CALVERT CLIFFS NUCLEAR POWER PLANT

Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

BGE

May 9, 1997

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Calvert Cliffs Independent Spent Fuel Storage Installation, Docket No. 72-8
Radiological Environmental Monitoring Program Annual Report

REFERENCES: (a) Calvert Cliffs Nuclear Power Plant Technical Specification 6.6.2

(b) Calvert Cliffs Independent Spent Fuel Storage Installation Technical Specification 6.2

In accordance with References (a) and (b), the Baltimore Gas and Electric Company is submitting the Annual Radiological Environmental Monitoring Report, dated March 1997.

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

Chas Earls

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CEE/NH/bjd

140057

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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL REPORT

March 1997

Calvert Cliffs Nuclear Power Plant
Units 1 and 2
and the
Independent Spent Fuel Storage Installation

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January 1 to December 31, 1996

BGE

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM FOR THE CALVERT CLIFFS NUCLEAR POWER PLANT UNITS 1 AND 2 AND THE INDEPENDENT SPENT FUEL STORAGE INSTALLATION

January 1 - December 31, 1996

G. K. BARLEY
L. J. BARTAL, Ph.D.
A. J. KAUPA

BALTIMORE GAS AND ELECTRIC COMPANY

MARCH 1997

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I. SUMMARY

During the 1996 operating period for Calvert Cliffs Nuclear Power Plant (CCNPP) Units 1 and 2, radiochemical analyses were performed on environmental samples, and thermoluminescent dosimeters (TLDs) were analyzed for ambient radiation exposure rates. These analyses were performed to satisfy the requirements of the CCNPP Off-Site Dose Calculation Manual (ODCM), Sections 3/4.12.

For the Independent Spent Fuel Storage Installation (ISFSI), radiochemical analyses were performed on environmental samples, some of which were in common with the power plant program. Additional TLDs, some of which are also in common with the power plant program, were analyzed for ambient radiation exposure rates. These analyses were performed to satisfy the requirements of the ODCM.

In addition, analyses were performed on quality assurance samples, and quality assurance TLDs were analyzed for ambient radiation exposure rates as part of the Analytics Cross-Check Program and an internal Quality Assurance Program with Duke Power Company, Radiological and Environmental Services.

And lastly, analyses were performed on extra environmental samples, and extra TLDs were analyzed for ambient radiation exposure rates. Also, six pressurized ion chambers continuously monitored the environs around the plant for ambient radiation levels. The additional analyses reflect a commitment to maintain historical continuity for samples and sampling pathways discontinued from the program when the Environmental Technical Specifications were changed in March 1985 and to satisfy our commitment to the community.

The samples collected from the aquatic environment included bay water, fish, oysters, and shoreline sediment samples. Bay water was analyzed for tritium and gamma emitters. Fish, oysters, and shoreline sediments were analyzed for gamma emitting radionuclides.

Monitoring the atmospheric environment involved sampling the air at various locations surrounding CCNPP and the ISFSI. Air particulates and gaseous iodine were collected on glass fiber filters and silver zeolite molecular sieve cartridges, respectively. The particulate filters were analyzed for beta activity and gamma emitting nuclides. The molecular sieve cartridges were analyzed for airborne gaseous radioiodine.

Samples from the terrestrial environment consisted of vegetation and soil samples, collected and analyzed for gamma emitters. Vegetation samples for the CCNPP REMP were also analyzed for I-131.

Measurements of direct radiation, as required by the ODCM, were performed by analyzing TLDs from forty locations surrounding CCNPP and the ISFSI.

Low levels of various man-made fission and activation by-products were observed in the environment surrounding the plant during 1996. Some of these observations were attributed to fallout from past atmospheric weapons testing. The others cited were related to the operation of the plant (e.g., H-3 in quarterly composited bay water samples, Ag-110m in oyster samples, and Co-60 in soil samples).

To assess the plant's contribution to the radiation levels of the ambient environment, dose calculations were performed using the plant's effluent release data, on-site meteorological data, and appropriate pathways. The results of these dose calculations indicate:

a. a maximum thyroid dose of 4.70×10^{-3} mrem via liquid and gaseous pathways, about 0.006% of the acceptable limit of 75 mrem/yr as specified in 40 CFR 190;

b. a maximum whole body dose of 1.16×10^{-2} mrem via liquid and gaseous pathways, about 0.05% of the acceptable limit of 25 mrem/yr as specified in 40 CFR 190;

c. a maximum calculated dose to all other organs via liquid and gaseous pathways was equal to 2.45×10^{-1} mrem to the GI-Tract. This dose was about 1% of the allowable limit of 25 mrem/yr as specified in 40 CFR 190.

Thus, it is concluded based upon the levels of radioactivity observed and the various dose calculations performed, that Calvert Cliffs Nuclear Power Plant Units 1 and 2 and the ISFSI did not cause any significant radiological impact on the surrounding environment during 1996.

II. CALVERT CLIFFS NUCLEAR POWER PLANT RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

II.A. INTRODUCTION

Baltimore Gas and Electric Company (BGE) has been conducting a radiological environmental monitoring program in the environs of the Calvert Cliffs Nuclear Power Plant since the summer of 1970. The Calvert Cliffs site is an operating nuclear generating station consisting of two pressurized water reactors. Unit 1 achieved criticality on October 7, 1974 and commenced commercial operation in May 1975. Unit 2 achieved criticality on November 30, 1976 and went into commercial operation April 1, 1977.

Originally the Radiological Environmental Monitoring Program (REMP) was conducted under separate Environmental Technical Specifications (34,35). On July 29, 1977 the monitoring program began operation under a combined set of Technical Specifications (36) for both Units. The program has operated as such until March 1, 1985 when the Environmental Technical Specifications were revised to reflect a new generic format for radiological environmental monitoring adopted by the Nuclear Regulatory Commission (37). Changes in the program (sample locations, sample types, and/or sampling frequencies) were implemented to conform to these revisions. In October 1996, the Nuclear Regulatory Commission approved the relocation of these Technical Specifications to the ODCM in accordance with Generic Letter 89-01. (47)

Results of the monitoring program for the pre-operational and previous operational periods through December 31, 1995 have been reported in a series of documents (1-32).

Results of the monitoring program for the current operational period of January 1, 1996 through December 31, 1996 are included in this report. The report presents the content of the Radiological Environmental Monitoring Program (Table 1), the sampling locations (Appendix A), the summary of the analytical results of 1996 (Table 2), a compilation of the analytical data for 1996 (Appendix B), the results of the Analytics Intercomparison Program and the Quality Assurance Program (Appendix C), the results of the Land Use Survey (Appendix D), and a compilation of the analytical data for extra samples collected in 1996 (Appendix E). Interpretation of the data and conclusions are presented in the body of the report.

The environmental surveillance data collected during this reporting period were compared with that generated in previous periods whenever possible to evaluate the environmental radiological impact of Calvert Cliffs Nuclear Power Plant Units 1 and 2 during 1996.

II.B. PROGRAM

II.B.1 Objectives

The objectives of the REMP for the Calvert Cliffs Nuclear Power Plant are:

a. To verify that radioactivity and ambient radiation levels attributable to plant operation are within the limits specified in the ODCM (38) and the Environmental Radiation Protection Standards as stated in 40 CFR Part 190,

b. To detect any measurable buildup of long-lived radionuclides in the environment,

c. To monitor and evaluate ambient radiation levels,

d. To determine whether any statistically significant increase occurs in the concentration of radionuclides in important pathways.

II.B.2 Sample Collection

The locations of the individual sampling stations are listed in Table A-1 and shown in Figures A-2 and A-3. All samples were collected by contractors to, or personnel of, the Baltimore Gas and Electric Company according to Calvert Cliffs Nuclear Power Plant Procedures (39).

II.B.3 Data Interpretation

Many results in environmental monitoring occur at or below the minimum detectable activity (MDA). In this report, all results at or below the relevant MDA are reported as being "less than" the MDA value.

II.B.4 Program Exceptions

During 1995, one program exception had been identified. The sample garden required by Technical Specifications to be located at, or near, the Site Boundary is actually located closer to the plant than the Site Boundary. This location is more conservative than the requirement, but still necessitated entry into the ACTION statement as required by the Technical Specifications. Corrective action was completed in 1996 when a proper description of the garden location was incorporated into the requirement when it was relocated from the Technical Specification to the Off-Site Dose Calculation Manual (38).

II.C. RESULTS AND DISCUSSIONS

All the environmental samples collected during the year were analyzed using BGE's laboratory procedures (41). The analytical results for this reporting period are presented in Appendix B and are also summarized in Table 2. For discussion, the analytical results are divided into four categories. The categories are the Aquatic Environment, the Atmospheric Environment, the Terrestrial Environment, and Direct Radiation. These categories are further divided into subcategories according to sample type (e.g., Bay Water, Aquatic Organisms, etc., for the Aquatic Environment).

II.C.1 **Aquatic Environment**

The aquatic environment surrounding the plant was monitored by analyzing samples of bay water, aquatic organisms, and shoreline sediment. These samples were obtained from various sampling locations on the Chesapeake Bay near the plant.

II.C.1.a **Bay Water**

Monthly bay water samples were taken from two locations during the year. These locations are the Intake Area (sample code Wa1) and the Discharge Area (sample code Wa2). The samples were obtained from a composite sampling system operating at each location for the entire sampling period. These samples were analyzed for tritium and gamma emitters.

The tritium analyses, performed on quarterly composites of the monthly bay water samples, showed the presence of tritium in the Discharge (Wa2) samples for all four quarters and a single, detectable reading in the Intake (Wa1) for the first quarter. The concentrations observed ranged from 36±33 to 112±37 pCi/L, which is similar to those ranges observed in previous years, (7-32).

The single, detectable intake sample was 36±33 pCi/L, which is slightly above the minimum detectable activity and is approximately the same level as the few instances of detectable tritium observed in the intake in 1992, 1993 and 1995. Investigation has shown that this is due to the backflow of discharge water into the intake, a periodic phenomenon.

Figure 1 compares tritium observed in the plant discharge and intake with annual effluent releases in 1996 as reported in the Radioactive Effluent Release Report required by Technical Specification 6.6.3.

Monthly analyses of bay water samples from both locations for gamma emitters exhibited no detectable concentrations of any plant-related radionuclides.

II.C.1.b **Aquatic Organisms**

Samples of aquatic organisms were obtained from three locations during the year. Samples of fish, when in season, are normally collected from the Intake-Discharge Area (sample codes Ia1 and Ia2) and from the Patuxent River (sample codes Ia4 and Ia5). As shown in Table B-2, two species of fish were sampled at both the plant intake and the control point in the Patuxent River. Oyster samples were obtained quarterly from Camp Conoy (sample code Ia3) and Kenwood Beach (sample code Ia6). Edible portion of the fish and oyster samples were analyzed for gamma emitters.

Gamma spectrometric analyses of the fish samples exhibited no detectable concentrations of any plant-related radionuclides.

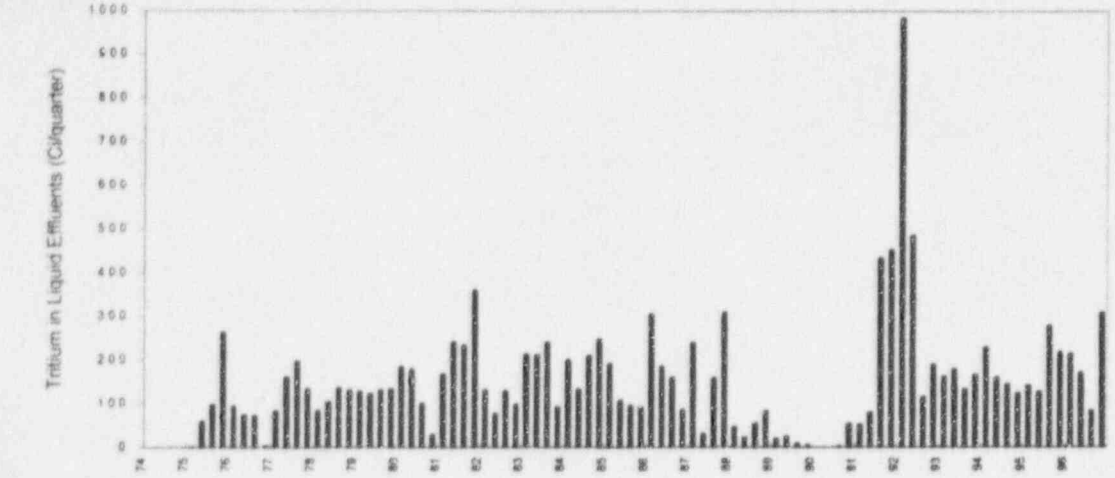
Quarterly analyses for gamma emitters in oysters continued to show low levels of detectable concentrations of a plant-related radionuclide, Ag-110m, in samples obtained from Camp Conoy (Ia3). The observed concentrations ranged from 20±7 to 44 ±14 pCi/kg. The magnitude of this range of values is similar to ranges observed previously (7-32) and is just above background. A historical plot of the data from this location, Figure 2, demonstrates this clearly.

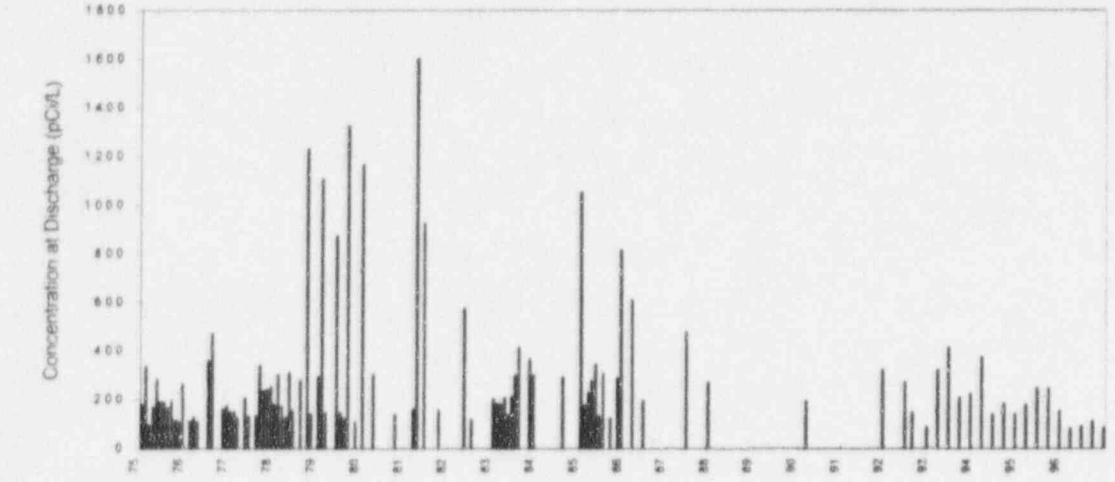
II.C.1.c **Shoreline Sediment**

Semiannual shoreline sediment samples were taken from one location during the year. This location is Shoreline at Barge Road (sample code Wb1). The samples obtained from this location were analyzed for gamma emitters.

Gamma spectrometric analyses of these samples exhibited no detectable concentrations of any plant-related radionuclides.

FIGURE 1
Tritium in Chesapeake Bay Water





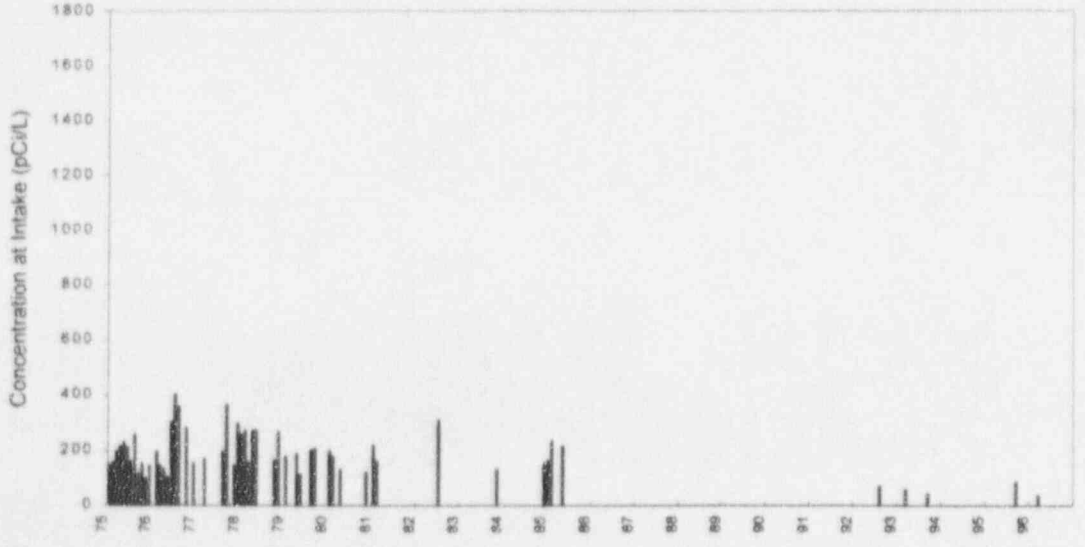
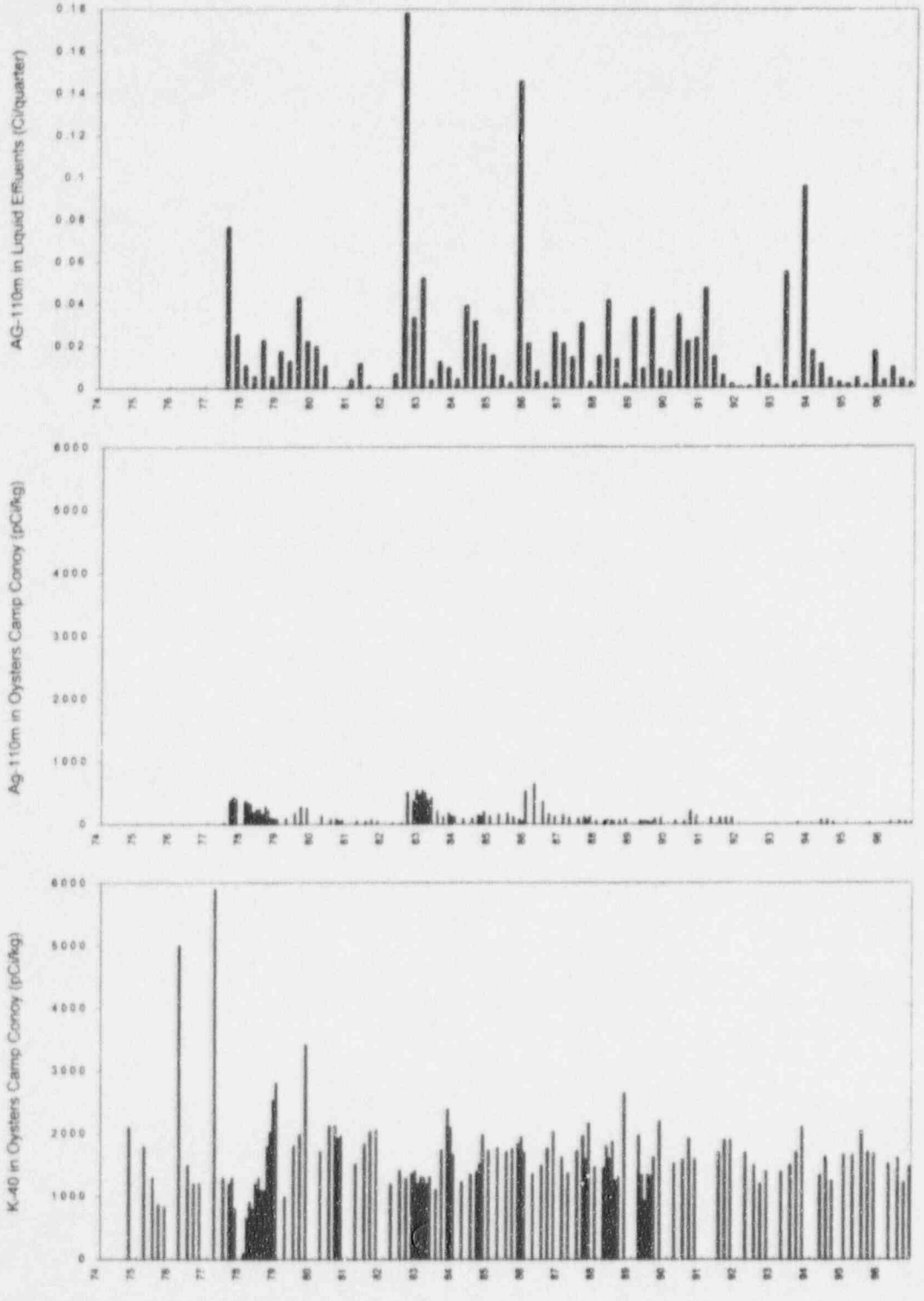


FIGURE 2
Silver-110m and Potassium-40 in Chesapeake Bay Oysters



II.C.2 **Atmospheric Environment**

The atmospheric environment was monitored by analyzing air particulate filters and silver zeolite cartridges (for trapping radioiodine species). These samples were collected from five locations surrounding the plant. These locations are On Site before the Entrance to Camp Conoy (sample code A1), Camp Conoy Road at the Emergency Siren (sample code A2), Bay Breeze Road (sample code A3), Route 765 at Lusby (sample code A4), and at the Emergency Operations Facility (sample code A5).

