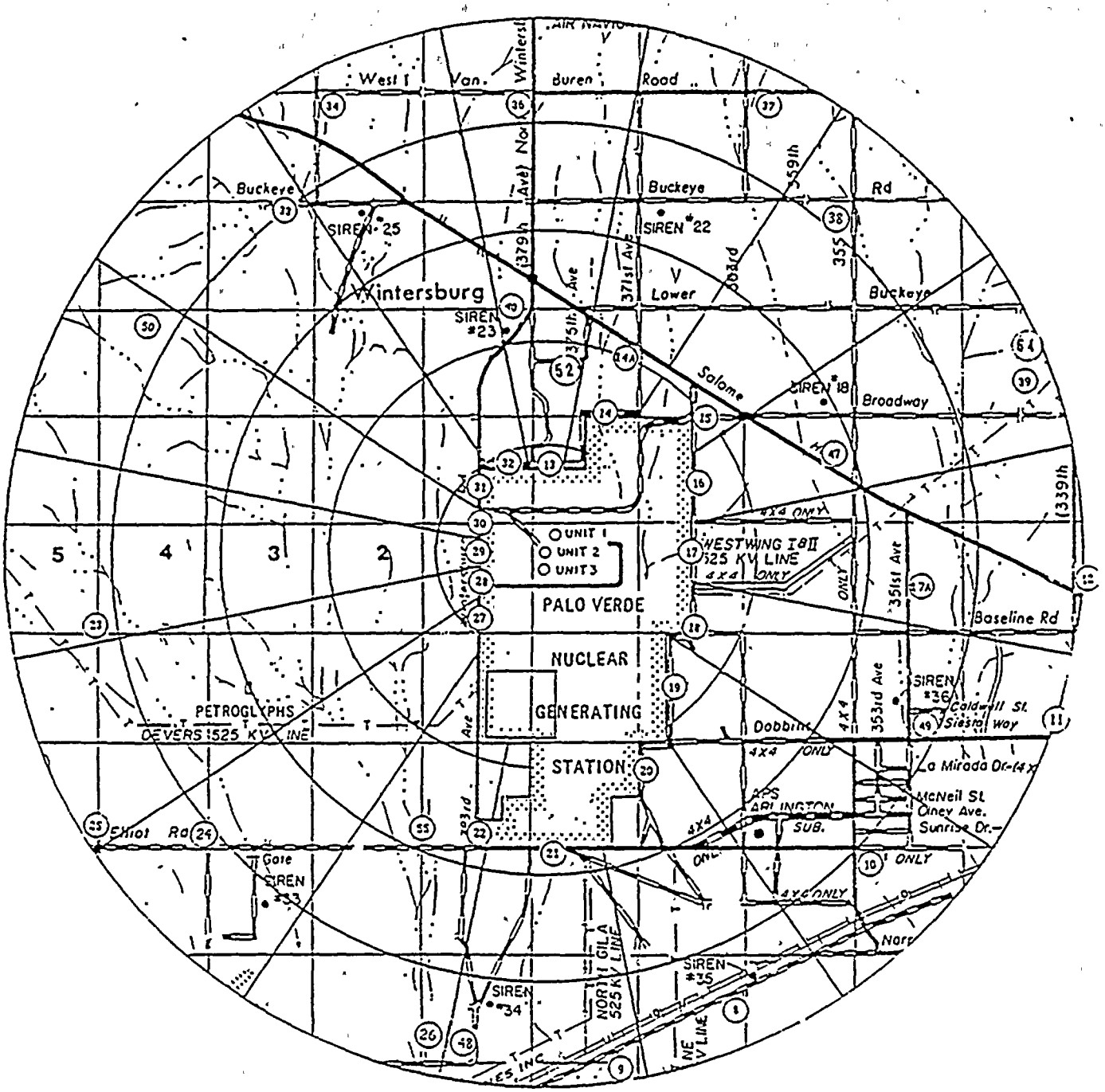


FIGURE 2-1



Palo Verde Nuclear Generating Station

Radiological Environmental

Monitoring Program

Sample Sites
0 to 5 miles

FIGURE 2-2

TABLE 2.1

SAMPLE COLLECTION LOCATIONS [11]

Sample Site #	Type	Location(a)	Location Description
1	Air	E30	APS Goodyear Office
4	Air	E16	APS Buckeye Office, 615 N. 4th St, Buckeye
6	Air (Control Site)	SSE31	APS Gila Bend Substation, Service Road West of Town, Off I-8
7A	Air	SE8	Arlington School, 16351 S. Arlington School Road
14A	Air	NNE2	Buckeye-Salome Road & 371st Ave.
15	Air	NE2	North East Site Boundary
17A	Air	E4	351st Ave., 1 mile South of Buckeye-Salome Road
21	Air	S3	South Site Boundary
29	Air	W1	West Site Boundary
35	Air	NNW9	Tonopah, Palo Verde Inn Fire Station, 40901 W Osborn Road
40	Air	N3	Wintersburg, End of Transmission Road
44	Air	ENE35	APS El Mirage Office (Sun City), 12313 W. Grand Ave.
46	Water	NNW9	McArthur's Farm, 41701 W. Indian School Rd., Tonopah
47	Vegetation	ENE3	Adams's Residence, 355th Ave. & Buckeye - Salome Road
48	Water	S5	Shepard Farms, 13202 S. 383rd Avenue
49	Water	ESE4	Scott Residence, 351st Ave. & Dobbins Road
50	Milk	ENE12	Crosswinds Dairy, 295th Ave. and Van Buren St.
51	Milk	E11	Butler Diary, Palo Verde Road & Southern Ave.
52	Vegetation	N2	DeShazo Residence, 375th Ave. south of Buckeye--Salome Rd.
53	Milk	E20	Kerr Dairy, Dean & Buckeye Roads
54	Milk	E17	Dickman Dairy, Broadway and Apache Roads
55	Water	SW3	Gavette Residence, 39326 W. Elliot Road
56	Milk (Control Site)	E75	Pew Dairy #2, McQueen & Ryan Roads
57	Water	on-site	Well 27ddc
58	Water	on-site	Well 34abb
59	Surface Water	on-site	PVNGS Evaporation Pond #1
60	Surface Water	on-site	PVNGS Reservoir
62	Vegetation (Control Site)	ENE75	J.A. Wood Co., North Alma School Road, Scottsdale, AZ
63	Surface Water	on-site	PVNGS Evaporation Pond #2
	Milk (goat)	ENE5	Kolb residence, 343rd Ave. north of Broadway Rd.
	Vegetation	NE5	Bennett residence, 355th Ave. north of Buckeye Rd.

(a) Distance and direction are from center-line of Unit 2 containment.

TABLE 2.2

SAMPLE COLLECTION SCHEDULE [11]

Collection Site	Air Particulates	Airborne Radioiodine	Fresh Milk	Vegetation	Groundwater	Drinking Water	Surface Water
#1, APS Goodyear Office	W	W					
#4, APS Buckeye Office	W	W					
#6, APS Gila Bend Substation	W	W					
#7A, Arlington School	W	W					
#14A, Buckeye-Salome Road. & 371st Ave.	W	W					
#15, NE Site Boundary	W	W					
#17A, 351st. Ave., 1 mi. South of Buckey-Salome Road.	W	W					
#21, South Site Boundary	W	W					
#29, W. Site Boundary	W	W					
#35, Tonapah, Palo Verde Inn Fire Station	W	W					
#40, Trailer Park at Wintersburg	W	W					
#44, APS El Mirage Office	W	W					
#46, McArthur's Farm						W	
#47, Adam's Residence				AA			
#48, Shepherd Farms						W	
#49, Scott Residence						W	
#50, Crosswinds Dairy			M				
#51, Butler Dairy			M				
#52, De Shazo Residence				AA			
#53, Kerr Dairy			M				
#54, Dickman Dairy			M				
#55, Gavette Residence						W	
#56, Pew #2 Dairy			M				

TABLE 2.2

SAMPLE COLLECTION SCHEDULE [11]

Collection Site	Air Particulates	Airborne Radioiodine	Fresh Milk	Vegetation	Groundwater	Drinking Water	Surface Water
#57, Well 27ddc					Q		
#58, Well 34abb					Q		
#59, PVNGS Evaporation Pond #1							W
#60, PVNGS Reservoir							W
#62, J.A. Wood Co.				AA			
#63, PVNGS Evaporation Pond #2							W
Kolb Residence (goat milk)			AA				

W = Weekly M = Monthly Q = quarterly AA = As available

3.0 Sample Collection Program

3.1 Water

Water samples were collected by RMF and WRF personnel using PVNGS procedures.

3.1.1 Weekly samples were collected from the Reservoir, the Evaporation Pond #1, and Evaporation Pond #2. Weekly samples were collected in 1-gallon cubitainers and 500-mL glass bottles at all three sites. Cubitainer samples were acidified with HCl in the laboratory prior to analysis.

3.1.2 Monthly composited samples were collected at four residence wells. Monthly composited samples were collected in 500 mL glass bottles and in one gallon cubitainers for the semi-monthly samples. Samples were collected in 1-gallon cubitainers and acidified with HCl in the laboratory prior to analysis.

3.1.3 Quarterly grab samples were obtained from on-site wells 34abb and 27ddc. Samples were collected in 1-gallon cubitainers and 500-mL glass bottles. Cubitainer samples were acidified with HCl in the laboratory prior to analysis.

3.2 Vegetation, soil

Vegetation samples were collected by RMF personnel using PVNGS procedures.

3.2.1 Vegetation samples were scheduled to be collected monthly, as available, if required.

3.2.2 Soil samples were not collected during 1989.

3.3 Air Filters and Canisters

Air samples were collected by RMF personnel using PVNGS procedures.

3.3.1 Air particulate filters and charcoal canisters were exchanged at 12 sites on a weekly basis.

3.4 Milk

Milk samples were collected by RMF personnel using PVNGS procedures.

3.4.1 Monthly milk samples were obtained from five dairies during the year. Samples were collected in 1-gallon cubitainers to which 100 mL of carrier preservative was added. Goats milk was collected as available.

3.5 Sludge

Sludge samples were collected by RMF personnel using PVNGS procedures.

3.5.1 Monthly sludge samples were obtained from several on-site locations. Samples were collected using 1000 mL plastic bottles.

4.0 Analytical Procedures

A summary of RMF methods is presented here. Sample sizes are provided in Table 4.1. Typical times between sample collection and counting are presented in Table 4.2. Typical counting efficiencies and radiochemical yields are presented in Table 4.3. Table 4.4 presents typical sample counting times. The sample size and counting times used for LLD calculations are the same as used for actual measurements.

4.1 Gamma Spectrometry

All gamma spectra are obtained from Ge(Li) or HPGe detectors. Efficiency calibrations are done annually, and in triplicate, for each geometry used. The calculations are performed with a solution of mixed gamma ray emitters whose activities are explicitly traceable to the U.S. National Institute of Standards and Technology.

4.1.1 Water

Samples are counted in a 500-mL Marinelli beaker. To reduce the counting time, up to 2 liters may be evaporated to 500 mL and counted.

4.1.2 Milk

Milk is counted as received, in a 500 mL Marinelli beaker.

4.1.3 Soil, Animal Feeds, Vegetation

300 g of material is mixed with 200 mL of water and homogenized in a blender. The sample is then transferred to a 500-mL Marinelli beaker and counted.

4.1.4 Air Particulate Filters

Filters are counted as received. Monthly composites consist of 4-5 filters stacked on the detector and counted.

4.1.5 Charcoal Canisters

Charcoal canisters are counted on a twin NaI detector system. Gamma spectroscopy is used only for verification if I-131 is detected by NaI. Counting efficiency is determined by spiking blank canisters with I-131 traceable to the National Institute of Standards and Technology (NIST). A

canister spiked with Ba-133 is used to verify system performance prior to counting each week's samples.

4.1.6 Sludge

Sludge was packed uniformly in a Marinelli beaker and counted.

4.2 Gross Beta Activity

4.2.1 Water

Samples are evaporated to dryness in stainless steel planchettes (after preliminary evaporation and conversion to nitrates).

4.2.2 Air Particulate Filters

Efficiency calibration is obtained by depositing a known amount of NIST traceable Sr-90 on the surface of a glass fiber filter whose surface has been sealed to prevent penetration of the activity into the filter medium. Samples are counted as received after allowing 10 days for decay of radium and thorium daughters.

4.3 Tritium

4.3.1 Water

Water samples are distilled from alkaline permanganate and counted in a liquid scintillation counter. Efficiency is determined on samples with identical quench and sample scintillant ratios.

4.4 Iodine-131

4.4.1 Water

Radioiodine and added carrier are oxidized to I_2 and extracted into chloroform, reduced and back-extracted into aqueous bisulfite, precipitated as PdI_2, and counted in a low-background counter. Counting efficiency is corrected for self-absorption by adding a known amount of I-131 traceable to NIST standard to a series of samples having

varying amounts of iodide, precipitating as PdI_2, and counting in a low-background counter.

4.4.2 Milk

Radioiodine and added carrier are adsorbed onto Dowex 1-X8 resin, stripped with hypochlorite, extracted into chloroform and determination completed as for water samples.

4.5 Strontium-89 and Strontium-90

Radiostrontium and added carrier are precipitated from the samples as carbonates. Calcium and other elements are separated by repeated extractions with fuming nitric acid. The sample is counted immediately after separation from the Y-90 daughter of Sr-90. This gives the total activity due to Sr-89 and Sr-90. After a 14-day ingrowth the sample is counted again. The increase in count rate is due to Y-90, which at equilibrium is equal to Sr-90, whose activity is subtracted from the initial count to determine Sr-90. Counting efficiencies are corrected for self-absorption by adding a known amount of respective NIST traceable nuclide to a series of samples containing varying amounts of the respective carrier, precipitating as carbonate, and counting in a low-background counter.

TABLE 4.1

TYPICAL ALIQUOT SIZES

Sample Type	Gross Beta	Gamma Spec.	Iodine-131	Strontium-89	Strontium-90	Tritium
Air Particulates	430 m^3 (a)	430 m^3 (a)				
Airborne Radioiodine		430 m^3 (a)				
Fresh Milk		500 mL	2000 mL			
Broadleaf Vegetation		300 g				
Groundwater	250 mL	500 mL	2000 mL		2000 mL	5 mL
Drinking Water	250 mL	500 mL	2000 mL		2000 mL	5 mL
Surface	100 mL	500 mL	2000 mL	1000 mL	2000 mL	5 mL

(a) Air sample volume determined using assumed constant flow of 1.5 CFM times conversion factors (cubic feet to cubic meters and hours to minutes) times the elapsed time. 1.5 ft^3/min x .02832 m^3/ft^3 x 60 min/hr x Elapsed time in hours (ETM reading) = total flow in cubic meters. Monthly composite is 1720 m^3.

TABLE 4.2

TYPICAL TIMES BETWEEN SAMPLE COLLECTION AND COUNTING

Sample Type	Time between collection and Counting
Air Particulates	10 d
Airborne Radioiodine	1 d < T < 2d
Fresh Milk	2 d < T < 4d *
Vegetation	2 d < T < 5d
Water	1 d < T < 7d
Sludge	1 d < T < 7d

* Priority is given to Iodine-131 radiochemical assay, then measurement of other nuclides with longer half lives.

TABLE 4.3

TYPICAL COUNTING EFFICIENCIES AND RADIOCHEMICAL YIELDS

GAMMA SPECTROSCOPY

Energy MeV	Isotope	Detector Efficiency
0.134	Ce-144	0.031
0.365	I-131	0.015
0.537	Ba-140	0.010
0.605	Cs-134	0.0091
0.622	Ru, Rh-106	0.0089
0.662	Cs-137	0.0083
0.756	Zr-95	0.0065
0.765	Nb-95	0.0064
0.811	Co-58	0.0068
0.835	Mn-54	0.0066
1.095	Fe-59	0.0051
1.115	Zn-65	0.0050
1.173	Co-60	0.0047
1.596	La-140	0.0036

OTHER THAN GAMMA SPECTROSCOPY

(Detector Efficiency // Chemical Recovery)

Sample Type	Gross Beta	I-131	Sr-89	Sr-90	H-3
Air Particulates	0.40//na				
Airborne Radioiodine		0.12//na			
Fresh Milk		0.30//0.80	0.45//0.85	0.30//0.85	
Groundwater	0.32//na	0.30//0.90	0.45//0.85	0.30//0.85	0.45//na
Drinking Water	0.32//na	0.30//0.90	0.45//0.85	0.30//0.85	0.45//na
Surface Water	0.20//na	0.30//0.90	0.45//0.85	0.30//0.85	0.45//na

na not applicable

TABLE 4.4

TYPICAL SAMPLE COUNTING TIMES

Sample Type	Gross Beta	Gamma Spec.	I-131	Sr-89	Sr-90	H-3
Air Particulates	100 m	45 m				
Airborne Radioiodine		45 m	30 m			
Fresh Milk		16 h	300 m			
Broadleaf Vegetation		8 h				
Groundwater	200 m	16 h*			300 m	100 m
Drinking Water	200 m	16 h*			300 m	100 m
Surface Water	200 m	16 h*	300 m	100 m	300 m	100 m
Sludge		8 h*				

* Counting times may be increased to meet LLD requirements.

