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P.O. BOX 52034 PHOENIX, ARIZONA 85072-2034

102-03670-WLS/SAB/PMB
April 11, 1996

WILLIAM L. STEWART
EXECUTIVE VICE PRESIDENT
NUCLEAR

U.S. Nuclear Regulatory Commission
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Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station (PVNGS)**
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Annual Radiological Environmental Operating Report for 1995

In accordance with PVNGS Technical Specification 6.9.1.7, enclosed please find the PVNGS Annual Radiological Environmental Operating Report for 1995. This report covers operation of PVNGS Units 1, 2, and 3 during 1995.

Should have any questions, please contact Scott A. Bauer at (602) 393-5978.

Sincerely,

James M. Levine for WLS

WLS/SAB/PMB/pb
Enclosure

cc: L. J. Callan (all with enclosure)
A. V. Godwin (ARRA)
K. E. Johnston
K. E. Perkins
C. R. Thomas

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ENCLOSURE

1995
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

FOR THE
PALO VERDE NUCLEAR GENERATING STATION

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ABSTRACT

The Radiological Environmental Monitoring Program (REMP) is an ongoing program conducted by Arizona Public Service Company (APS) for the Palo Verde Nuclear Generating Station (PVNGS). Various types of environmental samples are collected in the vicinity of PVNGS and analyzed for radionuclide concentrations.

During 1995, samples were collected by APS. The following categories of samples were collected:

- Broad leaf vegetation
- Fresh milk
- Groundwater
- Drinking water
- Surface water
- Airborne particulate and radioiodine
- Sludge and sediment

Thermoluminescent dosimeters (TLDs) were used to measure environmental gamma radiation. The Environmental TLD program is also conducted by APS.

APS reviews analysis results for trends and anomalies for inclusion in this report. Controls for Environmental Pollution (CEP) also performed sample analyses in 1995 as required to supplement the REMP.

The Arizona Radiation Regulatory Agency (ARRA) performs radiochemistry analyses on various duplicate samples provided to them by APS. Samples analyzed by ARRA include: Reservoir, Evaporation Ponds 1 and 2, Sheppard well, Butler dairy, well 27ddc, and well 34abb. Additionally, ARRA performs air sampling at seven locations identical to APS sampling locations and places TLDs at nineteen locations identical to APS. ARRA reports the results of their comparisons in a separate report on an annual basis.

Assessment of pre-operational and operational data revealed no changes to environmental radiation levels. There were no observed radiological impacts on the environment due to PVNGS operations in 1995.

(NOTE: Reference to APS throughout this report refers to PVNGS personnel)

1.0 Introduction

This report presents the results of the operational environmental radiological monitoring program conducted by Arizona Public Service Company (APS). The Radiological Environmental Monitoring Program (REMP) was established for the Palo Verde Nuclear Generating Station (PVNGS) by APS in 1979 in accordance with federal requirements to provide a complete environmental monitoring program for nuclear reactors, and with concern for maintaining the quality of the local environment. The program complies with the requirements of the US Nuclear Regulatory Commission (USNRC) in their Reactor Assessment Branch Technical Position, Revision 1, November 1979. This report contains the measurements and findings for 1995. All references are specifically identified in Section 12 (page 65).

The objectives of the REMP 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 of the PVNGS pre-operational environmental monitoring program are presented in Reference 1.

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 Reference 2. This report contains the measurements and findings for 1995.

2.0 Description of the Monitoring Program

The pre-operational radiological environmental monitoring program, which began in 1979, was performed by APS and vendor organizations. APS and vendors continued the program into the operational phase of PVNGS.

2.1 1995 PVNGS Radiological Environmental 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, sludge, and sediment.

Samples were collected by APS 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 the PVNGS Offsite Dose Calculation Manual (ODCM), Reference 4, are presented in Tables 2.1, 2.2, and 9.1.

Sample analyses were performed by APS at the PVNGS Central Chemistry Laboratory and the CEP facility in Santa Fe, New Mexico.

Background gamma radiation measurements are performed by APS using TLDs at forty-nine locations near PVNGS.

In addition to the monitoring of environmental media, a land use survey is performed annually to identify the nearest milk animals, residents, gardens, and/or changes thereto in the vicinity of PVNGS. This information is used to evaluate the potential dose to members of the public for those exposure pathways which are indicated.

2.2 Radiological Environmental Monitoring Program Changes for 1995

An evaluation was performed on REMP sample locations in June, 1995. As a result of this evaluation, it was decided to discontinue milk sampling as of August, 1995. This is justified since there are no milk samples being taken within 5 miles of PVNGS (the nearest sample was obtained at a distance greater than 10 miles from the plant). It was also decided to delete one of the supplemental air sample locations (site #1) as of October, 1995, since it is located about 30 miles east of PVNGS. The east sector has two other air sample stations closer to the plant.

Table 2.1 SAMPLE COLLECTION LOCATIONS

SAMPLE SITE #	SAMPLE TYPE	LOCATION (a)	LOCATION DESCRIPTION
1	air	E30	APS Office, Goodyear, AZ
4	air	E16	APS Office, Buckeye, AZ
6A*	air	SSE13	Old US 80, Gila Bend Side of Gillespie Bridge
7A	air	SE8	Arlington School, 16351 S. Arlington School Rd.
14A	air	NNE2	371st Ave. and Buckeye-Salome Rd.
15	air	NE2	NE Site Boundary
17A	air	E4	351st Ave., 1 Mile South of Buckeye-Salome Rd.
21	air	S3	S Site Boundary
29	air	W1	W Site Boundary
35	air	NNW8	Fire Station, 40901 W. Osborn Rd., Tonopah, AZ
40	air	N3	Transmission Rd., South of Trailer Park, Wintersburg
46	drinking water	NW9	McArthur Residence, 41701 W. Indian School Rd., Tonopah, AZ
47	vegetation	ENE3	Adams Residence, 355th Ave. and Buckeye-Salome Rd.
48	drinking water	SSW4	Sheppard Farm, 13202 S. 383rd Ave.
49	drinking water	N2	Masengale Residence, 371st Ave. South of Buckeye-Salome Rd.
50	milk	ENE12	Crosswinds Dairy, 295th Ave. and Van Buren St., Buckeye, AZ
51	milk	E11	Butler Dairy, Palo Verde Rd. and Southern Ave., Buckeye, AZ
52	vegetation	NNE3	Guajardo Residence, 37300 W. Lower Buckeye Rd.
53	milk	E19	Kerr Dairy, Dean and Baseline Rds., Buckeye, AZ
54	milk	E17	Dickman Dairy, Broadway and Apache (Cemetery) Rds., Buckeye, AZ
55	drinking water	SW3	Gavette Residence, 39326 W. Elliot Rd.
56*	milk	E60	Pew Dairy, McQueen and Ryan Rds., Chandler, AZ
57	groundwater	ONSITE	Well 27ddc
58	groundwater	ONSITE	Well 34abb
59	surface water	ONSITE	Evaporation Pond #1
60	surface water	ONSITE	Reservoir
62*	vegetation	E35	Tolleson Produce Co., 91st Ave. and Van Buren St., Tolleson, AZ
63	surface water	ONSITE	Evaporation Pond #2
64	vegetation	NNE3	Bigelow Residence, 37000 W. Lower Buckeye Rd.
65	vegetation	ENE4	Hommel Residence, 35026 W. Broadway Rd.

NOTES:

* Designates a control site

(a) Distances and direction are from the center-line of Unit 2 containment and rounded to the nearest mile

Air sample sites designated with "A" are used to identify air sample locations with duplicate site number in dissimilar location (e.g. site #6 TLD location is different from site #6A air sample location)

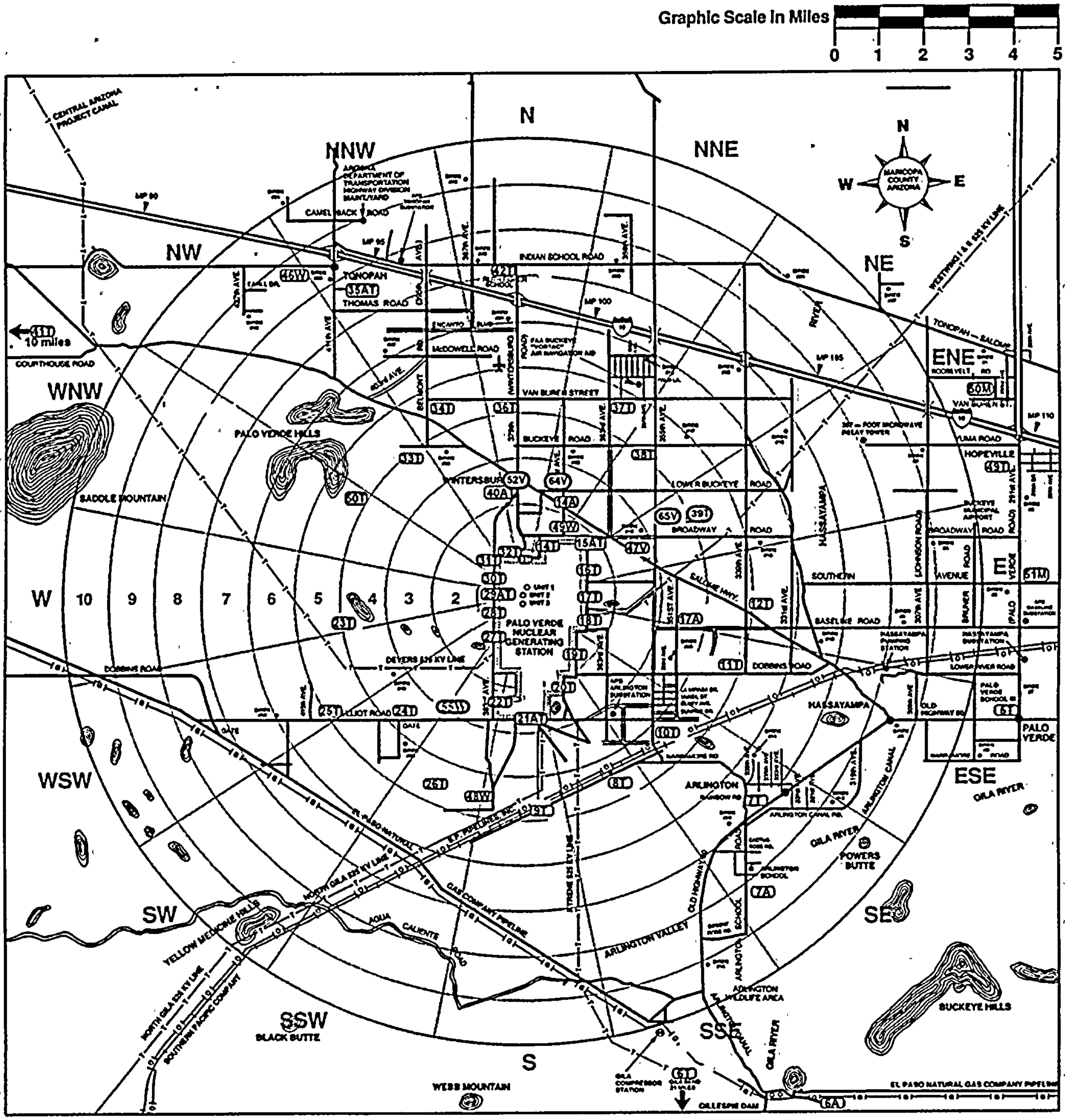
Table 2.2 SAMPLE COLLECTION SCHEDULE

SAMPLE SITE #	AIR PARTICULATE	AIRBORNE RADIOIODINE	MILK	VEGETATION	GROUND WATER	DRINKING WATER	SURFACE WATER
1	W	W					
4	W	W					
6A	W	W					
7A	W	W					
14A	W	W					
15	W	W					
17A	W	W					
21	W	W					
29	W	W					
35	W	W					
40	W	W					
46						W	
47				M/AA			
48						W	
49						W	
50			M				
51			M				
52				M/AA			
53			M				
54			M				
55						W	
56			M				
57					Q		
58					Q		
59							W
60							W
62				M/AA			
63							W
64				M/AA			
65				M/AA			

W = WEEKLY M = MONTHLY M/AA = MONTHLY AS AVAILABLE Q =QUARTERLY

FIGURE 2.1

PVNGS REMP SAMPLE SITES (0 - 10 MILES)



KEY TO MAP

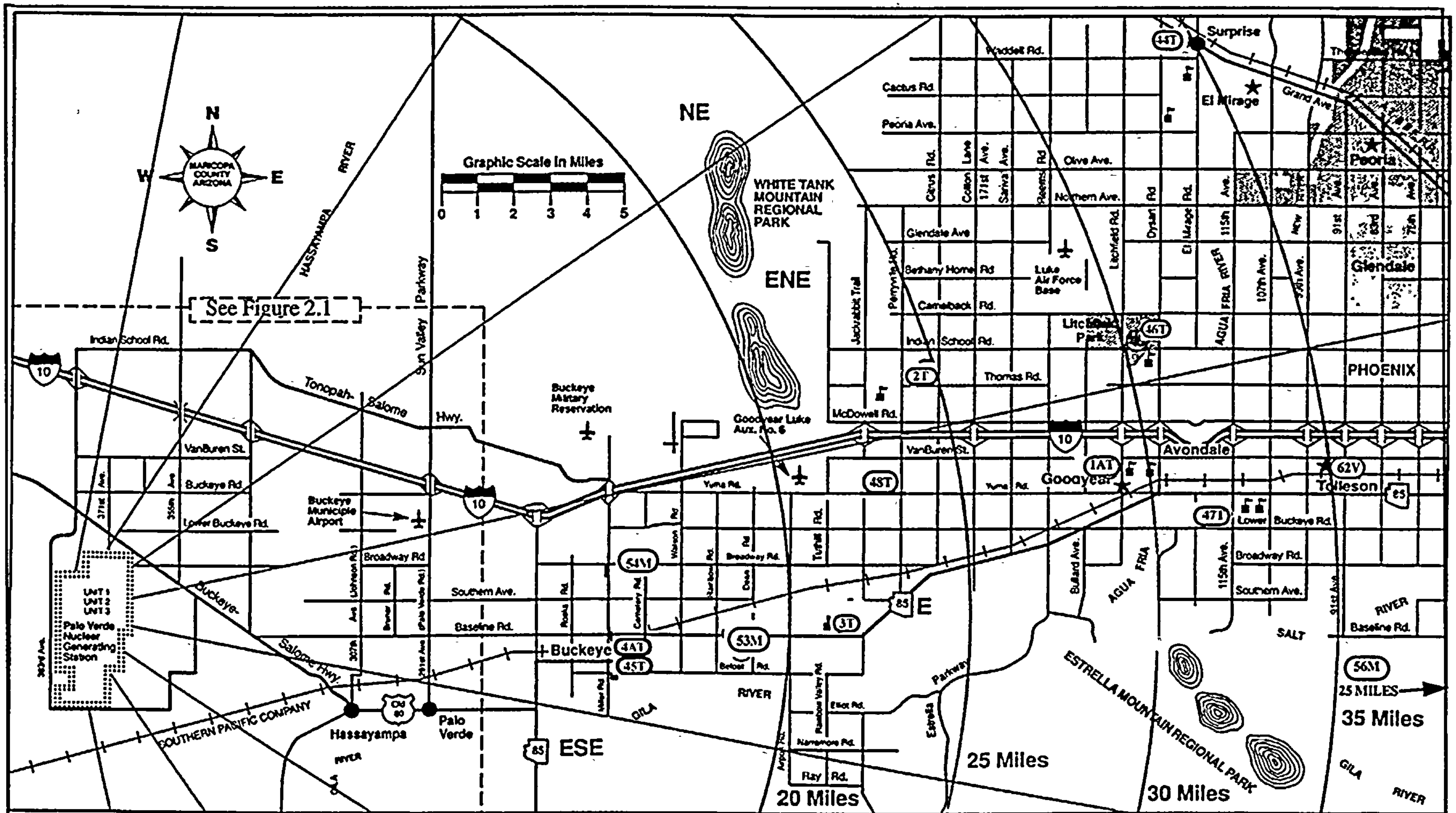
- Paved Road
- Unpaved Road
- 4WD Road
- Gas Pipeline
- Oil Pipeline
- Power Line
- Railroad
- Airstrip
- School
- Siren
- MP Milepost
- Palo Verde Nuclear Generating Station Boundary
- T Thermoluminescent Dosimeters (TLD)
- A Air Sample
- V Vegetation Sample
- W Water Sample
- M Milk Sample
- (1) Sample Sites

Palo Verde Nuclear Generating Station

Radiological Environmental Monitoring Program Sample Sites

0 – 10 Miles

FIGURE 2.2
PVNGS REMP SAMPLE SITES (0 - 35 miles)



KEY TO MAP

- Railroad
- Airstrip/Airport
- Schools Located Near Sample Sites
- Municipal Buildings
- Palo Verde Nuclear Generating Station Boundary
- T Thermoluminescent Dosimeters (TLD)
- A Air Sample
- M Milk Sample
- (1) Sample Sites
- V Vegetation

Palo Verde Nuclear Generating Station

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLE SITES

0–35 Miles

3.0 Sample Collection Program

3.1 Water

Water samples were collected by APS using PVNGS procedures.