II.C.2.a **Air Particulate Filters**

Weekly composite air particulate filter samples were collected from the five locations during the year. These samples were analyzed for beta activity and gamma emitters.

Weekly analyses for beta activity on air particulate filters collected from all five locations showed values characteristic of background levels (7-32). The values ranged from 0.3×10^{-2} to 3.9×10^{-2} pCi/m^3 for the indicator locations and 0.8×10^{-2} to 3.7×10^{-2} pCi/m^3 at the control location. The location with the highest overall mean of 1.7×10^{-2} pCi/m^3 was A5 at the Emergency Operation Facility.

Gamma spectrometric analyses of monthly composited air particulate samples exhibited no detectable concentrations of any plant-related radionuclides in any of these samples.

Figure 3 depicts the historical trends of beta activity.

II.C.2.b **Air Iodine**

Weekly composited silver zeolite cartridges (for trapping radioiodine species) were collected from the five locations during the year. These samples were analyzed for radioiodine species.

Weekly radioiodine analyses of silver zeolite cartridges collected from all five locations exhibited no detectable concentrations of I-131.

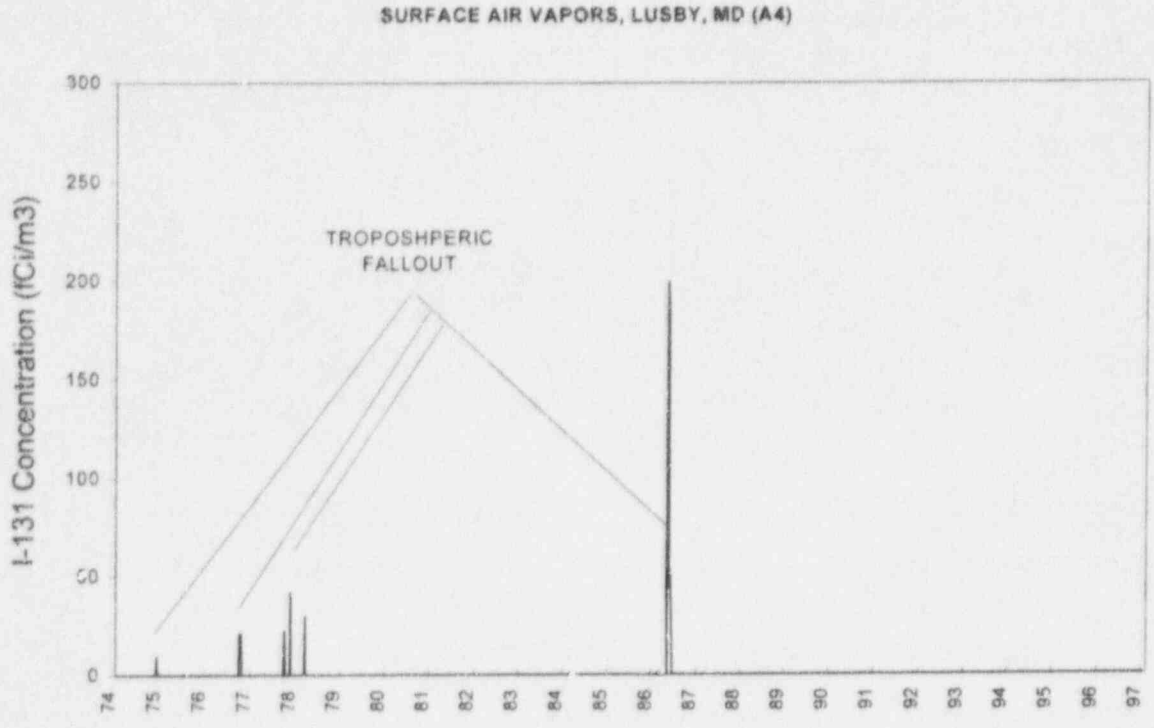
Figure 3 depicts the historical trends of radioiodine.

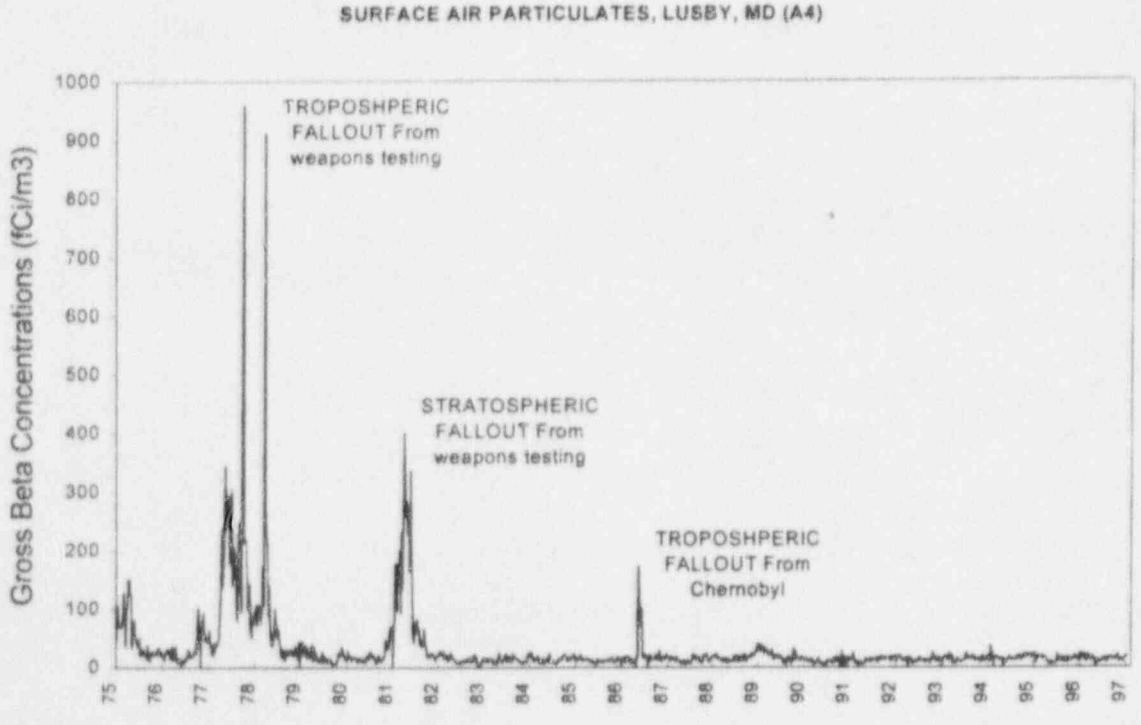
II.C.3 **Terrestrial Environment**

The terrestrial environment was monitored by analyzing samples of vegetation collected monthly, when available, from various sampling locations near the plant during the normal growing season.

During the 1995 internal QA audit, it was noted that the REMP program south sector sample locations DR7 (direct radiation), A1 (airborne), and Ib4-6 (ingestion, food products) are not located in the "general area of/close to/near the Site Boundary", as required by Technical Specification Table 3.12-1. This sampling is co-located at the onsite entrance to Camp Conoy, which is located approximately 0.7 km south of the plant discharge for gaseous waste. The Site Boundary in this sector varies between approximately 2.1 and 2.9 kms from the plant main vent discharge.

FIGURE 3
Nuclear Fallout in the Calvert Cliffs Area





In response to the discovery of this issue, CCNPP personnel determined that the current sampling location is conservative with respect to the Technical Specification requirement and, therefore, meets the intent of the requirement. Nonetheless, this sampling location does not meet the letter of the description in the Technical Specification, and, as such, required entry into the Technical Specification ACTION statement to "...prepare and submit to the Commission...a description of the reasons for not conducting the program as required and the plans for preventing a recurrence". The former Technical Specification wording was revised to more clearly reflect our current sampling program when the requirement was relocated to the ODCM in 1996 (47).

II.C.3.a **Vegetation**

Vegetation samples were collected from three locations during the year. These locations are Garden Plot off Bay Breeze Road (sample codes Ib1, Ib2, and Ib3), On Site before the Entrance to Camp Conoy (sample codes Ib4, Ib5, and Ib6), and the Emergency Operations Facility (sample codes Ib7, Ib8, and Ib9). These samples were analyzed for gamma emitters, including analyses for I-131.

Gamma spectrometric analyses exhibited no detectable concentrations of plant-related radionuclides in any of these samples.

II.C.4 **Direct Radiation**

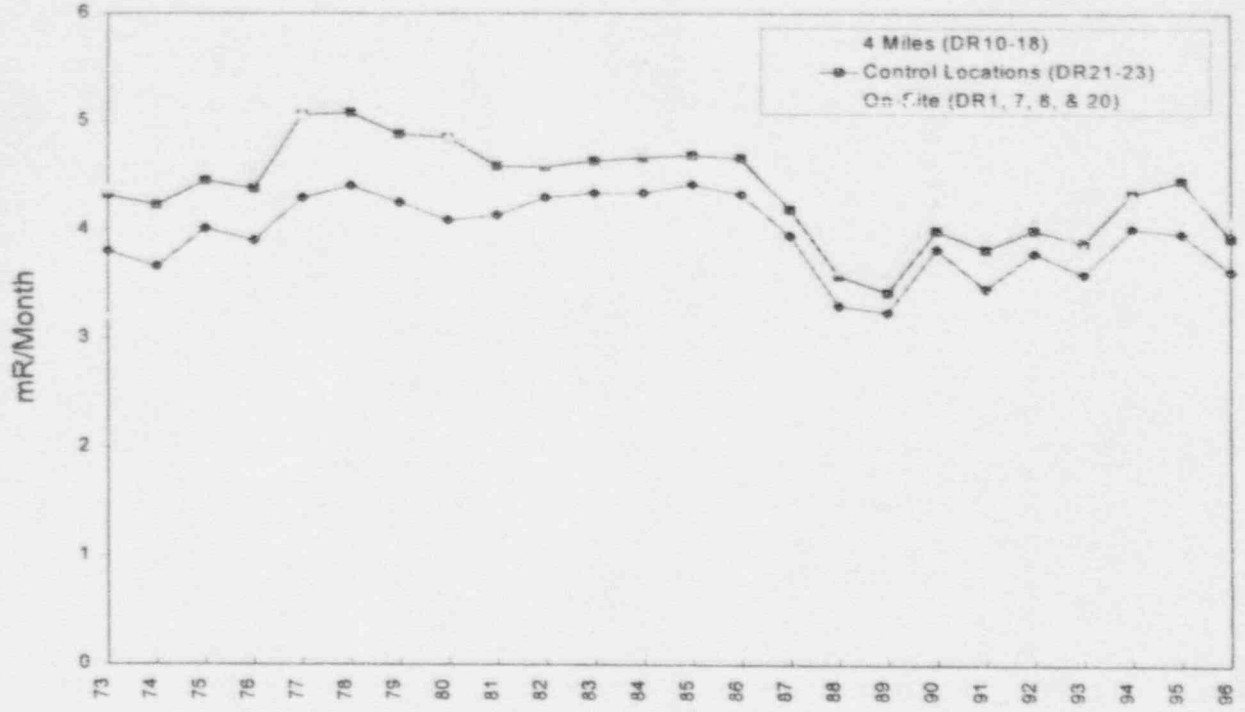
Direct radiation is measured by a network of TLDs in each overland sector surrounding the Plant both at the plant boundary and at 4 miles from the Plant.

During the year the TLD system was improved to allow the use of automatic reading and data transmission. This required a change to a new TLD (Panasonic Model 814) containing three elements used for environmental monitoring. Testing of the dosimeters was conducted in accordance with Regulatory Guide 4.13 and ANSI N545 and the new system was placed in service in September 1996.

Thermoluminescent dosimeters were collected monthly from twenty-three locations surrounding the plant. The twenty indicator locations are On Site Along the Cliffs (sample code DR1), Route 765 Auto Dump (sample code DR2), Giovanni's Tavern (sample code DR3), Route 765 across from White Sands (sample code DR4), John's Creek (sample code DR5), Lusby (sample code DR6), On Site before the Entrance to Camp Conoy (sample code DR7), On Site at Emergency Siren (sample code DR8), Bay Breeze Road (sample code DR9), Decatur and Calvert Beach Roads (sample code DR10), Dirt Road off Mackall and Parran Roads (sample code DR11), Mackall and Bowen Roads (sample code DR12), Wallville (sample code DR13), Rodney Point (sample code DR14), Mill Bridge and Turner Roads (sample code DR15), Appeal School (sample code DR16), Cove Point and Little Cove Point Roads (sample code DR17), Cove Point (sample code DR18), Long Beach (sample code DR19), and On Site Near Shore (sample code DR20). The three control locations are the Emergency Operations Facility (sample code DR21), Solomons Island (sample code DR22), and Taylors Island, Carpenters Property (sample code DR23).

The mean 30 day ambient radiation measured at the indicator locations was 3.69 mR and ranged from 2.46 to 5.26 mR as reported in Table 2. The control locations showed a 30 day mean of 3.93 mR with ranges from 2.20 to 5.72 mR. The location with the highest overall mean of 4.86 was DR23, Taylors Island, Carpenters Property, which ranged from 3.79 to 5.72 mR. A comparison of the means and ranges of the current TLD data with those of both the historical data and the regional data (7-32) shows no plant-related contribution to the measured direct radiation exposure for 1996. Figure 4 shows the historical comparison of the yearly means of the TLDs on site, at four miles, and at the control locations.

FIGURE 4
Mean TLD Gamma Dose, Calvert Cliffs Nuclear Power Plant



II.D. CONCLUSION

Low levels of various man-made fission and activation by-products were observed in the environment surrounding the plant during 1996. Some of these observations were attributed to fallout from past atmospheric weapons testing. The others cited were related to the operation of the plant (e.g., Ag-110m in oyster samples and tritium in quarterly composited bay water samples).

Historical trends for tritium in bay water, Ag-110m and K-40 in oyster samples, nuclear fallout in the Calvert Cliffs area, and TLD data are depicted in Figures 1 through 4. As can be seen from these figures, the plant made radiological contributions to the surrounding environment during 1996.

To assess the plant's contribution to the ambient radiation levels of the surrounding environment, dose calculations were performed using the plant's effluent release data, on site meteorological data (see X/Q and D/Q values presented in Figures 5 and 6), and appropriate pathways. The results of these dose calculations indicate:

Gaseous Pathways

A maximum thyroid dose of 9.02×10^{-4} mrem to a child via the plume, ground, vegetable, meat, and inhalation pathways at 1.8 km SW of Calvert Cliffs. This is about 0.001% of the acceptable limit of 75 mrem/year as specified in 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."

A maximum whole body gamma dose of 1.88×10^{-4} mrem to a child at 1.8 km SSW of Calvert Cliffs, about 0.0008% of the acceptable dose limit of 25 mrem/year as specified in 40 CFR 190.

A maximum dose to any other organ, in this case liver, of 9.20×10^{-4} mrem at the Site Boundary, 2.0 km W of Calvert Cliffs. This is about 0.004% of the acceptable dose limit of 25 mrem/year as specified in 40 CFR 190.

Liquid Pathways

A maximum thyroid dose of 3.80×10^{-3} mrem to a teenager for all liquid pathways, about 0.005% of the acceptable dose limit of 75 mrem/year as specified in 40 CFR 190.

A maximum whole body dose of 1.14×10^{-2} mrem via all liquid pathways, less than 0.05% of the acceptable dose limit of 25 mrem/year as stated in 40 CFR 190.

A maximum dose to any organ, in this case the GI-Tract, of 2.45×10^{-1} mrem, which is 1% of the acceptable dose limit of 25 mrem/year specified in 40 CFR 190.

Gaseous and Liquid Pathways Combined

A maximum thyroid dose of 4.70×10^{-3} mrem via liquid and gaseous pathways, about 0.006% of the acceptable limit of 75 mrem/year specified in 40 CFR 190.

A maximum whole body dose of 1.16×10^{-2} mrem via liquid and gaseous pathways which is about 0.05% of the acceptable limit of 25 mrem/year as specified in 40 CFR 190.

A maximum calculated dose to all other organs via liquid and gaseous pathways was equal to 2.45×10^{-1} mrem to the GI-Tract. This dose is about 1% of the allowable limit of 25 mrem/year as specified in 40 CFR 190.

In all cases, the calculated doses are a small fraction of the applicable limits specified in 40 CFR 190. Therefore, it is concluded that the operation of Calvert Cliffs Units 1 & 2 produced radioactivity and ambient radiation levels significantly below the limits of Off-Site Dose Calculation Manual and 40 CFR Part 190. There was no measurable buildup of long-lived radionuclides in the environment due to Calvert Cliffs. In addition, there was no statistically significant increase in the concentration of plant-related radionuclides in important pathways.