5.0 Nuclear Instrumentation

5.1 Detectors and Equipment

Gamma spectra are analyzed by a Canberra Series 95 Multichannel Analyzer (MCA) using a MicroVax computer. Three Detectors are available:

1) PGT Ge(Li), 26% efficiency, 1.90 keV FWHM @ 1332.5 keV
2) Canberra Ge(Li), 14% efficiency, 2.08 keV FWHM @ 1332.5 keV
3) ORTEC HPGe, 13% efficiency, 1.98 keV FWHM @ 1332.5 keV

Two Tennelec LB-5100 low background proportional counters are used for alpha and beta counting. Each system has been interfaced to a personal computer and is completely automatic. Sample results and background counts are stored on disk. In addition, the computer is able to produce control charts and voltage plateaus.

Liquid scintillation counting is done in a Beckman LS-1801 Liquid Scintillation Spectrometer.

6.0 Isotopic Detection Limits and Reporting Criteria

6.1 Lower Limits of Detection

The lower limits of detection (LLD) and the method for calculation are specified in the PVNGS Technical Specifications [11] and are presented in Table 6.1. RMF *a priori* LLDs are presented in Table 6.2.

6.2 Data Reporting Criteria

All results which are less than the Technical Specifications defined LLD, but greater than the *a posteriori* LLD are reported at the amount of activity determined and its respective error. Errors are presented as $\pm$ 1 σ.

Occasionally the PVNGS Technical Specifications *a priori* LLDs [11] may not be achieved as a result of;

- background fluctuations,
- unavoidably small sample sizes,
- the presence of interfering nuclides,
- self absorption corrections,
- decay corrections for short half-lived
- radionuclides, or
- other uncontrollable circumstances.

In these instances, the contributing factors will be noted in the table where the data is presented.

TABLE 6.1

PVNGS TECHNICAL SPECIFICATION LOWER LIMITS OF DETECTION (a priori) [11]

Analysis	Water (pCi/L)	Airborne Particulate or Gas (pCi/m3)	Fresh Milk (pCi/L)	Food Products (pCi/kg, wet)
Gross beta	4	0.01		
H-3	2000*			
Mn-54	15			
Fe-59	30			
Co-58,-60	15			
Zn-65	30			
Zr-95	30			
Nb-95	15			
I-131	1**	0.07	1	60
Cs-134	15	0.05	15	60
Cs-137	18	0.06	18	80
Ba-140	60		60	
La-140	15		15	

Note: this list does not mean that only these nuclides are to be detected and reported. Other peaks that are measurable and identifiable, together with the above nuclides, shall also be identified and reported.

*If no drinking water pathway exists, a value of 3000 pCi/L may be used.

**If no drinking water pathway exists, a value of 15 pCi/L may be used.

TABLE 6.2

RMF a priori LOWER LIMITS OF DETECTION

GAMMA SPECTROSCOPY

Energy MeV	Isotope	Vegetation pCi/Kg	Water pCi/L	Fresh Milk pCi/L	Air Particulate pCi/m^3
0.365	I-131	15	9	9	.0.040
0.537	Ba-140	50	30	30	0.015
0.605	Cs-134	13	8	8	0.015
0.662	Cs-137	17	10	10	0.030
0.756	Zr-95	27	16	16	0.050
0.765	Nb-95	15	9	9	0.035
0.811	Co-58	15	9	9	0.020
0.835	Mn-54	15	9	9	0.020
1.095	Fe-59	30	18	18	0.060
1.115	Zn-65	33	20	20	0.075
1.173	Co-60	17	10	10	0.020
1.596	La-140	18	11	11	0.055

OTHER THAN GAMMA SPECTROSCOPY

Sample Type	Gross Beta	I-131	Sr-89	Sr-90	H-3
Air Particulates	0.0034 pCi/m3				
Airborne Radioiodine		0.06 pCi/m^3			
Fresh Milk		0.5 pCi/L	1.0 pCi/L	0.5 pCi/L	
Groundwater	2.0 pCi/L			0.5 pCi/L	570 pCi/L
Drinking Water	2.0 pCi/L	0.5 pCi/L	1.0 pCi/L	0.5 pCi/L	570 pCi/L
Surface Water	2.0 pCi/L	0.5 pCi/L	1.0 pCi/L	0.5 pCi/L	570 pCi/L

7.0 Quality Control

7.1 Intercomparisons and Certification

The RMF routinely participates in intercomparisons sponsored by USEPA and BRMD.

7.2 Intercomparison Results

Results for the intercomparison program with the USEPA are presented in Table 7.1.

Table 7.1

U.S. EPA INTERCOMPARISON RESULTS

Date	Sample Type	Units	Isotope	EPA Value	Reported Value	Control Limits
1-06-89	Strontium in Water	pCi/L	Sr-89	40.00 ± 5.00	(a)	31.34 - 48.66
		pCi/L	Sr-90	25.00 ± 1.50	25.67 ± 0.58	22.40 - 27.60
1-20-89	Gross beta in Water	pCi/L	beta	4.00 ± 5.00	5.00 ± 1.00	0.00 - 12.66
2-10-89	Gamma in Water	pCi/L	Cr-51	235.00 ± 24.00	243.67 ± 14.74	193.43 - 276.57
		pCi/L	Co-60	10.00 ± 5.00	10.33 ± 1.53	1.34 - 18.66
		pCi/L	Zn-65	159.00 ± 16.00	168.00 ± 10.82	131.29 - 186.71
		pCi/L	Ru-106	178.00 ± 18.00	174.67 ± 0.58	146.82 - 209.18
		pCi/L	Cs-134	10.00 ± 5.00	10.00 ± 1.00	1.34 - 18.66
		pCi/L	Cs-137	10.00 ± 5.00	10.67 ± 1.15	1.34 - 18.66
2-17-89	Iodine in Water	pCi/L	I-131	106.00 ± 11.00	115.33 ± 4.16 (b)	86.95 - 125.05
2-24-89	Tritium in Water	pCi/L	H-3	2754.00 ± 356.00	2990.00 ± 113.57	2137.39 - 3370.61
3-31-89	Air Filter	pCi/filter	beta	62.00 ± 5.00	59.67 ± 0.58	53.34 - 70.66
		pCi/filter	Sr-90	20.00 ± 1.50	19.33 ± 0.58	17.40 - 22.60
		pCi/filter	Cs-137	20.00 ± 5.00	19.33 ± 1.15	11.34 - 28.66
4-18-89	Blind Intercomparison	pCi/L	beta	57.00 ± 5.00	(c), (d)	48.34 - 65.66
		pCi/L	Sr-89	8.00 ± 5.00	5.66 ± 1.50 (c)	0.00 - 16.66
		pCi/L	Sr-90	8.00 ± 1.50	8.80 ± 0.40 (c)	5.40 - 10.60
		pCi/L	Cs-134	20.00 ± 5.00	20.73 ± 1.29 (c)	11.34 - 28.66
		pCi/L	Cs-137	20.00 ± 5.00	21.87 ± 2.00 (c)	11.34 - 28.66
5-5-89	Strontium in Water	pCi/L	Sr-89	6.00 ± 5.00	5.67 ± 0.58	0.00 - 14.66
		pCi/L	Sr-90	6.00 ± 1.50	6.00 ± 0.00	3.40 - 8.60

Table 7.1

U.S. EPA INTERCOMPARISON RESULTS

Date	Sample Type	Units	Isotope	EPA Value	Reported Value	Control Limits
8-4-89	Iodine in Water	pCi/L	I-131	83.00 ± 8.00	84.67 ± 3.05	69.14 - 96.86
9-22-89	Gross beta in Water	pCi/L	beta	6.00 ± 5.00	3.33 ± 0.58	0.00 - 14.66
10-6-89	Gamma in Water	pCi/L	Ba-133	59.0 ± 6.00	58.67 ± 2.08	48.61 - 69.39
			Co-60	30.0 ± 5.00	30.33 ± 0.58	21.34 - 38.66
			Zn-65	129.00 ± 13.00	135.67 ± 9.61	106.48 - 151.52
			Ru-106	161.00 ± 16.00	153.00 ± 26.63	133.29 - 188.71
			Cs-134	29.00 ± 5.00	28.33 ± 0.58	20.34 - 37.66
			Cs-137	59.00 ± 5.00	63.33 ± 0.58	50.34 - 67.66
10-20-89	Tritium in Water	pCi/L	H-3	3496.00 ± 364.00	3323.33 ± 276.83	2865.53 - 4126.47
10-31-89	Blind Intercomparison	pCi/L	beta	32.00 ± 5.00	35.67 ± 3.79	23.34 - 40.66
		pCi/L	Sr-89	15.00 ± 5.00	(e)	6.34 - 23.66
		pCi/L	Sr-90	7.00 ± 1.50	(e)	4.40 - 9.60
		pCi/L	Cs-134	5.00 ± 5.00	5.33 ± 0.58	0.00 - 13.66
		pCi/L	Cs-137	5.00 ± 5.00	5.67 ± 0.58	0.00 - 13.66

(a) Sr-89 results from 1988 were inconsistent and required new methodology. The revised procedure was not completed in time to analyze this sample, so another procedure, which provides for Sr-90 only was used.

(b) Determined using gamma spectroscopy.

(c) Results were not received by EPA in time to be included in the EPA report.

(d) EPA requires evaporation on the 29th day after sample date and counting on the 30th day after sample date. We were not able to meet this requirement and thus had an invalid sample.

(e) Detector was out of service and out of calibration for Sr during this study.

Note: RMF annual EPA milk intercomparison scheduled for September was cancelled by the EPA, so no results were available.

8.0 Results and Data Interpretation

Results and interpretation of the data for all of the samples analyzed during 1989 are presented in the following sections. Assessment of pre-operational and operational data revealed no significant changes to environmental radiation levels. There was no observed impact on the environment due to PVNGS operations in 1989.

8.1 Air Particulates

Weekly gross beta results in quarterly format, are presented in Tables 8.1 through 8.4. Table 8.5 contains the average gross beta activities by station. Average quarterly activities are calculated using all weekly activities except those marked invalid. The findings are consistent with pre-operational baseline and previous operational results.

8.2 Airborne Radioiodine

Tables 8.7 through 8.10 present the quarterly radioiodine results. No radioiodine was detected in any of the samples.

8.3 Vegetation

Table 8.11 presents I-131, Cs-134 and Cs-137 data for the vegetation samples. No activity was observed in any of the samples.

8.4 Drinking Water

All samples were analyzed for I-131 (radiochemical), Gross Beta, Sr-90, H-3, and for gamma-emitting nuclides. Results of these analysis are summarized in Tables 8.12 and 8.13.

Gross Beta activity ranged from less than 2.7 pCi/L to a high of 11.6 pCi/L (Shepard Residence 10/31/89). A trace amount of Sr-90 was detected at the Scott residence (3/15/89). Tritium results were less than LLD for all drinking water samples. No gamma-emitting nuclides of man-made origin were detected. All I-131 results were less than LLD.

8.5 Groundwater

All groundwater samples were analyzed for Gross Beta, Sr-90, H-3, I-131 and for gamma-emitting nuclides. Results obtained from the analysis of the samples are presented in Table 8.14.

Gross Beta results were consistent with pre-operational and prior operational measurements. No radioactivity was observed above the LLD values for I-131, Sr-90, H-3 or gamma spectrometry.

8.6 Surface Water

Surface water samples from the Reservoir and Evaporation ponds were analyzed for Gross Beta, Sr-89, Sr-90, H-3 and gamma-emitting nuclides. Results are presented in Tables 8.15 through 8.17. I-131 was observed in the Reservoir and Evaporation Pond #1. The highest concentration was 25.8 pCi/L (02/14/89) in the Reservoir and 23.2 pCi/L in Evaporation Pond #1.

Influent samples were collected from the Water Reclamation Facility (WRF) and analyzed for gamma emitting nuclides, H-3, and Gross Beta activity. The results, presented in Table 8.19, indicate that I-131 was observed routinely. The highest concentration was 55.5 pCi/L (08/15/89). The results are consistent with assays from the previous year.

Gamma spectrometry analysis was performed on samples obtained from each of the three cooling towers and results are presented in Tables 8.20 through 8.22. Iodine-131 was routinely measured in the cooling towers of operating units. The highest concentration was 132 pCi/L (02/14/89), 142 pCi/L (02/14/89) and 164pCi/L (02/21/89) for Units #1, #2, and #3 respectively. A trace amount of Cs-137 was detected in Unit #1 (02/21/89).

Elevated I-131 levels in the cooling towers are not the result of plant effluents, but instead reflect the increased concentration observed in the WRF influent. The WRF influent I-131 is a result of radiopharmicudical discharges into the Phoenix sewage system, not the result of PVNGS effluents. Refer to Section 11 of the 1988 AREOR for a detailed explanation.

Water samples from the Retention Basins were analyzed for Tritium and by gamma spectrometry. The results, presented in Tables 8.23 and 8.24, indicate that Cs-134, Cs-137, and I-131 concentrations were above LLD in a few of the samples collected during the first four months of the year. Cs-137 was noted again in the 09/26/89 sample obtained from Retention Basin #2. Cr-51 was observed in the sample obtained from Retention Basin #2 on 02/21/89. Tritium concentrations in both Retention Basins were elevated at the end of 1988 and the maximum concentrations for 1989 were recorded on the first sample collection of 1989. Tritium concentrations decreased thereafter.

Table 8.25 presents gamma spectrometry measurements of samples collected from Sedimentation Basin #2 (J-Hook Pond). No man-made gamma-emitting radionuclides were observed.

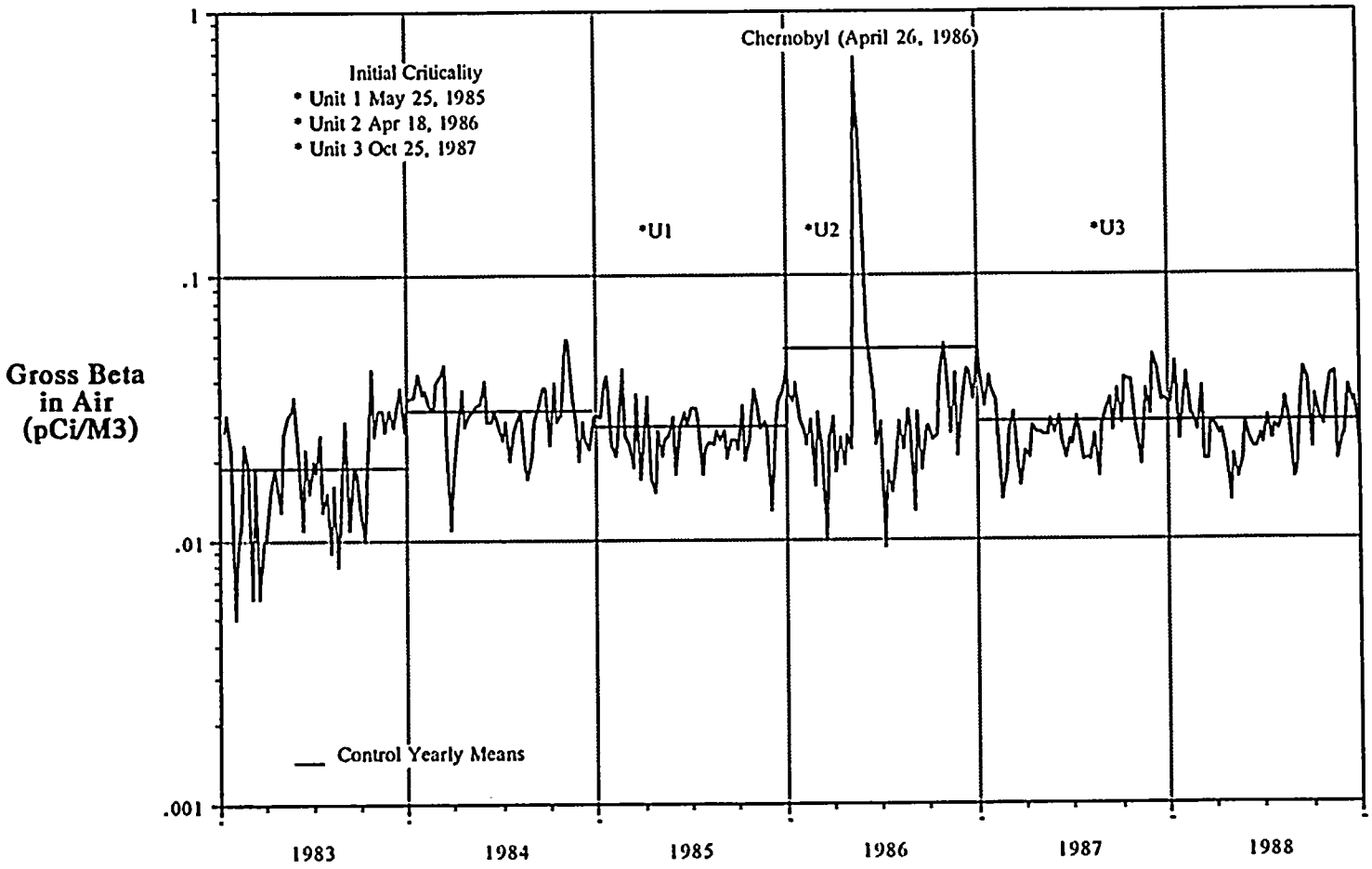
8.7 Milk

Fresh Milk samples were analyzed by gamma spectrometry for Cs-134, Cs-137, Ba-140, and La-140. Samples were analyzed radiochemically for I-131. As shown in Table 8.18 all of the results were < LLD.