3.1.1 Weekly samples were collected from the Reservoir, Evaporation Pond #1, Evaporation Pond #2, and four residence wells. Samples were collected in one gallon cubitainers and 500 ml glass bottles. One liter of each weekly one gallon sample was added to a monthly composite which is preserved with nitric acid (HNO_3). The composite samples are then analyzed for gamma emitters. Residence wells were also analyzed for gross beta activity. Weekly grab samples in glass bottles were composited quarterly and analyzed for tritium.

3.1.2 Quarterly grab samples were collected from onsite wells 34abb and 27ddc. Samples were collected in one gallon cubitainers and 500 ml glass bottles. Samples were analyzed for gamma emitters and tritium.

3.2 Vegetation

Vegetation samples were collected by APS using PVNGS procedures.

3.2.1 Vegetation samples were scheduled to be collected monthly, as available, and were analyzed for gamma emitters.

3.3 Air

Air samples were collected by APS using PVNGS procedures.

3.3.1 Air particulate filters and charcoal canisters were exchanged at eleven (11) sites on a weekly basis until October, when the total number of sample stations was decreased to ten (10). Particulate filters were analyzed for gross beta. Charcoal canisters were analyzed for I-131. Particulate filters were composited quarterly, by location, and analyzed for gamma emitters.

3.4 Milk

Milk samples were collected by APS using PVNGS procedures.

3.4.1 Monthly milk samples were obtained from five (5) dairies during the year through July. Samples were collected in one gallon cubitainers. Milk samples are preserved using ice to prevent curdling. Samples were analyzed for gamma emitters. The milk is also analyzed for low level I-131. Milk sampling was discontinued as of August, 1995. If milk animals are located within five (5) miles of PVNGS, milk sampling will once again be included in the monitoring program.

3.5 Sludge and Sediment

Sludge and sediment samples were collected by APS using PVNGS procedures.

3.5.1 Sludge samples were obtained from the Water Reclamation Facility (WRF) centrifuge, Evaporation Ponds #1 and #2, and Unit 1 cooling towers, and analyzed for gamma emitters. Samples were collected using 1 liter plastic bottles.

3.5.2 Sediment samples were collected from Sedimentation Basin #2 and analyzed for gamma emitters. Samples were collected using 1 liter plastic bottles.

4.0 Analytical Procedures

The procedures described in this report are those used by APS and/or CEP to routinely analyze samples.

4.1 Air Particulate

4.1.1 Gross Beta

A glass fiber filter sample is placed in a 50 mm stainless steel planchet and counted for gross beta activity utilizing a low-background gas flow, proportional counter.

4.1.2 Gamma Spectroscopy

The glass fiber filters are placed in a standard geometry container and counted on a multichannel analyzer equipped with an intrinsic Ge or Ge(Li) detector. The resulting spectrum is analyzed by computer and specific nuclides, if present, are identified and quantified.

4.2 Airborne Radioiodine

The charcoal cartridge is counted on a multichannel analyzer equipped with an intrinsic Ge or Ge(Li) detector. The resulting spectrum is analyzed by computer and I-131, if present, is identified and quantified.

4.3 Milk

4.3.1 Iodine-131

Two (2) liters of milk containing standardized Iodine carrier are stirred with anion exchange resin for one hour. The Iodine is stripped from the resin with 2N sodium perchlorate ($NaClO_4$) and precipitated with silver nitrate ($AgNO_3$). The precipitate is filtered on a tared glass fiber filter. The dried precipitate is weighed for percent recovery and counted for Iodine-131 in a thin window, gas flow, proportional counter. Samples are analyzed within forty-eight hours of receipt to keep the I-131 decay to a minimum.

4.3.2 Gamma Spectroscopy

One (1) liter of sample is placed in a 1 liter plastic Marinelli beaker and counted on a multichannel analyzer equipped with an intrinsic Ge or Ge(Li) detector. The resulting spectrum is analyzed by computer, and specific nuclides if present, are identified and quantified.

4.4 Vegetation

4.4.1 Gamma Spectroscopy

The sample is pureed in a food processor, placed in a one liter plastic marinelli beaker, weighed, and counted on a multichannel analyzer equipped with an intrinsic Ge or Ge(Li) detector. The resulting spectrum is analyzed by computer and specific nuclides, if present, are identified and quantified.

4.5 Sludge/Sediment

4.5.1 Gamma Spectroscopy

The wet/dry sample is placed in a one liter plastic marinelli beaker, weighed, and counted on a multichannel analyzer equipped with an intrinsic Ge or Ge(Li) detector. The resulting spectrum is analyzed by computer and specific nuclides, if present, are identified and quantified.

4.6 Water

4.6.1 Gamma Spectroscopy

The sample is measured, placed in a one liter plastic marinelli beaker, and counted on a multichannel analyzer equipped with an intrinsic Ge or Ge(Li) detector. The resulting spectrum is analyzed by computer and specific nuclides if present, are identified and quantified.

4.6.2 Tritium

The sample is evaluated to determine the appropriate method of preparation prior to counting. If the sample contains suspended solids or is turbid, it may be filtered, distilled, and/or de-ionized, as appropriate. Six (6) milliliters of sample are mixed with fifteen (15) milliliters of liquid scintillation cocktail. The mixture is dark adapted and counted using a liquid scintillation counting system.

4.6.3 Gross Beta

A 200-250 milliliter sample is placed in a beaker. Five (5) milliliters of concentrated nitric (HNO_3) acid is added and the sample is evaporated down to about twenty (20) milliliters. The remaining sample is quantitatively transferred to a stainless steel planchet. The sample is heated to dryness and counted for gross beta in a gas flow, proportional counter.

Table 4.1 TYPICAL ALIQUOT SIZES

SAMPLE TYPE	GROSS BETA	GAMMA SPECTROSCOPY	I-131 (RADIOCHEMICAL SEPARATION)	TRITIUM
Air Particulate	430 m^3 *	5590 m^3 **		
Airborne Radioiodine		430 m^3 *		
Milk		4000 ml	2000 ml	
Vegetation		500-1000 g		
Groundwater	200-250 ml	1000 ml		6 ml
Drinking Water	200-250 ml	1000 ml		6 ml
Surface Water		1000 ml		6 ml
Sediment/Sludge		1000 g		

* Air sample volume determined for a standard flow rate of 43 standard liters per minute over a one-week period

** Air sample volume determined for a standard flow rate of 43 standard liters per minute over a thirteen-week period

Table 4.2 TYPICAL TIMES BETWEEN COLLECTION AND COUNTING

SAMPLE TYPE	TYPICAL DECAY TIME
Air Particulate	7-10 days
Airborne Radioiodine	1-3 days
Milk	2-4 days *
Vegetation	1-3 days
Water	1-5 days
Sludge/Sediment	1-7 days

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

Table 4.3 TYPICAL COUNTING EFFICIENCIES

Gamma Spectroscopy, liquid, 1 liter

Energy (keV)	Detector #1 Efficiency (serial #489220)	Detector #2 Efficiency (serial #2604)
59.54	0.0026	NA
88.03	0.0119	0.0308
122.06	0.0193	0.0375
165.85	0.0197	0.0359
279.19	NA	0.0269
391.69	0.0109	0.0211
661.65	0.0068	0.0142
898.02	0.0051	0.0103
1173.22	0.0041	0.0086
1332.49	0.0036	0.0076
1836.01	0.0029	0.0061

Gamma Spectroscopy, charcoal cartridge

Energy (keV)	Detector #1 Efficiency (serial #489220)	Detector #2 Efficiency (serial #25-P-17PA)
88.03	0.0440	0.0306
122.06	0.0628	0.0460
165.85	0.0613	0.0469
279.19	NA	0.0211
391.69	0.0294	0.0216
661.65	0.0178	0.0123
898.02	0.0124	0.0087
1173.22	0.0098	0.0067
1332.49	0.0088	0.0059
1836.01	0.0066	0.0043

Other than gamma spectroscopy

Sample Type	Gross Beta	Tritium	I-131
airborne particulates	0.31		
milk			0.30
drinking water/groundwater	0.38	0.42	
surface water		0.42	

Table 4.4 TYPICAL SAMPLE COUNTING TIMES

(counting times may vary in order to meet LLD requirements)

SAMPLE TYPE	GROSS BETA	GAMMA SPECTROSCOPY	I-131 (RADIOCHEMICAL SEPARATION)	TRITIUM
Air Particulate	100 min.	1-2 hours		
Airborne Radioiodine		45 min.		
Milk		1-4 hours	400 min.	
Vegetation		1-3 hours		
Groundwater	1-2 hours	1-3 hours		1-2 hours
Drinking Water	1-2 hours	1-3 hours		1-2 hours
Surface Water		1-3 hours		1-2 hours
Sludge/Sediment		1-3 hours		

5.0 Nuclear Instrumentation

5.1. Nuclear Data Computer Based Gamma Spectrometer

The Gamma Spectrometer consists of a Nuclear Data Model #9900 Multichannel Analyzer (MCA) equipped with two of three intrinsic detectors at various time intervals during the year. These detectors have resolutions of 1.73 keV, 1.81 keV, and 1.87 keV (as determined by full width half max with an energy of 0.5 keV per channel) and respective relative efficiencies of 9.42%, 16.27%, and 37.9% (as determined by the manufacturer with Co-60). The Computer Based Nuclear Data Gamma Spectrometry System is used for all gamma counting. The system uses Nuclear Data developed software (automatic isotope analysis) to search and identify, as well as quantify, the peaks of interest.

5.2 Beckman Liquid Scintillation Spectrometer

A Beckman LS-5801 Liquid Scintillation Counter is used for tritium determinations. The system background averages approximately 15 cpm with a counting efficiency of 60% using an unquenched sample.

5.3 Tennelec LB5100 Low Background Counting System

The LB5100 is a low background, gas flow proportional counter. The system contains an automatic sample changer capable of counting 50 samples in succession. Average beta background count rate is about 1-2 cpm with a beta efficiency of about 32% (Cs-137).

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 ODCM. *A priori* LLDs are presented in Table 6.3.

6.2 Data Reporting Criteria

All results that are greater than Minimum Detectable Activity (MDA) (*a posteriori* LLD) are reported as positive activity with its associated 2σ counting error. If the error associated with a result exceeds that result, the value is reported as <LLD.

If the MDA exceeds the ODCM required *a priori* LLD, the value is reported as <MDA (e.g., <30). If the result is less than the *a priori* LLD and the MDA, the value is reported as <LLD.

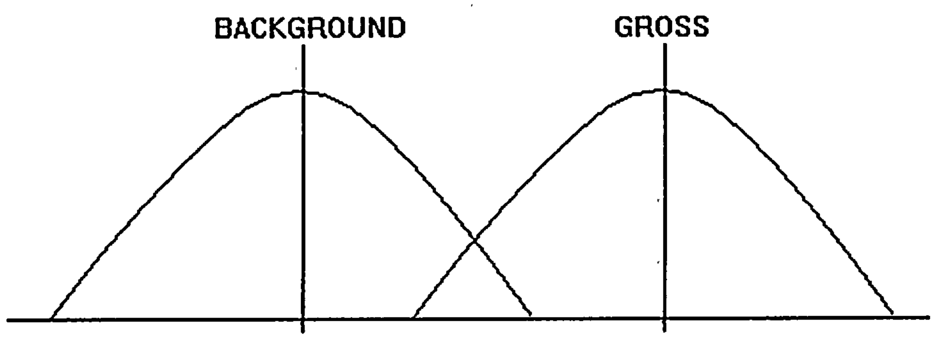
Occasionally the PVNGS ODCM *a priori* LLDs may not be achieved as a result of:

- Background fluctuations
- Unavoidably small sample sizes
- The presence of interfering nuclides
- Self absorption corrections
- Decay corrections for short half-lived radionuclides
- Other uncontrollable circumstances

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

6.3 LLD and Reporting Criteria Overview

Making a reasonable estimate of the limits of detection for a counting procedure or a radiochemical method is usually complicated by the presence of significant background. It must be considered that the background or blank is not a fixed value but that a series of replicates would be normally distributed. The desired net activity is thus the difference between the gross and background activity distributions. The interpretation of this difference becomes a problem if the two distributions intersect as indicated in the diagram.



If a sufficient number of replicate analyses are run, it is to be expected that the results would fall in a normal Gaussian Distribution. Standard statistics allow an estimate of the probability of any particular deviation from the mean value. It is common practice to report the mean ± one or two standard deviations as the final result. In routine analysis such replication is not carried out, and it is not possible to report a Gaussian standard deviation. With counting procedures, however, it is possible to estimate a Poisson standard deviation directly from the count. Data is commonly reported as the measured value ± one or two Poisson standard deviations. The reported values are then considered to give some indication of the range in which the true value might be expected to occur.

The simplest possible case to consider would be one where the background is negligible and the sample activity is zero. It is sometimes not realized that if a series of counts is taken on

such a system, half of the net values should be less than zero. Negative counts are not possible, of course. But when there is an appreciable background, the entire scale is raised. The resulting situation: half of the sample counts on a zero activity sample would be less than background. The negative net counts occur frequently in low-level measurements, causing considerable concern. Actually, such results are to be expected.

A LLD is the smallest amount of sample activity that will yield a net count for which there is confidence at a predetermined level that activity is present. LLDs are calculated values for individual nuclides based on a number of different factors including sample size, counting efficiency and background count rate of the instrument, the background and sample counting time, the decay time, and the chemical recovery of the analytical procedures. LLDs are normally calculated using average values from analyses performed over a long period of time. A minimum detectable activity value (MDA) is the smallest amount of activity that can be detected in an actual sample and uses the values obtained from the instrument and outcome of the analytical process. Therefore, the MDA values may differ from the calculated LLD values if the sample size and chemical recovery, decay values or the instrument efficiency, background, or count time differed from those used in the LLD calculation.

The factors governing the calculation of the LLD and MDA values are discussed below:

1. Sample Size

2. Counting Efficiency

The fundamental quantity in the measurement of a radioactive substance is the number of disintegrations per unit time. As with most physical measurements in analytical chemistry, it is seldom possible to make an absolute measurement of the disintegration rate, but rather it is necessary to compare the sample with one or more standards. The standards determine the counter efficiency that may then be used to convert sample counts per minute (cpm) to disintegrations per minute (dpm).

3. Background Count Rate

Any counter will show a certain counting rate without a sample in position. This background counting rate comes from several sources: 1) natural environmental radiation from the surroundings, 2) cosmic radiation, and 3) the natural radioactivity in the counter material itself. The background counting rate will depend on the amounts of these types of radiation and the sensitivity of the counter to the radiation.

4. Background and Sample Counting Time

The amount of time devoted to the counting of the background depends on the level of activity being measured. In general, with low level samples, this time should be about equal to that devoted to counting a sample (Table 4.4).

5. Time Interval Between Sample Collection and Counting

Decay measurements are useful in identifying certain short-lived isotopes. The disintegration constant is one of the basic characteristics of a specific radionuclide and is readily determined, if the half life is sufficiently short. In order to ensure the required LLDs are achieved, conservative values are used in decay correction to allow for transit time and sample processing.

6. Chemical Recovery of the Analytical Procedures

Most radiochemical analyses are carried out in such a way that losses occur during the separations. These losses occur due to the large number of contaminants that may be present and interfere during chemical separations. Thus, it is necessary to include a technique for estimating these losses in the development of the analytical procedure.

Table 6.1 ODCM REQUIRED LOWER LIMITS OF DETECTION (*a priori*)

ANALYSIS/NUCLIDE	WATER (pCi/liter)	AIRBORNE PARTICULATE or GAS (pCi/m^3)	MILK (pCi/liter)	VEGETATION (pCi/kg, wet)
gross beta	4	0.01		
tritium	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/liter may be used.