FIGURE 5

Atmospheric Dispersion Around CCNPP 1996 Average Relative Air Concentrations

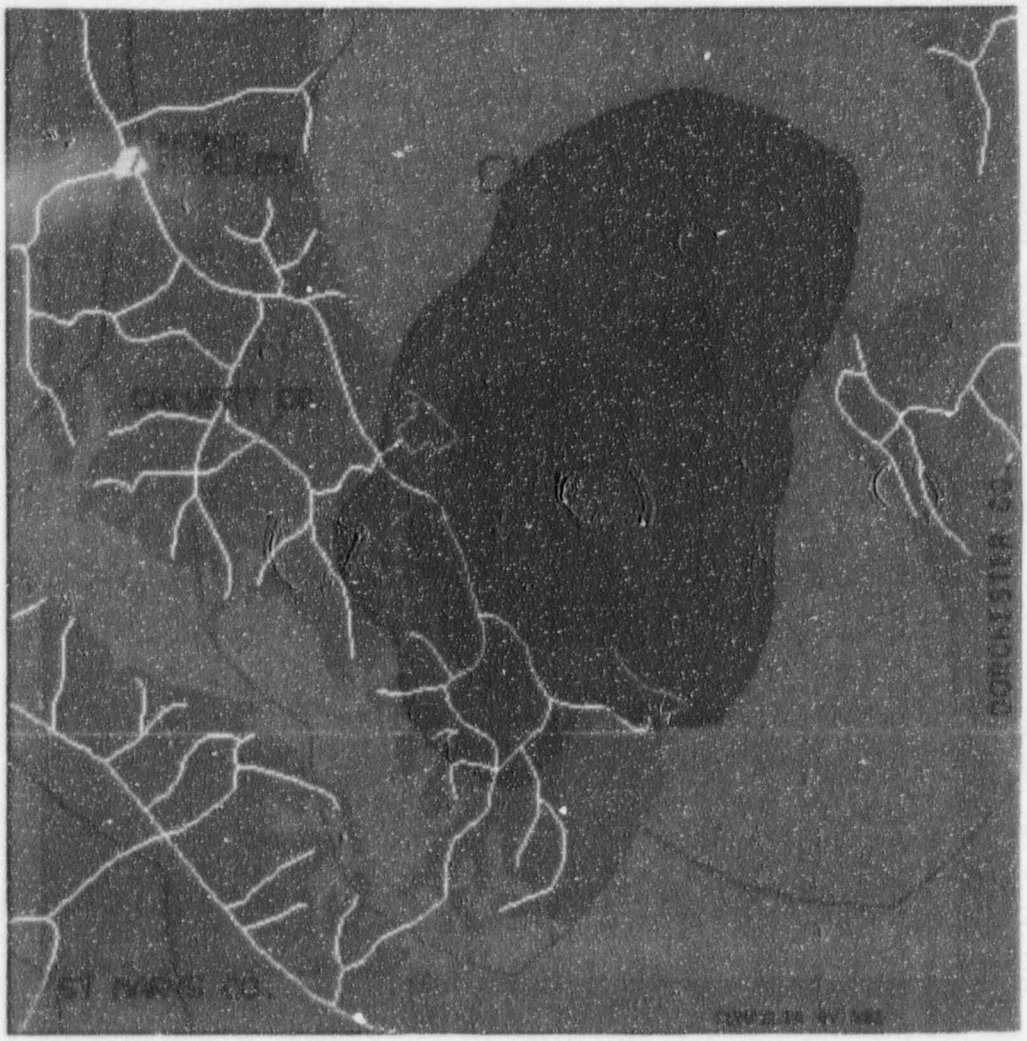


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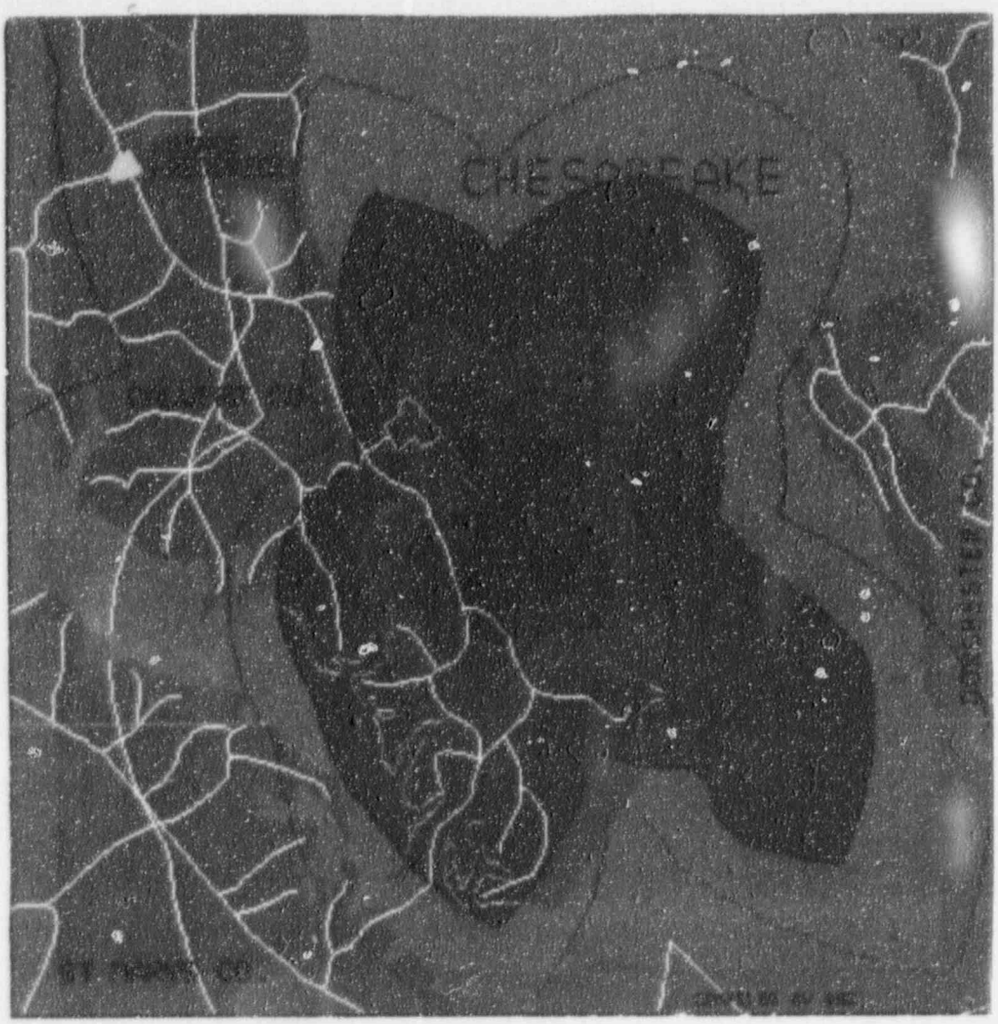
FIGURE 6

Atmospheric Dispersion Around CCNPP 1996 Average Relative Ground Deposition



CONTOUR LEGEND	D/Q (1/M2)
1	1.0E-09+
2	7.0E-10-1.0E-09
3	4.0E-10-7.0E-10
4	2.0E-10-4.0E-10
5	1.0E-10-2.0E-10
6	7.0E-11-1.0E-10
7	4.0E-11-7.0E-11
8	2.0E-11-4.0E-11

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TABLE 1

Synopsis of 1996 Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program

Sample Type	Sampling Frequency [1]	Number of Locations	Number Collected	Analysis	Analysis Frequency [1]	Number Analyzed
Aquatic Environment						
Bay Water	MC	2	24	Gamma	M	24
				H-3	QC	8
Fish [2]	A	2	4	Gamma	A	4
Oysters	Q	2	8	Gamma	Q	8
Shoreline Sediment	SA	1	2	Gamma	SA	2
Atmospheric Environment						
Air iodine [3]	W	5	257	I-131	W	257
Air Particulates [4]	W	5	257	Gross Beta	W	257
				Gamma	MC	60
Direct Radiation						
Ambient Radiation	M	23	1288	TLD	M	1288
Terrestrial Environment						
Vegetation [5]	M	9	45	Gamma	M	45

[1] W-weekly, M-monthly, Q-quarterly, SA-semiannual, A-annual, C-composite
[2] Once in Season, July Through September
[3] The collection device contains silver zeolite
[4] Beta counting is perfomed after >= 72 hour decay. Gamma spectroscopy performed on monthly composites of weekly samples
[5] Monthly during Growing Season

TABLE 2

Annual Summary of Radioactivitiy in the Environs of the Calvert Cliffs Nuclear Power Plant Units 1 and 2

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	Indicator Locations Mean (F)/ Range [1]	Location with Highest Annual Mean Name/ Distance & Direction [2]	Highest Annual Mean (F) / Range [1]	Control Locations Mean (F)/ Range [1]
Aquatic Environment						
Bay Water (pCi/L)	H-3 (8)	54	92 (4/4) (81-112)	Discharge Area Wa2 0.3 km N	92 (4/4) (81-112)	36 (1/4) --
Oysters (pCi/kg)	Gamma (8) Ag110m	14	33 (4/4) (20-44)	Camp Conoy Ia3 0.9 km E	33 (4/4) (20-44)	-- --
Atmospheric Environment						
Air Particulates (10^{-2} pCi/m^3)	Gross Beta (257)	0.5	1.4 (205/205) (0.3-3.9)	EOF A5 19.3 km WNW	1.7 (52/52) (0.8-3.7)	1.7 (52/52) (0.8-3.7)
Direct Radiation						
Ambient Radiation (mR/30 days)	TLD (1288)	--	3.69 (1120/1120) (2.46-5.26)	Taylors Island DR23 12.6 km ENE	4.86 (56/56) (3.79-5.72)	3.93 (168/168) (2.20-5.72)

[1] Mean and range based upon detectable measurements only. Fraction (F) of detectable measurements at specified location is indicated in parentheses.
[2] From the centerpoint between the two containment buildings.

III. INDEPENDENT SPENT FUEL STORAGE INSTALLATION RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

III.A. INTRODUCTION

In August 1990 BGE initiated a program of additional radiological environmental monitoring around the site for the Independent Spent Fuel Storage Facility (ISFSI). The first dry fuel storage canister was loaded into the ISFSI in November of 1993.

Results of the monitoring program for the ISFSI for the current period of January 1, 1996 through December 31, 1996 are included in this report.

This report presents the content of the ISFSI radiological environmental monitoring program (Table 3), the ISFSI sampling locations (Appendix A), the summary of the analytical results of the period (Table 4), and a compilation of the analytical data for the period (Appendix B). Interpretation of the data and conclusions are presented in the body of the report.

The ISFSI monitoring program is as described in this section of the report with the exception of the Pressurized Ion Chambers (PICs). Pressurized Ion Chambers, because they duplicate direct surveillance by TLDs and because they experience problems with reliability, were excluded from the Technical Specification portion of the ISFSI REMP (46). Pressurized Ion Chambers' results, however, are given in table E-9 and will continue to be a non-Technical Specification surveillance to satisfy our commitment to the community.

The results for 1996 were compared with that generated during the previous ISFSI pre-operational periods (33) and the current and previous CCNPP REMP periods (7-32). These comparisons demonstrate the consistency of data throughout the CCNPP site, which are very close to the natural background levels for the region. A discussion of these results is given in Section III. C. 3.

III.B. PROGRAM

III.B.1 Objectives

The objectives of the radiological environmental monitoring program for the ISFSI are:

a. To satisfy the community concern regarding the impact of the ISFSI on the environment,

b. To verify that radioactivity and ambient radiation levels attributable to operation of the ISFSI are within the limits specified in the Environmental Radiation Protection Standards as stated in 40 CFR Part 190,

c. To detect any measurable buildup of long-lived radionuclides in the environment due to the ISFSI,

d. To monitor and evaluate ambient radiation levels around the ISFSI,

e. To determine whether any statistically significant increase occurs in the concentration of radionuclides near the ISFSI.

III.B.2 **Sample Collection**

The locations of the individual sampling sites are listed in Table A-2 and shown in Figures A-4 and A-5. All samples were collected by BGE personnel according to Calvert Cliffs Nuclear Power Plant Procedures (39).

III.B.3 **Data Interpretation**

Many results in environmental monitoring occur at or below the minimum detectable activity (MDA). In this report, all results at or below the relevant MDA are reported as being "less than" the MDA value.

III.B.4 **Program Exceptions**

There were no program exceptions during 1996.

III.C. RESULTS AND DISCUSSIONS

All the environmental samples collected during the year were analyzed using BGE's laboratory procedures (41). The analytical results for this reporting period are presented in Appendix B and are also summarized for the period in Table 4. For discussion, the analytical results are divided into three categories. The categories are the Atmospheric Environment, the Terrestrial Environment, and Direct Radiation. These categories are further divided into subcategories according to sample type (e.g., Vegetation and Soil for Terrestrial Environment).

III.C.1 **Atmospheric Environment**

The atmospheric environment was monitored by analyzing air particulate filters. These samples were collected from five locations surrounding the ISFSI.

No source of airborne radioiodine exists for the ISFSI. Airborne radioiodine is, therefore, not considered.

III.C.1.a **Air Particulate Filters**

Weekly composite air particulate filter samples were collected from five locations during the period. These locations are On Site before the Entrance to Camp Conoy (sample code A1; in common with the CCNPP REMP), Meteorological Station (SFA1), CCNPP Visitors Center (SFA2), NNW of the ISFSI (SFA3), and South of the ISFSI (SFA4). These samples were analyzed for beta radioactivity and gamma emitting radionuclides.

Weekly analyses for beta activity on air particulate filters collected from all five locations showed values characteristic of levels routinely observed in the REMP (7-32). These values ranged from 0.5×10^{-2} to 2.8×10^{-2} pCi/m^3 for the indicator locations and 0.8×10^{-2} to 3.2×10^{-2} pCi/m^3 for the control location. The location with the highest overall mean of 1.6×10^{-2} pCi/m^3 was SFA2 at the CCNPP Visitors Center.

Gamma spectrometric analyses of monthly composited air particulate samples exhibited no detectable concentrations of any plant-related radionuclides in any of these samples.

III.C.2 **Terrestrial Environment**

The terrestrial environment was monitored by analyzing samples of vegetation and soil collected quarterly from the vicinity of the air sampling locations for the ISFSI.

III.C.2.a **Vegetation**

Vegetation samples were collected quarterly from five locations during the year. These locations are: Meteorological Station (sample code SFb1), CCNPP Visitors Center (sample code SFb2), NNW of the ISFSI (sample code SFb3), South of the ISFSI (sample code SFb4), and On Site before the Entrance to Camp Conoy (sample code SFb5). These samples were analyzed for gamma emitters.

Gamma spectrometric analyses of these samples revealed the presence of Cs-137. The range of Cs-137 concentrations observed was 52±19 to 196±27 pCi/kg. While the presence of Cs-137 in these samples may be plant-related, this range is consistent with that found to be due to the residual fallout from past atmospheric nuclear weapons testing. These activities are well below the federal limits established in 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operations" and are comparable to those observed in previous annual reporting periods for the CCNPP REMP (7-32) and in the earlier pre-operational data for the ISFSI (33).

III.C.2.b **Soils**

Soil samples were collected quarterly from five locations surrounding the ISFSI in the vicinity of the air samplers. These locations are: Meteorological Station (sample code SFS1), CCNPP Visitors Center (sample code SFS2), NNW of the ISFSI (sample code SFS3), South of the ISFSI (sample code SFS4), and On Site before the Entrance to Camp Conoy (sample code SFS5).

Soil samples were analyzed for gamma emitting radionuclides. Cesium-137 was detected in quarterly samples from all sites, while Co-60 was detected in two quarterly samples from the Visitors Center (SFS2). The Cs-137 concentrations ranged from 12±9 to 1141±65 pCi/kg and the Co-60 ranged from 16±19 to 18±15 pCi/kg. While the presence of Cs-137 in these samples may be plant-related, this range is consistent with that found to be due to the residual fallout from past atmospheric nuclear weapons testing. The presence of Co-60 is plant-related; however, the values are near the minimum detectable activity. The activities of both these radionuclides are well below the federal limits established in 40 CFR 190, "Environmental

Radiation Protection Standards for Nuclear Power Operations" and are comparable to those observed in previous annual reporting periods for the CCNPP REMP (7-32) and in the earlier pre-operational data for the ISFSI (33).

III.C.3 **Direct Radiation**

Direct radiation is measured by a network of TLDs surrounding the ISFSI. These thermo-luminescent dosimeters are collected monthly from seventeen locations surrounding the ISFSI, plus one control TLD location at the Visitors Center (sample code SFDR7). The locations include On Site before the Entrance to Camp Conoy (sample code DR7, common to both the CCNPP Program and the ISFSI Program) and the Meteorological Station (sample code DR30, previously a location maintained for historical continuity.) The other sampling locations are: SW of ISFSI, Collocated with Plant TLD #159, (sample code SFDR1); N of ISFSI, Collocated with Plant TLD #160, (sample code SFDR2); NNE of ISFSI, Collocated with Plant TLD #161, (sample code SFDR3); NE of ISFSI, Collocated with Plant TLD #162, (sample code SFDR4); E of ISFSI, Collocated with Plant TLD #163, (sample code SFDR5); ESE of ISFSI, Collocated with Plant TLD #164, (sample code SFDR6); North Northwest of ISFSI, (sample code SFDR8); South of ISFSI, (sample code SFDR9); NNW of ISFSI, (sample code SFDR10); WNW of ISFSI, (sample code SFDR11); West of ISFSI, (sample code SFDR12); SSW of ISFSI, (sample code SFDR13); SSE of ISFSI, (sample code SFDR14); ENE of ISFSI, (sample code SFDR15); and WSW of ISFSI, (sample code SFDR16). Sampling locations are shown on Figures A-4 and A-5.

During the year the TLD system was improved to allow the use of automatic reading and data transmission. This required a change to a new TLD (Panasonic Model 814) containing three elements used for environmental monitoring. Testing of the dosimeters was conducted in accordance with Regulatory Guide 4.13 and ANSI N545 and the new system was placed in service in September 1996.

The mean 30 day ambient radiation measured at the ISFSI indicator locations was 4.95 mR and ranged from 2.85 to 13.55 mR as reported in Table 4. The control location showed a 30 day mean of 4.20 mR and ranged from 3.65 to 5.07 mR. A comparison of the mean and ranges of the current TLD data with those of both the historical data and the regional data (32) reveals only one set of elevated TLD readings.

That location with the highest overall mean of 10.94 mR with ranges from 8.71 to 13.55 mR was SFDR10, North Northwest of ISFSI. These readings are consistent with those expected from the storage of spent fuel in the ISFSI (32). A comparison of the mean ISFSI TLD data with the ISFSI control location at the Visitors Center, SFDR7, can be seen in Figure 7.

III.D. CONCLUSION

Low levels of Cs-137 and Co-60 were observed in the environment surrounding the ISFSI during the period. The Cs-137 observations were attributed to fallout from past atmospheric weapons testing while the low level Co-60 observations were related to past plant operations.