8.8 Sludge

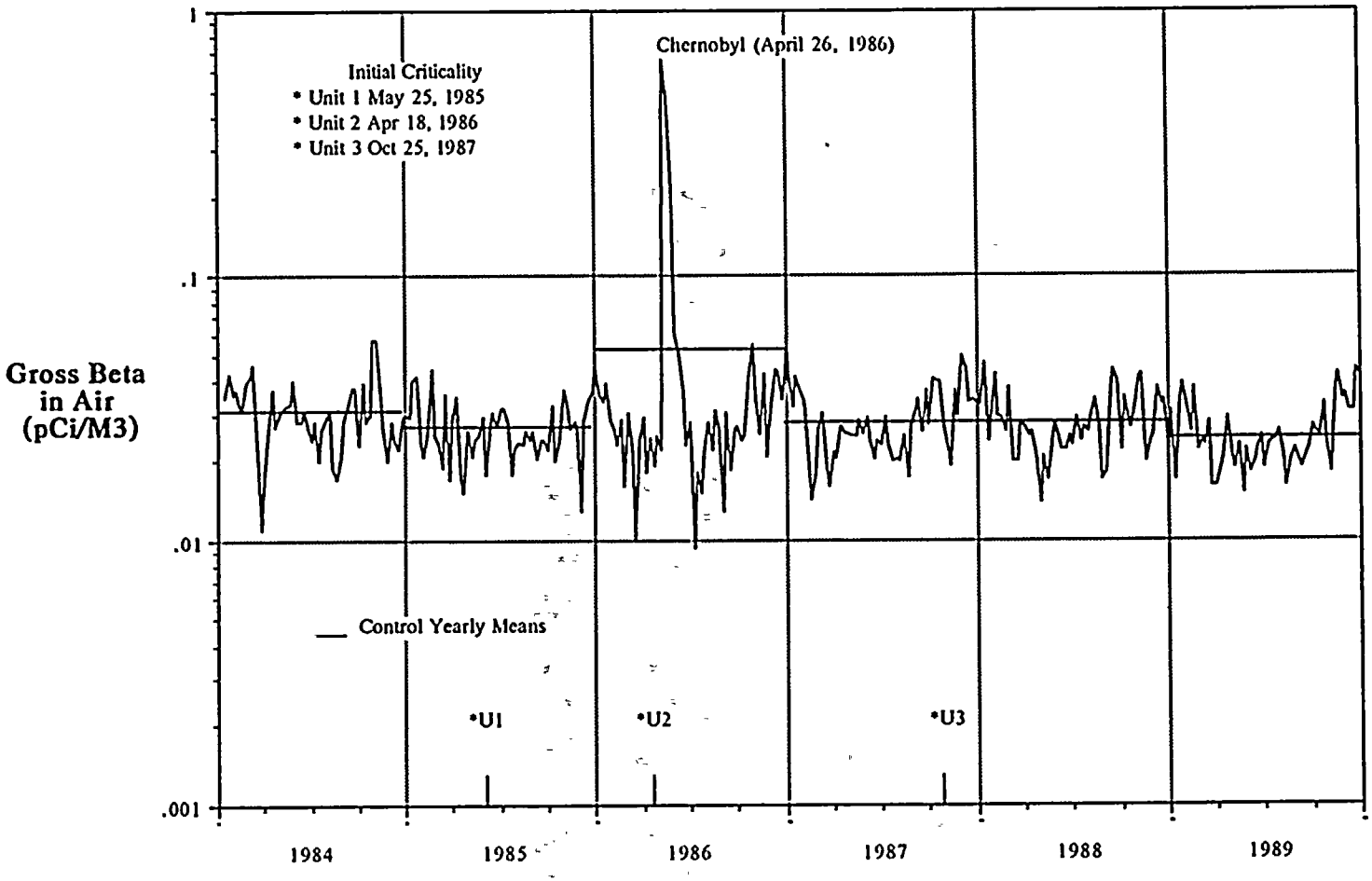
Sludge samples were obtained from several on-site locations and analyzed by gamma spectrometry. Results can be found in Table 8.26. During the year, trace amounts of Cs-137 were detected in Sedimentation Basin #2 (J-Hook Pond) and a trace of Mn-54 was observed once (09/05/89). Various radionuclides, including Co-60, Cs-137, Mn-54 and Sb-125 were observed in the Retention Basins. Iodine-131 was measured in the Waste Centrifuge from the WRF. No activity was observed in the STP Digestor. Small concentrations of Co-60, Cs-137 and Mn-54 were noted in Evaporation Pond #2.

Figure 8.1
Gross Beta In Air From 1983 to 1988



1983-1988 Weekly Samples

Figure 8.2
Gross Beta in Air from 1984 to 1989



1984-1989 Weekly Air Sample Results

TABLE 8.1

GROSS BETA IN AIR PARTICULATE DATA (pCi/m^3)

FIRST QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44	WEEKLY MEAN ALL SITES	%SD
12/28/88 - 01/03/89	0.028 ± 0.002	0.032 ± 0.002	0.034 ± 0.002	0.034 ± 0.002	0.031 ± 0.002	0.032 ± 0.002	0.028 ± 0.002	0.033 ± 0.002	0.031 ± 0.002	0.029 ± 0.002	0.029 ± 0.002	0.029 ± 0.002	0.031	7.2
01/03/89 - 01/11/89	0.017 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.018 ± 0.001	0.019 ± 0.001	0.018 ± 0.001	0.017 ± 0.001	0.013 ± 0.001	0.017	9.0
01/11/89 - 01/18/89	0.029 ± 0.002	0.031 ± 0.002	0.034 ± 0.002	0.038 ± 0.003	0.035 ± 0.002	0.035 ± 0.002	0.033 ± 0.002	0.036 ± 0.002	0.034 ± 0.002	0.036 ± 0.002	0.035 ± 0.002	0.027 ± 0.002	0.034	9.4
01/18/89 - 01/25/89	0.041 ± 0.003	0.035 ± 0.002	0.041 ± 0.003	0.038 ± 0.003	0.038 ± 0.003	0.037 ± 0.003	0.039 ± 0.003	0.041 ± 0.003	0.041 ± 0.003	0.043 ± 0.003	0.043 ± 0.003	0.036 ± 0.002	0.039	6.7
01/25/89 - 02/01/89	0.029 ± 0.002	0.030 ± 0.002	0.030 ± 0.002	0.038 ± 0.003	0.031 ± 0.002	0.033 ± 0.002	0.033 ± 0.002	0.033 ± 0.002	0.035 ± 0.002	0.034 ± 0.002	0.030(a) ± 0.002	0.030 ± 0.002	0.032	8.3
02/01/89 - 02/08/89	0.029(b) ± 0.002	0.026 ± 0.002	0.025 ± 0.002	0.026 ± 0.002	0.027 ± 0.002	0.027 ± 0.002	0.025 ± 0.002	0.026 ± 0.002	0.025 ± 0.002	0.027 ± 0.002	0.023 ± 0.002	0.027(b) ± 0.002	0.026	5.8
02/08/89 - 02/15/89	0.036(b) ± 0.002	0.038 ± 0.002	0.041 ± 0.003	0.041 ± 0.003	0.037 ± 0.002	0.036(b) ± 0.002	0.038 ± 0.002	0.039 ± 0.002	0.040(b) ± 0.002	0.036 ± 0.002	0.038(b) ± 0.002	0.033(b) ± 0.002	0.038	6.2
02/15/89 - 02/22/89	0.023(b) ± 0.002	0.021 ± 0.002	0.023 ± 0.002	0.024 ± 0.002	0.023 ± 0.002	0.021(b) ± 0.002	0.020 ± 0.002	0.022(b) ± 0.002	0.022(b) ± 0.002	0.021 ± 0.002	0.022 ± 0.002	0.019 ± 0.002	0.022	6.5
02/22/89 - 03/01/89	0.023(b) ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.027 ± 0.002	0.024 ± 0.002	0.021(b) ± 0.002	0.023 ± 0.002	0.024 ± 0.002	0.024 ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.024 ± 0.002	0.024	5.9

TABLE 8.1

GROSS BETA IN AIR PARTICULATE DATA (pCi/m^3)

FIRST QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44	WEEKLY MEAN ALL SITES	%SD
03/01/89 - 03/08/89	0.022(b) ± 0.002	0.022 ± 0.002	0.023 ± 0.002	0.024 ± 0.002	0.023 ± 0.002	0.022 ± 0.002	0.022 ± 0.002	0.024 ± 0.002	0.023(b) ± 0.002	0.023 ± 0.002	0.023 ± 0.002	0.021 ± 0.002	0.023	3.9
03/08/89 - 03/15/89	0.028(b) ± 0.002	0.029 ± 0.002	0.030 ± 0.002	0.029 ± 0.002	0.029 ± 0.002	0.027(b) ± 0.002	0.027 ± 0.002	0.030(b) ± 0.002	0.029(b) ± 0.002	0.028 ± 0.002	0.029 ± 0.002	0.026 ± 0.002	0.028	4.4
03/15/89 - 03/22/89	0.015(b) ± 0.001	0.017 ± 0.001	(c)	0.015 ± 0.001	0.017 ± 0.001	0.016(b) ± 0.001	0.015 ± 0.001	0.014 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.015 ± 0.001	0.016	6.4
03/22/89 - 03/29/89	0.016(b) ± 0.001	0.017 ± 0.001	(c)	0.017 ± 0.001	0.015 ± 0.001	0.016(b) ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.016	4.1

(a) Power failure at site.
(b) Excessive flow meter reading.
(c) Sample invalid due to erroneous ETM; sample not counted.

TABLE 8.2

GROSS BETA IN AIR PARTICULATE DATA (pCi/m^3)

SECOND QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44	WEEKLY MEAN ALL SITES	%SD
03/29/89 - 04/05/89	0.019 ± 0.001	0.020 ± 0.002	0.019 ± 0.001	0.020 ± 0.002	0.019 ± 0.001	0.019 ± 0.001	0.018 ± 0.001	0.020 ± 0.002	0.018 ± 0.001	0.018 ± 0.001	0.017 ± 0.001	0.019 ± 0.001	0.019	5.0
04/05/89 - 04/12/89	0.019(a) ± 0.001	0.020 ± 0.002	0.022 ± 0.002	0.022 ± 0.002	0.020 ± 0.002	0.021 ± 0.002	0.021 ± 0.002	0.024 ± 0.002	0.023 ± 0.002	0.021 ± 0.002	0.023 ± 0.002	0.021 ± 0.002	0.021	6.7
04/12/89 - 04/19/89	0.031(b) ± 0.002	0.026 ± 0.002	0.025 ± 0.002	0.029 ± 0.002	0.031 ± 0.002	(c)	0.029 ± 0.002	0.031 ± 0.002	0.029 ± 0.002	0.028 ± 0.002	0.029 ± 0.002	0.029(a) ± 0.002	0.029	6.7
04/19/89 - 04/26/89	0.021(a) ± 0.002	0.020 ± 0.002	0.021 ± 0.002	0.022 ± 0.002	0.020 ± 0.002	0.018(a) ± 0.001	0.020 ± 0.002	0.021 ± 0.002	0.021 ± 0.002	0.021 ± 0.002	0.022 ± 0.002	0.022 ± 0.002	0.021	5.5
04/26/89 - 05/03/89	0.018(a) ± 0.001	0.018 ± 0.001	0.018 ± 0.001	0.020 ± 0.002	0.020 ± 0.002	0.017(a) ± 0.001	0.021 ± 0.002	0.020 ± 0.002	0.018 ± 0.001	0.021 ± 0.002	0.020 ± 0.002	0.018 ± 0.001	0.019	7.2
05/03/89 - 05/10/89	0.023 ± 0.002	0.023 ± 0.002	0.022 ± 0.002	0.025 ± 0.002	0.024 ± 0.002	0.021(a) ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.022 ± 0.002	0.024 ± 0.002	0.024 ± 0.002	0.022 ± 0.002	0.023	5.5
05/10/89 - 05/17/89	0.015 ± 0.001	0.014 ± 0.001	0.015 ± 0.001	0.016 ± 0.001	0.014 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.012 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.016 ± 0.001	0.014 ± 0.001	0.015	7.3
05/17/89 - 05/24/89	0.022 ± 0.002	0.021 ± 0.002	0.021 ± 0.002	0.024 ± 0.002	0.022 ± 0.002	0.020(a) ± 0.001	0.020 ± 0.002	0.024 ± 0.002	0.021 ± 0.002	0.023 ± 0.002	0.022 ± 0.002	0.022 ± 0.002	0.022	6.1
05/24/89 - 05/31/89	0.018(a) ± 0.001	0.016 ± 0.001	0.019 ± 0.001	0.020 ± 0.002	0.019 ± 0.001	0.018(a) ± 0.001	0.017 ± 0.001	0.018 ± 0.001	0.020 ± 0.002	0.018 ± 0.001	0.018 ± 0.001	0.019 ± 0.002	0.018	6.3

TABLE 8.2

GROSS BETA IN AIR PARTICULATE DATA (pCi/m^3)

SECOND QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44	WEEKLY MEAN ALL SITES	%SD
05/31/89 - 06/07/89	0.019 ± 0.001	0.021 ± 0.002	0.021 ± 0.002	0.021 ± 0.002	0.021 ± 0.002	0.020(a) ± 0.001	0.020 ± 0.002	0.022 ± 0.002	0.019 ± 0.001	0.021 ± 0.002	0.019 ± 0.001	0.019 ± 0.001	0.020	5.2
06/07/89 - 06/13/89	0.022 ± 0.002	0.021 ± 0.002	0.022 ± 0.002	0.023 ± 0.002	0.022 ± 0.002	0.020(a) ± 0.002	0.021 ± 0.002	0.022 ± 0.002	0.022 ± 0.002	0.023 ± 0.002	0.022 ± 0.002	0.021 ± 0.002	0.022	4.0
06/13/89 - 06/20/89	0.024(a) ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.027 ± 0.002	0.025 ± 0.002	0.021(a) ± 0.002	0.024 ± 0.002	0.026 ± 0.002	0.024 ± 0.002	0.026(b) ± 0.002	0.025 ± 0.002	0.026 ± 0.002	0.025	6.2
06/20/89 - 06/27/89	0.019 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.018 ± 0.001	0.016 ± 0.001	0.018 ± 0.001	0.020 ± 0.002	0.019 ± 0.001	0.020 ± 0.002	0.019 ± 0.001	0.019 ± 0.001	0.019	5.6

(a) Excessive flow meter reading.
(b) Low flow meter reading.
(c) Sample invalid due to equipment malfunction; sample not counted.