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

Table 6.2 ODCM REQUIRED REPORTING LEVELS

ANALYSIS/NUCLIDE	WATER (pCi/liter)	AIRBORNE PARTICULATE or GAS (pCi/m^3)	MILK (pCi/liter)	VEGETATION (pCi/kg, wet)
tritium	20,000*			
Mn-54	1,000			
Fe-59	400			
Co-58	1,000			
Co-60	300			
Zn-65	300			
Zr/Nb-95	400			
I-131	2**	0.9	3	100
Cs-134	30	10	60	1,000
Cs-137	50	20	70	2,000
Ba/La-140	200		300	

* For drinking water samples. This is a 40CFR141 value. If no drinking water pathway exists, a value of 30,000 pCi/liter may be used.

** If no drinking water pathway exists, a reporting level of 20 pCi/liter may be used.

Table 6.3 TYPICAL LLDs (*a priori*)

ANALYSIS/NUCLIDE	WATER (pCi/liter)	AIRBORNE PARTICULATE or GAS (pCi/m^3)	MILK (pCi/liter)	VEGETATION (pCi/kg, wet)
gross beta	3	0.002		
tritium	300			
Mn-54	11			
Fe-59	19			
Co-58	11			
Co-60	11			
Zn-65	26			
Zr-95	17			
Nb-95	12			
I-131	10 **	0.02	1	18
Cs-134	10	0.01	10	16
Cs-137	11	0.02	11	17
Ba-140	44		44	
La-140	10		10	

** Low level I-131 (1 pCi/liter sensitivity) is not required since there is no drinking water pathway.

7.0 EPA Interlaboratory Comparison Program

7.1 Quality Control Program

APS maintains an extensive QA/QC Program which provides certainty that samples are collected, handled, tracked, and analyzed to specified requirements. This program includes appropriate elements of USNRC Regulatory Guide 4.15. Included in the program are procedures for sample collection, preparation and tracking, sample analysis, equipment calibration and checks, and ongoing participation in an interlaboratory comparison program. Duplicate/replicate samples are analyzed routinely to verify analytical precision and sample methodology. Comprehensive data reviews are performed including trending of data where appropriate.

CEP has an approved QA Program which is audited by APS QA personnel on a scheduled basis. This program includes provisions required per Reg. Guide 4.15.

During 1995, APS and/or CEP tested the following USEPA distributed samples for analysis under the interlaboratory comparison program;

- Beta/Gamma in Air Filter
- Beta in Water
- Gamma in Water
- Tritium in Water
- Gamma in Milk
- Performance Studies

7.2 Intercomparison Results

Results of interlaboratory comparison samples between APS, CEP, and the USEPA are presented in Table 7.1. Laboratory data also include results for those facilities which perform Sr-89/90 for Unit airborne effluent releases.

TABLE 7.1 US EPA PERFORMANCE EVALUATION STUDY RESULTS

(all results in pCi/l unless otherwise annotated)

DATE	SAMPLE TYPE	EPA KNOWN VALUE	PVNGS LAB RESULT	NORMALIZED DEVIATION (1)
1-27-95	Gross Beta in Water	5.0	6.7	0.58
2-3-95	I-131 in Water	100.0	101.0	0.17
3-10-95	Tritium in Water	7435.0	7003.3	-1.0
4-18-95	Performance Eval. (blind water)			
	gross beta	86.6	87.0	0.08
	Co-60	29.0	31.3	0.81
	Cs-134	20.0	17.7	-0.81
	Cs-137	11.0	13.0	0.69
6-9-95	Gamma in Water			
	Co-60	40.0	41.0	0.35
	Zn-65	76.0	80.3	0.94
	Cs-134	50.0	42.7	-2.54
	Cs-137	35.0	31.3	-1.27
	Ba-133	79.0	75.0	-0.87
8-4-95	Tritium in Water	4872.0	4465.0	-1.45
8-25-95	Air Filter			
	gross beta	86.6 pCi/Filter	94.3 pCi/Filter	1.33
	Cs-137	25.0 pCi/Filter	23.0 pCi/Filter	-0.69
10-6-95	I-131 in water	148.0	150.3	0.27
10-27-95	Gross Beta in Water	24.8	26.3	0.51
11-3-95	Gamma in Water			
	Co-60	60.0	61.0	0.35
	Zn-65	125.0	131.7	0.89
	Cs-134	40.0	35.3	-1.62
	Cs-137	49.0	50.7	0.58
	Ba-133	99.0	102.0	0.52

NOTES:

(1) Normalized deviation (N) acceptance criteria is $-3 \leq N \leq 3$

TABLE 7.1 US EPA PERFORMANCE EVALUATION STUDY RESULTS

(all results in pCi/l unless otherwise annotated)

DATE	SAMPLE TYPE	EPA KNOWN VALUE	CEP LAB RESULT	NORMALIZED DEVIATION (1)
8-25-95	Air Filter			
	Sr-90	30.0 pCi/Filter	28.7 pCi/Filter	-0.46
9-29-95	Milk			
	I-131	99.0	108.0	1.56
	Cs-137	50.0	46.3	-1.27

DATE	SAMPLE TYPE	EPA KNOWN VALUE	TMA LAB RESULT	NORMALIZED DEVIATION (1)
8-25-95	Air Filter			
	Sr-90	30.0 pCi/Filter	28.7 pCi/Filter	-0.46

NOTES:

(1) Normalized deviation (N) acceptance criteria is $-3 \leq N \leq 3$

8.0 Data Interpretations and Conclusions

Associated with the analytical process are potential random and systematic errors. Systematic errors can be caused by instrument malfunctions, incomplete precipitation, and back scattering and self-absorption. Random errors are beyond the control of the analyst and are caused by the random nature of radioactive decay.

Efforts are made to eliminate both systematic and random errors in the data reported. Systematic errors are eliminated by performing reviews throughout the analysis. For example, instrument calibrations are checked with radioactive sources daily and after any instrument maintenance or adjustment, and recovery and self-absorption factors based on individual sample analyses are incorporated into the calculation equations where necessary. Random errors are reduced by comparing all data to historical data for the same site and performing cross comparisons between analytical results when available. In addition, when data do not appear to match historical results, analyses would be rerun on a separate aliquot of the sample to verify the presence of the activity. The acceptance of data is dependent upon the results of quality control samples and is part of the data review process for all analytical results.

The "plus or minus value" reported with each analytical result represents the error associated with the result and gives the 95% confidence (2 σ) interval around the data.

Most samples contain radioactivity associated with natural background/cosmic radioactivity(e.g. K-40, Th-234, Be-7). Gross beta results for drinking water and air are due to natural background sources. <u>Gamma emitting radionuclides which can be attributed to natural background sources are not indicated in this report</u>.

Results and interpretation of the data for all of the samples analyzed during 1995 are presented in the following sections. Assessment of pre-operational and operational data revealed no changes to environmental radiation levels. There were no observed radiological impacts on the environment due to PVNGS operations in 1995.

8.1 Air Particulates

Weekly gross beta results, in quarterly format, are presented in Tables 8.1 and 8.2 and depicted in graphs in Figures 8.1 and 8.2. Gross beta activity ranged from 0.011 to 0.086 pCi/m^3. The associated counting error ranged from 0.001 to 0.004 pCi/m^3. Average quarterly activities are calculated using all weekly activities except those marked invalid. Also presented in the tables are the weekly averages of all the sites as well as the relative standard deviation (RSD) of the data. The findings are consistent with pre-operational baseline and previous operational results. Figure 8.2 shows the results of the gross beta in air from the pre-operational phase compared to the 1991-1995 gross beta in air results. As can be seen, the indicator sites trend consistently with the control site. Table 8.3 displays the results of gamma spectroscopy on the quarterly composites. The results are summarized in Table 11.1. No Cs-134 or Cs-137 was observed.

8.2 Airborne Radioiodine

Tables 8.4 through 8.5 present the quarterly radioiodine results. No radioiodine was detected in any of the samples.

8.3 Vegetation

Table 8.6 presents gamma isotopic data for the vegetation samples. No gamma emitting nuclides were observed in any of the samples.

8.4 Drinking Water

Samples were analyzed for gross beta, tritium, and gamma emitting nuclides. Results of these analyses are presented in Table 8.7. No tritium or gamma-emitting nuclides were detected in any samples. Gross beta activity ranged from less than detectable, to a high of 7.4 ± 2.1 pCi/l (Sheppard farm, May composite).

8.5 Groundwater

Groundwater samples were analyzed for tritium and gamma emitting nuclides. Results obtained from the analysis of the samples are presented in Table 8.8.

No tritium or gamma emitting nuclides were observed in any of the samples.

8.6 Surface Water

Surface water samples from the Reservoir and Evaporation Ponds were analyzed for tritium and gamma emitting nuclides. Results are presented in Table 8.9. I-131 was detected in the Reservoir (May composite) at 17 ± 8 pCi/l. The I-131 is introduced into the site's circulating water systems via radiopharmaceutical discharges into the Phoenix sewage system (refer to Section 11 of the 1988 AREOR for a detailed explanation).

Tritium was routinely observed in Evaporation Ponds 1 and 2. The highest concentration in Evaporation Pond #1 was 819 ± 194 pCi/l and the highest concentration in Evaporation Pond #2 was 1078 ± 201 pCi/l.

Sewage influent samples collected by the WRF were analyzed for gamma emitting nuclides and tritium. The results, presented in Table 8.9, demonstrate that I-131 was observed routinely. The highest concentration was 64 ± 11 pCi/l (week of May 30^{th}). The results are consistent with assays from the previous years.

Table 8.9 presents gamma spectroscopy and tritium measurements of samples collected from Sedimentation Basin #2. Neither gamma emitting radionuclides nor tritium were detected in any of the samples.

8.7 Milk

Fresh milk samples were analyzed by gamma spectroscopy for Cs-134, Cs-137, Ba-140, and La-140. Samples were also analyzed radiochemically for I-131. Results can be found in Table 8.11. There were no gamma emitters detected via gamma spectroscopy. No samples contained I-131 in excess of the 1 pCi/l LLD. The highest I-131 was detected in the March, 1995 sample from the Crosswinds Dairy (site #50). A value of 0.8 ± 0.1 pCi/l was reported. This dairy is located approximately 12 miles East Northeast of PVNGS. None of the weekly air radioiodine samples indicated the presence of I-131. Therefore, it is reasonable to conclude the I-131 reported was not a result of effluent releases from PVNGS.

8.8 Sludge and Sediment

Sludge samples were obtained from the Water Reclamation Facility (WRF) centrifuge and analyzed by gamma spectroscopy. A Sedimentation Basin #2 sediment sample was obtained and analyzed by gamma spectroscopy. Results for WRF waste centrifuge sludge and Sedimentation Basin #2 sediment can be found in Table 8.10.

I-131 activity in the WRF waste centrifuge sludge ranged from 170 ± 88 pCi/kg to 5219 ± 77 pCi/kg. The I-131 in the WRF waste centrifuge sludge is consistent with historical values and, as previously discussed, it is due to radiopharmaceuticals in the WRF influent.

Cs-137 was detected in Sedimentation Basin #2 sediment (70 ± 18 pCi/kg) and it is consistent with pre-operational levels in soil.

Evaporation Ponds 1 and 2 sludge samples were taken quarterly. Evaporation Pond #1 samples indicated low levels of Cs-137 which are consistent with soil levels. Evaporation Pond #2 samples indicated low levels of Cs-134, Cs-137, and Co-60. These radionuclides are evidently due to previous primary-to-secondary leaks which resulted in the transport of these isotopes to the onsite ponds. Results can be found in Table 8.10. (Evaporation Pond #2 indicates low levels of radioactivity due to the entire volume of water/sediment from Evaporation Pond #1 being pumped into Evaporation Pond #2 in September 1991. Radioactivity in low levels was present in Evaporation Pond #1 as a result of previous primary-to-secondary leaks at Units 1 and 2).

8.9 Cooling Tower Sludge

Sludge was removed from the Unit 1 Cooling towers in 1995 and placed in the WRF landfill onsite. A summary of the gamma spectroscopy results are presented in the following table:

Sample Date	Unit No.	Volume (yd^3)	Isotope	Activity range (pCi/kg)	
4-12-95 and 5-3-95	1	130	Mn-54	<MDA to 18	(6 of 24 samples)
			Co-58	<MDA to 19	(4 of 24 samples)
			Co-60	92 to 828	(24 of 24 samples)
			I-131	<MDA to 225	(21 of 24 samples)
			Cs-134	<MDA to 34	(11 of 24 samples)
			Cs-137	<MDA to 444	(23 of 24 samples)
			Nb-95	59	(1 of 24 samples)

Reference to samples in the "Activity range" column of the above table identifies the fraction of samples indicating activity above the MDA.

8.10 Summary of Results

Sample data are presented in graphic form in Figures 8.1-8.5. When practical, comparisons to pre-operational data are displayed. A summary of the sample results is presented in Table 11.1.

TABLE 8.1 Particulate Gross Beta in Air 1st - 2nd Quarter

ODCM required samples denoted by *
units are pCi/m^3

1st Quarter

Week #	START DATE	STOP DATE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*	Mean	RSD (%)
1	27-Dec-94	3-Jan-95	0.032	0.037	0.037	0.033	0.033	0.037	0.038	0.034	0.040	0.033	0.037	0.036	7.4
2	3-Jan-95	10-Jan-95	0.023	0.025	0.027	0.026	0.022	0.023	0.028	0.026	0.024	0.023	0.026	0.025	7.8
3	10-Jan-95	17-Jan-95	0.022	0.022	0.025	0.026	0.021	0.022	0.022	0.021	0.023	0.019	0.025	0.023	9.2
4	17-Jan-95	24-Jan-95	0.025	0.031	0.029	0.029	0.026	0.026	0.026	0.027	0.028	0.025	0.027	0.027	6.9
5	24-Jan-95	31-Jan-95	0.022	0.025	0.021	0.021	0.018	0.020	0.020	0.020	0.019	0.018	0.022	0.021	9.8
6	31-Jan-95	8-Feb-95	0.044	0.041	0.045	0.044	0.041	0.039	0.043	0.040	0.040	0.035	0.046	0.042	7.6
7	8-Feb-95	14-Feb-95	0.021	0.024	0.022	0.022	0.025	0.020	0.022	0.023	0.026	0.020	0.028	0.023	11.0
8	14-Feb-95	21-Feb-95	0.018	0.021	0.020	0.022	0.017	0.022	0.020	0.020	0.019	0.018	0.021	0.020	8.4
9	21-Feb-95	28-Feb-95	0.033	0.038	0.037	0.045	0.036	0.036	0.039	0.038	0.038	0.034	0.039	0.038	8.4
10	28-Feb-95	8-Mar-95	0.022	0.022	0.021	0.019	0.023	0.019	0.021	0.022	0.022	0.021	0.021	0.021	5.9
11	8-Mar-95	14-Mar-95	0.027	0.024	0.023	0.023	0.022	0.024	0.022	0.024	0.026	0.026	0.024	0.024	6.8
12	14-Mar-95	20-Mar-95	0.033	0.035	0.034	0.034	0.033	0.033	0.033	0.038	0.038	0.031	0.036	0.034	6.4
13	20-Mar-95	28-Mar-95	0.014	0.016	0.012	0.013	0.011	0.014	0.015	0.014	0.012	0.014	0.014	0.014	10.6
	Mean		0.026	0.028	0.027	0.027	0.025	0.026	0.027	0.027	0.027	0.024	0.028	0.027	4.4