In general, the results in the following tables continue the historical trends previously observed at the official sites of the Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program (7-32).

FIGURE 7
Mean TLD Gamma Dose, ISFSI

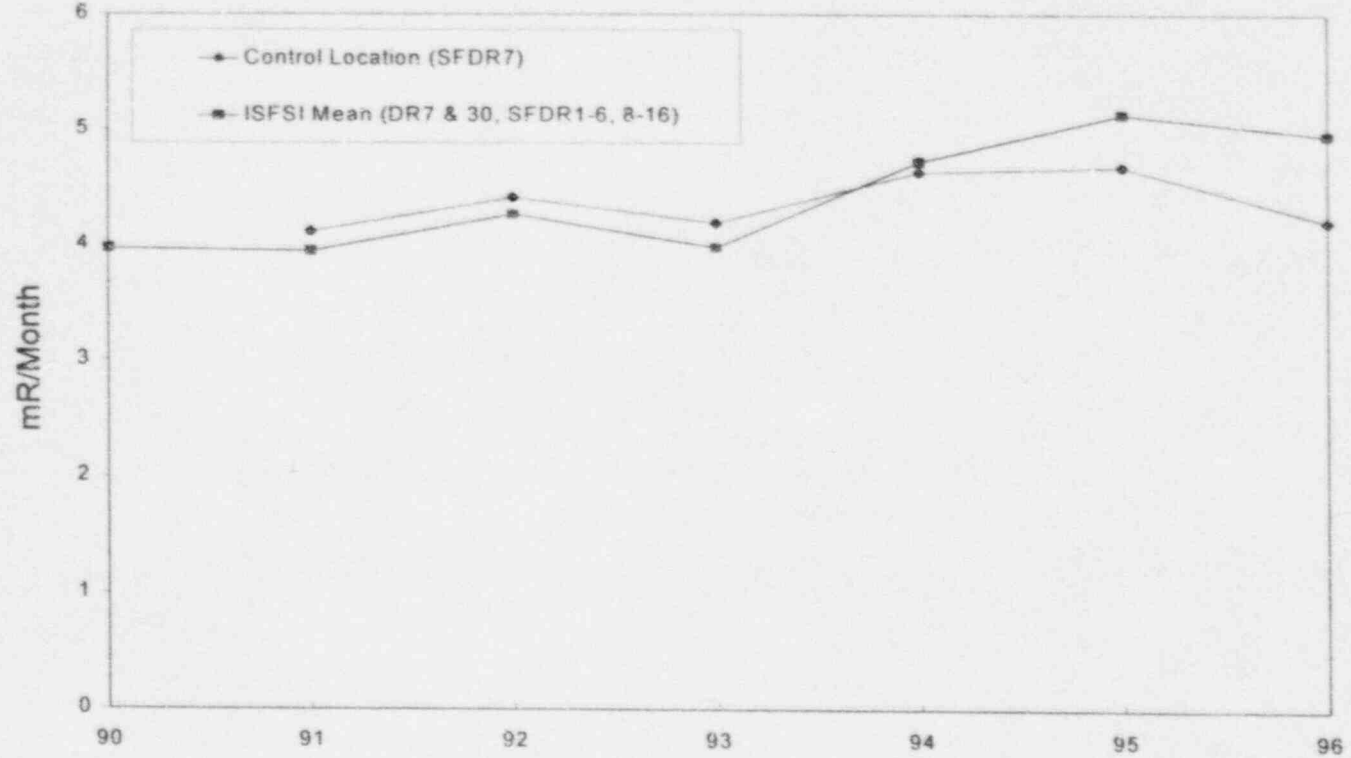

TABLE 3

Synopsis of 1996 Calvert Cliffs Nuclear Power Plant
Independent Spent Fuel Storage Installation
Radiological Environmental Monitoring Program

Sample Type	Sampling Frequency [1]	Number of Locations	Number Collected	Analysis	Analysis Frequency [1]	Number Analyzed
Atmospheric Environment						
Air Particulates [2]	W	5	260	Gross Beta	W	260
				Gamma	MC	60
Direct Radiation						
Ambient Radiation	M	18	1008	TLD	M	1008
Terrestrial Environment						
Vegetation	Q	5	20	Gamma	Q	20
Soil	Q	5	20	Gamma	Q	20

[1] W-weekly, M-monthly, Q-quarterly, SA-semiannual, A-annual, C-composite
[2] Beta counting is perfomed after >= 72 hour decay. Gamma spectroscopy performed on monthly composites of weekly samples

TABLE 4

Annual Summary of Radioactivitiy in the Environs of the Calvert Cliffs Nuclear Power Plant Independent Spent Fuel Storage Installation

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	Indicator Locations Mean (F)/ Range [1]	Location with Highest Annual Mean Name/ Distance & Direction [2]	Highest Annual Mean (F) / Range [1]	Control Locations Mean (F)/ Range [1]
Atmospheric Environment						
Air Particulates (10^{-2} pCi/m^3)	Gross Beta (260)	0.5	1.5 (208/208) (0.5-2.8)	Visitors Center SFA2 0.7 km NNE	1.6 (52/52) (0.8-3.2)	1.6 (52/52) (0.8-3.2)
Direct Radiation						
Ambient Radiation (mR/30 days)	TLD (1008)	--	4.95 (952/952) (2.85-13.55)	NNW of ISFSI SFDR10 0.1 km NNW	10.94 (56/56) (8.71-13.55)	4.20 (56/56) (3.65-5.07)
Terrestrial Environment						
Vegetation (pCi/L)	Gamma (20) Cs-137	27	124 (4/16) (52-196)	NNW Corner of ISFSI SFb3 0.1 km NNW	196 (1/4) --	50 (1/4) --
Soil (pCi/kg)	Gamma (20) Cs-137	17	412 (13/16) (12-1141)	NNW of ISFSI SFs3 0.1 km NNW	765 (4/4) (168-1141)	215 (4/4) (124-285)

[1] Mean and range based upon detectable measurements only. Fraction (F) of detectable measurements at specified location is indicated in parentheses.
[2] From the centerpoint of the ISFSI facility.

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(35) Calvert Cliffs Nuclear Power Plant, Unit Number 2, License No. DPR-69, Appendix A, Technical Specifications; Appendix B, Environmental Technical Specifications.

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APPENDIX A

Appendix A contains information concerning the environmental samples which were collected during the period January 1, 1996 to December 31, 1996.

Sample locations and specific information about individual locations for the CCNPP Radiological Environmental Monitoring Program are given in Table A-1. Figure A-1 shows the location of the Calvert Cliffs Nuclear Power Plant in relation to Southern Maryland and the Chesapeake Bay. Figures A-2 and A-3 show the locations of the power plant sampling sites in relation to the plant site at different degrees of detail.

Sample locations and specific information about individual locations for the ISFSI radiological environmental monitoring program are given in Table A-2. Figures A-4 and A-5 show the locations of the ISFSI sampling sites in relation to the plant site at different degrees of detail.

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TABLE OF CONTENTS - SAMPLING LOCATIONS

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TABLE A-1
Locations of Environmental Sampling Stations
for the Calvert Cliffs Nuclear Power Plant

Station	Description	Distance[1] (Kilometers)	Direction[1] (Sector)
A1[2]	On Site before Entrance to Camp Conoy	0.7	S
A2	Camp Conoy at Emergency Siren	2.5	SSE
A3	Bay Breeze Road	2.6	SE
A4	Route 765 Lusby	2.9	SSW
A5	Emergency Operations Facility (EOF)	19.3	WNW
DR1	On Site along Cliffs	0.6	NW
DR2	Route 765, Auto Dump	2.7	WNW
DR3	Route 765, Giovanni's Tavern (Knotty Pine)	2.3	W
DR4	Route 765, across from White Sands Drive	2.0	WSW
DR5	Route 765, St. John's Creek	2.4	SW
DR6[2]	Route 765 Lusby	2.9	SSW
DR7	On Site before Entrance to Camp Conoy	0.7	S
DR8	Camp Conoy at Emergency Siren	2.5	SSE
DR9	Bay Breeze Road	2.6	SE
DR10	Calvert Beach Rd. and Decatur Street	6.4	NW
DR11	Dirt road off Mackall & Parran Roads	6.6	WNW
DR12	Mackall and Bowen Roads	6.7	W
DR13	Mackall Rd. near Wallville	6.1	WSW
DR14	Rodney Point	6.4	SW
DR15	Mill Bridge and Turner Roads	6.2	SSW
DR16	Across from Appeal School	6.5	S
DR17	Cove Point and Little Cove Point Roads	5.9	SSE
DR18	Cove Point	7.1	SE
DR19	Long Beach	4.4	NW
DR20	On Site near shore	0.4	NNW
DR21	Emergency Operations Facility (EOF)	19.3	WNW
DR22	Solomons Island	12.5	S
DR23	Taylors Island, Carpenter's Property	12.6	ENE
Ia1,2	Discharge Area	0.3	N
Ia3	Camp Conoy	0.9	E
Ia4,5	Patuxent River	N/A	N/A
Ia6	Kenwood Beach	10.7	NNW
Ib1,2,3	Garden Off Bay Breeze Road	2.6	SSE
Ib4,5,6	On Site before Entrance to Camp Conoy	0.7	S
Ib7,8,9	Emergency Operations Facility (EOF)	19.3	WNW
Wa1	Intake Area	0.2	NNE
Wa2	Discharge Area	0.3	N
Wb1	Shoreline at Barge Rd.	0.6	ESE

[1] Distance and direction from the central point between the two containment buildings.
[2] Common to both the REMP and ISFSI monitoring program

FIGURE A-1
Map of Southern Maryland and Chesapeake Bay Showing Location of Calvert Cliffs Nuclear Power Plant

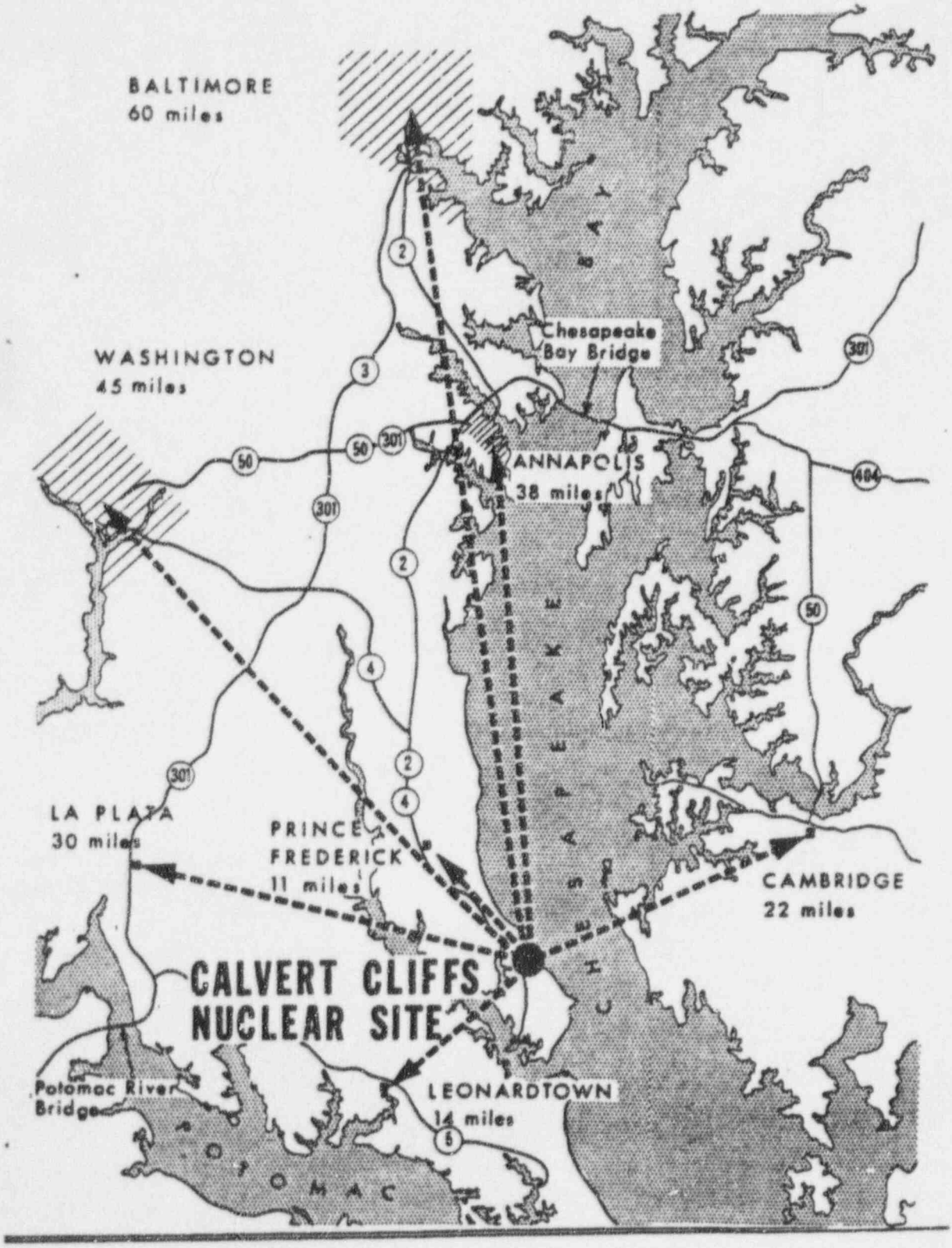

FIGURE A-2
Calvert Cliffs Nuclear Power Plant Sampling Locations
Scale 1" = 1.35 km

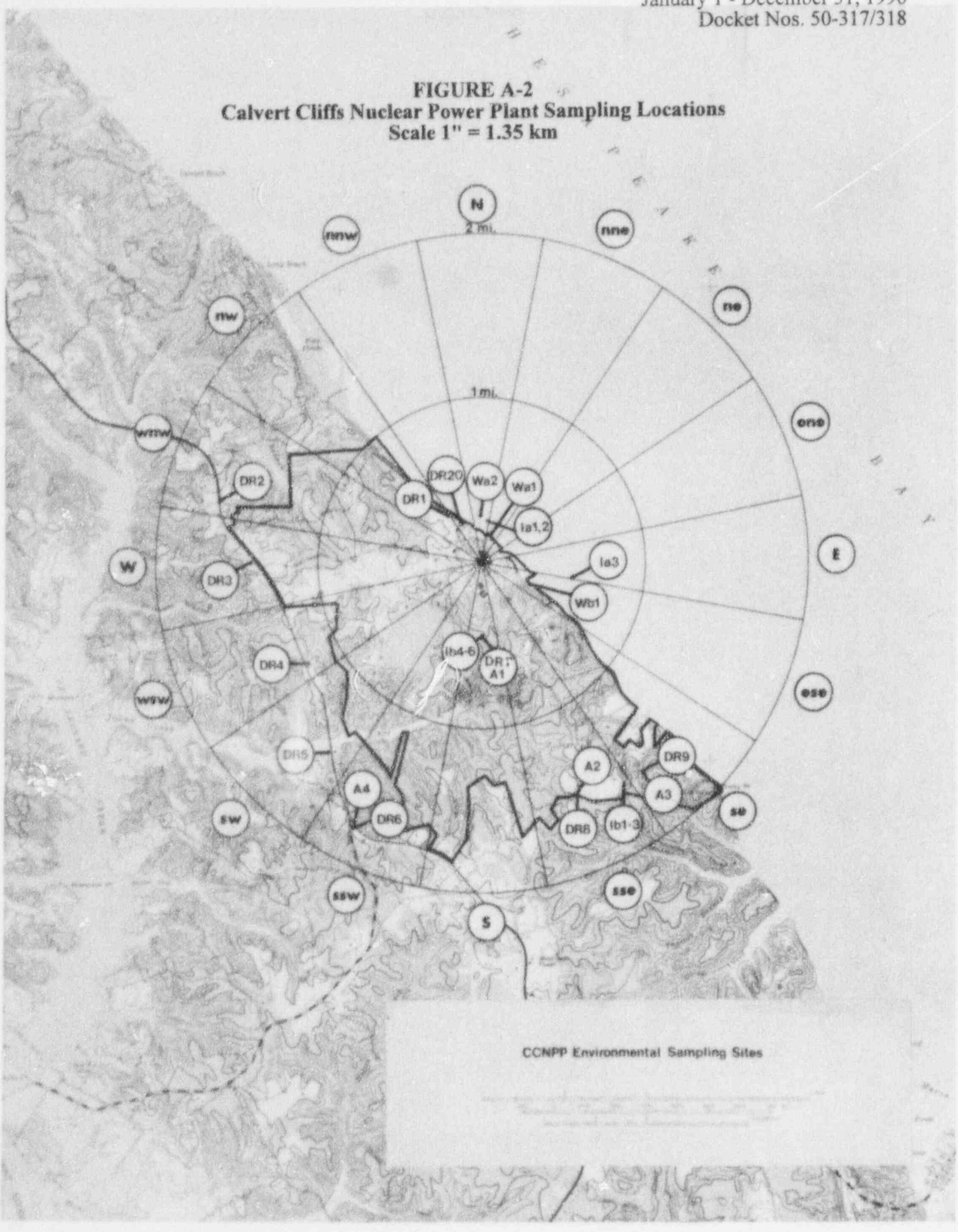

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FIGURE A-3
Calvert Cliffs Nuclear Power Plant Sampling Locations
Scale 1" = 4.0 km