TABLE 8.3

GROSS BETA IN AIR PARTICULATE DATA (pCi/m^3)

THIRD QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44	WEEKLY MEAN ALL SITES	%SD
06/27/89 - 07/05/89	0.023 ± 0.002	0.023 ± 0.002	0.022 ± 0.002	0.025 ± 0.002	0.023 ± 0.002	0.022 ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.024 ± 0.002	0.022 ± 0.002	0.024 ± 0.002	0.022 ± 0.002	0.023	4.9
07/05/89 - 07/11/89	0.023(a) ± 0.002	0.024 ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.023 ± 0.002	0.022 ± 0.002	0.025 ± 0.002	0.025 ± 0.002	0.025 ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.025 ± 0.002	0.024	4.3
07/11/89 - 07/19/89	0.023(b) ± 0.002	0.022 ± 0.002	0.025 ± 0.002	0.026 ± 0.002	0.023 ± 0.002	0.026 ± 0.002	0.023 ± 0.002	0.026 ± 0.002	0.024 ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.023 ± 0.002	0.024	5.8
07/19/89 - 07/25/89	0.026 ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.026 ± 0.002	0.025 ± 0.002	0.024 ± 0.002	0.024 ± 0.002	0.026 ± 0.002	0.027 ± 0.002	0.027 ± 0.002	0.026 ± 0.002	0.026 ± 0.002	0.026	4.3
07/25/89 - 08/01/89	0.022 ± 0.002	0.019 ± 0.001	0.021 ± 0.002	0.023 ± 0.002	0.020 ± 0.002	0.020 ± 0.002	0.020 ± 0.002	0.023 ± 0.002	0.023 ± 0.002	0.020 ± 0.002	(c)	0.020 ± 0.002	0.021	7.1
08/01/89 - 08/08/89	0.018 ± 0.001	0.015 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.015 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	(c)	0.016 ± 0.001	0.016	5.6
08/08/89 - 08/15/89	0.019 ± 0.001	0.019 ± 0.001	0.020 ± 0.001	0.019 ± 0.001	0.021 ± 0.001	0.018 ± 0.001	0.021 ± 0.001	0.021 ± 0.001	0.021 ± 0.001	0.021 ± 0.001	0.020 ± 0.001	0.021 ± 0.001	0.020	5.4
08/15/89 - 08/22/89	0.020 ± 0.001	0.021 ± 0.001	0.023 ± 0.001	0.021 ± 0.001	0.022 ± 0.001	0.023 ± 0.001	0.022 ± 0.001	0.022 ± 0.001	0.022 ± 0.001	0.022 ± 0.001	0.022 ± 0.001	0.023 ± 0.001	0.022	4.1
08/22/89 - 08/29/89	0.022 ± 0.001	0.023 ± 0.001	0.018 ± 0.001	0.022 ± 0.001	0.021 ± 0.001	0.019 ± 0.001	0.021 ± 0.001	0.021 ± 0.001	0.021 ± 0.001	0.022 ± 0.001	0.019 ± 0.001	0.020 ± 0.001	0.021	7.2

TABLE 8.3

GROSS BETA IN AIR PARTICULATE DATA (pCi/m^3)

THIRD QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44	WEEKLY MEAN ALL SITES	%SD
08/29/89 - 09/05/89	0.019 ± 0.001	0.017 ± 0.001	0.017 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.017 ± 0.001	0.019 ± 0.001	0.020 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.018 ± 0.001	0.019 ± 0.001	0.019	5.4
09/05/89 - 09/12/89	0.018 ± 0.001	0.020 ± 0.001	0.020 ± 0.001	0.022 ± 0.001	0.020 ± 0.001	0.018 ± 0.001	0.020 ± 0.001	0.019 ± 0.001	0.020 ± 0.001	0.021 ± 0.001	0.018 ± 0.001	0.019 ± 0.001	0.020	6.3
09/12/89 - 09/19/89	0.021 ± 0.001	0.020 ± 0.001	(c)	0.022 ± 0.001	0.021 ± 0.001	0.019 ± 0.001	0.022 ± 0.001	0.023 ± 0.001	0.022 ± 0.001	0.023 ± 0.001	0.024 ± 0.001	0.021 ± 0.001	0.022	6.6
09/19/89 - 09/26/89	0.025 ± 0.001	0.025 ± 0.001	(c)	0.029 ± 0.002	0.027 ± 0.001	0.026 ± 0.001	0.027 ± 0.001	0.032 ± 0.002	0.029 ± 0.002	0.029 ± 0.002	0.027 ± 0.001	0.024 ± 0.001	0.027	8.5

(a) Excessive flow meter reading.
(b) Low flow meter reading.
(c) Sample invalid due to erroneous ETH; sample not counted.

TABLE 8.4

GROSS BETA IN AIR PARTICULATE DATA (pCi/m^3)

FOURTH QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44	WEEKLY MEAN ALL SITES	%SD
09/26/89 - 10/03/89	0.023 ± 0.001	0.026 ± 0.002	(a)	0.025 ± 0.001	0.022 ± 0.001	(a)	0.027 ± 0.002	0.029 ± 0.002	0.029 ± 0.001	0.024 ± 0.001	0.027 ± 0.001	0.024 ± 0.001	0.026	9.4
10/03/89 - 10/10/89	0.025 ± 0.001	0.023 ± 0.001	(a)	0.028 ± 0.002	0.025 ± 0.001	0.027 ± 0.002	0.020(b) ± 0.001	0.029 ± 0.002	0.027 ± 0.002	0.025 ± 0.001	0.026(b) ± 0.004	0.021 ± 0.001	0.025	11.2
10/10/89 - 10/17/89	0.028 ± 0.002	0.032 ± 0.002	0.027 ± 0.001	0.034 ± 0.002	0.036 ± 0.002	0.034 ± 0.002	0.032 ± 0.002	0.039 ± 0.002	0.037 ± 0.002	0.040 ± 0.002	(c)	0.028 ± 0.002	0.033	13.4
10/17/89 - 10/24/89	0.027 ± 0.002	0.023 ± 0.001	0.016 ± 0.001	0.030 ± 0.002	0.027 ± 0.002	0.029 ± 0.002	0.022 ± 0.001	0.026 ± 0.001	0.028 ± 0.002	0.023 ± 0.001	(c)	0.016 ± 0.001	0.024	19.9
10/24/89 - 10/31/89	0.018 ± 0.001	0.017 ± 0.001	0.017 ± 0.001	0.018 ± 0.001	0.020 ± 0.001	0.018 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.018 ± 0.001	0.018 ± 0.001	0.016 ± 0.001	0.018	5.9
10/31/89 - 11/07/89	0.032 ± 0.002	0.039 ± 0.002	0.037 ± 0.002	0.043 ± 0.003	0.039 ± 0.002	0.037 ± 0.002	0.035 ± 0.002	0.044 ± 0.003	0.042 ± 0.003	0.040 ± 0.003	0.029 ± 0.002	0.037 ± 0.002	0.038	11.6
11/07/89 - 11/14/89	0.039 ± 0.002	0.040 ± 0.002	0.042 ± 0.002	0.048 ± 0.003	0.043 ± 0.003	0.042 ± 0.002	0.041 ± 0.002	0.045 ± 0.003	0.044 ± 0.003	0.042 ± 0.003	0.045 ± 0.003	0.039 ± 0.002	0.043	6.3
11/14/89 - 11/21/89	0.035 ± 0.002	0.034 ± 0.002	0.034 ± 0.002	0.039 ± 0.003	0.036 ± 0.002	0.032 ± 0.002	0.036 ± 0.002	0.038 ± 0.003	0.035 ± 0.002	0.031 ± 0.002	0.034 ± 0.002	0.028 ± 0.002	0.034	8.7
11/21/89 - 11/28/89	0.032 ± 0.002	(c)	0.033 ± 0.002	0.039 ± 0.002	0.037 ± 0.002	0.038 ± 0.002	0.038 ± 0.002	0.038 ± 0.002	0.036 ± 0.002	0.035 ± 0.002	0.039 ± 0.002	0.035 ± 0.002	0.036	6.5

TABLE 8.4

GROSS BETA IN AIR PARTICULATE DATA (pCi/m^3)

FOURTH QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44	WEEKLY MEAN ALL SITES	%SD
11/28/89 - 12/05/89	0.029 ± 0.002	0.031 ± 0.002	0.025 ± 0.002	0.034 ± 0.002	0.026 ± 0.002	0.029 ± 0.002	0.032 ± 0.002	0.030 ± 0.002	0.033 ± 0.002	0.033 ± 0.002	0.033 ± 0.002	0.032 ± 0.002	0.031	9.4
12/05/89 - 12/12/89	0.034 ± 0.002	0.037 ± 0.002	0.030 ± 0.002	0.036 ± 0.002	(c)	0.029 ± 0.002	0.029 ± 0.002	0.031 ± 0.002	0.027 ± 0.002	0.028 ± 0.002	0.028 ± 0.002	0.029 ± 0.002	0.031	11.1
12/12/89 - 12/19/89	0.047 ± 0.003	0.042 ± 0.003	(d)	0.052 ± 0.003	0.043 ± 0.003	0.045 ± 0.003	0.043 ± 0.003	0.047 ± 0.003	0.044 ± 0.003	0.042 ± 0.003	0.043 ± 0.003	0.035 ± 0.002	0.044	9.5
12/19/89 - 12/27/89	0.040 ± 0.002	0.041 ± 0.002	0.044 ± 0.002	0.048 ± 0.002	0.040 ± 0.002	0.041 ± 0.002	0.042 ± 0.002	0.043 ± 0.002	0.042 ± 0.002	0.043 ± 0.002	0.043 ± 0.002	0.036 ± 0.002	0.042	6.8

(a) Sample invalid due to erroneous ETM; sample not counted.
(b) Low sample volume.
(c) Power failure at site; sample not counted.
(d) Sample invalid due to equipment malfunction.

TABLE 8.5

AVERAGE GROSS BETA IN AIR PARTICULATE (pCi/m^3), STATION SUMMARY

Station	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Average
1	0.026	0.021	0.021	0.031	0.025
4	0.026	0.020	0.021	0.032	0.025
6	0.029	0.021	0.021	0.031	0.025
7A	0.028	0.022	0.023	0.036	0.027
14A	0.027	0.021	0.022	0.033	0.026
15	0.026	0.019	0.021	0.033	0.025
17A	0.026	0.021	0.022	0.032	0.025
21	0.027	0.022	0.023	0.035	0.027
29	0.027	0.021	0.023	0.034	0.026
35	0.027	0.021	0.022	0.033	0.026
40	0.027	0.021	0.023	0.033	0.026
44	0.024	0.021	0.021	0.029	0.024
Average All Sites	0.027	0.021	0.022	0.033	0.026

TABLE 8.6

GAMMA RADIATION AIR FILTER COMPOSITES (pCi/m^3)

Collection Period		Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44
January	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
February	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
March	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
April	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
May	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
June	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
July	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
August	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
September	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
October	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
November	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
December	Cs-134	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	Cs-137	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.7

AIRBORNE RADIOIODINE DATA (pCi/m^3)

FIRST QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44
12/28/88 - 01/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
01/03/89 - 01/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
01/11/89 - 01/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
01/18/89 - 01/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
01/25/89 - 02/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD
02/01/89 - 02/08/89	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD(b)
02/08/89 - 02/15/89	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD(b)	< LLD	< LLD	< LLD(b)	< LLD	< LLD(b)	< LLD(b)
02/15/89 - 02/22/89	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD(b)	< LLD	< LLD(b)	< LLD(b)	< LLD	< LLD	< LLD
02/22/89 - 03/01/89	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
03/01/89 - 03/08/89	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD(b)	< LLD	< LLD	< LLD
03/08/89 - 03/15/89	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD(b)	< LLD	< LLD(b)	< LLD(b)	< LLD	< LLD	< LLD
03/15/89 - 03/22/89	< LLD(b)	< LLD	< LLD(c)	< LLD	< LLD	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
03/22/89 - 03/29/89	< LLD(b)	< LLD	< LLD(c)	< LLD	< LLD	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

(a) Power failure at site.
(b) Excessive flow meter reading.
(c) Sample invalid due to erroneous ETM.

TABLE 8.8

AIRBORNE RADIOIODINE DATA (pCi/m^3)

SECOND QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44
03/29/89 - 04/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/05/89 - 04/12/89	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/12/89 - 04/19/89	< LLD(b)	< LLD	< LLD	< LLD	< LLD	(c)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD(a)
04/19/89 - 04/26/89	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/26/89 - 05/03/89	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/03/89 - 05/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/10/89 - 05/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/17/89 - 05/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/24/89 - 05/31/89	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/31/89 - 06/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/07/89 - 06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/13/89 - 06/20/89	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD(a)	< LLD	< LLD	< LLD	< LLD(b)	< LLD	< LLD
06/20/89 - 06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

(a) Excessive flow meter reading.
(b) Low flow meter reading.
(c) Sample invalid due to equipment malfunction; sample not counted.

TABLE 8.9

AIRBORNE RADIOIODINE DATA (pCi/m^3)

THIRD QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44
06/27/89 - 07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/05/89 - 07/11/89	< LLD(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/11/89 - 07/19/89	< LLD(b)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/19/89 - 07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/25/89 - 08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)	< LLD
08/01/89 - 08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)	< LLD
08/08/89 - 08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/15/89 - 08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/22/89 - 08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/29/89 - 09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/05/89 - 09/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/12/89 - 09/19/89	< LLD	< LLD	(c)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/19/89 - 09/26/89	< LLD	< LLD	(c)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

(a) Excessive flow meter reading.
(b) Low flow meter reading.
(c) Sample invalid due to erroneous ETM; sample not counted.

TABLE 8.10

AIRBORNE RADIOIODINE DATA (pCi/m^3)

FOURTH QUARTER

Collection Period	Site 1	Site 4	Site 6	Site 7A	Site 14A	Site 15	Site 17A	Site 21	Site 29	Site 35	Site 40	Site 44
09/26/89 - 10/03/89	< LLD	< LLD	(a)	< LLD	< LLD	(a)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/03/89 - 10/10/89	< LLD	< LLD	(a)	< LLD	< LLD	< LLD	< LLD(b)	< LLD	< LLD	< LLD	< LLD(b)	< LLD
10/10/89 - 10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)	< LLD
10/17/89 - 10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)	< LLD
10/24/89 - 10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/31/89 - 11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/07/89 - 11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/14/89 - 11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/21/89 - 11/28/89	< LLD	(c)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/28/89 - 12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/05/89 - 12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/12/89 - 12/19/89	< LLD	< LLD	(d)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/19/89 - 12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

(a) Power failure at site; sample not counted.
(b) Low sample volume.
(c) Sample invalid due to erroneous ETM; sample not counted.
(d) Sample invalid due to equipment malfunction.

TABLE 8.11

BROADLEAF VEGETATION (pCi/kg) [Wet]

Collection Location	Date Collected	I-131	Cs-134	Cs-137
J.A. Woods - Commercial Operation (Site # 62) (a)				
Lettuce	03/21/89	< LLD	< LLD	< LLD
Lettuce	04/19/89	< LLD	< LLD	< LLD
DeShazo Residence				
Turnip Greens	02/14/89	< LLD	< LLD	< LLD
Beet Greens	02/14/89	< LLD	< LLD	< LLD
Lettuce	05/16/89 (b)	< 77	< 66	< LLD
Lettuce	06/12/89	< LLD	< LLD	< LLD
Bennett Residence				
Cauliflower Greens	03/21/89	< LLD	< LLD	< LLD
Bok Choy	03/21/89	< LLD	< LLD	< LLD
Cabbage	03/21/89	< LLD	< LLD	< LLD
Lettuce	04/21/89	< LLD	< LLD	< LLD
Cabbage	04/21/89	< LLD	< LLD	< LLD
Cauliflower Greens	04/21/89	< LLD	< LLD	< LLD
Lettuce	06/13/89	< LLD	< LLD	< LLD
Cabbage	06/13/89	< LLD	< LLD	< LLD
Lettuce	07/11/89	< LLD	< LLD	< LLD
Adams Residence (Site # 47)				
Beet Greens	04/20/89	< LLD	< LLD	< LLD
Turnip Greens	04/20/89	< LLD	< LLD	< LLD
Lettuce	04/20/89	< LLD	< LLD	< LLD
Lettuce	05/17/89	< LLD	< LLD	< LLD
Swiss Chard	05/17/89	< LLD	< LLD	< LLD
Turnip Greens	05/17/89 (b)	< 68	< LLD	< LLD
Lettuce	06/13/89	< LLD	< LLD	< LLD
Swiss Chard	06/13/89	< LLD	< LLD	< LLD

(a) Control site.
(b) Insufficient sample to meet LLD.