2nd Quarter

Week #	START DATE	STOP DATE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*	Mean	RSD (%)
14	28-Mar-95	5-Apr-95	0.037	0.042	0.038	0.041	0.038	0.038	0.041	0.037	0.043	0.039	0.040	0.039	5.4
15	5-Apr-95	11-Apr-95	0.023	0.030	0.029	0.024	0.024	0.023	0.025	0.023	0.025	0.024	0.027	0.025	9.7
16	11-Apr-95	18-Apr-95	0.023	0.021	0.020	0.021	0.020	0.021	0.021	0.021	0.021	0.021	0.021	0.021	3.7
17	18-Apr-95	26-Apr-95	0.022	0.025	0.023	0.021	0.023	0.022	0.022	0.023	0.026	0.023	0.023	0.023	6.1
18	26-Apr-95	3-May-95	0.026	0.022	0.022	0.022	0.022	0.024	0.023	0.023	0.023	0.022	0.022	0.023	5.5
19	3-May-95	9-May-95	0.021	0.022	0.019	0.021	0.018	0.020	0.019	0.016	0.017	0.019	0.020	0.019	9.3
20	9-May-95	16-May-95	0.022	0.021	0.019	0.022	0.022	0.021	0.020	0.022	0.021	0.024	0.024	0.022	6.9
21	16-May-95	23-May-95	0.031	0.030	0.026	0.029	0.027	0.025	0.028	0.028	0.030	0.030	0.029	0.028	6.5
22	23-May-95	31-May-95	0.027	0.028	0.031	0.031	0.029	0.030	0.029	0.032	0.031	0.032	0.030	0.030	5.4
23	31-May-95	7-Jun-95	0.032	0.037	0.033	0.031	0.037	0.030	0.035	0.033	0.032	0.035	0.036	0.034	7.2
24	7-Jun-95	13-Jun-95	0.030	0.030	0.032	0.032	0.027	0.029	0.031	0.027	0.029	0.030	0.028	0.030	5.9
25	13-Jun-95	21-Jun-95	0.026	0.023	0.022	0.022	0.024	0.023	0.024	0.025	0.024	0.024	0.024	0.024	5.0
26	21-Jun-95	27-Jun-95	0.036	0.037	0.035	0.033	0.037	0.036	0.034	0.032	0.036	0.032	0.034	0.035	5.3
	Mean		0.027	0.028	0.027	0.027	0.027	0.026	0.027	0.026	0.028	0.027	0.028	0.027	2.2

TABLE 8.2 Particulate Gross Beta in Air 3rd - 4th Quarter

ODCM required samples denoted by *
units are pCi/m^3

3rd Quarter

Week #	START DATE	STOP DATE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*	Mean	RSD (%)
27	27-Jun-95	5-Jul-95	0.031	0.035	0.039	0.035	0.036	0.033	0.037	0.038	0.036	0.035	0.037	0.036	6.3
28	5-Jul-95	11-Jul-95	0.042	0.044	0.043	0.041	0.042	0.040	0.039	0.036	0.045	0.041	0.036	0.041	7.2
29	11-Jul-95	18-Jul-95	0.028	0.031	0.026	0.028	0.028	0.027	0.024	0.029	0.027	0.026	0.028	0.027	6.6
30	18-Jul-95	25-Jul-95	0.023	0.023	0.021	0.024	0.022	0.022	0.020	0.016	0.021	0.022	0.021	0.021	9.9
31	25-Jul-95	1-Aug-95	0.036	0.038	0.040	0.035	0.036	0.036	0.037	0.036	0.039	0.034	0.038	0.037	4.8
32	1-Aug-95	8-Aug-95	0.040	0.032	0.041	0.046	0.043	0.043	0.040	0.042	(2)	0.043	0.048	0.042	10.2
33	8-Aug-95	15-Aug-95	0.027	0.031	0.032	0.031	0.027	0.026	0.028	0.040	0.027	0.029	0.029	0.030	13.2
34	15-Aug-95	22-Aug-95	0.023	0.022	0.022	0.023	0.024	0.023	0.024	0.023	0.024	0.024	0.022	0.023	3.6
35	22-Aug-95	28-Aug-95	0.031	0.031	0.029	0.030	0.029	(1)	0.028	0.031	0.030	0.031	0.030	0.030	3.5
36	28-Aug-95	4-Sep-95	0.037	0.032	0.037	0.042	0.038	(1)	0.037	0.034	0.039	0.036	0.036	0.037	7.3
37	4-Sep-95	11-Sep-95	0.026	0.024	0.026	0.024	0.023	(1)	0.024	0.025	0.023	0.026	0.027	0.025	5.6
38	11-Sep-95	19-Sep-95	0.032	0.030	0.037	0.033	0.033	(1)	0.033	0.032	0.031	0.034	0.034	0.033	5.8
39	19-Sep-95	25-Sep-95	0.042	0.042	0.042	0.040	0.042	(1)	0.040	0.041	0.041	0.041	0.043	0.041	2.3
	Mean		0.032	0.032	0.033	0.033	0.033	0.031	0.032	0.033	0.032	0.032	0.033	0.033	2.1

4th Quarter

Week #	START DATE	STOP DATE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*	Mean	RSD (%)
40	25-Sep-95	3-Oct-95	0.033	0.034	0.033	0.039	0.033	(1)	0.032	0.031	0.031	0.030	0.035	0.033	7.7
41	3-Oct-95	10-Oct-95	0.038	0.044	0.045	0.040	0.044	(1)	0.036	0.043	0.038	0.039	0.047	0.041	8.8
42	10-Oct-95	17-Oct-95	0.055	0.045	0.059	0.057	0.057	(1)	0.052	0.055	0.051	0.051	0.053	0.054	7.5
43	17-Oct-95	23-Oct-95	0.043	0.048	0.051	0.048	0.040	(1)	0.039	0.046	0.038	0.047	0.045	0.045	9.8
44	23-Oct-95	31-Oct-95	(3)	0.057	0.061	0.054	0.051	0.056	0.043	0.059	0.056	0.055	0.056	0.055	9.0
45	31-Oct-95	6-Nov-95	(3)	0.035	0.033	0.034	0.034	0.035	0.031	0.036	0.028	0.033	0.031	0.033	7.3
46	6-Nov-95	14-Nov-95	(3)	0.052	0.060	0.061	0.057	0.057	0.052	0.051	0.055	0.056	0.055	0.056	6.0
47	14-Nov-95	20-Nov-95	(3)	0.070	0.076	0.075	0.051	0.061	0.061	0.068	0.065	0.061	0.056	0.064	12.4
48	20-Nov-95	28-Nov-95	(3)	0.082	0.086	0.083	0.075	0.076	0.072	0.073	0.077	0.072	0.071	0.077	6.8
49	28-Nov-95	4-Dec-95	(3)	0.034	0.044	0.031	0.033	0.038	0.034	0.041	0.034	0.035	0.037	0.036	11.0
50	4-Dec-95	12-Dec-95	(3)	0.055	0.071	0.051	0.058	0.055	0.052	0.057	0.057	0.058	0.062	0.058	9.8
51	12-Dec-95	19-Dec-95	(3)	0.033	0.036	0.032	0.030	0.032	0.029	0.036	0.031	0.031	0.028	0.032	8.4
52	19-Dec-95	27-Dec-95	(3)	0.069	0.069	0.071	0.073	0.067	0.068	0.074	0.075	0.070	0.073	0.071	3.8
	Mean		0.042	0.051	0.056	0.052	0.049	0.053	0.046	0.052	0.049	0.049	0.050	0.050	7.1
	Annual Average		0.030	0.035	0.036	0.035	0.033	0.033	0.033	0.034	0.034	0.033	0.035	0.034	4.8

Notes: **(1) Storm damage caused power outage** **(2) Sample invalid due to equipment malfunction** **(3) Sample location deleted**

TABLE 8.3 Gamma in Air Filter Composites

ODCM required samples denoted by *
units are pCi/m^3

QUARTER ENDPOINT	NUCLIDE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*
28-Mar-95	Cs-134	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
28-Mar-95	Cs-137	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
27-Jun-95	Cs-134	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
27-Jun-95	Cs-137	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
25-Sep-95	Cs-134	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD (1)	<LLD	<LLD	<LLD	<LLD	<LLD
25-Sep-95	Cs-137	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD (1)	<LLD	<LLD	<LLD	<LLD	<LLD
27-Dec-95	Cs-134	(3)	<LLD	<LLD	<LLD	<LLD	<LLD (2)	<LLD	<LLD	<LLD	<LLD	<LLD
27-Dec-95	Cs-137	(3)	<LLD	<LLD	<LLD	<LLD	<LLD (2)	<LLD	<LLD	<LLD	<LLD	<LLD

(1) Site #15 out of service due to power outage from storm damage for 5 weeks during this quarter.
(2) Site #15 out of service due to power outage from storm damage for 4 weeks during this quarter.
(3) Discontinued monitoring at Site #1 on 10-23-95. This was a supplemental sample which was determined to be unnecessary.

TABLE 8.4 Radioiodine in Air 1st - 2nd Quarter

ODCM required samples denoted by *
units are pCi/m^3

1st Quarter

Week #	START DATE	STOP DATE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*
1	27-Dec-94	3-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2	3-Jan-95	10-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
3	10-Jan-95	17-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
4	17-Jan-95	24-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
5	24-Jan-95	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
6	31-Jan-95	8-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
7	8-Feb-95	14-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
8	14-Feb-95	21-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
9	21-Feb-95	28-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
10	28-Feb-95	8-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
11	8-Mar-95	14-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
12	14-Mar-95	20-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
13	20-Mar-95	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

2nd Quarter

Week #	START DATE	STOP DATE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*
14	28-Mar-95	5-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
15	5-Apr-95	11-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
16	11-Apr-95	18-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
17	18-Apr-95	26-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
18	26-Apr-95	3-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
19	3-May-95	9-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
20	9-May-95	16-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
21	16-May-95	23-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
22	23-May-95	31-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
23	31-May-95	7-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
24	7-Jun-95	13-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
25	13-Jun-95	21-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
26	21-Jun-95	27-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

TABLE 8.5 Radioiodine in Air 3rd - 4th Quarter

ODCM required samples denoted by *
units are pCi/m^3

3rd Quarter

Week #	START DATE	STOP DATE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*
27	27-Jun-95	5-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
28	5-Jul-95	11-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
29	11-Jul-95	18-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
30	18-Jul-95	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
31	25-Jul-95	1-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
32	1-Aug-95	8-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	(2)	<LLD	<LLD
33	8-Aug-95	15-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
34	15-Aug-95	22-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
35	22-Aug-95	28-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD
36	28-Aug-95	4-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD
37	4-Sep-95	11-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD
38	11-Sep-95	19-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD
39	19-Sep-95	25-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD

4th Quarter

Week #	START DATE	STOP DATE	Site 1	Site 4	(control) Site 6A*	Site 7A	Site 14A*	Site 15*	Site 17A	Site 21*	Site 29	Site 35	Site 40*
40	25-Sep-95	3-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD
41	3-Oct-95	10-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD
42	10-Oct-95	17-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD
43	17-Oct-95	23-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	(1)	<LLD	<LLD	<LLD	<LLD	<LLD
44	23-Oct-95	31-Oct-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
45	31-Oct-95	6-Nov-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
46	6-Nov-95	14-Nov-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
47	14-Nov-95	20-Nov-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
48	20-Nov-95	28-Nov-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
49	28-Nov-95	4-Dec-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
50	4-Dec-95	12-Dec-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
51	12-Dec-95	19-Dec-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
52	19-Dec-95	27-Dec-95	(3)	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

(1) Storm damage caused power outage

(2) Sample invalid due to equipment malfunction

(3) Sample location deleted

TABLE 8.6 Vegetation

ODCM required samples denoted by *
units are pCi/kg

LOCATION	TYPE	DATE COLLECTED	Cs-134	Cs-137	I-131
ADAMS RESIDENCE (SITE #47)*	Lettuce	18-Apr-95	<LLD	<LLD	<LLD
	Swiss Chard	18-Apr-95	<LLD	<LLD	<LLD
	Beet Tops	18-Apr-95	<LLD	<LLD	<LLD
	Lettuce	2-May-95	<LLD	<LLD	<LLD
	Swiss Chard	2-May-95	<LLD	<LLD	<LLD
	Beet Tops	2-May-95	<LLD	<LLD	<LLD
	Lettuce	1-Jun-95	<LLD	<LLD	<LLD
	Swiss Chard	1-Jun-95	<LLD	<LLD	<LLD
	Beet Tops	1-Jun-95	<LLD	<LLD	<LLD
GUAJARDO RESIDENCE (SITE #52)*	NO SAMPLES AVAILABLE				
TOLLESON PRODUCE CO. (Site #62)*	Mustard Greens	4-Jan-95	<LLD	<LLD	<LLD
	Collards	4-Jan-95	<LLD	<LLD	<LLD
	Cilantro	4-Jan-95	<LLD	<LLD	<LLD
	Curly Mustard	7-Feb-95	<LLD	<LLD	<LLD
	Flat mustard	7-Feb-95	<LLD	<LLD	<LLD
	Spinach	8-Mar-95	<LLD	<LLD	<LLD
	Mustard Greens	8-Mar-95	<LLD	<LLD	<LLD
	Collard Greens	8-Mar-95	<LLD	<LLD	<LLD
	Cabbage	5-Apr-95	<LLD	<LLD	<LLD
	Mustard Greens	15-Nov-95	<LLD	<LLD	<LLD
	Turnip Greens	15-Nov-95	<LLD	<LLD	<LLD
	Flat Must. Greens	15-Nov-95	<LLD	<LLD	<LLD
	Spinach	7-Dec-95	<LLD	<LLD	<LLD
	Turnip Greens	7-Dec-95	<LLD	<LLD	<LLD
	Mustard Greens	7-Dec-95	<LLD	<LLD	<LLD
BIGELOW RESIDENCE (Site #64)	NO SAMPLES AVAILABLE				
HOMMEL RESIDENCE (Site #65)	Cabbage	9-Mar-95	<LLD	<LLD	<LLD
	Florida Broadleaf	9-Mar-95	<LLD	<LLD	<LLD
	Mustard Greens	9-Mar-95	<LLD	<LLD	<LLD

TABLE 8.7 Drinking Water

ODCM required samples denoted by *
units are pCi/liter

SAMPLE LOCATION	MONTH ENDPOINT	Ba-140	La-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	Mn-54	Zr-95	Nb-95	Zn-65	QTRLY Tritium	Gross Beta
McARTHUR RESIDENCE (SITE #46) *	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		5.9 +/- 1.7
	28-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		5.0 +/- 1.6
	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	5.4 +/- 1.5
	26-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		3.3 +/- 1.6
	31-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		3.9 +/- 1.6
	27-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	3.5 +/- 1.6
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		3.8 +/- 1.6
	28-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		4.2 +/- 1.6
	25-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	3.2 +/- 1.6
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		4.1 +/- 1.6
	28-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		<LLD
	2-Jan-96	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	3.3 +/- 1.6
GAVETTE RESIDENCE (SITE #55)	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		7.3 +/- 1.8
	28-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		6.0 +/- 1.6
	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	5.2 +/- 1.5
	26-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		3.4 +/- 1.6
	30-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		3.9 +/- 1.5
	27-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	3.2 +/- 1.5
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		<LLD
	28-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		4.0 +/- 1.6
	25-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	3.6 +/- 1.6
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<17	<LLD	<LLD	<LLD	<LLD		4.9 +/- 1.6
	28-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		4.8 +/- 1.7
	2-Jan-96	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	3.3 +/- 1.6

TABLE 8.7 Drinking Water

ODCM required samples denoted by *
units are pCi/liter

SAMPLE LOCATION	MONTH ENDPOINT	Ba-140	La-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	Mn-54	Zr-95	Nb-95	Zn-65	QTRLY Tritium	Gross Beta
SHEPPARD RESIDENCE (SITE #48) *	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		4.1 +/- 1.9
	28-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		6.2 +/- 1.9
	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	4.4 +/- 1.8
	26-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		4.5 +/- 2.0
	30-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		7.4 +/- 2.1
	27-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	5.2 +/- 2.0
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		6.5 +/- 2.0
	28-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		5.7 +/- 2.0
	25-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	6.3 +/- 2.1
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		5.5 +/- 2.0
	28-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		3.6 +/- 2.0
	2-Jan-96	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
MASENGALE RESIDENCE (SITE #49) *	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		<LLD
	28-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		3.1 +/- 1.4
	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	2.9 +/- 1.4
	26-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		<LLD
	31-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		<LLD
	27-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		<LLD
	28-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		3.3 +/- 1.4
	25-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		2.7 +/- 1.5
	28-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD		<LLD
	2-Jan-96	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

TABLE 8.7 Drinking Water

units are pCi/liter

LOCATION	DATE COLLECTED	Ba-140	La-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	Mn-54	Zr-95	Nb-95	Zn-65
UNIT #1 DOMESTIC WATER	11-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	15-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	15-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	12-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	14-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	6-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	9-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	12-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-Oct-95	<68	<29	<21	<17	<16	<19	<36	<19	<20	<LLD	<21	<46
	16-Nov-95	<67	<22	<19	<24	<20	<22	<38	<21	<20	<38	<27	<54
	(1)												
UNIT #2 DOMESTIC WATER	11-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	15-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	15-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	12-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	14-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	6-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	9-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	12-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-Oct-95	<80	<25	<LLD	<22	<17	<20	<45	<23	<18	<LLD	<23	<42
	16-Nov-95	<73	<16	<21	<21	<18	<19	<31	<21	<20	<31	<25	<39
	(1)												