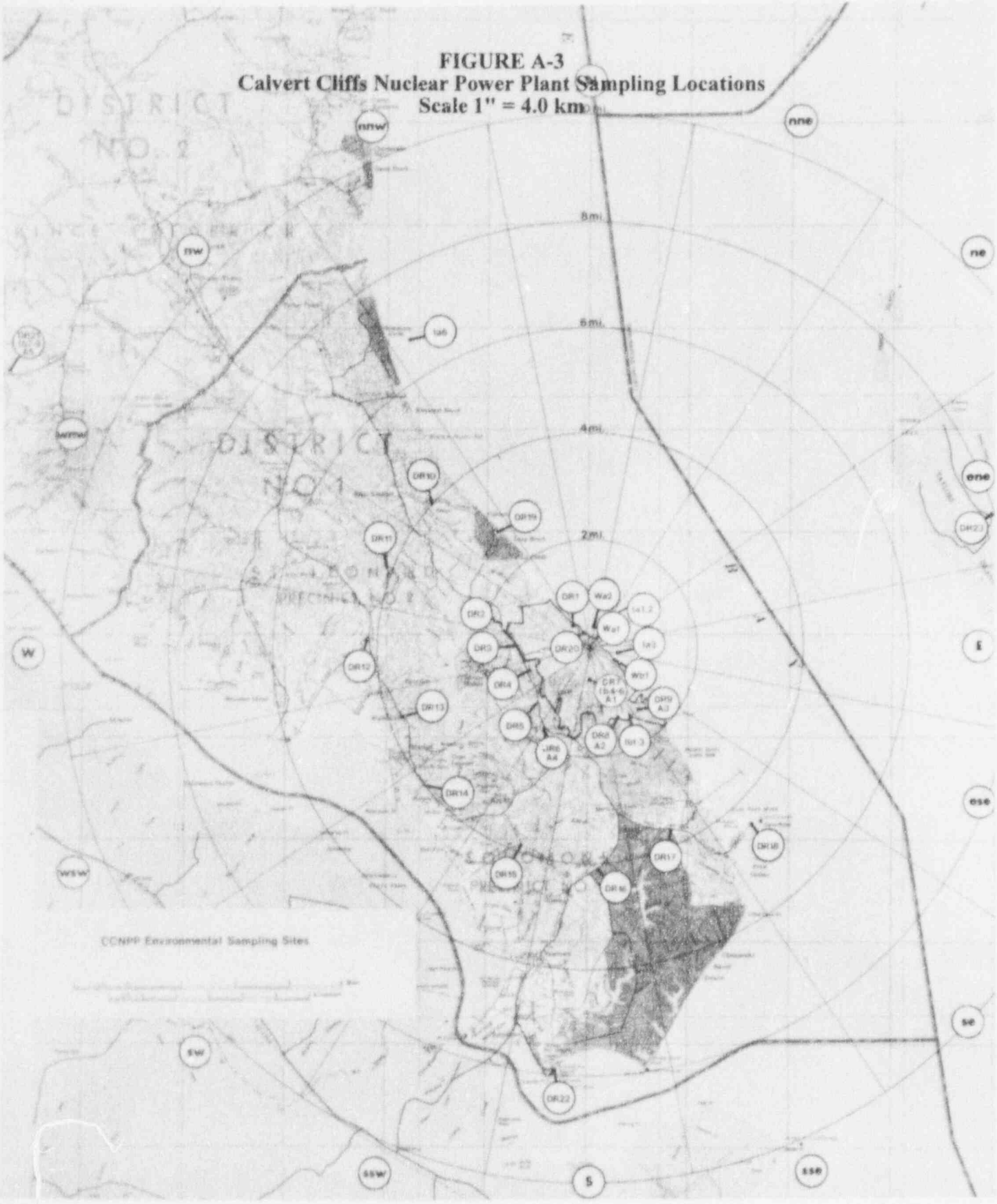

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TABLE A-2
Locations of Environmental Sampling Stations for the Independent Spent Fuel Storage Installation at Calvert Cliffs

Station	Description	Distance[1]	Direction[1]
A1[2]	On Site before Entrance to Camp Conoy	0.7	SE
SFA1	Meteorological Station	0.4	NW
SFA2	CCNPP Visitors Center	0.7	NNE
SFA3	NNW of ISFSI	0.1	NNW
SFA4	South of ISFSI	0.1	S
SFDR1	Collocated with Plant TLD #159	0.1	SW
SFDR2	Collocated with Plant TLD #160	0.1	N
SFDR3	Collocated with Plant TLD #161	0.1	NNE
SFDR4	Collocated with Plant TLD #162	≤0.1	NE
SFDR5	Collocated with Plant TLD #163	≤0.1	E
SFDR6	Collocated with Plant TLD #164	0.1	ESE
SFDR7	CCNPP Visitors Center	0.7	NNE
SFDR8	North Northwest of ISFSI	0.1	NNW
SFDR9	South of ISFSI	0.1	S
SFDR10	NNW of ISFSI	0.1	NNW
SFDR11	WNW of ISFSI	0.1	WNW
SFDR12	West of ISFSI	≤0.1	W
SFDR13	SSW of ISFSI	≤0.1	SSW
SFDR14	SSE of ISFSI	0.1	SSE
SFDR15	ENE of ISFSI	≤0.1	ENE
SFDR16	WSW of ISFSI	≤0.1	WSW
DR7[2]	On Site before Entrance to Camp Conoy	0.7	SE
DR30[3]	Meteorological Station	0.4	NW
SFb1	Meteorological Station	0.4	NW
SFb2	CCNPP Visitors Center	0.7	NNE
SFb3	NNW of ISFSI	0.1	NNW
SFb4	South of ISFSI	0.1	S
SFb5	On Site before Entrance to Camp Conoy	0.7	SE
SFS1	Meteorological Station	0.4	NW
SFS2	CCNPP Visitors Center	0.7	NNE
SFS3	NNW of ISFSI	0.1	NNW
SFS4	South of ISFSI	0.1	S
SFS5	On Site before Entrance to Camp Conoy	0.7	SE

[1]Distance and direction from the central point of the Independent Spent Fuel Storage Installation.

[2]Common to both the REMP and ISFSIMP.

[3]Formerly, part of the historical non-Technical Specification monitoring program. DR30 became a Tech Spec location when it was designated part of the ISFSI monitoring program.

FIGURE A-4
Independent Spent Fuel Storage Installation Sampling Locations

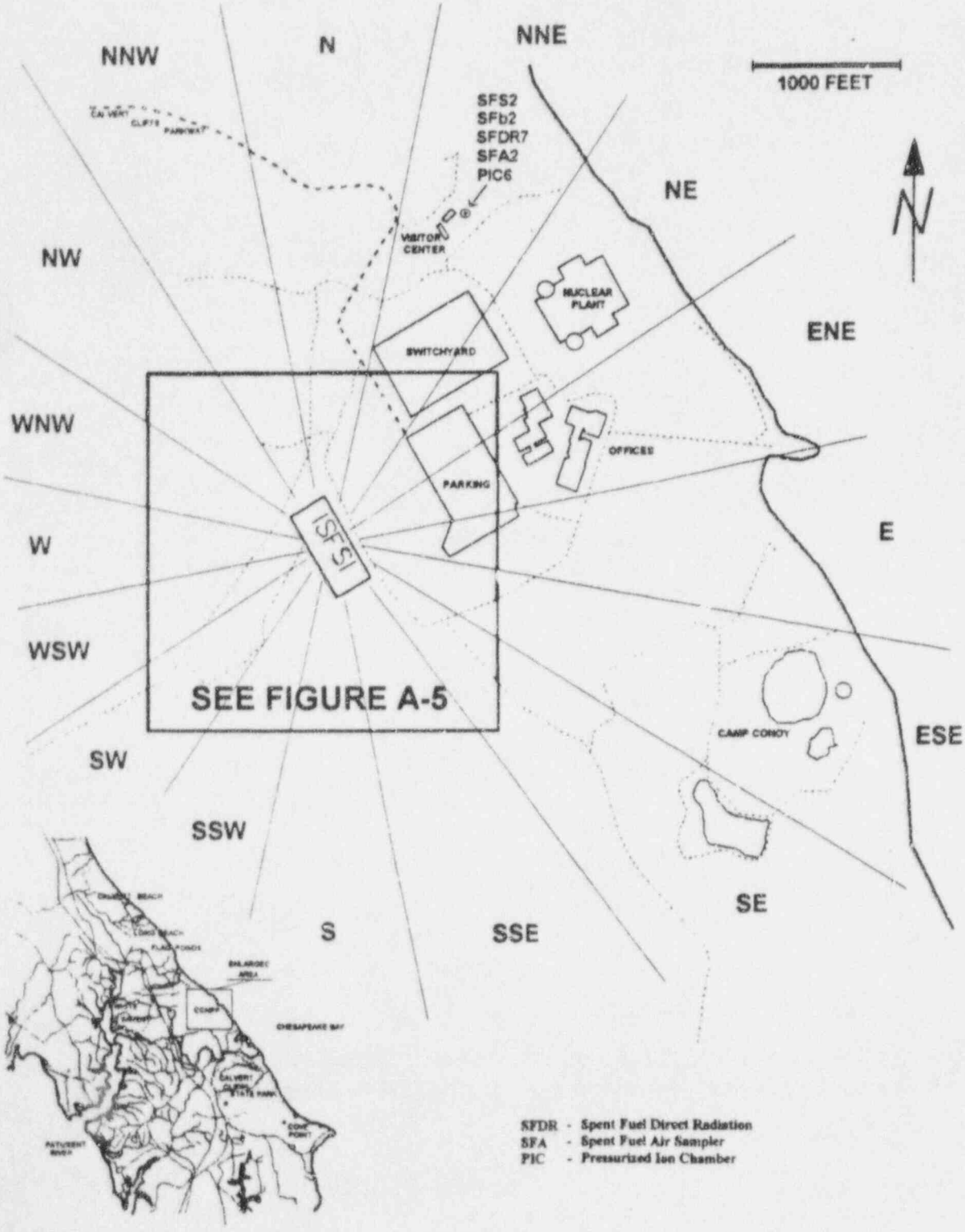
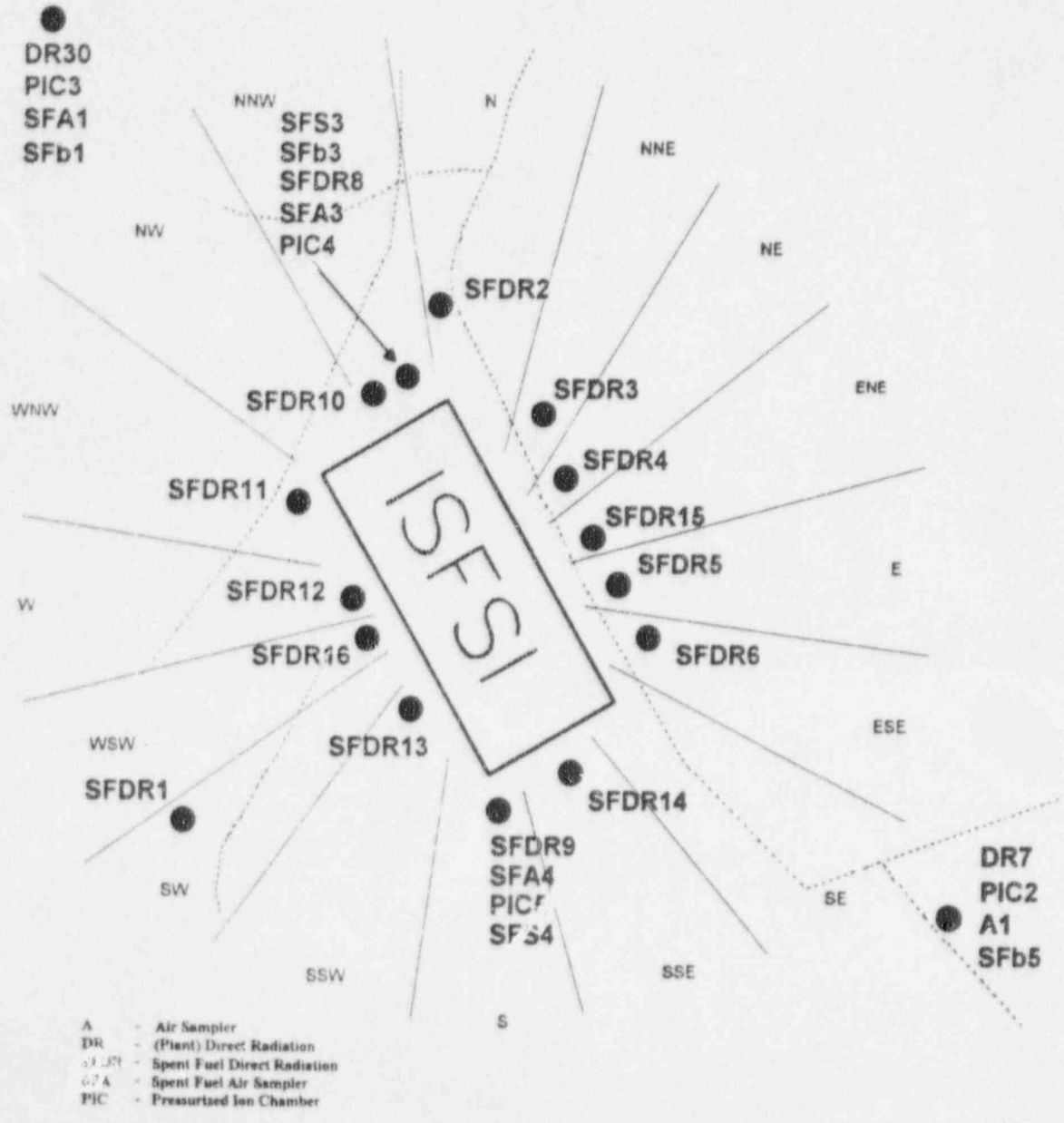


FIGURE A-5
Enlarged Map of the Independent Spent Fuel Storage Installation
Sampling Locations



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APPENDIX B

Appendix B is a presentation of the analytical results of the 1996 Calvert Cliffs Nuclear Power Plant and the Independent Spent Fuel Storage Installation environmental monitoring programs.

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TABLE OF CONTENTS - ANALYTICAL RESULTS

TABLE B-1

Concentration of Tritium and Gamma Emitters in Bay Water
(Results in units of pCi/L +/- 2σ)

Sample Code	Sample Date	H-3 [1]	Gamma Emitters
Wa1	1/15/96		*
Intake Area	2/15/96		*
	3/15/96		*
	3/31/96	36 +/- 33	
	4/15/96		*
	5/15/96		*
	6/15/96		*
	6/30/96	<36	
	7/15/96		*
	8/15/96		*
	9/15/96		*
	9/30/96	<38	
	10/15/96		*
	11/15/96		*
	12/15/96		*
	12/31/96	<37	
Wa2	1/15/96		*
Discharge Area	2/15/96		*
	3/15/96		*
	3/31/96	81 +/- 34	
	4/15/96		*
	5/15/96		*
	6/15/96		*
	6/30/96	90 +/- 35	
	7/15/96		*
	8/15/96		*
	9/15/96		*
	9/30/96	112 +/- 37	
	10/15/96		*
	11/15/96		*
	12/15/96		*
	12/31/96	84 +/- 37	

* Non-Natural Gamma Emitters < MDA
[1] Quarterly composite of monthly samples

TABLE B-2

Concentration of Gamma Emitters in the Flesh of Edible Fish
(Results in units of pCi/kg (wet) +/- 2σ)

SAMPLE CODE	Sample Date	Sample Type	Gamma Emitters
Ia1 Discharge Area	10/6/96	Bluefish	*
Ia2 Discharge Area	10/2/96	Striped bass	*
Ia4 [1] Patuxent River	10/18/96	Bluefish	*
Ia5 [1] Patuxent River	10/11/96	Striped bass	*

* Non-Natural Gamma Emitters < MDA
[1] Control Location

TABLE B-3

Concentration of Gamma Emitters in Oyster Samples
(Results in units of pCi/kg (wet) +/- 2σ)

SAMPLE CODE	Sample Date	Ag110m	Gamma Emitters
Ia3	3/25/96	38 +/- 10	*
Camp Conoy	6/3/96	44 +/- 14	*
	8/19/96	32 +/- 8	*
	10/2/96	20 +/- 7	*
Ia6 [1]	3/26/96	[2]	*
Kenwood Beach	6/6/96	[2]	*
	8/20/96	[2]	*
	10/2/96	[2]	*

* Non-Natural Gamma Emitters < MDA
[1] Control Location
[2] This Isotope < MDA

TABLE B-4

Concentration of Gamma Emitters in Shoreline Sediment
(Results in units of pCi/kg (dry) +/- 2σ)

SAMPLE CODE	Sample Date	Gamma Emitters
Wb1 Shoreline at Barge Rd	5/17/96	*
	10/31/96	*

* Non-Natural Gamma Emitters < MDA

TABLE B-5

Concentration of Iodine-131 in Filtered Air
(Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Start Date	Stop Date	A1 Entrance to Camp Conoy	A2 Camp Conoy Siren	A3 Bay Breeze Rd	A4 Route 765 at Lusby	A5 [1] EOF
1/2/96	1/11/96	*	*	*	*	*
1/11/96	1/16/96	*	*	*	*	*
1/16/96	1/22/96	*	*	*	*	*
1/22/96	1/29/96	*	*	*	*	*
1/29/96	2/5/96	*	*	*	*	*
2/5/96	2/12/96	*	*	*	*	*
2/12/96	2/20/96	*	[2]	*	*	*
2/20/96	2/26/96	*	*	*	*	*
2/26/96	3/4/96	*	*	*	*	*
3/4/96	3/11/96	*	*	*	*	*
3/11/96	3/18/96	*	*	*	*	*
3/18/96	3/25/96	*	*	*	*	*
3/25/96	4/1/96	*	*	*	*	*
4/1/96	4/8/96	*	*	*	*	*
4/8/96	4/15/96	*	*	*	*	*
4/15/96	4/22/96	*	*	*	*	*
4/22/96	4/29/96	*	*	*	*	*
4/29/96	5/6/96	*	*	*	[2]	*
5/6/96	5/13/96	*	*	*	*	*
5/13/96	5/20/96	*	*	*	*	*
5/20/96	5/28/96	*	*	*	*	*
5/28/96	6/3/96	*	*	*	*	*
6/3/96	6/10/96	*	*	*	*	*
6/10/96	6/17/96	*	*	*	*	*
6/17/96	6/24/96	*	*	*	*	*
6/24/96	7/1/96	*	*	*	*	*
7/1/96	7/8/96	*	*	*	*	*
7/8/96	7/15/96	*	*	*	*	*
7/15/96	7/22/96	*	[2]	*	*	*
7/22/96	7/29/96	*	*	*	*	*

* < MDA
[1] Control Location
[2] Sampler malfunction low flow

TABLE B-5 - Continued

Concentration of Iodine-131 in Filtered Air
(Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Start Date	Stop Date	A1 Entrance to Camp Conoy	A2 Camp Conoy Siren	A3 Bay Breeze Rd	A4 Route 765 at Lusby	A5 [1] EOF
7/29/96	8/5/96	*	*	*	*	*
8/5/96	8/12/96	*	*	*	*	*
8/12/96	8/19/96	*	*	*	*	*
8/19/96	8/26/96	*	*	*	*	*
8/26/96	9/3/96	*	*	*	*	*
9/3/96	9/9/96	*	*	*	*	*
9/9/96	9/16/96	*	*	*	*	*
9/16/96	9/23/96	*	*	*	*	*
9/23/96	9/30/96	*	*	*	*	*
9/30/96	10/7/96	*	*	*	*	*
10/7/96	10/14/96	*	*	*	*	*
10/14/96	10/21/96	*	*	*	*	*
10/21/96	10/28/96	*	*	*	*	*
10/28/96	11/4/96	*	*	*	*	*
11/4/96	11/11/96	*	*	*	*	*
11/11/96	11/18/96	*	*	*	*	*
11/18/96	11/25/96	*	*	*	*	*
11/25/96	12/2/96	*	*	*	*	*
12/2/96	12/9/96	*	*	*	*	*
12/9/96	12/16/96	*	*	*	*	*
12/16/96	12/23/96	*	*	*	*	*
12/23/96	12/30/96	*	*	*	*	*

* < MDA
[1] Control Location

TABLE B-6

Concentration of Beta Emitters in Air Particulates
(Results in units of 10^{-2} pCi/m^3 +/- 2σ)