TABLE 8.12

DRINKING WATER BI-WEEKLY
I-131 (pCi/L)
(RADIOCHEMICAL SEPARATION)

Date Collected	McArthur Residence (Site # 46)	Scott Residence (Site # 49)	Shepard Residence (Site # 48)	Gavette Residence (Site # 55)
01/04/89				
01/10/89(a)	< LLD	< LLD	< LLD	(b)
01/17/89				
01/25/89	< LLD	< LLD	< LLD	(b)
02/01/89				
02/08/89	< LLD	< LLD	< LLD	(b)
02/15/89(c)	< LLD	< LLD	< LLD	(b)
02/22/89				
03/01/89	< LLD	< LLD	< LLD	< LLD
03/08/89				
03/15/89	< LLD	< LLD	< LLD	< LLD
03/22/89				
03/29/89	< LLD	< LLD	< LLD	< LLD
04/05/89				
04/12/89	< LLD	< LLD	< LLD	< LLD
04/19/89				
04/26/89	< LLD	< LLD	< LLD	< LLD
05/03/89				
05/10/89	< LLD	< LLD	< LLD	< LLD
05/17/89				
05/24/89	< LLD	< LLD	< LLD	< LLD
05/31/89 (d)	< LLD	< LLD	< LLD	< LLD
06/06/89 (e)				
06/13/89	< LLD	< LLD	< LLD	< LLD
06/20/89				
06/27/89	< LLD	< LLD	< LLD	< LLD

TABLE 8.12

DRINKING WATER BI-WEEKLY
I-131 (pCi/L)
(RADIOCHEMICAL SEPARATION)

Date Collected	McArthur Residence (Site # 46)	Scott Residence (Site # 49)	Shepard Residence (Site # 48)	Gavette Residence (Site # 55)
07/04/89				
07/11/89	< LLD	< LLD	< LLD	< LLD
07/18/89				
07/25/89	< LLD	< LLD	< LLD	< LLD
08/01/89				
08/08/89	< LLD	< LLD	< LLD	< LLD
08/15/89				
08/22/89	< LLD	< LLD	< LLD	< LLD
08/29/89	< LLD	< LLD	< LLD	< LLD
09/05/89				
09/12/89	< LLD	< LLD	< LLD	< LLD
09/19/89				
09/26/89	< LLD	< LLD	< LLD	< LLD
10/03/89				
10/10/89	< LLD	< LLD	< LLD	< LLD
10/17/89				
10/24/89	< LLD	< LLD	< LLD	< LLD
10/31/89 (d)	< LLD	< LLD	< LLD	< LLD
11/07/89				
11/14/89	< LLD	< LLD	< LLD	< LLD
11/21/89				
11/28/89	< LLD	< LLD	< LLD	< LLD
12/05/89				
12/12/89	< LLD	< LLD	< LLD	< LLD
12/19/89				
12/27/89	< LLD	< LLD	< LLD	< LLD

(a) Sample taken from composite water sampler.
Bi-weekly composite of weekly grab samples commenced 1-17-89.
(b) No sample. Water shut off at well by owner due to broken line.
(c) Single week grab.
(d) Five week collection month.
(e) Sampling day switched from Wednesday to Tuesday.

TABLE 8.13

DRINKING WATER (pCi/L)

Collection Location	Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Sr-90	Gross Beta
Gavette Residence (Site #55)	01/10/89(a)														
	02/15/89(a)														
	03/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4.4 ± 0.8
	04/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4.7 ± 0.8
	05/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4.1 ± 0.7
	05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.0 ± 0.8
	06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	3.6 ± 0.7
	07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	3.1 ± 0.6
	08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	3.7 ± 0.8
	09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	(c)
	10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	6.8 ± 0.2
	11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	4.6 ± 1.1
	12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	4.5 ± 1.0
Shepard Residence (Site #48)	01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.4 ± 1.1
	02/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	8.7 ± 1.0
	03/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.6 ± 0.9
	04/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	7.8 ± 1.0
	05/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	7.7 ± 1.0
	05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	9.1 ± 1.1
	06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	7.8 ± 1.0
	07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	7.3 ± 0.9
	08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	5.7 ± 1.0
	09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	(c)
	10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	11.6 ± 2.6
	11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	8.4 ± 2.3
	12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	10.0 ± 0.4

TABLE 8.13

DRINKING WATER (pCi/L)

Collection Location	Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Sr-90	Gross Beta
McArthur Residence (Site #46)	01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	02/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	6.1 ± 0.8
	03/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	2.8 ± 0.7
	04/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	3.0 ± 0.7
	05/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4.4 ± 0.8
	05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	6.3 ± 0.9
	06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	4.2 ± 0.7
	07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	3.0 ± 0.7
	08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	2.8 ± 0.7
	09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	2.7 ± 0.7
	10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	7.2 ± 1.3
	11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	7.7 ± 1.4
	12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	5.7 ± 1.1
Scott Residence (Site #49)	01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
	02/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4.9 ± 0.8
	03/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	0.52 ± .01	2.7 ± 0.7
	04/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	2.8 ± 0.7
	05/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.3 ± 0.8
	05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	9.6 ± 1.0
	06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	4.4 ± 0.7
	07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	3.9 ± 0.7
	08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	3.2 ± 0.7
	09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	< LLD
	10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	6.3 ± 1.1
	11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	3.2 ± 0.9
	12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	3.4 ± 0.9

(a) No sample. Water shut off at well by owner due to broken line.
(b) Starting 6/1/89 Sr-90 analysis not required on residence water samples.
(c) Samples were discarded prior to beta analysis.

TABLE 8.14

GROUNDWATER QUARTERLY (pCi/L)

Collection Location	Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Sr-90	H-3	Gross Beta	I-131 (Radiochemical)
Well 27ddc	02/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.2 ± 0.8	< LLD
(Site #57)	05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	2.1 ± 0.6	< 1.4 (a)
	08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	< LLD	(b)	(b)
	11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	< LLD	(b)	(b)
Well 34abb	02/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4.4 ± 0.8	< LLD
(Site #58)	05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	3.6 ± 0.7	< LLD
	08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	< LLD	(b)	(b)
	11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)	< LLD	(b)	(b)

(a) Result is due to a high background. Recount showed that the half-life was not that of I-131.
(b) As of 6/1/89 Gross Beta and Sr-90 analysis were not required for on-site wells.

TABLE 8.15

SURFACE WATER (pCi/L)
RESERVOIR (SITE #60)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta	Sr-89	Sr-90
01/04/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.4 ± 0.9	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	18.6 ± 1.7		
01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	10.1 ± 1.7	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	21.6 ± 1.8		
01/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	9.5 ± 1.4	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	17.8 ± 1.7		
01/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	19.3 ± 1.7		
01/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	9.2 ± 1.8	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	18.5 ± 1.8		
02/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	17.8 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	15.9 ± 1.6		
02/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	25.8 ± 2.3	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	19.3 ± 1.5		
02/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	23.9 ± 2.7	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	18.4 ± 1.7		
02/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	22.3 ± 2.4	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	18.4 ± 1.5		
03/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	9.1 ± 1.2	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	18.8 ± 1.5		
03/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	10.0 ± 1.8	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	17.9 ± 1.5		
03/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	21.6 ± 1.6		
03/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	19.3 ± 1.5	< LLD (a)	< LLD (a)
04/04/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
04/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
04/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
04/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
05/02/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
05/16/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
05/23/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	21.0 ± 1.6	< LLD (a)	< LLD (a)

TABLE 8.15

SURFACE WATER (pCi/L)
RESERVOIR (SITE #60)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta	Sr-89	Sr-90
07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	7.0 ± 1.4	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	9.3 ± 2.2	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
09/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	19.8 ± 2.5	< 3.3 (a)	0.74 ± 0.52 (a)
10/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	2.2 ± 0.8	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	17.3 ± 2.3	< LLD (a)	< LLD (a)

(a) Quarterly composite analysis.

TABLE 8.16

SURFACE WATER (pCi/L)
EVAPORATION POND #1 (SITE #59)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta	Sr-89	Sr-90
01/03/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	23.2 ± 2.4	< LLD	4.7 ± 1.9	< LLD	< LLD	< LLD	890 ± 130	268 ± 18		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1030 ± 130	266 ± 18		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	860 ± 130	301 ± 20		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	820 ± 130	242 ± 17		
01/10/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	6.8 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD	850 ± 150	285 ± 19		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1020 ± 150	306 ± 20		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	940 ± 150	282 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	840 ± 140	319 ± 21		
01/17/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	8.0 ± 1.6	< LLD	< LLD	< LLD	< LLD	< LLD	880 ± 150	227 ± 17		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	920 ± 150	252 ± 18		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1070 ± 150	280 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1140 ± 160	257 ± 18		
01/24/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.3 ± 1.7	< LLD	< LLD	< LLD	< LLD	< LLD	810 ± 140	289 ± 19		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	760 ± 140	302 ± 20		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	910 ± 150	290 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	900 ± 150	294 ± 19		
01/31/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1000 ± 150	289 ± 20		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	670 ± 140	252 ± 18		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	850 ± 150	223 ± 17		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	800 ± 150	235 ± 17		
02/07/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	6.4 ± 1.4	< LLD	< LLD	< LLD	< LLD	< LLD	890 ± 150	249 ± 18		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	680 ± 140	297 ± 20		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	640 ± 140	231 ± 17		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	750 ± 150	242 ± 18		
02/14/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	930 ± 150	261 ± 16		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1090 ± 150	277 ± 17		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1100 ± 150	340 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.7 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD	970 ± 150	317 ± 18		
02/21/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	11.9 ± 2.1	< LLD	< LLD	< LLD	< LLD	< LLD	680 ± 140	282 ± 19		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	820 ± 150	291 ± 19		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	8.1 ± 2.1	< LLD	< LLD	< LLD	< LLD	< LLD	1050 ± 150	279 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	880 ± 150	290 ± 19		

TABLE 8.16

SURFACE WATER (pCi/L)
EVAPORATION POND #1 (SITE #59)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta	Sr-89	Sr-90
02/28/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	460 ± 130	325 ± 19		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(a)	309 ± 18		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(a)	305 ± 18		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(a)	289 ± 17		
03/07/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	8.4 ± 1.8	< LLD	< LLD	< LLD	< LLD	< LLD	840 ± 140	342 ± 20		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	700 ± 140	330 ± 19		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	910 ± 140	326 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	640 ± 140	285 ± 17		
03/14/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.9 ± 1.4	< LLD	5.9 ± 1.4	< LLD	< LLD	< LLD	940 ± 140	267 ± 17		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	860 ± 140	308 ± 18		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1040 ± 140	265 ± 17		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	720 ± 140	293 ± 18		
03/21/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	790 ± 130	302 ± 18		
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	6.8 ± 2.0	< LLD	< LLD	< LLD	< LLD	< LLD	830 ± 130	330 ± 19		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	710 ± 130	330 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	800 ± 130	301 ± 18		
03/28/89N	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	910 ± 140	296 ± 18	< 3.5 (c)	0.65 ± 0.21 (c)
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1190 ± 140			
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	850 ± 140			
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	880 ± 140			
04/04/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1010 ± 140	(b)		
04/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1130 ± 140			
04/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	850 ± 130			
04/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	580 ± 130			
05/02/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	830 ± 140			
05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	850 ± 140			
05/16/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	850 ± 130			
05/23/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	710 ± 130			
05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	870 ± 130			
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	980 ± 140			
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	900 ± 130			
06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	880 ± 140			
06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	760 ± 170	342 ± 20	< LLD (c)	0.79 ± 0.26 (c)

TABLE 8.16

SURFACE WATER (pCi/L)
EVAPORATION POND #1 (SITE #59)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta	Sr-89	Sr-90
07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	780 ± 170			
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	810 ± 170			
07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	640 ± 170			
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	810 ± 170			
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	900 ± 170			
08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	730 ± 170			
08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	560 ± 170			
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	620 ± 170			
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	640 ± 170			
09/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	880 ± 170			
09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	584 ± 96	< LLD (c)	0.84 ± 0.31 (c)
10/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	830 ± 160			
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1020 ± 180			
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	660 ± 170			
11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	650 ± 190			
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	620 ± 190			
11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	690 ± 190			
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	610 ± 190			
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< 34 (d)	< LLD	< LLD			
12/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	838 ± 80	< 1.1 (c)	1.1 ± 0.52 (c)

(a) Sample composited from the four sample points.
(b) Beginning April 1, 1989 samples taken from N, S, E and W at Evaporation Ponds were composited for analysis.
(c) Quarterly composite analysis.
(d) Tech spec LLD not achieved because detector was out of service.

TABLE 8.17

SURFACE WATER (pCi/L)
EVAPORATION POND #2 (SITE #63)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta	Sr-89	Sr-90
01/03/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	790 ± 130	267 ± 18		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	810 ± 130	285 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	700 ± 130	296 ± 19		
01/10/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	780 ± 140	320 ± 21		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	650 ± 140	292 ± 20		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	900 ± 150	301 ± 20		
01/17/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	950 ± 150	260 ± 18		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1010 ± 150	243 ± 18		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	940 ± 150	274 ± 19		
01/24/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	700 ± 140	296 ± 20		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	720 ± 140	298 ± 20		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	600 ± 140	283 ± 19		
01/31/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	700 ± 140	264 ± 19		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	600 ± 140	279 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	750 ± 140	253 ± 18		
02/07/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	580 ± 140	328 ± 22		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	480 ± 140	269 ± 19		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	490 ± 140	280 ± 20		
02/14/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	970 ± 150	333 ± 19		
E	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1060 ± 150	351 ± 20		
W	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	950 ± 150	344 ± 20		
02/21/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	710 ± 140	294 ± 20		
E	(a)															
W	(a)															

TABLE 8.17

SURFACE WATER (pCi/L)
EVAPORATION POND #2 (SITE #63)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta	Sr-89	Sr-90
02/28/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	550 ± 130	386 ± 22		
E	(a)															
W	(a)															
03/07/89N	(a)															
S	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	910 ± 140	407 ± 23		
E	(a)															
W	(a)															
03/14/89N	(a)															
S	(a)															
E	(a)															
W	(a)															
03/21/89N	(a)															
S	(a)															
E	(a)															
W	(a)															
03/28/89N														349 ± 20	< LLD (c)	0.92 ± 0.26 (c)
S	(a)															
E	(a)															
W	(a)															
04/04/89	(a), (c)															
04/11/89	(a)															
04/18/89	(a)															
04/25/89	(a)															
05/02/89	(a)															
05/09/89	(a)															
05/16/89	(a)															
05/23/89	(a)															
05/30/89	(a)															
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	920 ± 140			
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	870 ± 130			
06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1170 ± 140			
06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	750 ± 170	384 ± 22	< LLD (c)	0.97 ± 0.29 (c)

TABLE 8.17

SURFACE WATER (pCi/L)
EVAPORATION POND #2 (SITE #63)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta	Sr-89	Sr-90
07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	780 ± 170			
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	670 ± 170			
07/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	530 ± 170			
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	620 ± 170			
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	630 ± 170			
08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	670 ± 170			
08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	540 ± 170			
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	750 ± 170			
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	770 ± 170			
09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
09/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	600 ± 170			
09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	630 ± 170			
09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	730 ± 170	741 ± 73	< 3.4 (c)	1.3 ± 0.9 (c)
10/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	630 ± 170			
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	610 ± 170			
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	680 ± 170			
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	680 ± 190			
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< 16 (d)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD			
12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	773 ± 48	< 1.1 (c)	< LLD (c)

(a) No sample taken, sample point dry.
(b) Beginning April 1, 1989 samples taken from N, S, E and W at Evaporation Ponds were composited for analysis.
(c) Quarter composite analysis.
(d) Tech spec LLD not achieved because detector was out of service.