(1) Routine sampling discontinued in November

TABLE 8.7 Drinking Water

units are pCi/liter

LOCATION	DATE COLLECTED	Ba-140	La-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	Mn-54	Zr-95	Nb-95	Zn-65
UNIT #3 DOMESTIC WATER	11-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	15-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	15-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	12-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	14-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	6-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	9-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	12-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-Oct-95	<LLD	<17	<17	<18	<18	<LLD	<35	<22	<22	<31	<17	<36
	16-Nov-95 (1)	<77	<20	<19	<20	<19	<20	<38	<20	<16	<LLD	<25	<45
NORTH ANNEX DOMESTIC WATER	11-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	15-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	15-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	12-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	14-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	6-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	9-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	12-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-Oct-95	<69	<17	<20	<20	<19	<LLD	<35	<20	<18	<31	<21	<45
	16-Nov-95 (1)	<66	<21	<18	<22	<18	<LLD	<33	<19	<18	<LLD	<24	<42

(1) Routine sampling discontinued in November

TABLE 8.8 Groundwater

ODCM required samples denoted by *
units are pCi/liter

SAMPLE LOCATION	DATE COLLECTED	Ba-140	La-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	Mn-54	Zr-95	Nb-95	Zn-65	Tritium
WELL 27ddc (Site #57)*	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	25-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
WELL 34abb (Site #58)*	6-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	no data
	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	25-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

TABLE 8.9 Surface Water

ODCM required samples denoted by *
units are pCi/liter

SAMPLE LOCATION	MONTH ENDPOINT	Ba-140	La-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	Mn-54	Nb-95	Zn-65	Zr-95	Tritium
	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	25-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
RESERVOIR	30-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	17 +/- 8	<LLD	<LLD	<LLD	<LLD	
(Site #60) *	27-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	25-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	2-Jan-96	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	684 +/- 195
	25-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
EVAP POND 1	30-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
(Site #59) *	27-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	819 +/- 194
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	25-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<16 (1)	<LLD	<LLD	<LLD	<LLD	716 +/- 193
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	2-Jan-96	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	751 +/- 194
	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	1078 +/- 201
	25-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
EVAP POND 2	30-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
(Site #63) *	27-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	1030 +/- 206
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	25-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	864 +/- 197
	31-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	28-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	2-Jan-96	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	884 +/- 198

(1) MDA exceeded a priori LLD due to count time too short.

TABLE 8.9 Surface Water

units are pCi/liter

SAMPLE LOCATION	DATE COLLECTED	Ba-140	La-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	Mn-54	Nb-95	Zn-65	Zr-95	Tritium
WRF INFLUENT	4-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	10-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	17-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	20 +/- 10	<LLD	<LLD	<LLD	<LLD	
	24-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	19 +/- 12	<LLD	<LLD	<LLD	<LLD	
	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	54 +/- 10	<LLD	<LLD	<LLD	<LLD	<LLD **
	8-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	31 +/- 13	<LLD	<LLD	<LLD	<LLD	
	14-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	35 +/- 12	<LLD	<LLD	<LLD	<LLD	
	21-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	25 +/- 12	<LLD	<LLD	<LLD	<LLD	
	1-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	22 +/- 14	<LLD	<LLD	<LLD	<LLD	<LLD **
	8-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	14-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	21 +/- 9	<LLD	<LLD	<LLD	<LLD	
	21-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	29-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	31 +/- 10	<LLD	<LLD	<LLD	<LLD	<LLD **
	4-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	30 +/- 14	<LLD	<LLD	<LLD	<LLD	
	11-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	34+/-13	<LLD	<LLD	<LLD	<LLD	
	20-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	17 +/- 10	<LLD	<LLD	<LLD	<LLD	
	26-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	13 +/- 9	<LLD	<LLD	<LLD	<LLD	<LLD **
	3-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	11 +/- 10	<LLD	<LLD	<LLD	<LLD	
	17-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	26 +/- 9	<LLD	<LLD	<LLD	<LLD	
	23-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	41 +/- 15	<LLD	<LLD	<LLD	<LLD	
	30-May-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	64 +/- 11	<LLD	<LLD	<LLD	<LLD	<LLD **
	7-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	13-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	20 +/- 11	<LLD	<LLD	<LLD	<LLD	
	20-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	10+/-9	<LLD	<LLD	<LLD	<LLD	
	28-Jun-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	17 +/- 11	<LLD	<LLD	<LLD	<LLD	<LLD **
	6-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	16 +/- 12	<LLD	<LLD	<LLD	<LLD	
	11-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	18-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	15 +/- 12	<LLD	<LLD	<LLD	<LLD	
	25-Jul-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	1-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	8-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	16-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	14 +/- 6	<LLD	<LLD	<LLD	<LLD	
	23-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	29-Aug-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	37 +/- 13	<LLD	<LLD	<LLD	<LLD	<LLD **
	5-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	17 +/- 10	<LLD	<LLD	<LLD	<LLD	
	12-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	48 +/- 12	<LLD	<LLD	<LLD	<LLD	
	22-Sep-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	21 +/- 10	<LLD	<LLD	<LLD	<LLD	<LLD **

** MONTHLY COMPOSITE

TABLE 8.9 Surface Water

units are pCi/liter

SAMPLE LOCATION	DATE COLLECTED	Ba-140	La-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	Mn-54	Nb-95	Zn-65	Zr-95	Tritium
WRF INFLUENT (continued)	4-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	17 +/- 11	<LLD	<LLD	<LLD	<LLD	
	10-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	17-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	27 +/- 12	<LLD	<LLD	<LLD	<LLD	
	23-Oct-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	41 +/- 16	<LLD	<LLD	<LLD	<LLD	
	1-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	23 +/- 12	<LLD	<LLD	<LLD	<LLD	<LLD **
	7-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	17 +/- 11	<LLD	<LLD	<LLD	<LLD	
	15-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	24 +/- 11	<LLD	<LLD	<LLD	<LLD	
	21-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	29-Nov-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD **
	6-Dec-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	15 +/- 8	<LLD	<LLD	<LLD	<LLD	
	13-Dec-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	
	21-Dec-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	10 +/- 8	<LLD	<LLD	<LLD	<LLD	
	2-Jan-96	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	27 +/- 15	<LLD	<LLD	<LLD	<LLD	<LLD **
SEDIMENT. BASIN #2	5-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	10-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	17-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	24-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	31-Jan-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	8-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	14-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	21-Feb-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	1-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	8-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	14-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	20-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	28-Mar-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
	4-Apr-95	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** MONTHLY COMPOSITE

TABLE 8.10 Sludge/Sediment

units are pCi/kg

SAMPLE LOCATION	DATE COLLECTED	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
WRF CENTRIFUGE WASTE SLUDGE	10-Jan-95	<6	<7	<17	<6	<13	<10	<13	170 +/- 88	<6	<6	<93	<28
	24-Jan-95	<10	<11	<24	<10	<24	<14	<20	613 +/- 72	<11	<11	<80	<22
	8-Feb-95	<7	<7	<16	<7	<15	<95	<13	362 +/- 47	<6	<7	<49	<15
	21-Feb-95	<25	<26	<52	<27	<56	<27	<48	1776 +/- 200	<27	<27	<125	<44
	21-Mar-95	<5	<5	<12	<5	<10	<7	<10	1165 +/- 117	<4	<5	<46	<13
	4-Apr-95	<7	<7	<15	<6	<15	<6	<8	614 +/- 79	<7	<7	<48	<15
	20-Apr-95	<5	<10	<22	24 +/- 7 *	<22	<12	<19	1466 +/- 165	<9	<10	<57	<15
	3-May-95	<7	<7	<16	13 +/- 4 *	<15	<9	<13	996 +/- 116	<7	<7	<54	<15
	17-May-95	<8	<7	<15	6 +/- 3 *	<18	<8	<14	3110 +/- 223	<8	<8	<33	<9
	30-May-95	<10	<9	<19	<13	<16	<11	<17	2820 +/- 60	<8	<10	<40	<9
	3-Jun-95	<10	<10	<21	<10	<20	<12	<14	3103 +/- 92	<9	<9	<62	<19
	13-Jun-95	<9	<8	<19	<13	<19	<12	<16	1561 +/- 39	<9	<10	<35	<9
	20-Jun-95	<9	<8	<15	<10	<19	<11	<17	957 +/- 32	<9	<9	<35	<10
	28-Jun-95	<7	<8	<19	<10	<16	<8	<14	653+/-25	<7	<8	<33	<9
	6-Jul-95	<11	<10	<20	<12	<25	<11	<19	487+/-30	<9	<12	<37	<10
	11-Jul-95	<9	<9	<18	<9	<18	<9	<13	788+/-28	<8	<8	<31	<8
	18-Jul-95	<11	<9	<23	<10	<26	<11	<17	1319+/-45	<11	<12	<38	<11
	25-Jul-95	<11	<12	<25	<14	<21	<13	<19	1186 +/- 43	<11	<13	<44	<9
	1-Aug-95	<7	<7	<14	<8	<16	<7	<12	536+/-23	<6	<8	<26	<7
	8-Aug-95	<8	<7	<16	<6	<18	<7	<12	490 +/- 21	<7	<8	<30	<8
	16-Aug-95	<10	<8	<13	<10	<19	<9	<14	1061 +/- 30	<8	<10	<31	<9
	23-Aug-95	<9	<8	<15	<9	<20	<8	<13	643 +/- 24	<9	<9	<29	<9
	29-Aug-95	<9	<10	<20	<13	<20	<11	<18	5219 +/- 77	<9	<10	<41	<8
	5-Sep-95	<8	<7	<15	<7	<16	<8	<11	1441 +/- 35	<8	<8	<29	<9
	12-Sep-95	<8	<7	<14	<9	<19	<9	<13	4130 +/- 57	<8	<7	<32	<10
	3-Oct-95	<9	<9	<19	<9	<18	<9	<15	1621 +/- 42	<10	<9	<40	<9
	10-Oct-95	<8	<8	<15	<8	<17	<9	<14	1251 +/- 35	<8	<8	<37	<10
	17-Oct-95	<10	<9	<19	<9	<24	<11	<15	3900 +/- 65	<8	<10	<41	<12
	25-Oct-95	<9	<11	<15	<10	<21	<11	<16	3667 +/- 60	<10	<9	<36	<12
	1-Nov-95	<8	<10	<21	<10	<22	<11	<16	2151 +/- 55	<9	<10	<45	<14
	8-Nov-95	<10	<8	<17	<9	<16	<10	<14	1361 +/- 35	<9	<9	<35	<6
	16-Nov-95	<10	<9	<21	<10	<20	<10	<15	2153 +/- 43	<10	<11	<37	<10
	29-Nov-95	<12	<11	<24	<12	<26	<14	<20	662 +/- 40	<9	<11	<56	<16
	13-Dec-95	<7	<7	<13	<10	<16	<9	<13	1007 +/- 29	<8	<9	<32	<8
	21-Dec-95	<8	<8	<18	<10	<17	<8	<15	596 +/- 24	<8	<9	<27	<9
	28-Dec-95	<10	<8	<16	<9	<23	<8	<17	1182 +/- 34	<8	<10	<33	<10
SEDIMENTATION BASIN #2	26-May-95	<19	<17	<38	<21	<42	<21	<33	<18	<23	70 +/- 18	<62	<18

*** Results validated by recount (CRDR #9-5-0580 initiated to investigate). Activity determined to be due to steam generator drain to circulating water. Corrective actions taken included additional procedure guidance and disposition of sludge.**

TABLE 8.10 Sludge/Sediment

units are pCi/kg

SAMPLE LOCATION	DATE COLLECTED	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
Evap Pond 2 (#1)	17-Feb-95	<16	<15	<31	<21	<31	<17	<26	<15	<20	33 +/- 14	<49	<17
Evap Pond 2 (#2)	17-Feb-95	<17	<15	<21	<17	<32	<14	<24	<13	<15	22 +/- 17	<44	<10
Evap Pond 2 (#3)	17-Feb-95	<15	<15	<28	<19	<25	<14	<24	<19	<14	<19	<56	<13
Evap Pond 2 (#4)	17-Feb-95	<16	<11	<31	<17	<34	<11	<24	<18	<13	15 +/- 13	<56	<15
Evap Pond 2 (#5)	17-Feb-95	<14	<14	<27	<18	<33	<13	<23	<18	<14	<19	<55	<13
Evap Pond 2 (#6)	17-Feb-95	<15	<14	<29	23 +/- 17	<33	<17	<23	<20	<15	23 +/- 15	<50	<19
Evap Pond 2 (#7)	17-Feb-95	<14	<14	<30	<24	<34	<16	<26	<21	<14	<19	<65	<15
Evap Pond 2 (#8)	17-Feb-95	<15	<14	<32	<20	<34	<16	<22	<20	<13	<19	<53	<17
Evap Pond 2 (#9)	17-Feb-95	<16	<12	<28	<20	<31	<16	<25	<22	<14	20 +/- 13	<71	<14
Evap Pond 2 (#10)	17-Feb-95	<16	<12	<36	25 +/- 13	<29	<16	<30	<24	<17	29 +/- 18	<66	<20
Evap Pond 2 (#1)	12-May-95	<13	<13	<30	<20	<27	<15	<22	<13	14 +/- 9	<18	<51	<11
Evap Pond 2 (#2)	12-May-95	<16	<13	<26	<15	<31	<13	<18	<13	<14	<16	<40	<11
Evap Pond 2 (#3)	12-May-95	<13	<12	<28	<21	<30	<11	<21	<13	<15	<18	<44	<14
Evap Pond 2 (#4)	12-May-95	<16	<13	<34	23 +/- 16	<32	<17	<24	<21	<14	24 +/- 16	<57	<9
Evap Pond 2 (SW)	16-Aug-95	<12	<11	<24	30 +/- 9	<26	<11	<21	<11	<13	15 +/- 12	<37	<10
Evap Pond 2 (NW)	16-Aug-95	<13	<9	<23	59 +/- 11	<23	<12	<15	<11	<11	<15	<37	<12
Evap Pond 2 (NE)	16-Aug-95	<13	<10	<22	44 +/- 12	<23	<11	<16	<11	18 +/- 7	13 +/- 11	<38	<5
Evap Pond 2 (SE)	16-Aug-95	<11	<11	<20	39 +/- 12	<20	<10	<19	<12	<9	<14	<37	<11
Evap Pond 2 (center)	16-Aug-95	<11	<10	<23	<15	<24	<10	<19	<13	<11	16 +/- 10	<36	<12
Evap Pond 2 (N)	5-Dec-95	<14	<14	<30	67 +/- 15	<26	<15	<21	<33	<12	<14	<94	<19
Evap Pond 2 (S)	5-Dec-95	<13	<14	<29	34 +/- 11	<28	<13	<18	<23	<11	16 +/- 10	<55	<24
Evap Pond 2 (E)	5-Dec-95	<12	<11	<28	36 +/- 13	<27	<13	<20	<38	<12	<16	<75	<30
Evap Pond 2 (W)	5-Dec-95	<14	<15	<31	28 +/- 16	<30	<16	<20	<35	<13	17 +/- 11	<83	<15