Start Date	Stop Date	A1 Entrance to Camp Conoy	A2 Camp Conoy Siren	A3 Bay Breeze Rd	A4 Route 765 at Lusby	A5 [1] EOF
1/2/96	1/11/96	2.2 +/- 0.2	2.5 +/- 0.2	1.8 +/- 0.2	2.4 +/- 0.2	2.5 +/- 0.2
1/11/96	1/16/96	1.9 +/- 0.3	2.5 +/- 0.4	1.2 +/- 0.3	2.2 +/- 0.4	2.8 +/- 0.4
1/16/96	1/22/96	1.5 +/- 0.2	1.4 +/- 0.2	1.1 +/- 0.2	1.6 +/- 0.2	1.8 +/- 0.3
1/22/96	1/29/96	1.6 +/- 0.2	1.7 +/- 0.3	1.0 +/- 0.2	1.3 +/- 0.2	1.4 +/- 0.2
1/29/96	2/5/96	2.3 +/- 0.2	3.9 +/- 0.5	1.9 +/- 0.2	2.3 +/- 0.3	2.5 +/- 0.3
2/5/96	2/12/96	1.9 +/- 0.2	2.0 +/- 0.2	1.5 +/- 0.2	1.8 +/- 0.3	1.6 +/- 0.2
2/12/96	2/20/96	1.4 +/- 0.2	[2]	1.2 +/- 0.2	1.5 +/- 0.2	1.7 +/- 0.2
2/20/96	2/26/96	0.7 +/- 0.2	0.8 +/- 0.3	0.4 +/- 0.2	1.0 +/- 0.3	1.2 +/- 0.3
2/26/96	3/4/96	1.5 +/- 0.2	1.5 +/- 0.2	0.9 +/- 0.2	2.3 +/- 0.3	1.7 +/- 0.2
3/4/96	3/11/96	1.6 +/- 0.2	1.6 +/- 0.2	1.4 +/- 0.2	1.6 +/- 0.2	1.7 +/- 0.3
3/11/96	3/18/96	1.3 +/- 0.2	1.5 +/- 0.2	1.5 +/- 0.2	1.8 +/- 0.2	1.3 +/- 0.3
3/18/96	3/25/96	1.4 +/- 0.2	1.4 +/- 0.2	1.2 +/- 0.2	1.5 +/- 0.3	1.8 +/- 0.3
3/25/96	4/1/96	1.2 +/- 0.2	1.1 +/- 0.2	1.0 +/- 0.2	1.2 +/- 0.2	0.8 +/- 0.2
4/1/96	4/8/96	1.7 +/- 0.2	1.3 +/- 0.2	1.5 +/- 0.2	2.0 +/- 0.3	2.1 +/- 0.2
4/8/96	4/15/96	1.5 +/- 0.2	1.5 +/- 0.3	1.3 +/- 0.2	1.4 +/- 0.2	1.6 +/- 0.2
4/15/96	4/22/96	1.7 +/- 0.2	2.2 +/- 0.3	1.9 +/- 0.3	1.5 +/- 0.2	1.9 +/- 0.2
4/22/96	4/29/96	1.5 +/- 0.2	1.7 +/- 0.3	1.9 +/- 0.3	1.6 +/- 0.2	1.6 +/- 0.2
4/29/96	5/6/96	0.8 +/- 0.2	0.9 +/- 0.3	0.9 +/- 0.3	[2]	0.9 +/- 0.2
5/6/96	5/13/96	0.8 +/- 0.3	0.6 +/- 0.3	0.7 +/- 0.2	0.7 +/- 0.2	0.8 +/- 0.2
5/13/96	5/20/96	1.1 +/- 0.2	1.1 +/- 0.3	1.3 +/- 0.3	1.1 +/- 0.3	1.1 +/- 0.2
5/20/96	5/28/96	1.3 +/- 0.2	1.3 +/- 0.3	1.2 +/- 0.3	1.3 +/- 0.2	1.2 +/- 0.2
5/28/96	6/3/96	1.0 +/- 0.3	0.7 +/- 0.3	1.0 +/- 0.3	0.7 +/- 0.2	1.0 +/- 0.3
6/3/96	6/10/96	1.0 +/- 0.2	1.1 +/- 0.3	1.4 +/- 0.3	1.0 +/- 0.2	0.9 +/- 0.2
6/10/96	6/17/96	1.4 +/- 0.3	0.9 +/- 0.3	1.3 +/- 0.3	1.2 +/- 0.2	1.8 +/- 0.2
6/17/96	6/24/96	1.3 +/- 0.2	0.6 +/- 0.3	1.1 +/- 0.2	1.1 +/- 0.2	1.2 +/- 0.2
6/24/96	7/1/96	0.8 +/- 0.2	0.4 +/- 0.3	0.8 +/- 0.3	1.0 +/- 0.2	1.3 +/- 0.2
7/1/96	7/8/96	1.6 +/- 0.2	0.3 +/- 0.2	1.1 +/- 0.3	1.6 +/- 0.3	2.0 +/- 0.3
7/8/96	7/15/96	1.1 +/- 0.2	0.5 +/- 0.4	0.9 +/- 0.3	1.2 +/- 0.2	1.5 +/- 0.3
7/15/96	7/22/96	1.7 +/- 0.3	[2]	0.9 +/- 0.2	1.5 +/- 0.2	1.5 +/- 0.2
7/22/96	7/29/96	1.3 +/- 0.2	0.9 +/- 0.2	0.6 +/- 0.2	0.9 +/- 0.2	1.8 +/- 0.2
7/29/96	8/5/96	1.2 +/- 0.2	0.8 +/- 0.2	0.8 +/- 0.3	0.8 +/- 0.2	1.5 +/- 0.2
8/5/96	8/12/96	1.9 +/- 0.3	1.5 +/- 0.2	2.3 +/- 0.3	1.6 +/- 0.2	2.0 +/- 0.3
8/12/96	8/19/96	1.6 +/- 0.2	1.1 +/- 0.2	1.4 +/- 0.3	1.2 +/- 0.2	2.0 +/- 0.2
8/19/96	8/26/96	2.6 +/- 0.3	1.6 +/- 0.2	2.8 +/- 0.3	1.7 +/- 0.2	3.7 +/- 0.3
8/26/96	9/3/96	2.3 +/- 0.2	1.5 +/- 0.2	1.5 +/- 0.2	1.7 +/- 0.2	2.4 +/- 0.3

[1] Control Location
[2] Sampler malfunction/low flow

TABLE B-6 - Continued

Concentration of Beta Emitters in Air Particulates
(Results in units of 10^{-2} pCi/m^3 +/- 2σ)

Start Date	Stop Date	A1 Entrance to Camp Conoy	A2 Camp Conoy Siren	A3 Bay Breeze Rd	A4 Route 765 at Lusby	A5 [1] EOF
9/3/96	9/9/96	1.5 +/- 0.3	1.2 +/- 0.3	1.2 +/- 0.2	1.3 +/- 0.3	1.9 +/- 0.3
9/9/96	9/16/96	1.4 +/- 0.2	1.1 +/- 0.2	1.3 +/- 0.2	1.3 +/- 0.2	1.8 +/- 0.2
9/16/96	9/23/96	1.7 +/- 0.2	1.5 +/- 0.3	1.3 +/- 0.2	1.6 +/- 0.2	2.5 +/- 0.3
9/23/96	9/30/96	1.6 +/- 0.2	1.4 +/- 0.2	1.1 +/- 0.2	1.3 +/- 0.3	1.9 +/- 0.3
9/30/96	10/7/96	1.8 +/- 0.2	1.1 +/- 0.2	1.5 +/- 0.2	1.6 +/- 0.3	1.9 +/- 0.3
10/7/96	10/14/96	1.7 +/- 0.3	1.3 +/- 0.2	1.4 +/- 0.2	1.4 +/- 0.2	1.3 +/- 0.2
10/14/96	10/21/96	1.7 +/- 0.2	1.3 +/- 0.2	1.5 +/- 0.2	1.7 +/- 0.2	1.8 +/- 0.3
10/21/96	10/28/96	2.1 +/- 0.3	1.7 +/- 0.2	1.5 +/- 0.2	1.9 +/- 0.2	2.3 +/- 0.3
10/28/96	11/4/96	2.0 +/- 0.2	1.4 +/- 0.2	1.7 +/- 0.2	2.1 +/- 0.3	2.3 +/- 0.3
11/4/96	11/11/96	1.2 +/- 0.2	1.1 +/- 0.2	0.9 +/- 0.2	1.0 +/- 0.2	1.4 +/- 0.3
11/11/96	11/18/96	1.3 +/- 0.3	1.0 +/- 0.2	1.1 +/- 0.2	1.3 +/- 0.2	1.6 +/- 0.3
11/18/96	11/25/96	2.0 +/- 0.3	1.7 +/- 0.3	2.0 +/- 0.3	1.3 +/- 0.2	2.0 +/- 0.3
11/25/96	12/2/96	1.1 +/- 0.2	0.9 +/- 0.2	0.9 +/- 0.2	1.3 +/- 0.2	1.4 +/- 0.3
12/2/96	12/9/96	1.5 +/- 0.2	1.2 +/- 0.2	1.1 +/- 0.2	1.3 +/- 0.3	1.8 +/- 0.4
12/9/96	12/16/96	0.8 +/- 0.2	0.9 +/- 0.2	0.8 +/- 0.2	1.0 +/- 0.2	1.7 +/- 0.3
12/16/96	12/23/96	1.4 +/- 0.3	1.2 +/- 0.2	1.2 +/- 0.2	1.3 +/- 0.3	1.7 +/- 0.4
12/23/96	12/30/96	1.6 +/- 0.3	1.2 +/- 0.2	1.4 +/- 0.2	1.8 +/- 0.3	2.2 +/- 0.3

[1] Control Location

TABLE B-6 - Continued

Concentration of Beta Emitters in Air Particulates
(Results in units of 10^{-2} pCi/m^3 +/- 2σ)

Start Date	Stop Date	SFA1 MET Station	SFA2 [1] Visitors Center	SFA3 NNW Corner of ISFSI	SFA4 S corner of ISFSI
1/2/96	1/11/96	2.1 +/- 0.2	2.4 +/- 0.2	2.3 +/- 0.2	2.8 +/- 0.2
1/11/96	1/16/96	2.0 +/- 0.3	3.2 +/- 0.4	2.5 +/- 0.4	2.5 +/- 0.4
1/16/96	1/22/96	1.3 +/- 0.2	2.0 +/- 0.4	1.5 +/- 0.3	1.7 +/- 0.3
1/22/96	1/29/96	1.2 +/- 0.2	1.6 +/- 0.3	1.4 +/- 0.2	1.5 +/- 0.2
1/29/96	2/5/96	2.3 +/- 0.2	3.1 +/- 0.3	2.5 +/- 0.3	2.8 +/- 0.3
2/5/96	2/12/96	1.9 +/- 0.2	2.3 +/- 0.3	2.0 +/- 0.2	2.3 +/- 0.3
2/12/96	2/20/96	1.4 +/- 0.2	2.0 +/- 0.3	1.5 +/- 0.2	1.7 +/- 0.2
2/20/96	2/26/96	0.7 +/- 0.2	1.3 +/- 0.3	0.5 +/- 0.2	1.1 +/- 0.3
2/26/96	3/4/96	1.9 +/- 0.3	1.3 +/- 0.2	0.5 +/- 0.2	2.4 +/- 0.3
3/4/96	3/11/96	1.3 +/- 0.2	1.8 +/- 0.2	1.8 +/- 0.3	1.9 +/- 0.2
3/11/96	3/18/96	1.4 +/- 0.2	1.4 +/- 0.2	1.5 +/- 0.2	2.2 +/- 0.3
3/18/96	3/25/96	1.9 +/- 0.3	1.3 +/- 0.2	1.5 +/- 0.2	1.6 +/- 0.2
3/25/96	4/1/96	1.0 +/- 0.2	1.0 +/- 0.2	1.3 +/- 0.2	1.4 +/- 0.2
4/1/96	4/8/96	1.6 +/- 0.2	1.6 +/- 0.2	1.9 +/- 0.2	2.0 +/- 0.3
4/8/96	4/15/96	1.2 +/- 0.2	1.4 +/- 0.2	1.4 +/- 0.2	1.7 +/- 0.3
4/15/96	4/22/96	1.3 +/- 0.2	1.8 +/- 0.2	1.6 +/- 0.2	1.5 +/- 0.2
4/22/96	4/29/96	1.3 +/- 0.2	1.7 +/- 0.2	1.4 +/- 0.2	1.2 +/- 0.2
4/29/96	5/6/96	0.8 +/- 0.2	1.0 +/- 0.2	1.0 +/- 0.2	0.8 +/- 0.2
5/6/96	5/13/96	0.6 +/- 0.2	0.8 +/- 0.2	0.8 +/- 0.2	0.6 +/- 0.2
5/13/96	5/20/96	1.4 +/- 0.2	1.3 +/- 0.2	1.3 +/- 0.3	1.0 +/- 0.2
5/20/96	5/28/96	1.0 +/- 0.2	1.1 +/- 0.2	1.5 +/- 0.2	0.8 +/- 0.2
5/28/96	6/3/96	0.8 +/- 0.2	1.0 +/- 0.2	0.9 +/- 0.2	0.7 +/- 0.2
6/3/96	6/10/96	1.1 +/- 0.2	1.1 +/- 0.2	1.0 +/- 0.2	0.9 +/- 0.2
6/10/96	6/17/96	1.4 +/- 0.2	1.5 +/- 0.2	1.4 +/- 0.2	1.2 +/- 0.2
6/17/96	6/24/96	1.3 +/- 0.2	1.2 +/- 0.2	1.1 +/- 0.2	0.9 +/- 0.2
6/24/96	7/1/96	0.9 +/- 0.2	0.9 +/- 0.2	0.8 +/- 0.2	1.0 +/- 0.2
7/1/96	7/8/96	1.5 +/- 0.2	1.7 +/- 0.3	1.4 +/- 0.2	1.4 +/- 0.2
7/8/96	7/15/96	1.1 +/- 0.2	1.4 +/- 0.2	1.2 +/- 0.2	0.9 +/- 0.2
7/15/96	7/22/96	1.2 +/- 0.2	1.6 +/- 0.2	1.6 +/- 0.2	1.3 +/- 0.2
7/22/96	7/29/96	1.3 +/- 0.2	1.4 +/- 0.2	1.5 +/- 0.2	1.1 +/- 0.2
7/29/96	8/5/96	1.2 +/- 0.2	1.2 +/- 0.2	1.4 +/- 0.2	1.1 +/- 0.2
8/5/96	8/12/96	1.6 +/- 0.2	1.9 +/- 0.3	1.8 +/- 0.3	1.5 +/- 0.2
8/12/96	8/19/96	1.4 +/- 0.2	1.4 +/- 0.2	1.5 +/- 0.2	1.1 +/- 0.2
8/19/96	8/26/96	2.2 +/- 0.2	2.4 +/- 0.3	2.3 +/- 0.2	1.9 +/- 0.3
8/26/96	9/3/96	1.7 +/- 0.2	2.1 +/- 0.2	2.3 +/- 0.2	2.5 +/- 0.3

[1] Control Location

TABLE B-6 - Continued

Concentration of Beta Emitters in Air Particulates
(Results in units of 10^{-2} pCi/m^3 +/- 2σ)

Start Date	Stop Date	SFA1 MET Station	SFA2 [1] Visitors Center	SFA3 NNW Corner of ISFSI	SFA4 S corner of ISFSI
9/3/96	9/9/96	1.5 +/- 0.2	1.4 +/- 0.3	1.6 +/- 0.3	1.2 +/- 0.2
9/9/96	9/16/96	1.4 +/- 0.2	1.3 +/- 0.2	1.7 +/- 0.3	1.3 +/- 0.2
9/16/96	9/23/96	1.5 +/- 0.2	1.6 +/- 0.2	1.7 +/- 0.3	1.3 +/- 0.2
9/23/96	9/30/96	1.4 +/- 0.2	1.5 +/- 0.2	1.1 +/- 0.2	1.2 +/- 0.2
9/30/96	10/7/96	1.6 +/- 0.2	1.6 +/- 0.2	1.6 +/- 0.3	1.5 +/- 0.2
10/7/96	10/14/96	1.3 +/- 0.2	1.5 +/- 0.3	1.3 +/- 0.2	1.0 +/- 0.2
10/14/96	10/21/96	1.6 +/- 0.2	1.5 +/- 0.2	1.6 +/- 0.3	1.3 +/- 0.2
10/21/96	10/28/96	1.9 +/- 0.3	2.1 +/- 0.3	2.1 +/- 0.3	1.5 +/- 0.2
10/28/96	11/4/96	1.7 +/- 0.2	2.3 +/- 0.3	2.0 +/- 0.3	2.1 +/- 0.3
11/4/96	11/11/96	1.1 +/- 0.2	1.1 +/- 0.2	1.2 +/- 0.2	1.1 +/- 0.2
11/11/96	11/18/96	1.2 +/- 0.2	1.3 +/- 0.3	1.3 +/- 0.2	1.2 +/- 0.2
11/18/96	11/25/96	1.8 +/- 0.3	1.9 +/- 0.3	2.0 +/- 0.2	1.9 +/- 0.3
11/25/96	12/2/96	1.2 +/- 0.2	1.1 +/- 0.2	1.1 +/- 0.2	1.3 +/- 0.2
12/2/96	12/9/96	1.4 +/- 0.3	1.6 +/- 0.3	1.8 +/- 0.3	1.7 +/- 0.3
12/9/96	12/16/96	1.0 +/- 0.2	1.0 +/- 0.2	1.1 +/- 0.2	0.9 +/- 0.2
12/16/96	12/23/96	1.7 +/- 0.3	1.6 +/- 0.3	1.5 +/- 0.3	1.3 +/- 0.3
12/23/96	12/30/96	1.4 +/- 0.2	1.7 +/- 0.3	1.7 +/- 0.3	1.8 +/- 0.3

[1] Control Location

TABLE B-7

Concentration of Gamma Emitters in Air Particulates
(Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Sample Date	A1 Entrance to Camp Conoy	A2 Camp Conoy Siren	A3 Bay Breeze Rd	A4 Route 765 at Lusby	A5 [1] EOF
1/15/96	*	*	*	*	*
2/15/96	*	*	*	*	*
3/15/96	*	*	*	*	*
4/15/96	*	*	*	*	*
5/15/96	*	*	*	*	*
6/15/96	*	*	*	*	*
7/15/96	*	*	*	*	*
8/15/96	*	*	*	*	*
9/15/96	*	*	*	*	*
10/15/96	*	*	*	*	*
11/15/96	*	*	*	*	*
12/15/96	*	*	*	*	*

Sample Date	SFA1 MET Station	SFA2 [1] Visitors Center	SFA3 NNW Corner of ISFSI	SFA4 S corner of ISFSI
1/15/96	*	*	*	*
2/15/96	*	*	*	*
3/15/96	*	*	*	*
4/15/96	*	*	*	*
5/15/96	*	*	*	*
6/15/96	*	*	*	*
7/15/96	*	*	*	*
8/15/96	*	*	*	*
9/15/96	*	*	*	*
10/15/96	*	*	*	*
11/15/96	*	*	*	*
12/15/96	*	*	*	*