TABLE 8.18

MILK (pCi/L)

Collection Location	Date Collected	I-131	Cs-134	Cs-137	Ba-140	La-140
Crosswinds Dairy	01/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	02/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	03/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	04/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	05/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	08/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	10/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	11/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	12/17/89	< LLD	< LLD	< LLD	< LLD	< LLD
Dickman Dairy	01/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	02/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	03/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	04/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	05/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	08/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	10/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	11/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	12/17/89	< LLD	< LLD	< LLD	< LLD	< LLD
John Kerr Dairy (Site #53)	01/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	02/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	03/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	04/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	05/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	08/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	10/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	11/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	12/17/89	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.18

MILK (pCi/L)

Collection Location	Date Collected	I-131	Cs-134	Cs-137	Ba-140	La-140
Butler Dairy	01/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
(Site #51)	02/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	03/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	04/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	05/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	08/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	10/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	11/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	12/17/89	< LLD	< LLD	< LLD	< LLD	< LLD
Hamstra #2 Dairy	01/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
(Site #56)	02/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	03/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	04/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	05/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	08/20/89	< LLD	< LLD	< LLD	< LLD	< LLD
	09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD
	10/15/89	< LLD	< LLD	< LLD	< LLD	< LLD
	11/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	12/17/89	< LLD	< LLD	< LLD	< LLD	< LLD
Kolb (Goat)	02/12/89	< LLD	< LLD	< LLD	< LLD	< LLD
	04/16/89	< LLD	< LLD	< LLD	< LLD	< LLD
	05/15/89	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.19

WRF INFLUENT WATER (pCi/L)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta
01/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	7.4 ± 1.5	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	14.5 ± 1.5
01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	17.1 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	11.6 ± 1.3
01/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	16.3 ± 2.2	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	13.2 ± 1.5
01/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.2 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	15.7 ± 1.5
01/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	17.0 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	14.6 ± 1.5
02/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	28.0 ± 2.6	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	10.9 ± 1.3
02/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	39.5 ± 3.4	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	15.7 ± 1.4
02/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	41.9 ± 3.7	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	12.7 ± 1.3
02/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	27.2 ± 2.9	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	14.3 ± 1.3
03/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	19.0 ± 2.6	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	16.2 ± 1.4
03/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	12.6 ± 1.6	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	12.4 ± 1.2
03/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	6.8 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	14.8 ± 1.3
03/28/89	(a)													
04/04/89	(a)													
04/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(b)
04/18/89	(a)													
04/25/89	(a)													
05/02/89	(a)													
05/09/89	(a)													
05/16/89	(a)													
05/23/89	(a)													
05/30/89	(a)													
06/06/89	(a)													(c)
06/13/89	(a)													(c)
06/20/89	(a)													(c)
06/27/89	(a)													(c)

TABLE 8.19

WRF INFLUENT WATER (pCi/L)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3	Gross Beta
07/05/89	(a)													(c)
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	16.6 ± 2.3	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	16.0 ± 2.3	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	55.5 ± 4.1	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	16.3 ± 2.3	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	10.5 ± 2.0	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
09/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
09/19/89	(a)													
09/26/89	(a)													
10/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	9.2 ± 2.0	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
10/24/89	(a)													
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	8.6 ± 1.4	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
11/28/89	(a)													
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	14.4 ± 1.8	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	15.0 ± 1.6	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)
12/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	15.5 ± 1.6	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	(c)

(a) No sample available.
(b) Insufficient volume of sample to perform beta analysis.
(c) As of 6/1/89, Gross Beta analysis not required for WRF Influent.

TABLE 8.20

COOLING TOWERS (pCi/L)
UNIT #1

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95
01/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	67.8 ± 4.0	< LLD	< LLD	< LLD	< LLD	< LLD
01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	44.5 ± 3.7	< LLD	< LLD	< LLD	< LLD	< LLD
01/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	44.5 ± 2.9	< LLD	< LLD	< LLD	< LLD	< LLD
01/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	40.3 ± 2.7	< LLD	< LLD	< LLD	< LLD	< LLD
01/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	40.9 ± 3.2	< LLD	< LLD	< LLD	< LLD	< LLD
02/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	56.1 ± 3.7	< LLD	< LLD	< LLD	< LLD	< LLD
02/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	132 ± 7	< LLD	< LLD	< LLD	< LLD	< LLD
02/21/89	< LLD	< LLD	< LLD	< LLD	2.8 ± 1.1	< LLD	115 ± 5	< LLD	< LLD	< LLD	< LLD	< LLD
02/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	124 ± 7	< LLD	< LLD	< LLD	< LLD	< LLD
03/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	91.1 ± 4.9	< LLD	< LLD	< LLD	< LLD	< LLD
03/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	49.8 ± 3.8	< LLD	< LLD	< LLD	< LLD	< LLD
03/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	18.4 ± 2.8	< LLD	< LLD	< LLD	< LLD	< LLD
03/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/04/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	5.9 ± 1.3	< LLD	< LLD	< LLD	< LLD	< LLD
04/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/02/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/16/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/23/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.20

COOLING TOWERS (pCi/L)
UNIT #1

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95
07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.21

COOLING TOWERS (pCi/L)
UNIT #2

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95
01/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	57.5 ± 3.8	< LLD	< LLD	< LLD	< LLD	< LLD
01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	56.6 ± 4.3	< LLD	< LLD	< LLD	< LLD	< LLD
01/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	56.4 ± 3.7	< LLD	< LLD	< LLD	< LLD	< LLD
01/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	41.4 ± 1.6	< LLD	< LLD	< LLD	< LLD	< LLD
01/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	49.6 ± 3.1	< LLD	< LLD	< LLD	< LLD	< LLD
02/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	58.2 ± 3.3	< LLD	< LLD	< LLD	< LLD	< LLD
02/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	142 ± 8	< LLD	< LLD	< LLD	< LLD	< LLD
02/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	72.2 ± 4.3	< LLD	< LLD	< LLD	< LLD	< LLD
02/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	38.8 ± 2.7	< LLD	< LLD	< LLD	< LLD	< LLD
03/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	78.7 ± 4.4	< LLD	< LLD	< LLD	< LLD	< LLD
03/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	74.1 ± 4.1	< LLD	< LLD	< LLD	< LLD	< LLD
03/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	42.4 ± 3.8	< LLD	< LLD	< LLD	< LLD	< LLD
03/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	18.7 ± 2.3	< LLD	< LLD	< LLD	< LLD	< LLD
04/04/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	10.6 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD
04/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/02/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/16/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/23/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.21

COOLING TOWERS (pCi/L)
UNIT #2

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95
07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	18.9 ± 1.8	< LLD	< LLD	< LLD	< LLD	< LLD
08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	20.0 ± 2.2	< LLD	< LLD	< LLD	< LLD	< LLD
08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	33.4 ± 2.8	< LLD	< LLD	< LLD	< LLD	< LLD
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	49.6 ± 3.2	< LLD	< LLD	< LLD	< LLD	< LLD
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	45.9 ± 3.6	< LLD	< LLD	< LLD	< LLD	< LLD
09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	32.0 ± 3.0	< LLD	< LLD	< LLD	< LLD	< LLD
09/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	17.0 ± 1.9	< LLD	< LLD	< LLD	< LLD	< LLD
09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	8.9 ± 1.8	< LLD	< LLD	< LLD	< LLD	< LLD
09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	11.6 ± 1.7	< LLD	< LLD	< LLD	< LLD	< LLD
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	9.3 ± 1.8	< LLD	< LLD	< LLD	< LLD	< LLD
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	25.8 ± 2.4	< LLD	< LLD	< LLD	< LLD	< LLD
12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	21.2 ± 2.6	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.22

COOLING TOWERS (pCi/L)
UNIT #3

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95
01/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	71.8 ± 3.9	< LLD	< LLD	< LLD	< LLD	< LLD
01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	41.8 ± 3.1	< LLD	< LLD	< LLD	< LLD	< LLD
01/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	22.2 ± 2.9	< LLD	< LLD	< LLD	< LLD	< LLD
01/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	20.7 ± 2.4	< LLD	< LLD	< LLD	< LLD	< LLD
01/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	45.2 ± 3.2	< LLD	< LLD	< LLD	< LLD	< LLD
02/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	54.7 ± 3.7	< LLD	< LLD	< LLD	< LLD	< LLD
02/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	143 ± 8	< LLD	< LLD	< LLD	< LLD	< LLD
02/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	164 ± 7	< LLD	< LLD	< LLD	< LLD	< LLD
02/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	117 ± 7	< LLD	< LLD	< LLD	< LLD	< LLD
03/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	55.2 ± 3.4	< LLD	< LLD	< LLD	< LLD	< LLD
03/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	32.2 ± 2.9	< LLD	< LLD	< LLD	< LLD	< LLD
03/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	10.4 ± 2.1	< LLD	< LLD	< LLD	< LLD	< LLD
03/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/04/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/02/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/16/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/23/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.22

COOLING TOWERS (pCi/L)
UNIT #3

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95
07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.23

RETENTION BASIN #1 (pCi/L)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3
01/03/89	< LLD	< LLD	< LLD	< LLD	12.3 ± 1.2	< LLD	11.5 ± 1.3	< LLD	< LLD	< LLD	< LLD	< LLD	23300 ± 500
01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	8.5 ± 2.1	< LLD	< LLD	< LLD	< LLD	< LLD	4360 ± 250
01/17/89	< LLD	< LLD	< LLD	11.0 ± 0.7	14.4 ± 1.1	< LLD	8.4 ± 1.0	< LLD	< LLD	< LLD	< LLD	< LLD	3920 ± 240
01/24/89	< LLD	< LLD	< LLD	9.5 ± 0.6	12.6 ± 1.0	< LLD	6.2 ± 0.9	< LLD	< LLD	< LLD	< LLD	< LLD	5640 ± 290
01/31/89	< LLD	< LLD	< LLD	< LLD	8.2 ± 1.1	< LLD	5.0 ± 0.9	< LLD	< LLD	< LLD	< LLD	< LLD	6150 ± 300
02/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	2430 ± 200
02/14/89	< LLD	< LLD	< LLD	< LLD	8.7 ± 1.6	< LLD	13.6 ± 2.9	< LLD	< LLD	< LLD	< LLD	< LLD	4630 ± 260
02/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4410 ± 250
02/28/89	< LLD	< LLD	< LLD	< LLD	4.5 ± 1.1	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	2890 ± 180
03/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	1520 ± 150
03/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	790 ± 140
03/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	580 ± 130
03/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/04/89	< LLD	< LLD	< LLD	< LLD	6.9 ± 1.4	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/02/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	420 ± 130
05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/16/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/23/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	460 ± 130
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/20/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	690 ± 130
06/27/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

TABLE 8.23

RETENTION BASIN #1 (pCi/L)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3
07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	3920 ± 230
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/08/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	920 ± 280
08/15/89	(a)												
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/07/89	(a)												
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/21/89	(a)												
11/28/89	(a)												
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/12/89	(a)												
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/26/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD

(a) No sample available.

TABLE 8.24

RETENTION BASIN #2 (pCi/L)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3
01/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4000 ± 180
01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	3180 ± 220
01/17/89	< LLD	< LLD	< LLD	< LLD	7.8 ± 1.0	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	2850 ± 210
01/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4.5 ± 0.8	< LLD	< LLD	< LLD	< LLD	< LLD	4690 ± 260
01/31/89	< LLD	< LLD	< LLD	6.1 ± 0.7	7.1 ± 2.1	< LLD	5.3 ± 1.1	< LLD	< LLD	< LLD	< LLD	< LLD	3810 ± 240
02/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	4000 ± 240
02/14/89	< LLD	< LLD	< LLD	14.0 ± 1.5	17.1 ± 2.2	< LLD	12.5 ± 3.5	< LLD	8.7 ± 2.0	< LLD	< LLD	< LLD	3930 ± 240
02/21/89	< LLD	< LLD	< LLD	< LLD	11.1 ± 1.9	< LLD	59.0 ± 4.4	< LLD	< LLD	< LLD	< LLD	< LLD	3460 ± 220 (b)
02/28/89	< LLD	< LLD	< LLD	15.7 ± 1.2	22.1 ± 2.2	< LLD	16.1 ± 2.8	< LLD	< LLD	< LLD	< LLD	< LLD	5640 ± 230
03/07/89	< LLD	< LLD	< LLD	7.8 ± 0.9	11.9 ± 1.4	< LLD	19.0 ± 2.6	< LLD	< LLD	< LLD	< LLD	< LLD	3110 ± 180
03/14/89	(a)												
03/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	930 ± 140
03/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	410 ± 130
04/04/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/11/89	< LLD	< LLD	< LLD	17.2 ± 1.4	15.7 ± 2.1	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
04/25/89	(a)												
05/02/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	530 ± 130
05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/16/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
05/23/89	(a)												
05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
06/20/89	(a)												
06/27/89	(a)												

TABLE 8.24

RETENTION BASIN #2 (pCi/L)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3
07/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	810 ± 170
07/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
07/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/01/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/08/89	(a)												
08/15/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	650 ± 170
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< 17 (c)	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
08/29/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/05/89	(a)												
09/12/89	(a)												
09/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
09/26/89	< LLD	< LLD	< LLD	< LLD	4.6 ± 1.0	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	2420 ± 200
10/03/89	(a)												
10/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< 36	< LLD	< LLD
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
12/19/89	(a)												
12/27/89	(a)												

(a) No sample available.
(b) Cr-51 also detected in this sample, 29.2 ± 12.8 pCi/L.
(c) Delay between sample collection and counting.

TABLE 8.25

SEDIMENTATION BASIN #2 (J-HOOK POND) (pCi/L)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3
01/03/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
01/10/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
01/17/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
01/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
01/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
02/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
02/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	530 ± 130 (a)
02/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
02/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
03/07/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
03/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
03/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
03/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
04/04/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
04/11/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
04/18/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
04/25/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
05/02/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
05/09/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD (a)
05/16/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
05/23/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
05/30/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
06/06/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
06/13/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
06/20/89	(b)												
06/27/89	(b)												

TABLE 8.25

SEDIMENTATION BASIN #2 (J-HOOK POND) (pCi/L)

Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Zn-65	Zr-95	H-3
07/05/89	(b)												
07/11/89	(b)												
07/19/89	(b)												
07/25/89	(b)												
08/01/89	(b), (c)												
08/08/89	(b)												
08/15/89	(b)												
08/22/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
08/29/89	(b)												
09/05/89	(b)												
09/12/89	(b)												
09/19/89	(b)												
09/26/89	(b)												
10/03/89	(b)												
10/10/89	(b)												
10/17/89	(b)												
10/24/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
10/31/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
11/07/89	< 69 (d)	< LLD	< LLD	< LLD	< LLD	< LLD	< 25 (d)	< 23 (d)	< LLD	< 16 (d)	< 34	< LLD	
11/14/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
11/21/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
11/28/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
12/05/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
12/12/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	
12/19/89	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD (a)
12/27/89	(b)												

(a) H-3 analysis performed quarterly.
(b) No sample taken. Sample point dry.
(c) No sample available for third quarter H-3 analysis.
(d) > Tech Spec LLD due to decay correction.

Table 8.26

SLUDGE (pCi/kg)