TABLE 8.10 Sludge/Sediment

units are pCi/kg

SAMPLE LOCATION	DATE COLLECTED	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
Evap Pond 1 (#1)	16-Mar-95	<16	<13	<30	<18	<33	<17	<29	<24	<13	<15	<65	<11
Evap Pond 1 (#2)	16-Mar-95	<12	<15	<26	<15	<28	<18	<25	<21	<13	<14	<65	<18
Evap Pond 1 (#3)	16-Mar-95	<14	<13	<33	<17	<29	<16	<28	<26	<12	<16	<63	<14
Evap Pond 1 (#4)	16-Mar-95	<13	<14	<31	<17	<30	<14	<24	<23	<12	<15	<61	<20
Evap Pond 1 (#5)	16-Mar-95	<11	<14	<36	<14	<28	<16	<24	<21	<14	<14	<62	<11
Evap Pond 1 (#6)	16-Mar-95	<15	<14	<25	<16	<27	<17	<24	<24	<13	<14	<70	<15
Evap Pond 1 (#7)	16-Mar-95	<14	<12	<28	<11	<28	<16	<26	<31	<11	<16	<77	<23
Evap Pond 1 (#8)	16-Mar-95	<15	<14	<37	<16	<38	<20	<28	<39	<14	<15	<73	<31
Evap Pond 1 (#9)	16-Mar-95	<16	<16	<42	<17	<38	<19	<23	<42	<15	<18	<97	<28
Evap Pond 1 (#10)	16-Mar-95	<14	<20	<45	<19	<45	<23	<33	<43	<17	<20	<106	<31
Evap Pond 1 (#11)	16-Mar-95	<13	<17	<32	<15	<30	<16	<26	<41	<14	<15	<112	<15
Evap Pond 1 (#1)	17-May-95	<17	<12	<27	<20	<30	<13	<20	<12	<11	<15	<49	<14
Evap Pond 1 (#2)	17-May-95	<12	<10	<23	<18	<31	<11	<25	<13	<13	<13	<42	<13
Evap Pond 1 (#3)	17-May-95	<13	<13	<30	<19	<23	<13	<20	<14	<11	<15	<48	<11
Evap Pond 1 (#4)	17-May-95	<15	<13	<26	<18	<33	<14	<26	<15	<13	<16	<45	<12
Evap Pond 1 (#5)	17-May-95	<14	<15	<29	<18	<26	<14	<26	<13	<13	<14	<46	<15
Evap Pond 1 (SE)	16-Aug-95	<10	<10	<24	<12	<23	<12	<18	<9	<10	<12	<34	<10
Evap Pond 1 (NW)	16-Aug-95	<12	<10	<20	<13	<23	<11	<16	<10	<10	<11	<36	<10
Evap Pond 1 (NE)	16-Aug-95	<11	<11	<21	<13	<22	<12	<19	<11	<11	<13	<37	<11
Evap Pond 1 (SW)	16-Aug-95	<10	<10	<19	<11	<28	<11	<17	<11	<9	<10	<34	<10
Evap Pond 1 (N)	5-Dec-95	<12	<11	<25	<15	<28	<13	<20	<21	<11	<14	<60	<17
Evap Pond 1 (S)	5-Dec-95	<11	<11	<26	<13	<24	<12	<22	<19	<11	<12	<51	<14
Evap Pond 1 (E)	5-Dec-95	<14	<12	<28	<14	<27	<14	<22	<21	<9	<14	<61	<20
Evap Pond 1 (W)	5-Dec-95	<12	<13	<28	<14	<28	<15	<20	<24	<11	<12	<68	<20

TABLE 8.11 Milk

ODCM required samples denoted by *

units are pCi/liter

CROSSWINDS DAIRY (SITE #50)*				
DATE COLLECTED	I-131	Cs-134	Cs-137	Ba/La-140
3-Jan-95	<LLD	<LLD	<LLD	<LLD
7-Feb-95	<LLD	<LLD	<LLD	<LLD
7-Mar-95	0.8 +/- 0.1	<LLD	<LLD	<LLD
4-Apr-95	<LLD	<LLD	<LLD	<LLD
2-May-95	0.6 +/- 0.2	<LLD	<LLD	<LLD
6-Jun-95	<LLD	<LLD	<LLD	<LLD
10-Jul-95	<LLD	<LLD	<LLD	<LLD

BUTLER DAIRY (SITE #51)*				
DATE COLLECTED	I-131	Cs-134	Cs-137	Ba/La-140
3-Jan-95	<LLD	<LLD	<LLD	<LLD
7-Feb-95	<LLD	<LLD	<LLD	<LLD
7-Mar-95	<LLD	<LLD	<LLD	<LLD
4-Apr-95	<LLD	<LLD	<LLD	<LLD
2-May-95	<LLD	<LLD	<LLD	<LLD
6-Jun-95	<LLD	<LLD	<LLD	<LLD
10-Jul-95	<LLD	<LLD	<LLD	<LLD

KERR DAIRY (SITE #53)*				
DATE COLLECTED	I-131	Cs-134	Cs-137	Ba/La-140
3-Jan-95	<LLD	<LLD	<LLD	<LLD
7-Feb-95	<LLD	<LLD	<LLD	<LLD
7-Mar-95	0.3 +/- 0.1	<LLD	<LLD	<LLD
4-Apr-95	<LLD	<LLD	<LLD	<LLD
2-May-95	<LLD	<LLD	<LLD	<LLD
6-Jun-95	<LLD	<LLD	<LLD	<LLD
10-Jul-95	<LLD	<LLD	<LLD	<LLD

DICKMAN DAIRY (SITE #54)				
DATE COLLECTED	I-131	Cs-134	Cs-137	Ba/La-140
3-Jan-95	<LLD	<LLD	<LLD	<LLD
7-Feb-95	<LLD	<LLD	<LLD	<LLD
7-Mar-95	0.3 +/- 0.1	<LLD	<LLD	<LLD
4-Apr-95	<LLD	<LLD	<LLD	<LLD
2-May-95	<LLD	<LLD	<LLD	<LLD
6-Jun-95	<LLD	<LLD	<LLD	<LLD
10-Jul-95	<LLD	<LLD	<LLD	<LLD

PEW DAIRY (SITE #56)*				
DATE COLLECTED	I-131	Cs-134	Cs-137	Ba/La-140
3-Jan-95	0.4 +/- 0.2	<LLD	<LLD	<LLD
7-Feb-95	<LLD	<LLD	<LLD	<LLD
7-Mar-95	0.3 +/- 0.1	<LLD	<LLD	<LLD
4-Apr-95	<LLD	<LLD	<LLD	<LLD
2-May-95	<LLD	<LLD	<LLD	<LLD
6-Jun-95	<LLD	<LLD	<LLD	<LLD
10-Jul-95	<LLD	<LLD	<LLD	<LLD

Milk sampling discontinued as of August since there are no milk animals located within 5 miles of PVNGS.

FIGURE 8.1 HISTORICAL GROSS BETA IN AIR 1986 - 1995 (WEEKLY SYSTEM AVERAGES)

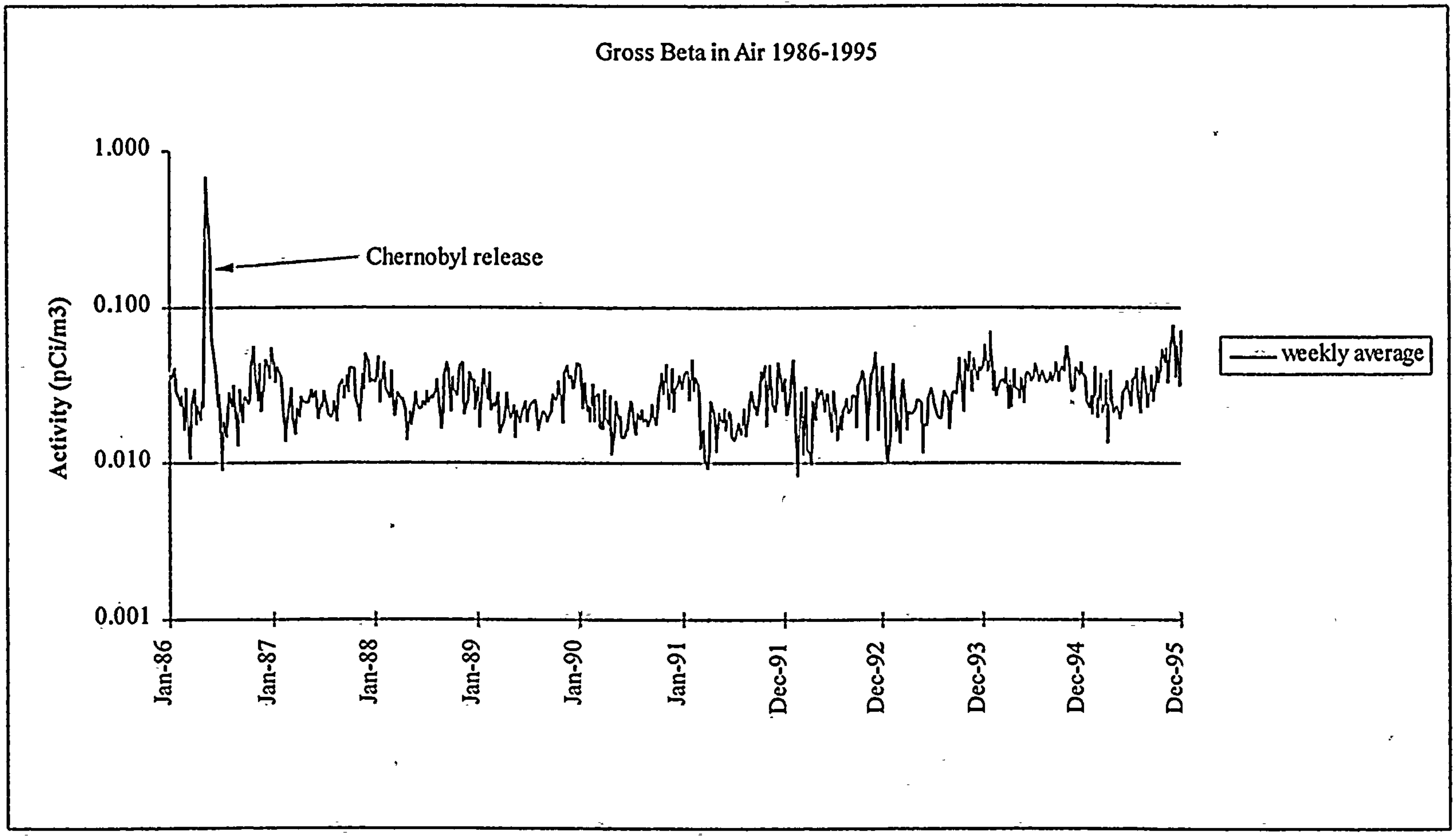
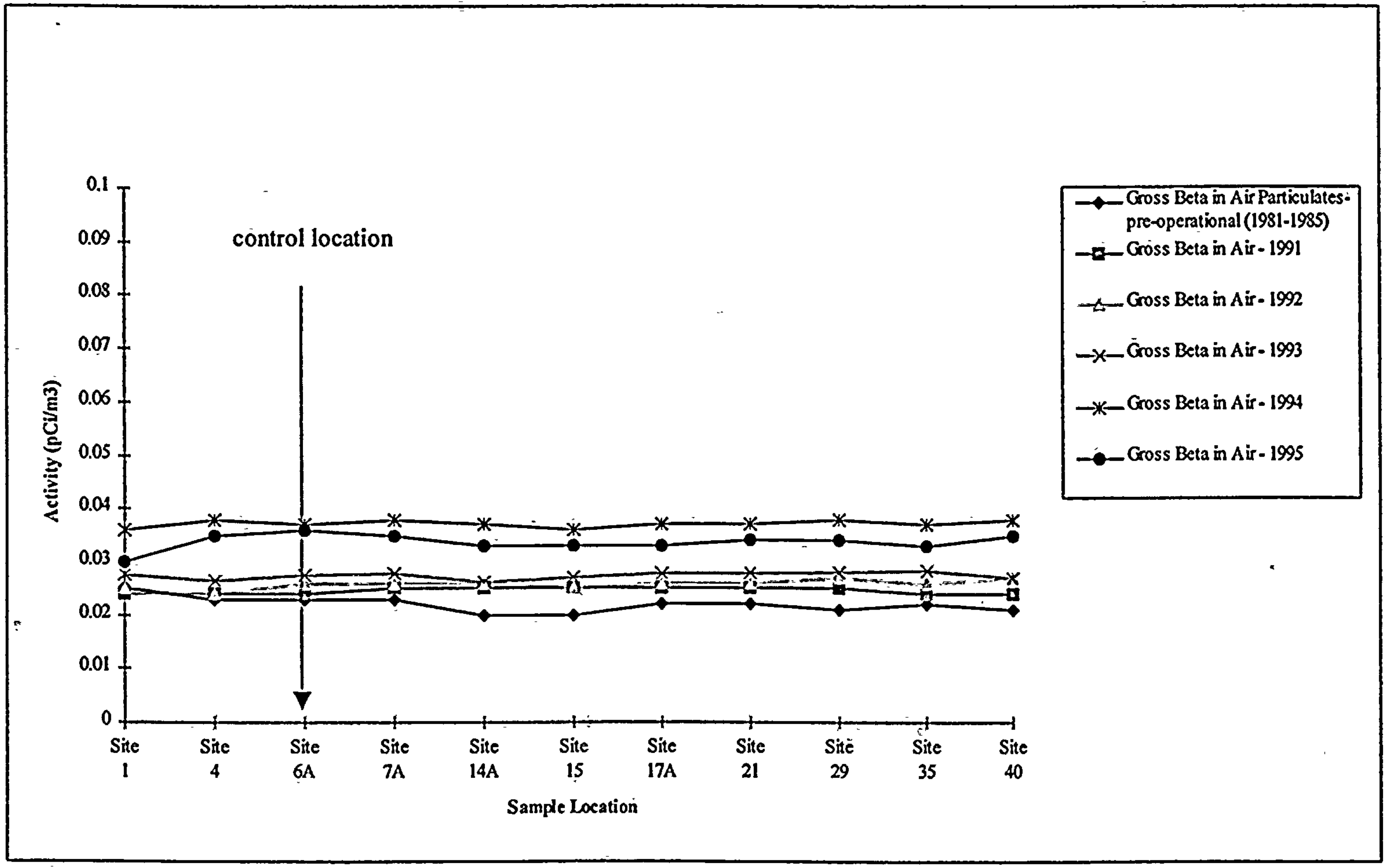


FIGURE 8.2 HISTORICAL GROSS BETA IN AIR (ANNUAL SITE TO SITE COMPARISONS) COMPARED TO PRE-OP



The 1994 and 1995 data trend higher. This is evidently the result of changing to the onsite central laboratory as our analyzing laboratory in 1994, which has shown a consistently high bias. The indicator locations trended well with the control location. Additionally, the central laboratory showed satisfactory results for EPA Performance Evaluation Study samples. No action is warranted as gross beta in air is trended and compared to action level values on a routine basis.