* Non-Natural Gamma Emitters < MDA
[1] Control Location

TABLE B-8a

Concentration of Gamma Emitters in Vegetation Samples
(Results in units of pCi/kg (wet) +/- 2σ)

SAMPLE CODE	Sample Date	Sample Type	Gamma Emitters
Ib1	6/24/96	Collards	*
Bay Breeze Rd	7/19/96	Collards	*
	8/26/96	Collards	*
	9/27/96	Collards	*
	10/28/96	Collards	*
Ib2	6/24/96	Cabbage	*
Bay Breeze Rd	7/19/96	Cabbage	*
	8/26/96	Cabbage	*
	9/27/96	Cabbage	*
	10/28/96	Cabbage	*
Ib3	6/24/96	Brussel sprouts	*
Bay Breeze Rd	7/19/96	Cauliflower	*
	8/26/96	Cabbage	*
	9/27/96	Cauliflower	*
	10/28/96	Brussel sprouts	*
Ib4	6/24/96	Collards	*
Camp Conoy Entrance	7/19/96	Collards	*
	8/26/96	Collards	*
	9/27/96	Collards	*
	10/28/96	Collards	*
Ib5	6/24/96	Cabbage	*
Camp Conoy Entrance	7/19/96	Cabbage	*
	8/26/96	Cabbage	*
	9/27/96	Cabbage	*
	10/28/96	Cabbage	*
Ib6	6/24/96	Brussel sprouts	*
Camp Conoy Entrance	7/19/96	Cauliflower	*
	8/26/96	Brussel sprouts	*
	9/27/96	Cauliflower	*
	10/28/96	Brussel sprouts	*

* Non-Natural Gamma Emitters < MDA

TABLE B-8a - Continued

Concentration of Gamma Emitters in Vegetation Samples
(Results in units of pCi/kg (wet) +/- 2σ)

SAMPLE CODE	Sample Date	Sample Type	Gamma Emitters
Ib7 [1]	6/24/96	Collards	*
EOF	7/19/96	Collards	*
	8/26/96	Collards	*
	9/27/96	Collards	*
	10/28/96	Collards	*
Ib8 [1]	6/24/96	Cabbage	*
EOF	7/19/96	Cabbage	*
	8/26/96	Cabbage	*
	9/27/96	Cabbage	*
	10/28/96	Cabbage	*
Ib9 [1]	6/24/96	Brussel sprouts	*
EOF	7/19/96	Cauliflower	*
	8/26/96	Brussel sprouts	*
	9/27/96	Cauliflower	*
	10/28/96	Brussel sprouts	*

* Non-Natural Gamma Emitters < MDA
[1] Control Location

TABLE B-8b

Concentration of Gamma Emitters in Vegetation From Locations Around the IFSFI
(Results in units of pCi/kg (wet) +/- 2σ)

SAMPLE CODE	Sample Date	Cs-137	Other Gamma Emitters
SFb1	3/18/96	[1]	*
MET Station	6/7/96	[1]	*
	9/20/96	[1]	*
	12/13/96	[1]	*
SFb2 [2]	3/18/96	50 +/- 18	*
Visitors Center	6/7/96	[1]	*
	9/20/96	[1]	*
	12/13/96	[1]	*
SFb3	3/18/96	196 +/- 27	*
NNW Corner of ISFSI	6/7/96	[1]	*
	9/20/96	[1]	*
	12/13/96	[1]	*
SFb4	3/18/96	[1]	*
South of ISFSI	6/7/96	[1]	*
	9/20/96	[1]	*
SFb5	3/18/96	52 +/- 19	*
On Site before Entrance	6/7/96	65 +/- 20	*
Camp Conoy	9/20/96	182 +/- 29	*
	12/13/96	[1]	*

* Non-Natural Gamma Emitters < MDA
[1] This Isotope < MDA
[2] Control Location

TABLE B-9

Concentration of Gamma Emitters in Soil Samples From Locations Around the ISFSI
(Results in units of pCi/kg (dry) +/- 2σ)

SAMPLE CODE	Sample Date	Co-60	Cs-137	Gamma Emitters
SFS1	3/18/96	[1]	[1]	*
MET station	6/7/96	[1]	[1]	*
	9/20/96	[1]	12 +/- 8	*
	12/13/96	[1]	[1]	*
SFS2 [1]	3/18/96	[1]	124 +/- 25	*
Visitors Center	6/7/96	18 +/- 15	285 +/- 26	*
	9/20/96	[1]	201 +/- 25	*
	12/13/96	16 +/- 19	252 +/- 26	*
SFS3	3/18/96	[1]	765 +/- 46	*
NNW of ISFSI	6/7/96	[1]	168 +/- 20	*
	9/20/96	[1]	1141 +/- 65	*
	12/13/96	[1]	986 +/- 52	*
SFS4	3/18/96	[1]	56 +/- 17	*
South of ISFSI	6/7/96	[1]	48 +/- 18	*
	9/20/96	[1]	60 +/- 15	*
	12/13/96	[1]	57 +/- 18	*
SFS5	3/18/96	[1]	683 +/- 39	*
Entrance to Camp	6/7/96	[1]	812 +/- 42	*
Conoy	9/20/96	[1]	293 +/- 20	*
	12/13/96	[1]	275 +/- 20	*

* Non-Natural Gamma Emitters < MDA
[1] Control Location

TABLE B-10
Typical MDA Ranges for Gamma Spectrometry

Selected Nuclides	Bay Water pCi/l	Fish pCi/kg	Shellfish pCi/kg	Shoreline pCi/kg	Vegetation pCi/kg	Soil pCi/kg	Particulates 10^{-3}pCi/m^3
Na-22	1.8 - 3.8	27 - 34	11 - 36	18 - 31	18 - 51	19 - 88	1.2 - 7.7
Cr-51	13 - 35	119 - 155	81 - 269	120 - 199	97 - 190	117 - 541	13 - 98
Mn-54	1.6 - 3.2	13 - 22	10 - 30	17 - 27	15 - 36	17 - 70	1.2 - 9.2
Co-58	1.5 - 3.5	19 - 24	10 - 33	17 - 39	14 - 34	16 - 69	1.4 - 9.7
Fe-59	3.6 - 9.4	50 - 69	27 - 76	32 - 53	31 - 88	33 - 153	3.6 - 24.9
Co-60	1.7 - 3.6	22 - 28	12 - 33	18 - 29	18 - 45	19 - 83	1.1 - 7.3
Zn-65	3.2 - 8.0	23 - 51	24 - 69	43 - 55	34 - 92	47 - 160	2.2 - 16.7
Nb-95	1.7 - 4.3	20 - 28	12 - 40	21 - 31	15 - 32	19 - 76	1.9 - 13.7
Zr-95	2.8 - 6.0	32 - 41	22 - 59	28 - 39	27 - 58	27 - 122	2.5 - 15.8
Ru-106	13 - 26	141-177	74 - 254	136 - 252	117 - 281	127 - 736	8.0 - 56.4
Ag-110m	1.5 - 2.8	15 - 18	9 - 27	14 - 25	12 - 33	16 - 92	0.9 - 16.6
Te-129m	20 - 49	199 - 280	123 - 425	205 - 295	142 - 345	203 - 969	2.2 - 133
I-131	2 - 19	28 - 84	25 - 117	19 - 33	14 - 34	21 - 137	*
Cs-134	1.8 - 2.6	14 - 16	10 - 25	19 - 33	16 - 31	19 - 80	1.2 - 8.6
Cs-137	1.5 - 2.7	16 - 18	8 - 27	16 - 22	14 - 35	12 - 90	0.9 - 6.0
Ba-140	6 - 34	90 - 183	58 - 242	64 - 101	44 - 114	70 - 334	13.2 - 105
Ce-144	9 - 14	44 - 51	30 - 120	74 - 109	59- 119	71 - 342	3.2 - 46.4

*The MDA range for I-131 measured on silver zeolite cartridge is 2.5 x 10^{-3} to 9.7 x 10^{-3} pCi/m^3.

TABLE B-11

Typical LLDs for Gamma Spectrometry

Selected Nuclides	Bay Water pCi/l	Fish pCi/kg	Shellfish pCi/kg	Sediment pCi/kg	Particulate 10^{-3}pCi/m^3	Precipitation pCi/l	Vegetation pCi/Kg	Soil pCi/Kg	Well Water pCi/l
Na-22	2.9	22	22	24	2.9	2.9	35	24	2.9
Cr-51	17	88	88	110	12	17	162	110	17
Mn-54	2.4	17	17	18	2.1	2.4	27	18	2.4
Co-58	2.4	16	16	17	2.0	2.4	25	17	2.4
Fe-59	5.2	37	37	38	4.6	5.2	60	38	5.2
Co-60	2.8	22	22	21	2.7	2.8	33	21	2.8
Zn-65	5.6	23	23	54	2.8	5.6	66	54	5.6
Nb-95	2.2	15	15	18	1.9	2.2	25	18	2.2
Zr-95	3.8	27	27	29	3.3	3.8	44	29	3.8
Ru-106	20	135	135	146	17	20	223	146	20
Ag-110m	2.1	14	14	16	1.8	2.1	25	16	2.1
Te-129m	26	149	149	180	20	26	265	180	26
I-131	2.0	11	11	14	1.5*	2.0	20	14	2.0
Cs-134	2.2	15	15	20	1.9	2.2	24	20	2.2
Cs-137	2.3	15	15	17	1.8	2.3	27	17	2.3
Ba-140	7.3	48	48	54	6.1	7.3	80	54	7.3
La-140	4.1	26	26	25	3.4	4.1	41	25	4.1
Ce-144	12	43	43	75	5.5	12	101	75	12

*The LLD for I-131 measured on silver zeolite cartridge is 7.9x10^{-3} pCi/m^3 for NaI1 Detector and 5.3 x10^{-3} pCi/m^3 for NaI2 Detector

TABLE B-12

Direct Radiation
(Results in Units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
DR01	JAN	3.91 +/- 0.18	FEB	4.41 +/- 0.80
On Site, along	MAR	4.26 +/- 0.35	APR	4.45 +/- 0.42
Cliffs	MAY	4.56 +/- 0.90	JUN	3.97 +/- 0.38
	JUL	4.08 +/- 0.44	AUG	3.93 +/- 0.57
	SEP	3.73 +/- 0.27	OCT	3.10 +/- 0.24
	NOV	4.42 +/- 0.27	DEC	4.27 +/- 0.31
DR02	JAN	2.82 +/- 1.34	FEB	3.72 +/- 0.32
Route 765, Auto	MAR	3.48 +/- 1.11	APR	3.79 +/- 0.38
Dump	MAY	3.77 +/- 0.42	JUN	3.42 +/- 0.20
	JUL	3.64 +/- 0.48	AUG	3.08 +/- 0.86
	SEP	2.90 +/- 0.30	OCT	2.68 +/- 0.38
	NOV	3.40 +/- 0.33	DEC	3.53 +/- 0.46
DR03	JAN	3.78 +/- 1.76	FEB	3.48 +/- 0.39
Route 765,	MAR	3.70 +/- 0.48	APR	3.80 +/- 0.50
Giovanni's Tavern	MAY	3.87 +/- 0.96	JUN	3.44 +/- 0.56
	JUL	3.53 +/- 0.56	AUG	3.03 +/- 0.77
	SEP	3.01 +/- 0.34	OCT	2.82 +/- 0.26
	NOV	3.53 +/- 0.44	DEC	3.55 +/- 0.41
DR04	JAN	3.87 +/- 0.04	FEB	4.02 +/- 1.16
Route 765, across	MAR	4.19 +/- 1.30	APR	4.03 +/- 0.10
from White Sands	MAY	4.11 +/- 0.18	JUN	3.62 +/- 0.33
Drive	JUL	3.92 +/- 0.70	AUG	3.47 +/- 0.06
	SEP	3.46 +/- 0.54	OCT	3.33 +/- 0.44
	NOV	4.08 +/- 0.67	DEC	4.21 +/- 0.47
DR05	JAN	3.91 +/- 0.21	FEB	3.89 +/- 0.49
Route 765,	MAR	3.82 +/- 0.42	APR	4.75 +/- 0.94
John's Creek	MAY	4.24 +/- 0.17	JUN	3.68 +/- 0.80
	JUL	4.02 +/- 0.32	AUG	3.94 +/- 0.57
	SEP	3.29 +/- 0.39	OCT	3.46 +/- 0.33
	NOV	3.96 +/- 0.47	DEC	4.06 +/- 0.23
DR06	JAN	3.43 +/- 0.51	FEB	3.81 +/- 0.45
Route 765 at	MAR	3.50 +/- 0.58	APR	3.90 +/- 0.83
Lusby	MAY	3.64 +/- 0.48	JUN	3.35 +/- 0.81
	JUL	3.56 +/- 0.13	AUG	3.12 +/- 0.48
	SEP	2.64 +/- 0.47	OCT	2.83 +/- 0.06
	NOV	3.42 +/- 0.45	DEC	3.43 +/- 0.43

TABLE B-12 - Continued

Direct Radiation
(Results in Units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
DR07	JAN	3.18 +/- 0.75	FEB	3.85 +/- 0.69
Entrance to	MAR	3.49 +/- 0.38	APR	3.52 +/- 0.70
Camp Conoy	MAY	4.11 +/- 1.31	JUN	3.53 +/- 0.87
	JUL	3.33 +/- 0.37	AUG	3.48 +/- 0.06
	SEP	2.93 +/- 0.44	OCT	2.88 +/- 0.26
	NOV	3.34 +/- 0.55	DEC	3.51 +/- 0.58
DR08	JAN	3.79 +/- 0.90	FEB	4.51 +/- 2.09
Camp Conoy Rd	MAR	4.44 +/- 0.57	APR	4.97 +/- 1.35
at Emergency	MAY	5.26 +/- 1.05	JUN	4.70 +/- 1.19
Siren	JUL	4.98 +/- 0.53	AUG	4.51 +/- 1.52
	SEP	4.14 +/- 0.48	OCT	3.90 +/- 0.54
	NOV	4.89 +/- 0.36	DEC	5.07 +/- 0.70
DR09	JAN	3.22 +/- 0.34	FEB	3.56 +/- 0.82
Bay Breeze Rd	MAR	3.65 +/- 0.66	APR	3.70 +/- 0.96
	MAY	3.85 +/- 1.34	JUN	3.43 +/- 0.58
	JUL	4.27 +/- 2.24	AUG	3.49 +/- 0.51
	SEP	3.27 +/- 0.31	OCT	3.20 +/- 0.43
	NOV	3.62 +/- 0.48	DEC	3.64 +/- 0.71
DR10	JAN	3.23 +/- 0.27	FEB	3.74 +/- 0.64
Decatur St. and	MAR	3.35 +/- 0.40	APR	4.32 +/- 0.23
Calvert Beach	MAY	3.72 +/- 0.39	JUN	3.45 +/- 0.23
Rd	JUL	3.69 +/- 0.38	AUG	3.05 +/- 0.02
	SEP	2.97 +/- 0.47	OCT	2.84 +/- 0.45
	NOV	3.45 +/- 0.20	DEC	3.66 +/- 0.31
DR11	JAN	3.27 +/- 1.56	FEB	3.21 +/- 1.24
Dirt road off	MAR	3.58 +/- 0.77	APR	4.48 +/- 1.17
Mackall & Parran	MAY	4.09 +/- 0.90	JUN	3.52 +/- 0.46
Rd	JUL	4.43 +/- 0.22	AUG	3.52 +/- 0.55
	SEP	3.14 +/- 0.20	OCT	3.01 +/- 0.64
	NOV	3.72 +/- 0.33	DEC	3.49 +/- 0.41
DR12	JAN	3.04 +/- 0.35	FEB	3.27 +/- 0.64
Mackall & Bowen	MAR	3.41 +/- 0.83	APR	4.36 +/- 1.54
Rds	MAY	3.64 +/- 1.02	JUN	3.70 +/- 0.67
	JUL	3.43 +/- 0.60	AUG	4.88 +/- 1.44
	SEP	3.11 +/- 0.49	OCT	3.04 +/- 0.45
	NOV	3.57 +/- 0.34	DEC	3.51 +/- 0.57

E B-12 - Continued

Direct Radiation
(Results in Units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
DR13	JAN	3.63 +/- 0.07	FEB	4.15 +/- 1.14
Mackall Rd, near	MAR	3.48 +/- 0.15	APR	3.56 +/- 0.98
Wallville	MAY	3.99 +/- 0.40	JUN	3.67 +/- 0.43
	JUL	3.59 +/- 0.61	AUG	3.77 +/- 0.43
	SEP	3.19 +/- 0.39	OCT	3.07 +/- 0.33
	NOV	3.54 +/- 0.49	DEC	3.83 +/- 0.25
DR14	JAN	3.79 +/- 0.89	FEB	4.14 +/- 1.02
Rodney Point	MAR	4.10 +/- 0.04	APR	4.26 +/- 0.23
	MAY	4.34 +/- 0.50	JUN	4.17 +/- 0.62
	JUL	4.54 +/- 0.75	AUG	4.00 +/- 1.42
	SEP	3.87 +/- 0.31	OCT	2.95 +/- 1.04
	NOV	4.52 +/- 0.90	DEC	4.42 +/- 0.45
DR15	JAN	3.41 +/- 1.23	FEB	4.21 +/- 1.08
Mill Bridge &	MAR	3.54 +/- 0.49	APR	4.08 +/- 1.74
Turner Rds	MAY	3.94 +/- 0.40	JUN	4.15 +/- 1.01
	JUL	3.86 +/- 1.15	AUG	3.68 +/- 1.17
	SEP	3.36 +/- 0.14	OCT	3.03 +/- 0.16
	NOV	4.29 +/- 0.76	DEC	3.95 +/- 0.27
DR16	JAN	3.41 +/- 1.17	FEB	3.96 +/- 1.18
Across from	MAR	3.62 +/- 0.80	APR	3.76 +/- 0.71
Appeal School	MAY	4.16 +/- 1.15	JUN	3.33 +/- 0.54
	JUL	3.55 +/- 0.58	AUG	3.31 +/- 0.17
	SEP	3.19 +/- 0.36	OCT	2.86 +/- 0.40
	NOV	3.66 +/- 0.57	DEC	3.89 +/- 0.46
DR17	JAN	3.47 +/- 0.47	FEB	3.85 +/- 0.92
Cove Point &	MAR	3.40 +/- 0.73	APR	3.87 +/- 0.23
Little Cove Point	MAY	4.11 +/- 0.39	JUN	3.64 +/- 1.17
Rds	JUL	3.65 +/- 0.61	AUG	3.41 +/- 0.69
	SEP	3.59 +/- 1.00	OCT	3.02 +/- 0.08
	NOV	4.35 +/- 0.29	DEC	3.81 +/- 0.47
DR18	JAN	3.37 +/- 0.83	FEB	3.31 +/- 0.56
Cove Point	MAR	3.38 +/- 0.17	APR	3.17 +/- 1.32
	MAY	3.75 +/- 0.99	JUN	3.62 +/- 0.84
	JUL	3.37 +/- 0.14	AUG	3.19 +/- 0.92
	SEP	2.81 +/- 0.11	OCT	2.46 +/- 0.27
	NOV	3.12 +/- 0.42	DEC	3.04 +/- 0.29