Collection Location	Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Sb-124	Sb-125	Zn-65	Zr-95
Sedimentation	01/24/89	< 57	< 18	< 20	< 16	< 21	< 45	< 17	< 21	< 20	< 21	< 16	< 44	< 51	< 32
Basin #2	02/21/89	(a)													
(J-Hook Pond)	03/21/89	< 70	< 19	< 20	< 14	< 20	< 42	< 27	< 23	< 16	< 20	< 13	< 42	< 42	< 35
	04/18/89	< 88	< 21	< 24	< 17	17.1 ± 4.2	< 47	< 28	< 29	< 18	< 24	< 17	< 50	< 51	< 32
	05/23/89	< 29	< 8	< 9	< 8	9.2 ± 1.7	< 17	< 11	< 11	< 8	< 8	< 8	< 22	< 18	< 16
	06/06/89	< 59	< 17	< 19	< 14	17.1 ± 3.5	< 35	< 16	< 21	< 16	< 20	< 14	< 44	< 42	< 29
	09/05/89(b,c)	< 62	< 16	< 20	< 16	47.1 ± 4.4	< 36	< 19	< 24	13.2 ± 3.5	< 18	< 16	< 46	< 43	< 32
	12/05/89	< 91	< 19	< 22	< 16	19.8 ± 3.8	< 55	< 30	< 30	< 20	< 22	< 18	< 48	< 56	< 40
Retention	01/24/89	< 91	20.1 ± 4.8	1990 ± 30	325 ± 8	725 ± 23	< 53	< 26	< 21	746 ± 24	< 28	< 29	199 ± 12	< 72	< 46
Basin #1	02/21/89	< 120	105 ± 7	2700 ± 40	398 ± 9	746 ± 22	< 54	61.7 ± 8.4	< 25	770 ± 23	44.0 ± 5.8	< 31	198 ± 10	< 68	< 47
	03/21/89(d)	< 127	86.5 ± 6.9	2630 ± 30	303 ± 8	560 ± 20	< 57	< 49	< 25	730 ± 20	30.7 ± 6.3	< 35	195 ± 11	< 75	< 52
	04/18/89	< 105	37.4 ± 1.8	1520 ± 20	407 ± 9	678 ± 21	< 51	< 40	< 21	490 ± 17	< 26	< 26	138 ± 10	< 56	< 44
	05/23/89	< 126	332 ± 13	1540 ± 20	365 ± 9	593 ± 19	< 58	< 40	< 25	406 ± 14	35.7 ± 5.6	< 35	< 70	< 62	< 46
	06/06/89	< 91	39.4 ± 5.6	3000 ± 10	95.4 ± 17.9	205 ± 9	< 47	< 23	< 16	1000 ± 30	< 30	< 31	326 ± 13	< 70	< 50
	09/05/89(c,e)	< 107	219 ± 12	1740 ± 40	299 ± 8	527 ± 19	< 66	< 30	< 23	316 ± 15	< 35	< 37	< 80	< 81	< 54
	12/05/89	< 140	< 34	1190 ± 30	590 ± 17	934 ± 21	< 67	< 43	< 28	236 ± 11	< 33	< 41	< 86	< 77	< 54
Retention	01/24/89	< 115	68.2 ± 7.8	1990 ± 40	411 ± 11	719 ± 25	< 70	27.2 ± 6.4	< 23	740 ± 28	46.4 ± 7.2	< 38	< 103	< 88	< 63
Basin #2	02/21/89	< 139	27.5 ± 6.5	1700 ± 30	292 ± 8	616 ± 21	< 66	< 48	< 32	705 ± 25	< 32	< 31	187 ± 11	< 77	< 53
	03/21/89	(a)													
	04/18/89	< 160	< 36	1880 ± 40	327 ± 9	645 ± 23	< 73	< 50	< 30	462 ± 19	< 33	< 34	< 90	< 79	< 61
	05/23/89	< 72	< 24	2930 ± 50	132 ± 4	321 ± 11	< 29	< 20	< 12	1670 ± 50	< 21	< 22	637 ± 14	< 58	< 37
	06/06/89	< 87	24.4 ± 5.0	1100 ± 20	522 ± 11	810 ± 27	< 60	< 25	< 23	298 ± 13	< 26	< 29	< 75	< 69	< 43
	09/05/89(c,f)	< 157	85.0 ± 10.4	5060 ± 100	301 ± 10	725 ± 26	< 94	< 47	< 28	977 ± 36	< 51	< 45	534 ± 21	< 137	< 71
	12/05/89	< 150	230 ± 11	1340 ± 30	633 ± 18	1040 ± 20	< 53	< 49	< 26	128 ± 8	< 34	302 ± 9	< 89	< 68	< 54
Waste	01/24/89	< 41	< 9	< 12	< 10	< 12	< 17	311 ± 14	< 15	< 9	< 12	< 96	< 29	< 19	< 19
Centrifuge	02/21/89	< 59	< 11	< 11	< 10	< 12	< 24	785 ± 31	< 20	< 12	< 13	< 11	< 30	< 26	< 21
(SL-G03)	03/21/89	< 41	< 10	< 12	< 10	< 12	< 20	390 ± 16	< 16	< 11	< 12	< 11	< 28	< 25	< 19
(Tertiary)	04/18/89	< 47	< 10	< 10	< 9	< 10	< 22	< 21	< 16	< 9	< 12	< 10	< 29	< 18	< 17
	05/23/89	(a)													
	06/06/89	(a)													
	09/05/89(c)	< 33	< 9	< 9	< 8	< 9	< 18	481 ± 17	< 15	< 11	< 10	< 9	< 26	< 18	< 17
	12/05/89	(a)													

Table 8.26

SLUDGE (pCi/kg)

Collection Location	Date Collected	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	La-140	Mn-54	Nb-95	Sb-124	Sb-125	Zn-65	Zr-95
STP	01/24/89	< 40	< 10	< 11	< 8	< 10	< 22	< 13	< 13	< 9	< 11	< 89	< 30	< 22	< 18
Digestor C	02/21/89	< 65	< 13	< 12	< 12	< 12	< 29	< 25	< 20	< 12	< 14	< 11	< 32	< 26	< 20
	03/21/89	< 42	< 10	< 12	< 10	< 11	< 20	< 13	< 13	< 10	< 10	< 9	< 27	< 21	< 19
	04/18/89	< 43	< 8	< 10	< 9	< 11	< 22	< 16	< 15	< 11	< 11	< 9	< 28	< 21	< 19
	05/23/89	< 23	< 6	< 6	< 5	< 6	< 11	< 8	< 7	< 6	< 6	< 5	< 14	< 12	< 10
	06/06/89	< 40	< 8	< 9	< 8	< 9	< 17	< 12	< 14	< 8	< 8	< 8	< 22	< 18	< 15
	07/05/89	< 31	< 8	< 9	< 7	< 9	< 17	< 12	< 11	< 8	< 8	< 7	< 22	< 17	< 14
	08/01/89	< 38	< 9	< 9	< 9	< 9	< 16	< 14	< 14	< 9	< 9	< 7	< 22	< 17	< 15
	09/05/89	< 42	< 12	< 14	< 11	< 13	< 24	< 15	< 18	< 11	< 10	< 10	< 33	< 25	< 20
	10/03/89	< 45	< 12	< 12	< 10	< 12	< 20	< 15	< 15	< 11	< 11	< 9	< 30	< 21	< 18
	11/07/89	< 82	< 16	< 13	< 13	< 16	< 30	< 31	< 26	< 13	< 17	< 14	< 37	< 30	< 26
	12/05/89(g)	< 54	< 10	< 11	< 9	< 10	< 22	< 21	< 15	< 10	< 11	< 10	< 30	< 23	< 19
Evap Pond #2	04/26/89	< 52	< 13	77.0 ± 3.2	< 13	94.4 ± 4.4	< 33	< 17	< 12	76.7 ± 4.3	< 15	< 12	< 37	< 35	< 26
	05/02/89	< 26	< 7	< 8	< 7	5.4 ± 1.4	< 13	< 8	< 8	5.9 ± 1.3	< 7	< 6	< 20	< 14	< 12

(a) No sample available.
(b) Be-7 detected (143 ± 27).
(c) Sample frequency changed to quarterly.
(d) Ce-144 detected (220 ± 30).
(e) Be-7 detected (318 ± 46).
(f) Be-7 detected (290 ± 60).
(g) Sample received in uncapped container; covered with tape instead of a suitable lid.

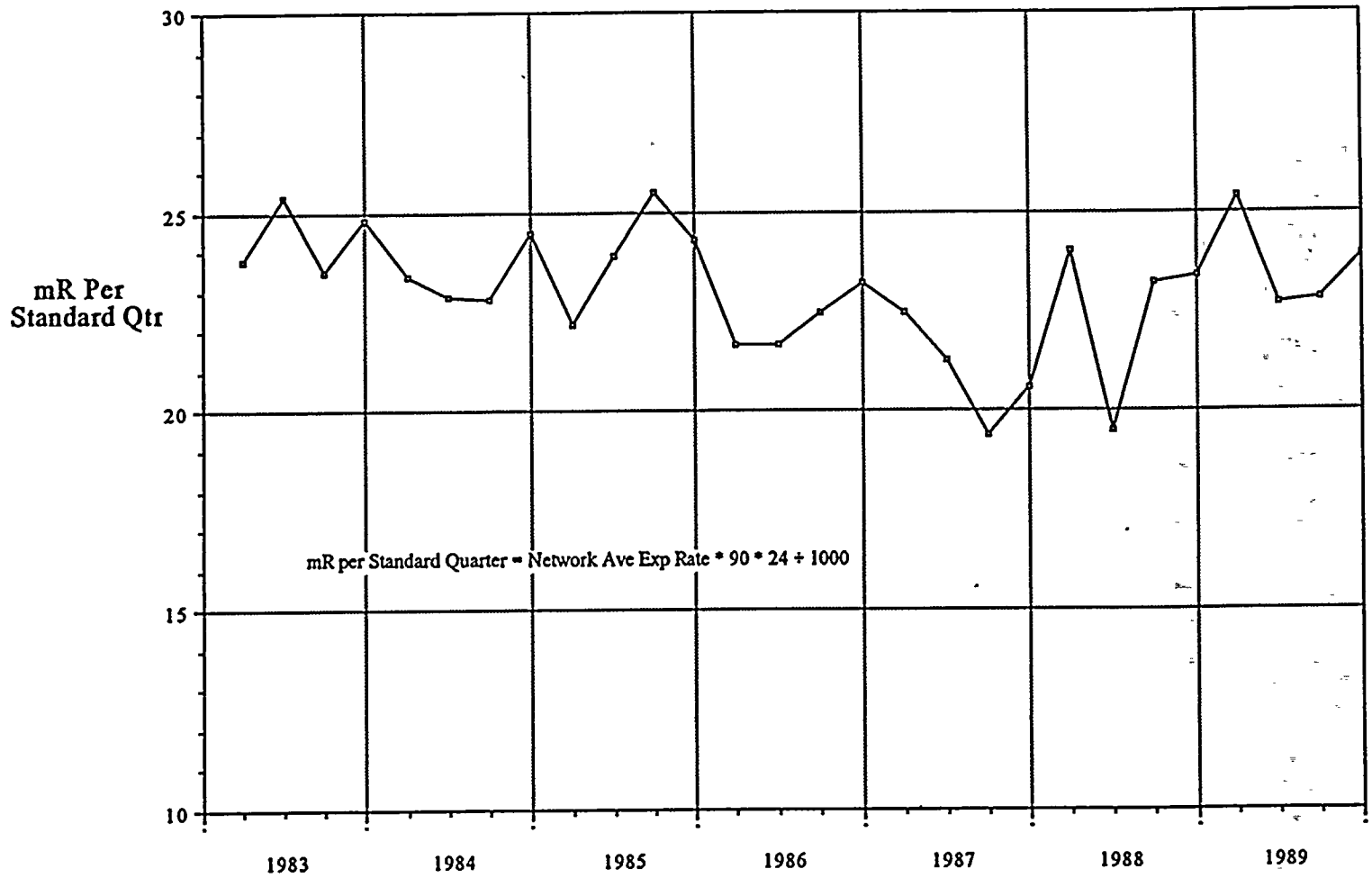
9.0 Thermoluminescent Dosimetry Results and Data Interpretation

Thermoluminescent Dosimeters were placed in fifty locations ranging from one to forty-five miles from the Palo Verde Nuclear Generating Station. Beginning in 1984, the Panasonic Model 812 Dosimeter replaced all other TLD's in use. The 812 is a multi-element dosimeter combining two elements of Lithium Borate and two elements of Calcium Sulfate.

TLD locations are shown in Figures 2-1 and 2-2. TLD locations are described in Table 9-1. TLD results for 1989 are presented in Table 9-2. TLD results for 1983 through 1989 are presented in Figure 9-1 (excluding TLD #45).

TLD results for 1989 are consistent with preoperational data.

Figure 9.1
PVNGS Network TLD Exposure Rate



1983-1989 Quarterly Results

TABLE 9.1

THERMOLUMINESCENT DOSIMETRY SITE LOCATIONS

TLD NUMBER	TLD LOCATION	LOCATION DESCRIPTION
1	E30	APS Western Division Office, Goodyear
2	ENE24	Scott-Libby School, Perryville Rd. and Thomas Rd.
3	E21	Liberty School, 19800 W. Hwy. 85
4	E16	APS Buckeye Office, 615 N. 4th St., Buckeye
5	ESE11	Palo Verde School, Palo Verde Rd. (291st Ave) and Old Hwy. 80
6	SSE31	APS Gila Bend Substation, service road west of town off I-8
7	SE7	Old U.S. 80 and Arlington School Rd.
8	SSE5	Southern Pacific Pipeline Rd., 1.4 miles SW of 355th Ave.
9	S5	Southern Pacific Pipeline Rd., 2.5 miles SW of 355th Ave.
10	SE5	SE corner of 355th Ave and Elliot Rd.
11	ESE5	NW corner of 339th Ave. and Dobbins Rd.
12	E5	NE corner of 339th Ave. and Buckeye-Salome Rd.
13	N1	N site boundary
14	NNE2	NNE site boundary
15	NE2	NE site boundary, on WRF Access Rd.
16	ENE2	ENE site boundary
17	E2	E site boundary
18	ESE2	ESE site boundary
19	SE2	SE site boundary
20	SSE2	SSE site boundary
21	S3	S site boundary
22	SSW3	SSW site boundary
23	W5	2 miles north of Elliot Rd., 3 miles west of Wintersburg Rd.
24	SW4	Elliot Rd., 2 miles west of Wintersburg Rd. at Desert Farms
25	WSW5	Elliot Rd., 3 miles west of Wintersburg Rd. at cattle guard
26	SSW5	Shepard farm, 13202 S. 383rd Ave., 0.5 miles west of house

TABLE 9.1

THERMOLUMINESCENT DOSIMETRY SITE LOCATIONS

TLD NUMBER	TLD LOCATION	LOCATION DESCRIPTION
27	SW1	SW site boundary
28	WSW1	WSW site boundary
29	W1	W site boundary
30	WNW1	WNW site boundary
31	NW1	NW site boundary
32	NNW1	NNW site boundary
33	NW4	Buckeye Rd., 0.5 miles west of 395th Ave.
34	NNW5	SE corner of 395th Ave. and Van Buren St.
35	NNW9	Palo Verde Inn Fire Station, 40901 W. Osborn Rd., Tonopah
36	N5	SW corner of Wintersburg Rd. and Van Buren St.
37	NNE5	SE corner od 363rd Ave. and Van Buren St.
38	NE5	SW corner of 355th Ave. and Buckeye Rd.
39	ENE5	343rd Ave., 0.5 miles south of Lower Buckeye Rd.
40	N3	Wintersburg, Transmission Rd. at telephone pole
41	WNW20	Harquahala Valley School, Van Buren St., 1 mile west of Steve Martori Dr.
42	N8	Ruth Fisher School, Indian School Rd. and Wintersburg Rd.
43	N45	Vulture Peak School, 1 mile south of U.S. 60, Wickenburg
44	ENE35	APS El Mirage Office, 12313 W. Grand Ave.
45	E16	APS Buckeye Office, 615 N. 4th St., REMP trailer (lead pig)
46	ENE30	Litchfield Park School, 13825 W. Indian School Rd.
47	E35	Littleton School, 115th Ave. and Hwy. 85, Cashion
48	E24	Jackrabbit Trail south of I-10, north of Filmore St.
49	ENE11	Palo Verde Rd., 0.25 miles south of I-10
50	WNW5	Olinski Rd., 2 miles south of Buckeye-Salome Rd.

Table 9.2

1989 Environmental TLD Results

Station	Qtr 1	2	3	4	Average mR/Std Qtr
1	21.8	20.1	19.0	20.3	20.3
2	23.3	20.5	19.4	21.4	21.2
3	23.3	21.0	21.6	22.2	22.0
4	24.4	21.0	21.0	22.7	22.2
5	20.1	16.6	16.6	17.3	17.7
6	27.0	25.5	24.0	26.6	25.8
7	27.4	24.0	23.5	*	25.0
8	23.8	21.0	21.6	22.2	22.1
9	30.5	*	27.9	29.6	29.3
10	24.4	21.0	22.0	23.3	22.7
11	25.3	22.9	23.5	24.2	24.0
12	25.3	22.5	22.5	22.7	23.2
13	25.9	22.9	23.5	23.8	24.0
14	26.4	23.5	22.5	25.3	24.4
15	24.4	22.0	21.6	22.7	22.7
16	22.2	20.5	20.5	21.4	21.2
17	25.3	22.9	24.0	24.2	24.1
18	23.8	22.5	21.6	22.2	22.5
19	26.4	24.0	23.5	25.3	24.8
20	25.3	22.0	22.0	23.3	23.2
21	26.4	23.5	22.9	25.3	24.5
22	26.4	25.1	24.4	26.6	25.6
23	24.4	20.1	21.6	22.7	22.2
24	22.7	20.1	21.0	20.7	21.1
25	23.8	21.6	22.0	22.7	22.5
26	27.0	26.4	25.9	28.5	26.9
27	28.5	25.1	25.5	26.6	26.4
28	26.4	24.0	25.1	26.1	25.4
29	26.4	22.9	24.0	24.6	24.5
30	28.5	23.5	24.4	25.7	25.5
31	23.8	21.6	22.0	22.2	22.4
32	25.3	23.5	22.9	24.6	24.1
33	28.5	25.1	24.4	26.6	26.1
34	28.9	25.5	25.9	27.6	27.0
35	30.5	27.9	28.9	30.0	29.3
36	25.3	22.5	23.5	24.2	23.9
37	24.8	21.6	22.0	22.7	22.8
38	28.5	25.9	25.5	27.2	26.8
39	25.3	22.0	21.6	24.2	23.3
40	27.4	22.0	22.9	24.2	24.1
41	27.9	25.1	25.5	26.6	26.2
42	26.4	22.9	24.0	24.2	24.4
43	27.0	22.9	23.5	23.8	24.3
44	22.2	19.0	20.1	20.3	20.4
45	8.2	5.2	6.7	5.2	6.3
46	22.7	21.6	21.0	20.7	21.5
47	27.0	24.0	24.0	25.7	25.2
48	23.8	21.6	21.6	22.7	22.4
49	23.8	21.6	21.6	21.8	22.2
50	20.1	17.1	18.1	18.4	18.4
Average	25.1	22.2	22.5	23.5	23.4

* Missing TLD

10.0 Land Use Census

10.1 Introduction

In accordance with PVNGS Technical Specifications 3.12.2, the annual Land Use Census within a five mile radius of mid-line PVNGS Unit 2 containment was performed during October 1989.