FIGURE 8.3 GROSS BETA IN DRINKING WATER

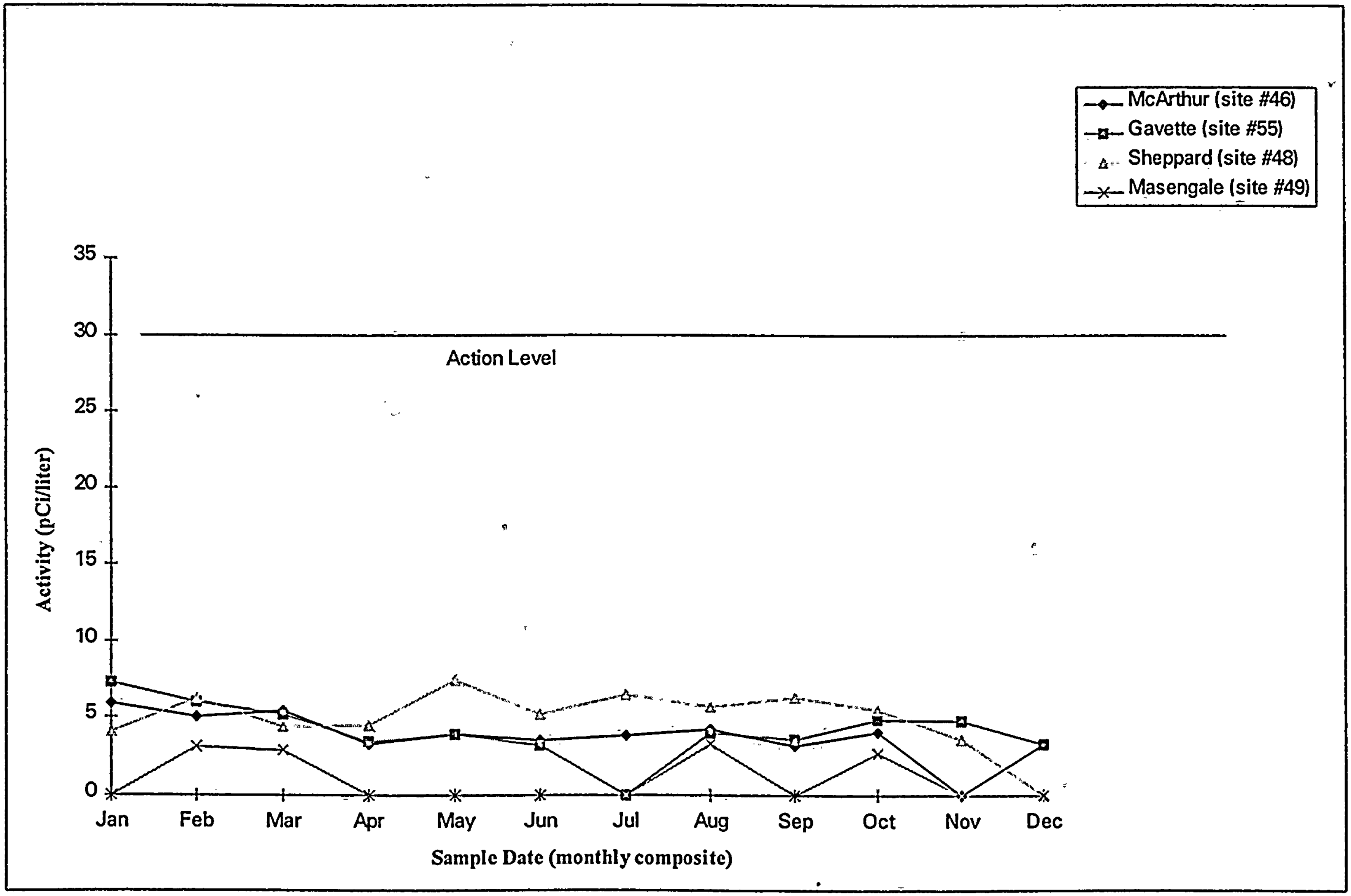


FIGURE 8.4 SOIL Cs-137 COMPARED TO ONSITE SEDIMENT

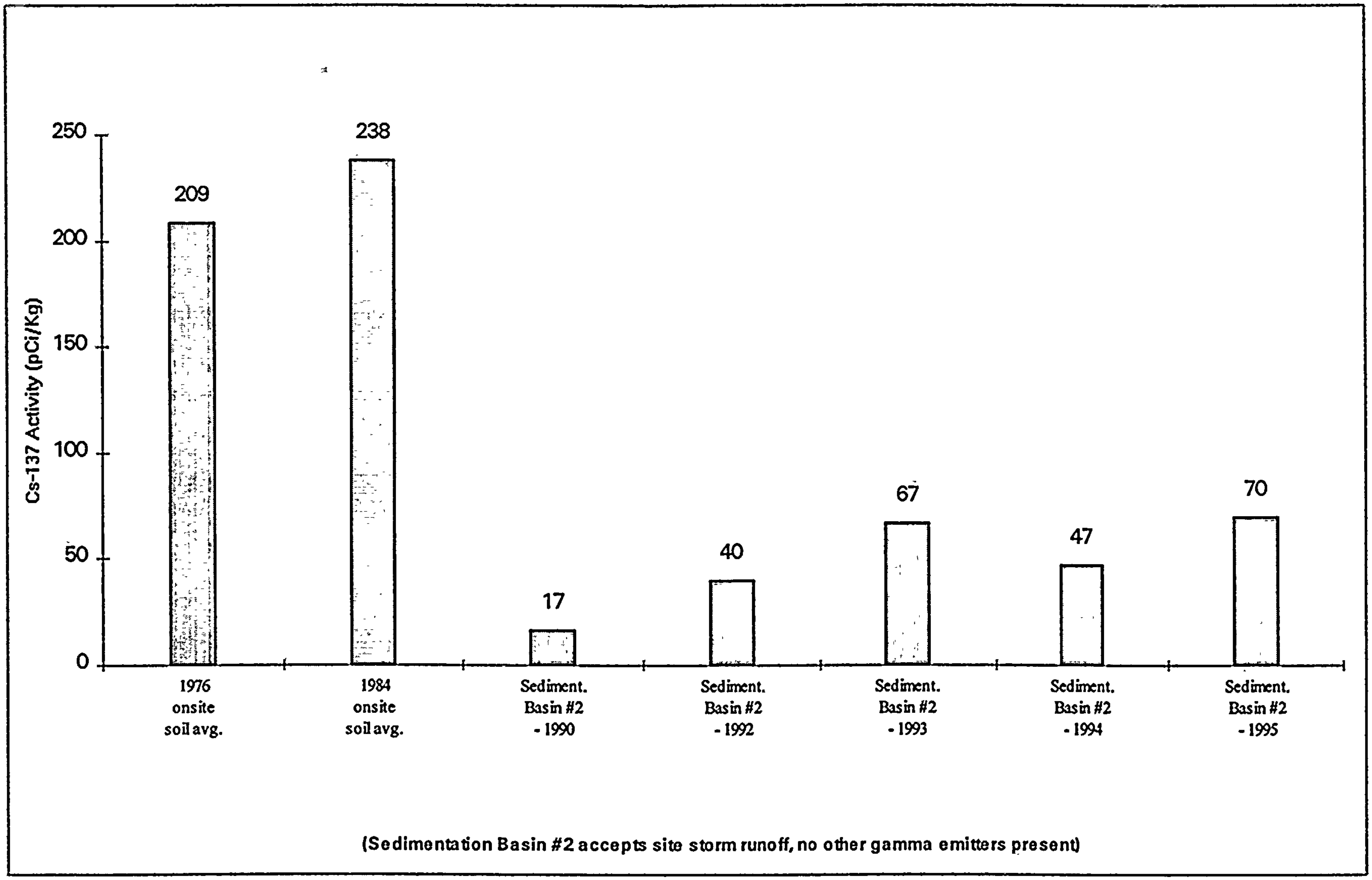
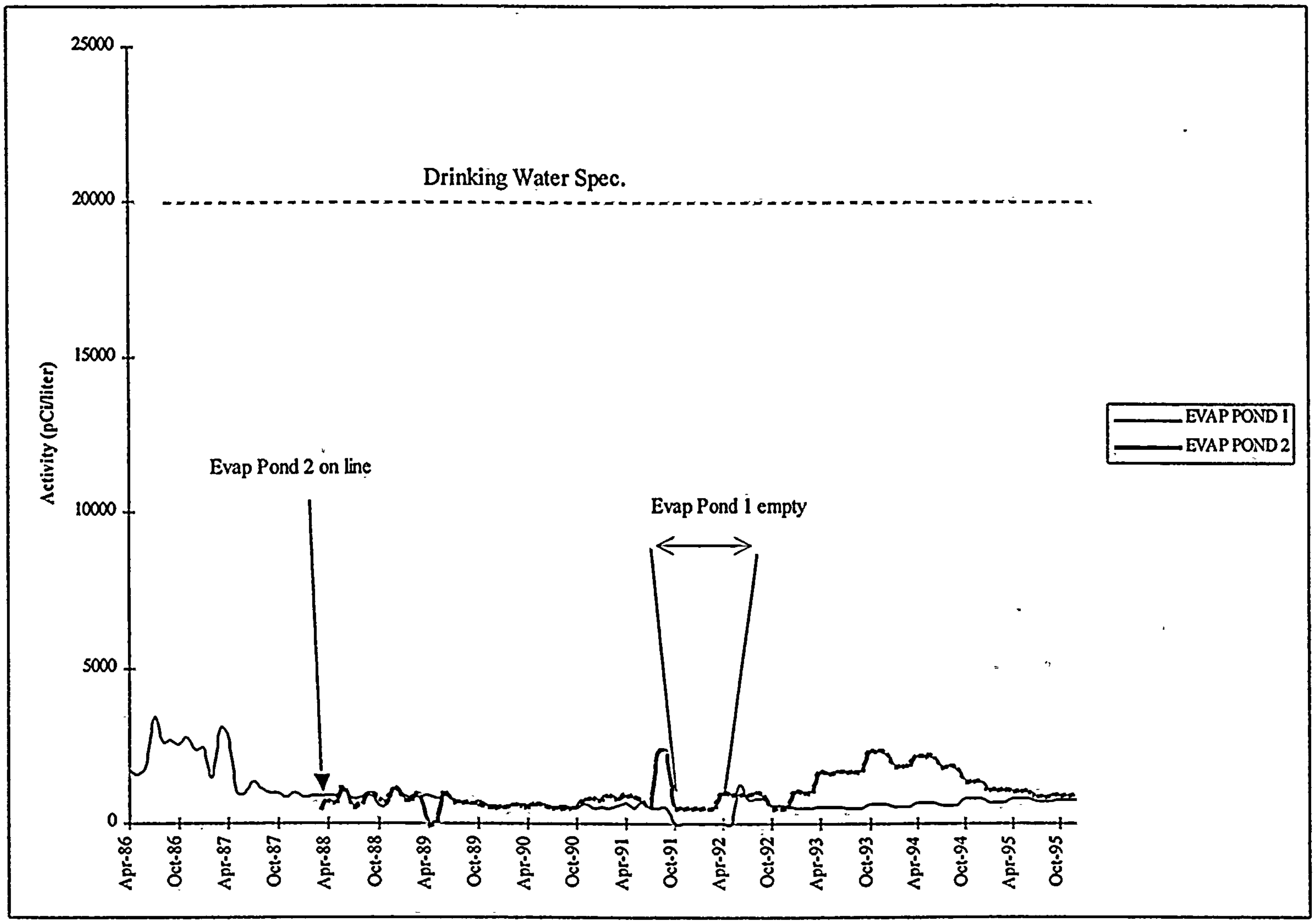


FIGURE 8.5 EVAPORATION POND TRITIUM ACTIVITY



9.0 Thermoluminescent Dosimetry (TLD) Results and Data Interpretation

Beginning in 1984, the Panasonic Model 812 Dosimeter replaced all other TLDs in use. The Model 812 is a multi-element dosimeter combining two elements of lithium borate and two elements of calcium sulfate under various filters.

Thermoluminescent dosimeters were placed in forty-nine locations from one to thirty-five miles from the PVNGS. TLD locations are shown in Figures 2.1 and 2.2. TLD locations are described in Table 9.1. TLD results for 1995 are presented in Table 9.2. TLD results for 1985 through 1995 are presented in graphical form on Figure 9.1 (excluding transit control TLD #45).

Figure 9.2 depicts the environmental TLD results from 1995 as compared to the pre-operational TLD results (excluding locations #43 which was deleted, and #46-50 due to no pre-op TLD for comparison). As can be seen, the site to site comparisons indicate a direct correlation with respect to pre-operational results. It is evident that the offsite dose, as measured by TLDs, has not changed since Palo Verde became operational.

TABLE 9.1 TLD SITE LOCATIONS

(distances and directions are relative to Unit 2 in miles)

TLD SITE	LOCATION	LOCATION DESCRIPTION
1	E30	APS Western Division Office, Goodyear
2	ENE24	Scott-Libby School, Perryville and Thomas Roads
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 US 80
6	SSE31	APS Gila Bend substation, frontage road west of town
7	SE7	Old US 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, WRF access road
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.
25	WSW5	Elliot Rd., 3 miles west of Wintersburg Rd. at cattleguard
26	SSW5	Sheppard farm, 13202 S. 383rd Ave., 0.5 miles west of house
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	NNW8	Fire Station, 40901 W. Osborn Rd., Tonopah
36	N5	SW corner of Wintersburg Rd. and Van Buren St.
37	NNE5	SE corner of 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. south of trailer park

TLD SITE	LOCATION	LOCATION DESCRIPTION
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	DELETED	DELETED
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	3.5 miles west of Wintersburg Rd., 2 miles south of Buckeye-Salome Rd.

TABLE 9.2 1995 ENVIRONMENTAL TLD RESULTS

(units are in mR/std qtr)

TLD Site #	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Average
1	21.8	21.8	21.6	19.4	21.2
2	21.2	24.6	22.5	21.4	22.4
3	21.8	24.2	24.0	23.5	23.4
4	22.7	26.1	24.0	22.5	23.8
5	21.8	23.8	23.5	20.3	22.4
6	25.7	27.6	28.1	23.1	26.1
7	24.8	26.6	25.7	24.0	25.3
8	22.2	24.2	24.0	23.1	23.4
9	28.7	32.6	30.0	27.6	29.7
10	21.8	25.3	24.0	22.0	23.3
11	23.3	26.6	25.3	23.5	24.7
12	23.3	24.6	24.0	19.9	23.0
13	25.3	27.2	25.3	24.6	25.6
14	24.2	26.6	25.7	22.5	24.8
15	22.2	25.3	25.3	22.5	23.8
16	20.7	22.7	22.0	22.0	21.9
17	24.8	27.2	25.7	23.5	25.3
18	22.2	24.6	24.0	22.0	23.2
19	25.3	27.2	25.7	24.6	25.7
20	23.8	25.3	24.8	23.1	24.3
21	24.8	26.6	26.8	24.6	25.7
22	25.3	28.5	27.2	25.1	26.5
23	21.8	24.2	22.9	22.5	22.9
24	20.7	24.2	22.5	21.4	22.2
25	22.2	24.6	24.0	22.0	23.2
26	26.4	29.6	28.5	27.6	28.0
27	26.4	29.2	28.1	25.7	27.4
28	24.8	28.1	27.2	24.0	26.0
29	23.8	26.1	25.7	24.0	24.9
30	24.8	28.1	27.2	22.5	25.7
31	21.8	24.6	24.8	22.0	23.3
32	24.8	26.1	27.2	21.4	24.9
33	24.8	28.5	26.8	24.0	26.0
34	25.7	29.2	28.1	26.1	27.3
35	29.2	32.0	32.0	28.3	30.4
36	24.8	25.7	25.7	25.1	25.3
37	22.7	24.6	24.0	23.1	23.6
38	25.7	28.1	28.1	25.1	26.8
39	23.8	24.6	24.4	22.5	23.8
40	22.7	26.1	25.3	23.1	24.3
41	26.4	29.2	27.6	26.1	27.3
42	24.2	27.6	26.4	24.0	25.6
43	deleted				
44 *	20.7	24.6	22.5	20.3	22.0
45 **	5.2	7.6	6.0	6.3	6.3
46	20.7	22.7	22.5	21.4	21.8
47	23.3	24.2	23.5	23.1	23.5
48	22.7	24.6	22.9	23.1	23.3
49	20.7	23.3	22.5	22.0	22.1
50	18.1	20.3	19.7	19.4	19.4