Observations were made in each of the 16 meteorological sectors of the nearest milking animals (cows and goats), nearest residence, and the nearest garden of greater than 500 square feet producing broad leaf vegetation. This census was completed by driving the roads within a five mile radius of PVNGS noting the location of the above mentioned items.

The results of the Land Use Census are presented in Table 10.1 and discussed below. In the table, the radial direction and mileage from Unit 2 containment are presented for each location. The mileage was estimated from map position from each location. Improved estimates in distance and direction have resulted in slightly different distances as compared to the 1988 AREOR. Unless otherwise stated, the actual location is the same as stated in the 1988 AREOR.

10.2 Census Results

10.2.1 Nearest Resident

There were five changes in the nearest resident status noted in the 1989 census. These changes were in the E, SE, SSE, WSW and NW sectors.

10.2.2 Milking Animals

Milk goats were located in the East Northeast sector within the five mile radius of Unit 2 during the 1988 and again during the 1989 Land Use Census. This location is not a commercial milking operation and was not added to the REMP due to unavailability of regular samples.

10.2.3 Vegetable Gardens

There was one change in the location of gardens greater than 500 square feet producing broad leaf vegetation found during the 1989 Land Use Census. This change was in the NE sector.

10.3 Conclusion

No changes were made to the REMP as a result of the 1989 Land Use Census.

TABLE 10.1

LAND USE CENSUS (in miles)

Sector	Nearest Resident	Nearest Garden	Nearest Cow	Milk Animal Goat	Changed Location
N	1.77	1.83	None	None	
NNE	1.66	None	None	None	
NE	2.10	None	None	None	Garden
ENE	2.80	2.85	None	4.75	
E	2.89	None	None	None	Resident
ESE	3.70	None	None	None	
SE	4.31	None	None	None	Resident
SSE	3.52	None	None	None	Resident
S	4.28	None	None	None	
SSW	None	None	None	None	
SW	2.65	None	None	None	
WSW	None	None	None	None	Resident
W	None	None	None	None	
WNW	None	None	None	None	
NW	4.08	None	None	None	Resident
NNW	2.51	None	None	None	

11.0 Summary and Conclusions

The conclusions are based on a review of the radioassay results and background gamma radiation measurements for the 1989 calendar year. The radioassay conclusions are based on observations of fission product radionuclides and do not include observations of naturally occurring radionuclides such as the uranium or thorium series, C-14, or K-40.

A summary of all sample results for 1989 is presented in Table 11.1. With the exception of on-site surface water and associated sludge, all sample assays presented in the annual report reveal no detectable man-made radioactivity which can be attributed to PVNGS. As reported in 1988 [10], I-131 concentrations in the Reservoir and Evaporation Ponds are the result of off-site sources and appear in the effluent sewage from Phoenix.

Natural background radiation is consistent with measurements reported in previous pre-operational and operational radiological environmental monitoring program annual reports. [1-10]

TABLE 11.1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM 1989 ANNUAL SUMMARY

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	All Indicator Locations Mean (a) Range	Location with Highest Annual Mean Name Distance Direction	Mean (a) Range	Control Locations Mean (a) Range	Number of Nonroutine Reported Measurements
Air Particulates pCi/m^3	Gross Beta (609)	0.026(609/609) 0.012-0.052	7a 8 miles 135°	0.027(52/52) 0.015-0.052	0.025(45/45) 0.015-0.044	0
	Gamma Spec (144) Composite	< LLD		< LLD	< LLD	0
	Iodine-131 (619)	< LLD		< LLD	< LLD	0
Broadleaf Vegetation (pCi/Kg - wet)	Iodine-131 (23)	< LLD		< LLD	< LLD	0
	Gamma Spec (23)	< LLD		< LLD	< LLD	0
Drinking Water pCi/L	Gross Beta (48)	6.9(45/48) 2.7-11.6	Shepard Residence 5 miles 202.5°	7.9(12/13) 5.4-11.6	N/A	0
	Strontium-90 (22)	0.5(1/22)	Scott Residence 4 miles 112.5°	0.5(1/13)	N/A	0
	Gamma Spec (50)	< LLD		< LLD	N/A	0
	Iodine-131 (28)	< LLD		< LLD	N/A	0
	Tritium (50)	< LLD		< LLD	N/A	0
Groundwater pCi/L	Gross Beta (4)	3.8(4/4) 2.1-5.2	27ddc Onsite	3.7(2/4) 2.1-5.2	N/A	0
	Strontium-90 (4)	< LLD		< LLD	N/A	0
	Tritium (8)	< LLD		< LLD	N/A	0
	Gamma Spec (8)	< LLD		< LLD	N/A	0
	Iodine-131 (4)	< LLD		< LLD	N/A	0

TABLE 11.1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM 1989 ANNUAL SUMMARY

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	All Indicator Locations Mean (a) Range	Location with Highest Annual Mean Name Distance Direction	Mean (a) Range	Control Locations Mean (a) Range	Number of Nonroutine Reported Measurements
Surface Water pCi/L	Gross Beta (96)	266(96/96) 15.9-838	Evap Pond #2 Onsite	338(28/28) 243-838	N/A	0
	Tritium (96)	802(123/194) 460-1190	Evap Pond #1 Onsite	837(79/88) 460-1190	N/A	0
	Strontium-90 (12)	0.91(8/12) 0.52-1.3	Evap Pond #2 Onsite	1.1(3/4) 0.92-1.3	N/A	0
	Gamma Spec					
	Iodine-131 (209)	10.8(24/145) 2.2-25.8	Reservoir Onsite	12.4(13/52) 2.2-25.8	N/A	0
	Mn-54 (145)	5.3(2/145) 4.7-5.9	Evap Pond #1 Onsite	5.3(2/91) 4.7-5.9	N/A	0
	(Ba-140, Co-58, Co-60, Cs-134, Cs-137, Fe-59, La-140, Mn-54, Nb-95, Zr-95)	< LLD		< LLD	N/A	0
Milk	Gamma Spec (Cs-134, Cs-137, Ba-140, La-140, I-131)	< LLD		< LLD	N/A	0
Sludge	See Table 8-26					

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

12.0 References

1. 1981 Annual Report, Palo Verde Nuclear Generating Station's Pre-Operational Radiological Monitoring Program.
2. 1982 Annual Report, Palo Verde Nuclear Generating Station's Pre-Operational Radiological Monitoring Program.
3. 1983 Annual Report, Palo Verde Nuclear Generating Station's Pre-Operational Radiological Monitoring Program.
4. 1984 Annual Report, Palo Verde Nuclear Generating Station's Pre-Operational Radiological Monitoring Program.
5. Palo Verde Nuclear Generating Station's Pre-Operational Radiological Monitoring Program, Summary Report 1979-1985.
6. 1985 Annual Report, Arizona Nuclear Power Project Operational Radiological Environmental Monitoring Program.
7. 1986 Annual Report, Arizona Nuclear Power Project Operational Radiological Environmental Monitoring Program.
8. 1987 Annual Report, Arizona Nuclear Power Project Operational Radiological Environmental Monitoring Program.
9. Operational Radiological Environmental Monitoring Program Report for 1987; Arizona State University, Radiation Measurements Facility.
10. Annual Radiological Environmental Operating Report for 1988; Arizona State University, Radiation Measurements Facility.
11. Palo Verde Nuclear Generating Station Technical Specifications.

13.0 Addendum

13.1 In the 1988 AREOR, Table 4.3 (page 16) reported the Cerium-144 detector efficiency as 0.0031, when in fact it was 0.031.

13.2 In the 1988 AREOR, Tables 8.6 and 8.7 (pages 37 and 38) reported a Lower Limit of Detection of 0.07 pCi/m^3. The correct value is 0.007 pCi/m^3.

13.3 In the 1988 AREOR, Table 10.1 (page 85) listed a milk goat at 4.75 miles in the NE sector. This should have read the ENE sector. The NE sector goat should be "None".

13.4 Due to the extent of revisions, the revised 1987 AREOR will be submitted under separate cover.

PALO VERDE NUCLEAR GENERATING STATION

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

1990

CONTENTS

TABLES

TABLES

FIGURES

Abstract

The radiological environmental monitoring program is an ongoing study conducted by the Radiation Measurements Facility at Arizona State University for the Palo Verde Nuclear Generating Station.

During 1990, samples were collected by the Palo Verde Nuclear Generating Station and Radiation Measurements Facility personnel. The following categories of samples were collected:

- broad leaf vegetation,
- fresh milk,
- groundwater,
- drinking water,
- surface water,
- airborne particulate and radioiodine,
- and sludge.

Thermoluminescent dosimeters were used to measure environmental gamma radiation.

All assays were performed by the Radiation Measurements Facility. Thermoluminescent dosimeters were issued and processed by the Palo Verde Nuclear Generating Station. Sludge and Water Reclamation Facility influent water samples were collected by personnel from the Palo Verde Nuclear Generating Station.

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

1.0 Introduction

The Radiological Environmental Monitoring Program (REMP) was established for the Palo Verde Nuclear Generating Station (PVNGS) by the Arizona Nuclear Power Project (ANPP) in 1979. The program complies with federal requirements set forth by the U.S. Nuclear Regulatory Commission (U.S. NRC) to provide a complete environmental monitoring program for nuclear reactors. This report contains the measurements and findings for 1990. All bracketed numbers refer to references contained in section 12.

The objectives of the radiological environmental monitoring program are as follows: 1) to determine baseline radiation levels in the environs prior to plant operation and to compare the findings with measurements obtained during reactor operations; 2) to monitor potential critical pathways of radioeffluent to man; and 3) to determine radiological impacts on the environment caused by the operation of PVNGS.

Results from the REMP help to evaluate sources of elevated levels of radiation in the environment, e.g., atmospheric nuclear detonations or abnormal plant releases.

Results for the PVNGS pre-operational environmental monitoring program are presented in references 1-5.

The initial criticality of Unit One occurred May 25, 1985. Initial criticality for Units Two and Three were April 18, 1986 and October 25, 1987, respectively. PVNGS operational findings are presented in references 6-8. The Radiation Measurements Facility (RMF) radiological assessments for 1988 and 1989 are found in references 9 and 10. This report contains the measurements and findings for 1990.

2.0 Description of the Monitoring Program

The pre-operational radiological environmental monitoring program, which began in 1979, was performed by PVNGS and outside organizations. These organizations continued the program into the operational phase of PVNGS. In 1988, the RMF assumed responsibility for sample collection, assay, data processing, and the REMP annual report. TLD measurements, collection of sludge, water influent samples, and the land use census are conducted by PVNGS personnel.

2.1 The ASU Radiation Measurements Facility

In the spring of 1983, the RMF implemented a long-term independent radiological environmental assessment program for the PVNGS.

In July 1987, the RMF was certified as a vendor by the APS Vendor Quality Program and assumed responsibility for many of the environmental assessments performed in support of the nuclear power station.

RMF staff are trained to perform routine sampling of air, surface and ground water, drinking water, milk, sludge, and vegetation. In accordance with the RMF Quality Assurance Program, all samples are collected using PVNGS procedures and analyzed using written and approved RMF procedures. Annual audits of the program are conducted by the APS Vendor Quality Organization.

To provide the highest quality results, the RMF participates in radiochemistry intercomparison programs with the United States Environmental Protection Agency (USEPA) and the Bureau of Radiation and Medical Devices (BRMD) of the Canadian Department of Health and Welfare.

2.2 1990 PVNGS Radiological Monitoring Program

The assessment program consists of routine measurements of background gamma radiation and of radionuclide concentrations in media such as air, groundwater, drinking water, surface water, fresh milk, vegetation, and sludge.

Samples were collected by PVNGS or RMF personnel at the monitoring sites shown in Figures 2.1 and 2.2. The specific sample types, sampling locations, and sampling frequencies as set forth in Palo Verde Nuclear Generating Station Technical Specifications [11] are presented in Tables 2.1 and 2.2. Other samples not required by reference 11 were processed in accordance with contractual obligations or written requests from PVNGS.

Background gamma radiation measurements are performed using thermoluminescent dosimetry at fifty locations by PVNGS.

2.3 Radiological Monitoring Program Changes for 1990

2.3.1 Air sampling station Site #44 became inaccessible in October, 1990. This supplemental air site has been subsequently dropped from the sample program.

TABLE 2.1

SAMPLE COLLECTION LOCATIONS [11]

Sample Site #	Type	Location(a)	Location Description
1	Air	E30	APS Goodyear Office
4	Air	E16	APS Buckeye Office, 615 N. 4th St, Buckeye
6*	Air	SSE31	APS Gila Bend Substation, Service Road West of Town.
7A	Air	SE8	Arlington School, 16351 S. Arlington School Road
14A	Air	NNE2	Buckeye-Salome Road & 371st Ave.
15	Air	NE2	North East Site Boundary
17A	Air	E4	351st Ave., 1 mile South of Buckeye-Salome Road
21	Air	S3	South Site Boundary
29	Air	W1	West Site Boundary
35	Air	NNW9	Tonapah, Palo Verde Inn Fire Station, 40901 W Osborn Rd.
40	Air	N3	Wintersburg, End of Transmission Road
44(b)	Air	ENE35	APS El Mirage Office (Sun City)
46	Water,	NNW9	McArthur's Farm, Tonapah
47	Vegetation	ENE3	Adams's Residence, 355th Ave. & Buckeye - Salome Rd.
48	Water	S5	Shepard Farms, 13202 S. 383rd Avenue
49	Water	ESE4	Scott Residence, 351st Ave. & Dobbins Road
50	Milk	ENE12	Crosswinds Dairy, 295th Ave and Van Buren St.
51	Milk	E11	Butler Diary, Palo Verde Road & Southern
52	Vegetation	N2	DeShazo Residence, 375th Ave South of Buckeye Salome Rd
53	Milk	E20	Kerr Dairy, Dean & Buckeye Roads
54	Milk	E17	Dickman Dairy, Broadway and Apache Roads.
55	Water	SW3	Gavette Residence, 39326 W. Elliot Road
56*	Milk	E75	Pew Dairy, McQueen & Ryan Roads
57	Water	on-site	Well 27ddc
58	Water	on-site	Well 34abb
59	Surface Water	on-site	PVNGS Evaporation Pond #1
60	Surface Water	on-site	PVNGS Reservoir
62*	Vegetation	ENE75	J.A. Wood Co., North Alma School Road, Scottsdale, AZ
63	Surface Water	on-site	PVNGS Evaporation Pond #2
64	Milk(goat)	ENE5	Kolb Residence, North of Broadway Rd on 343rd Ave.

* control site.
(a) Distances and direction are from center-line of Unit 2 containment.
(b) ceased operation on or about October 1990.

SAMPLE COLLECTION SCHEDULE [11]

Collection Site	Air Particulates	Airborne Radioiodine	Fresh Milk	Vegetation	Groundwater	Drinking Water	Surface Water
#1, APS Goodyear Office	W	W					
#4, APS Buckeye Office	W	W					
#6, APS Gila Bend Substation	W	W					
#7A, Arlington School	W	W					
#14A, Buckeye-Salome Road. & 371st Ave.	W	W					
#15, NE Site Boundary	W	W					
#17A, 351st. Ave., 1 mi South of Buckey-Salome Road.	W	W					
#21, South Site Boundary	W	W					
#29, W. Site Boundary	W	W					
#35, Tonapah, Palo Verde Inn Fire Station	W	W					
#40, Trailer Park at Wintersburg	W	W					
#44, APS El Mirage Office	W	W					
#46, McArthur's Farm						W	
#47, Adam's Residence				AA			
#48, Shepherd Farms						W	
#49, Scott Residence						W	
#50, Crosswinds Dairy			M				
#51, Butler Dairy			M				
#52, De Shazo Residence				AA			
#53, Kerr Dairy			M				
#54, Dickman Dairy			M				
#55, GaVette Residence						W	
#56, Pew Dairy			M				
#57, Well 27ddc					Q		
#58, Well 34abb					Q		
#59, PVNGS Evaporation Pond #1							W
#60, PVNGS Reservoir							W
#62, J.A. Wood Co.				AA			
#63, PVNGS Evaporation Pond #2							W
#64, Kolb Residence			AA				

W = Weekly
M = Monthly
Q = quarterly
AA = As available