* Site 44 is the control TLD

** Site 45 is the transit control TLD (stored in lead pig)

FIGURE 9.1 NETWORK ENVIRONMENTAL TLD EXPOSURE RATES

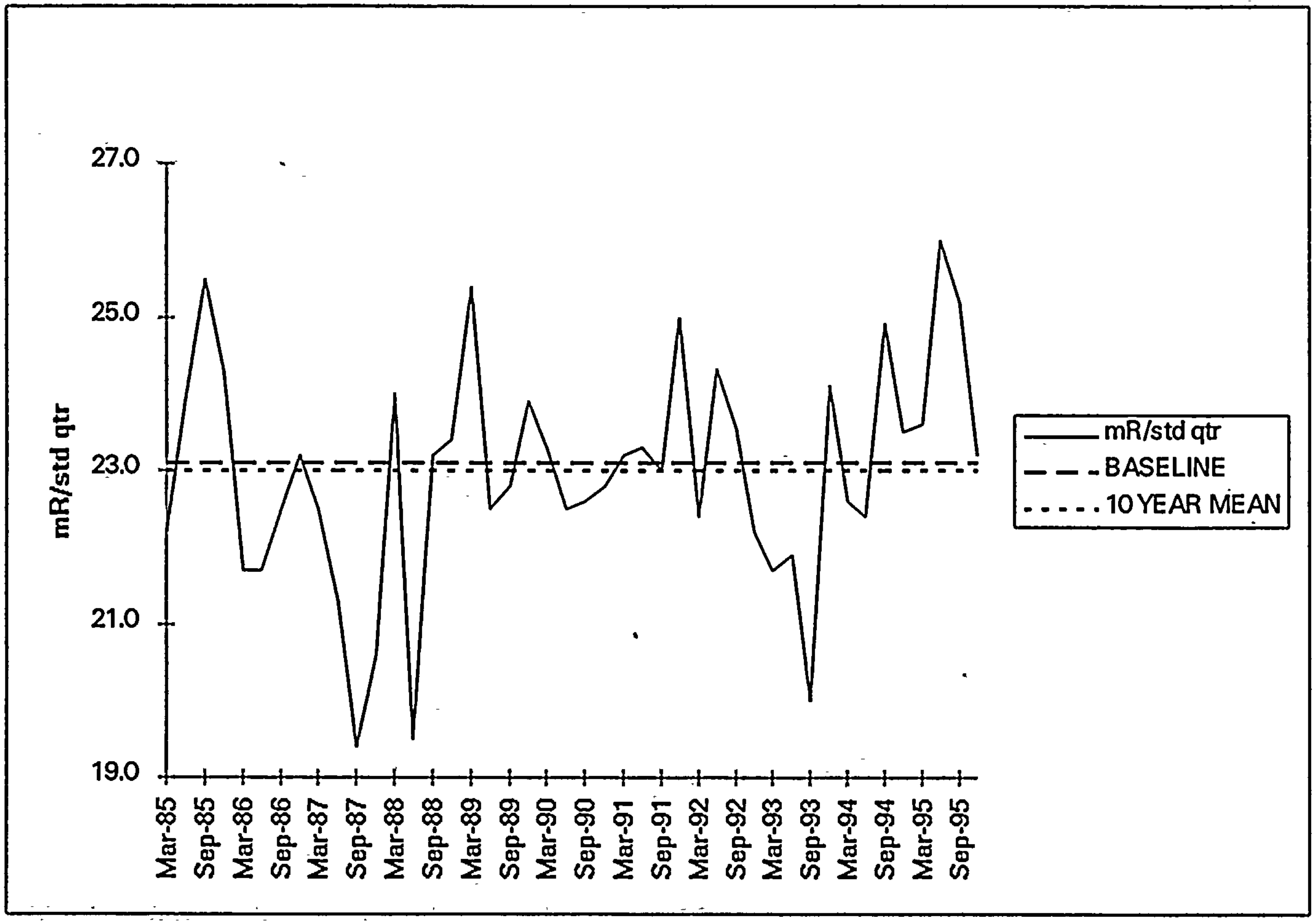
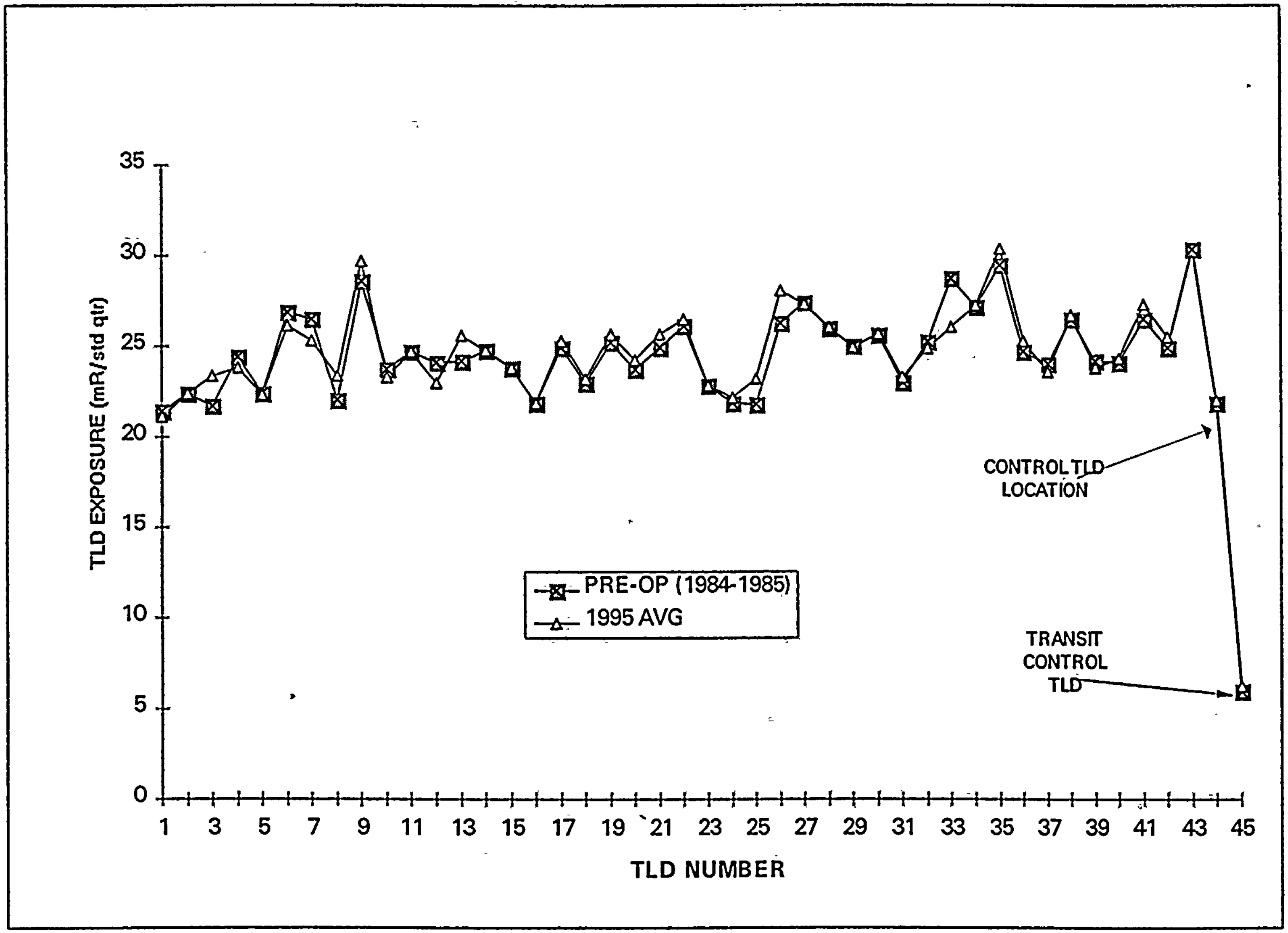


FIGURE 9.2 ENVIRONMENTAL TLD COMPARISON (PRE-OP /1995)



10.0 Land Use Census

10.1 Introduction

In accordance with the PVNGS ODCM Section 6.2, the annual Land Use Census was performed within a five mile radius of the mid-line of Unit 2 containment in February, 1996.

Observations were made in each of the 16 meteorological sectors to determine the nearest milking animals, residences, and gardens of greater than 500 square feet. This census was completed by driving the roads and speaking with residents within a five mile radius of PVNGS.

The results of the Land Use Census are presented in Table 10.1 and discussed below. The directions and distances listed are in sectors and miles from the Unit 2 containment. All locations indicated on Table 10.1 were determined by use of a Global Position System (GPS) instrument.

10.2 Census Results

10.2.1 Nearest Resident

There was one change in the nearest resident status noted in the census. A new residence was built in the ESE sector closer to PVNGS.

10.2.2 Milking Animals

There were no milking animals located in the five mile radius in the census.

10.2.3 Vegetable Gardens

No new vegetable gardens were located in the five mile radius in the census.

10.3 Conclusion

Nearest resident status changed for one sector.

A dose calculation was performed using the GASPAR code for a supplemental garden location at 2.60 miles NNE of Unit 2. This location was chosen since it shows the highest potential organ dose. The resultant dose to an individual at this location was less than 1 mrem (0.189 mrem, actual), child thyroid.

The dose calculation was performed a second time assuming there was a milk animal at this same location. The resultant dose to a child thyroid was also less than 1 mrem (0.274 mrem, actual). As can be seen, both calculations indicated insignificant dose due to PVNGS effluents.

TABLE 10.1 1995 LAND USE CENSUS

(Distances and directions are relative to Unit 2 in miles)

SECTOR	NEAREST RESIDENT	NEAREST GARDEN	NEAREST MILK ANIMAL (COW/GOAT)	CALCULATED DOSE (mrem)	CHANGE FROM 1994
N	1.79	NONE	NONE	2.82E-02	NONE
NNE	1.66	2.60	NONE	7.09E-02 (resident) 1.58E-01 (garden)	NONE
NE	2.16	NONE	NONE	6.43E-02	NONE
ENE	2.77	2.87	NONE	3.78E-02 (resident) 1.67E-01 (garden)	NONE
E	2.86	NONE	NONE	4.44E-02	NONE
ESE	3.44	NONE	NONE	4.78E-02	NEAREST RESIDENT
SE	4.18	NONE	NONE	5.16E-02	NONE
SSE	4.21	NONE	NONE	1.39E-01	NONE
S	4.76	NONE	NONE	1.80E-01	NONE
SSW	4.17	NONE	NONE	1.08E-01	NONE
SW	2.56	NONE	NONE	5.36E-02	NONE
WSW	NONE	NONE	NONE	NA	NONE
W	NONE	NONE	NONE	NA	NONE
WNW	NONE	NONE	NONE	NA	NONE
NW	NONE	NONE	NONE	NA	NONE
NNW	2.63	NONE	NONE	1.17E-02	NONE

NOTE:

Dose calculations were performed using the GASPAR code and 1995 meteorological data and source term. Dose reported for each location is the total for all three PVNGS Units and is the highest individual organ dose identified.

11.0 Summary and Conclusions

The conclusions are based on a review of the radioassay results and background gamma radiation measurements for the 1995 calendar year. The radioassay results and conclusions are based on observations of fission product and/or activation radionuclides and do not include observations of naturally occurring radionuclides, with the exception of gross beta in air and drinking water.

A summary of all sample results for 1995 is presented in Table 11.1. **With the exception of onsite surface water and associated sludge, all sample assays presented in the report reveal no detectable man-made radioactivity which can be attributed to PVNGS.** I-131 concentrations identified on occasion in the Evaporation Ponds, WRF Influent, WRF Centrifuge sludge, and Reservoir are the result of offsite sources and appear in the effluent sewage from Phoenix. The levels of I-131 detected in these locations are consistent with levels identified in previous years.

Natural background radiation is consistent with measurements reported in previous pre-operational and Operational Radiological Environmental Monitoring Program annual reports, Reference 2.

TABLE 11.1 ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Palo Verde Nuclear Generating Station
Maricopa County, Arizona

Docket Nos. STN 50-528/529/530
Calendar Year 1995

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD) (from Table 6.3)	All Indicator Locations Mean (f)[a] Range	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f)[a] Range	Control Locations Mean (f)[a] Range	Number of Nonroutine Reported Measurements
Direct Radiation (mR/std. qtr.)	TLD - 196	NA	24.5 (188/188) 18.1 - 32.6	Site #35 8 miles 330°	30.4 (4/4) 28.3 - 32.0	22.0 (4/4) 20.3 - 24.6	0
Air Particulates (pCi/m^3)	Gross Beta - 553	0.002	0.034 (501/501) 0.011 - 0.083	Site #7A 8 miles 140°	0.035 (52/52) 0.013 - 0.083	0.036 (52/52) 0.012 - 0.086	0
	Gamma Spec. Composite- 42						
	Cs-134	0.01	<LLD	NA	<LLD	<LLD	0
	Cs-137	0.02	<LLD	NA	<LLD	<LLD	0
Air Radioiodine (pCi/m^3)	Gamma Spec. - 553	0.02	<LLD	NA	<LLD	<LLD	0
Broadleaf Vegetation (pCi/Kg-wet)	Gamma Spec. - 27						
	I-131	18	<LLD	NA	<LLD	<LLD	0
	Cs-134	16	<LLD	NA	<LLD	<LLD	0
	Cs-137	17	<LLD	NA	<LLD	<LLD	0
Milk (pCi/l)	I-131 - 35	1	0.5 (4/28) 0.3 - 0.8	Site #50 11 miles 70°	0.7 (2/7) 0.6 - 0.8	0.35 (2/7) 0.3 - 0.4	0
	Gamma Spec. - 35						
	Cs-134	10	<LLD	NA	<LLD	<LLD	0
	Cs-137	11	<LLD	NA	<LLD	<LLD	0
	Ba-140	44	<LLD	NA	<LLD	<LLD	0
	La-140	10	<LLD	NA	<LLD	<LLD	0

TABLE 11.1 ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Palo Verde Nuclear Generating Station
Maricopa County, Arizona

Docket Nos. STN 50-528/529/530
Calendar Year 1995

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD) (from Table 6.3)	All Indicator Locations Mean (f)[a] Range	Location with Highest Annual Mean Name Distance and Direction	Location with Highest Annual Mean Mean (f)[a] Range	Control Locations Mean (f)[a] Range	Number of Nonroutine Reported Measurements
Groundwater (pCi/l)	Tritium - 8	300	<LLD	NA	<LLD	NA	0
	Gamma Spec. - 9						
	Mn-54	11	<LLD	NA	<LLD	NA	0
	Fe-59	19	<LLD	NA	<LLD	NA	0
	Co-58	11	<LLD	NA	<LLD	NA	0
	Co-60	11	<LLD	NA	<LLD	NA	0
	Zn-65	26	<LLD	NA	<LLD	NA	0
	Zr-95	17	<LLD	NA	<LLD	NA	0
	Nb-95	12	<LLD	NA	<LLD	NA	0
	I-131	10	<LLD	NA	<LLD	NA	0
	Cs-134	10	<LLD	NA	<LLD	NA	0
	Cs-137	11	<LLD	NA	<LLD	NA	0
	Ba-140	44	<LLD	NA	<LLD	NA	0
	La-140	10	<LLD	NA	<LLD	NA	0
Drinking Water (pCi/l)	Gross Beta - 48	3.0	4.5 (37/48) 2.7 - 7.4	Site #48 5 miles 190°	5.4 (11/12) 3.6 - 7.4	NA	0
	Tritium - 16	300	<LLD	NA	<LLD	NA	0
	Gamma Spec. - 48						
	Mn-54	11	<LLD	NA	<LLD	NA	0
	Fe-59	19	<LLD	NA	<LLD	NA	0
	Co-58	11	<LLD	NA	<LLD	NA	0
	Co-60	11	<LLD	NA	<LLD	NA	0
	Zn-65	26	<LLD	NA	<LLD	NA	0
	Zr-95	17	<LLD	NA	<LLD	NA	0
	Nb-95	12	<LLD	NA	<LLD	NA	0
	I-131	10	<LLD	NA	<LLD	NA	0

TABLE 11.1 ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Palo Verde Nuclear Generating Station
Maricopa County, Arizona

Docket Nos. STN 50-528/529/530
Calendar Year 1995

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD) (from Table 6.3)	All Indicator Locations Mean (f)[a] Range	Location with Highest Annual Mean Name Distance and Direction	Mean (f)[a] Range	Control Locations Mean (f)[a] Range	Number of Nonroutine Reported Measurements
Drinking Water (continued)	Cs-134	10	<LLD	NA	<LLD	NA	0
	Cs-137	11	<LLD	NA	<LLD	NA	0
	Ba-140	44	<LLD	NA	<LLD	NA	0
	La-140	10	<LLD	NA	<LLD	NA	0
Surface Water (pCi/l)	Gamma Spec. - 36						
	Mn-54	11	<LLD	NA	<LLD	NA	0
	Fe-59	19	<LLD	NA	<LLD	NA	0
	Co-58	11	<LLD	NA	<LLD	NA	0
	Co-60	11	<LLD	NA	<LLD	NA	0
	Zn-65	26	<LLD	NA	<LLD	NA	0
	Zr-95	17	<LLD	NA	<LLD	NA	0
	Nb-95	12	<LLD	NA	<LLD	NA	0
	I-131	10	17 (1/36) 17	Site #60 Onsite 80°	17 (1/12) 17	NA	0
	Cs-134	10	<LLD	NA	<LLD	NA	0
	Cs-137	11	<LLD	NA	<LLD	NA	0
	Ba-140	44	<LLD	NA	<LLD	NA	0
	La-140	10	<LLD	NA	<LLD	NA	0
	Tritium - 12	300	853 (8/12) 684 - 1078	Site #63 Onsite 180°	964 (4/4) 864 - 1078	NA	0

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

NOTE: Miscellaneous samples which are not indicated on Table 6-4 of the ODCM are not included on this table.

12.0 References

1. Pre-Operational Radiological Monitoring Program, Summary Report 1979-1985.

2. 1985 - 1994 Annual Radiological Environmental Operating Reports, Palo Verde Nuclear Generating Station.

3. Palo Verde Nuclear Generating Station Technical Specifications.

4. Offsite Dose Calculation Manual, PVNGS Units 1, 2, and 3.

5. Regulatory Guide 4.8, Environmental Technical Specifications for Nuclear Power Plants.

6. Branch Technical Position, Revision 1, November 1979.

APPENDIX A - CORRECTIONS TO THE 1994 AREOR

- On Table 9.2 of the 1994 Annual Report (page 52), TLD Site No. 6 was indicated to be the control TLD location. This should have referred to Site No. 44 as the control location.