TABLE B-12 - Continued

Direct Radiation
(Results in Units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
DR19	JAN	3.50 +/- 0.40	FEB	3.83 +/- 0.45
Long Beach	MAR	3.58 +/- 0.30	APR	3.52 +/- 0.15
	MAY	3.66 +/- 0.12	JUN	3.38 +/- 0.92
	JUL	3.54 +/- 0.32	AUG	3.22 +/- 0.39
	SEP	3.00 +/- 0.58	OCT	2.80 +/- 0.19
	NOV	3.39 +/- 0.52	DEC	3.50 +/- 0.53
DR20	JAN	4.67 +/- 0.83	FEB	4.30 +/- 0.44
On site, near	MAR	4.13 +/- 0.50	APR	4.22 +/- 1.22
Shore	MAY	4.57 +/- 0.70	JUN	4.03 +/- 0.29
	JUL	4.55 +/- 0.85	AUG	3.78 +/- 0.87
	SEP	4.07 +/- 0.31	OCT	3.30 +/- 0.31
	NOV	4.33 +/- 0.44	DEC	4.44 +/- 0.37
DR21 [1]	JAN	3.89 +/- 0.44	FEB	4.11 +/- 1.20
EOF	MAR	3.64 +/- 1.24	APR	3.43 +/- 0.54
	MAY	4.41 +/- 0.91	JUN	3.91 +/- 1.43
	JUL	4.32 +/- 0.98	AUG	3.57 +/- 1.32
	SEP	3.58 +/- 0.45	OCT	3.36 +/- 0.50
	NOV	4.22 +/- 0.65	DEC	4.24 +/- 0.31
DR22 [1]	JAN	2.89 +/- 0.99	FEB	4.27 +/- 3.09
Solomons Island	MAR	2.90 +/- 0.45	APR	3.15 +/- 0.79
	MAY	3.52 +/- 0.11	JUN	3.17 +/- 0.34
	JUL	2.93 +/- 0.65	AUG	2.84 +/- 0.08
	SEP	2.72 +/- 0.21	OCT	2.20 +/- 0.30
	NOV	3.04 +/- 0.26	DEC	2.92 +/- 0.26
DR23 [1]	JAN	4.52 +/- 1.67	FEB	4.52 +/- 0.43
Taylors Island	MAR	4.71 +/- 0.53	APR	4.92 +/- 0.52
	MAY	5.72 +/- 0.46	JUN	4.97 +/- 1.28
	JUL	4.71 +/- 0.54	AUG	5.43 +/- 1.82
	SEP	4.72 +/- 0.54	OCT	3.79 +/- 0.50
	NOV	5.38 +/- 0.18	DEC	4.91 +/- 0.49
DR30	JAN	3.92 +/- 0.45	FEB	3.96 +/- 0.51
MET Station	MAR	4.00 +/- 0.78	APR	4.25 +/- 1.17
	MAY	4.18 +/- 0.83	JUN	4.16 +/- 0.16
	JUL	3.84 +/- 0.50	AUG	3.93 +/- 1.00
	SEP	3.37 +/- 0.56	OCT	3.88 +/- 0.36
	NOV	4.23 +/- 0.61	DEC	4.02 +/- 0.38

[1] Control Location

TABLE B-12 - Continued

Direct Radiation
(Results in Units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
SFDR01	JAN	4.42 +/- 1.53	FEB	4.45 +/- 0.51
Collocated w/	MAR	4.87 +/- 0.10	APR	4.45 +/- 0.08
plant TLD #159	MAY	5.11 +/- 0.36	JUN	4.58 +/- 0.47
	JUL	4.86 +/- 0.32	AUG	4.27 +/- 0.12
	SEP	3.91 +/- 0.35	OCT	4.66 +/- 0.57
	NOV	5.14 +/- 0.61	DEC	4.84 +/- 0.51
SFDR02	JAN	5.68 +/- 0.36	FEB	5.06 +/- 2.62
collocated w/	MAR	5.09 +/- 0.45	APR	5.09 +/- 2.37
plant TLD # 160	MAY	6.17 +/- 1.71	JUN	4.90 +/- 0.61
	JUL	5.13 +/- 0.08	AUG	5.20 +/- 1.53
	SEP	4.86 +/- 0.36	OCT	5.01 +/- 0.55
	NOV	6.10 +/- 0.55	DEC	5.67 +/- 0.79
SFDR03	JAN	4.11 +/- 0.30	FEB	4.74 +/- 0.74
Collocated w/	MAR	4.36 +/- 1.92	APR	5.50 +/- 0.71
plant TLD #161	MAY	5.06 +/- 0.72	JUN	4.90 +/- 1.31
	JUL	5.28 +/- 2.08	AUG	5.06 +/- 1.63
	SEP	4.54 +/- 0.86	OCT	5.62 +/- 0.94
	NOV	6.31 +/- 0.42	DEC	6.01 +/- 0.57
SFDR04	JAN	4.52 +/- 0.31	FEB	5.74 +/- 4.06
Collocated w/	MAR	4.17 +/- 0.74	APR	5.77 +/- 2.38
plant TLD #162	MAY	4.16 +/- 0.36	JUN	4.85 +/- 1.66
	JUL	3.98 +/- 0.47	AUG	4.52 +/- 0.55
	SEP	4.20 +/- 0.73	OCT	4.88 +/- 0.75
	NOV	5.22 +/- 0.38	DEC	5.30 +/- 0.35
SFDR05	JAN	4.10 +/- 0.98	FEB	4.62 +/- 2.38
Collocated w/	MAR	3.97 +/- 0.39	APR	4.42 +/- 0.90
plant TLD #163	MAY	4.40 +/- 0.93	JUN	4.53 +/- 0.08
	JUL	4.30 +/- 1.06	AUG	4.19 +/- 0.81
	SEP	3.42 +/- 0.30	OCT	3.70 +/- 0.36
	NOV	4.41 +/- 0.46	DEC	4.11 +/- 0.37
SFDR06	JAN	4.30 +/- 2.01	FEB	6.54 +/- 1.08
Collocated w/	MAR	4.52 +/- 0.45	APR	5.51 +/- 1.49
plant TLD #164	MAY	4.94 +/- 0.82	JUN	4.37 +/- 0.40
	JUL	4.99 +/- 1.30	AUG	3.95 +/- 0.62
	SEP	3.96 +/- 0.40	OCT	4.45 +/- 0.62
	NOV	4.74 +/- 0.47	DEC	4.56 +/- 0.54

TABLE B-12 - Continued

Direct Radiation
(Results in Units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
SFDR07 [1]	JAN	4.29 +/- 0.79	FEB	4.17 +/- 0.37
Visitors Center	MAR	3.65 +/- 0.12	APR	4.58 +/- 0.88
	MAY	5.07 +/- 0.29	JUN	3.98 +/- 0.32
	JUL	4.76 +/- 0.54	AUG	3.76 +/- 0.81
	SEP	3.84 +/- 0.38	OCT	3.91 +/- 0.39
	NOV	4.36 +/- 1.62	DEC	4.05 +/- 0.42
SFDR08	JAN	6.03 +/- 2.40	FEB	6.04 +/- 3.77
NNW of	MAR	5.56 +/- 1.61	APR	6.00 +/- 1.10
ISFSI	MAY	7.70 +/- 1.46	JUN	5.47 +/- 1.26
	JUL	6.42 +/- 1.36	AUG	5.02 +/- 0.75
	SEP	5.86 +/- 0.82	OCT	6.45 +/- 0.88
	NOV	7.31 +/- 1.25	DEC	7.35 +/- 0.39
SFDR09	JAN	4.61 +/- 2.35	FEB	3.96 +/- 0.66
South of ISFSI	MAR	3.55 +/- 0.70	APR	3.66 +/- 0.32
	MAY	3.81 +/- 0.33	JUN	3.19 +/- 0.74
	JUL	2.85 +/- 0.34	AUG	3.25 +/- 1.40
	SEP	3.10 +/- 0.35	OCT	3.75 +/- 0.55
	NOV	3.69 +/- 0.47	DEC	3.60 +/- 0.32
SFDR10	JAN	10.93 +/- 1.23	FEB	10.87 +/- 0.77
NNW of ISFSI	MAR	10.89 +/- 2.60	APR	10.08 +/- 2.96
	MAY	11.02 +/- 2.97	JUN	10.46 +/- 1.37
	JUL	8.71 +/- 2.29	AUG	9.48 +/- 1.55
	SEP	9.76 +/- 0.48	OCT	12.09 +/- 1.66
	NOV	13.45 +/- 2.00	DEC	13.55 +/- 2.04
SFDR11	JAN	6.06 +/- 1.35	FEB	6.10 +/- 2.67
WNW ISFSF	MAR	6.01 +/- 1.46	APR	5.85 +/- 1.45
	MAY	6.74 +/- 0.74	JUN	5.61 +/- 0.09
	JUL	6.24 +/- 0.92	AUG	5.46 +/- 0.95
	SEP	5.20 +/- 1.24	OCT	6.56 +/- 0.80
	NOV	7.92 +/- 2.23	DEC	7.69 +/- 1.05
SFDR12	JAN	4.05 +/- 0.74	FEB	4.23 +/- 1.11
W of ISFSI	MAR	3.84 +/- 0.86	APR	4.11 +/- 0.43
	MAY	4.02 +/- 0.07	JUN	3.70 +/- 0.64
	JUL	3.84 +/- 1.11	AUG	3.78 +/- 1.18
	SEP	3.52 +/- 0.96	OCT	3.40 +/- 1.64
	NOV	6.11 +/- 0.95	DEC	6.13 +/- 0.57

[1] Control Location

TABLE B-12 - Continued

Direct Radiation
(Results in Units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
SFDR13	JAN	3.86 +/- 1.18	FEB	3.78 +/- 0.37
SSW of ISFSI	MAR	3.99 +/- 1.47	APR	4.15 +/- 1.40
	MAY	4.52 +/- 0.94	JUN	3.47 +/- 0.04
	JUL	3.95 +/- 1.01	AUG	2.95 +/- 0.21
	SEP	3.16 +/- 0.32	OCT	3.74 +/- 1.04
	NOV	4.25 +/- 0.58	DEC	3.87 +/- 0.36
SFDR14	JAN	3.67 +/- 0.87	FEB	3.79 +/- 0.05
SSE of ISFSI	MAR	3.96 +/- 0.64	APR	3.69 +/- 0.25
	MAY	4.11 +/- 1.20	JUN	3.50 +/- 0.48
	JUL	3.81 +/- 0.73	AUG	3.24 +/- 0.86
	SEP	2.88 +/- 0.19	OCT	2.93 +/- 1.18
	NOV	3.99 +/- 0.58	DEC	3.62 +/- 0.44
SFDR15	JAN	4.31 +/- 0.59	FEB	4.39 +/- 0.55
ENE of ISFSI	MAR	4.00 +/- 1.61	APR	4.26 +/- 0.26
	MAY	5.13 +/- 1.44	JUN	4.07 +/- 0.62
	JUL	4.38 +/- 1.37	AUG	3.69 +/- 1.60
	SEP	3.46 +/- 0.46	OCT	4.05 +/- 0.08
	NOV	4.66 +/- 0.17	DEC	4.71 +/- 0.48
SFDR16	JAN	5.16 +/- 0.27	FEB	4.60 +/- 0.12
WSW of ISFSI	MAR	4.92 +/- 0.01	APR	4.92 +/- 0.86
	MAY	5.11 +/- 0.19	JUN	4.67 +/- 0.22
	JUL	5.26 +/- 0.62	AUG	4.24 +/- 1.36
	SEP	4.28 +/- 0.58	OCT	4.96 +/- 0.79
	NOV	5.93 +/- 0.61	DEC	6.04 +/- 0.63

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APPENDIX C

Appendix C is a summary of BGE laboratory's quality assurance program. It consists of Table C-1 which is a compilation of the results of the laboratory's participation in the Analytics, Inc. Radiological Environmental Cross-Check Program during the period January 1, 1996 to December 31, 1996. It also consists of Table C-2 and Table C-3 that together form a compilation of the results of the laboratory's participation in a quality assurance program with Duke Power Company's Radiological and Environmental Services during the same period. The Duke Power Company operating procedures pertinent to these analyses are described in reference 40.

All of the results contained in Table C-2 agree quite well with laboratory replicates and split samples submitted to Duke Power Company with the exception of soil sample splits collected on 3/18/96 and 6/7/96. Investigation concluded that differences in sample preparation between the BGE and Duke Power Company laboratories appears to explain the variation in results. When samples were reprepared in the same manner, agreement was obtained. These results are included in Table C-2 as "reanalysis."

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TABLE OF CONTENTS - ANALYTICAL RESULTS

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TABLE C-1

Results of Participation in Analytics Cross Check Program for 1996

Sample Date	Sample Type and Units	Isotope Observed	Reported Laboratory's Results*	Analytics' Results*
3/12/96	Water-pCi/L	H-3	3156±90	2982±149
3/12/96	Water-pCi/L	Co-58	45±12	48±2
		Cs-134	39±20	58±3
		Cs-137	61±32	64±3
		Ce-141	81±50	88±4
		Zn-65	88±26	97±5
		Cr-51	412±313	322±16
		Mn-54	25±14	31±2
		Fe-59	86±51	83±4
		Co-60	76±20	76±4
		I-131	29±22	36±2
6/19/96	Water-pCi/L	Co-58	154±34	164±8
		Cs-134	254±26	294±15
		Cs-137	653±56	724±36
		Ce-141	348±82	379±19
		Zn-65	87±41	102±5
		Cr-51	808±452	995±50
		Mn-54	503±48	530±27
		Fe-59	146±52	137±7
		Co-60	141±20	148±7
6/19/96	Filter-pCi/filter	Beta	26±2	26±1
6/19/96	Filter-pCi/filter	Co-58	165±14	172±9
		Cs-134	256±12	308±15
		Cs-137	714±39	759±38
		Ce-141	386±20	397±20
		Zn-65	114±18	107±5
		Cr-51	983±116	1043±52
		Mn-54	570±28	556±28
		Fe-59	155±14	143±7
		Co-60	154±9	156±8

TABLE C-1 - Continued

Results of Participation in Analytics Cross Check Program for 1996

Sample Date	Sample Type and Units	Isotope Observed	Reported Laboratory's Results	Analytics' Results
6/19/96	Milk-pCi/L	Co-58	83±22	93±5
		Cs-134	147±16	166±8
		Cs-137	364±33	410±21
		Ce-141	210±48	215±11
		Zn-65	59±30	58±3
		Cr-51	594±298	563±28
		Mn-54	293±28	300±15
		Fe-59	85±39	77±4
		Co-60	82±14	84±4
9/26/96	Water-pCi/L	H-3	2452±87	2259±113
9/26/96	Water-pCi/L	Co-58	173±38	174±9
		Cs-134	281±30	295±15
		Cs-137	223±39	225±11
		Ce-141	436±50	423±21
		Zn-65	90±48	93±5
		Cr-51	663±224	646±32
		Mn-54	257±41	239±12
		Fe-59	50±42	50±3
		Co-60	155±24	151±8
		I-131	34±30	50±3
12/12/96	Water-pCi/L	Co-58	118±32	119±6
		Cs-134	165±26	172±9
		Cs-137	189±36	191±10
		Ce-141	272±42	272±14
		Zn-65	88±46	91±5
		Cr-51	223±183	209±10
		Mn-54	213±38	202±10
		Fe-59	64±46	48±2
		Co-60	113±21	108±5
		I-131	27±30	39±2

*Laboratory precision (3 sigma)

TABLE C-2

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Filter -A1	1/22/96	Beta	1.5±0.2	1.6±0.2	**
Air Filter -A2	1/22/96	Beta	1.4±0.2	1.6±0.2	**
Air Filter -A3	1/22/96	Beta	1.1±0.2	1.2±0.2	**
Air Filter -A4	1/22/96	Beta	1.6±0.2	1.7±0.2	**
Air Filter -A5	1/22/96	Beta	1.8±0.3	1.9±0.3	**
Air Filter -SFA1	1/22/96	Beta	1.3±0.2	1.4±0.2	**
Air Filter -SFA2	1/22/96	Beta	2.0±0.4	2.4±0.4	**
Air Filter -SFA3	1/22/96	Beta	1.5±0.3	1.6±0.3	**
Air Filter -SFA4	1/22/96	Beta	1.7±0.3	1.8±0.3	**
Air Iodine-A1	1/22/96	I-131	<0.4	<0.4	**
Air Iodine-A5	1/22/96	I-131	<0.8	<0.8	**
				pCi/L	
Bay Water-Wa1	1/15/96	Gamma	<MDA	<MDA	<MDA
Bay Water-Wa1	2/15/96	Tritium	81±34	119±34	<41
				10^{-2} pCi/m^3	
Air Filter-A1	2/12/96	Beta	1.9±0.2	1.9±0.2	**
Air Filter-A2	2/12/96	Beta	2.0±0.2	1.7±0.2	**
Air Filter-A3	2/12/96	Beta	1.5±0.2	1.4±0.2	**
Air Filter-A4	2/12/96	Beta	1.8±0.2	1.8±0.3	**
Air Filter-A5	2/12/96	Beta	1.6±0.2	1.6±0.3	**
Air Filter-SFA1	2/12/96	Beta	1.9±0.2	1.9±0.2	**
Air Filter-SFA2	2/12/96	Beta	2.3±0.3	2.2±0.4	**
Air Filter-SFA3	2/12/96	Beta	2.0±0.2	2.1±0.2	**
Air Filter-SFA4	2/12/96	Beta	2.2±0.3	2.2±0.3	**
Air Iodine-A2	2/12/96	I-131	<0.5	<0.5	**
Air Iodine-A3	2/12/96	I-131	<0.4	<0.4	**

*Samples split with Duke Power Company, Radiological and Environmental Services, Hunterville, NC. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-2 - Continued

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				pCi/kg	
Soil-SFS3	3/18/96	Cs-137	492±42 (reanalysis 765±49)	547±46	877±13
Soil-SFS5	3/18/96	Cs-137	337±32 (reanalysis 683±39)	480±40	657±8
Vegetation-SFb3	3/18/96	Cs-137	196±27	220±30	218±2
Vegetation-SFb5	3/18/96	Cs-137	52±19	60±16	78±3
				10^{-2} pCi/m^3	
Air Filter-A1	3/11/96	Beta	1.6±0.2	1.6±0.2	**
Air Filter-A2	3/11/96	Beta	1.6±0.2	1.4±0.2	**
Air Filter-A3	3/11/96	Beta	1.4±0.2	1.4±0.2	**
Air Filter-A4	3/11/96	Beta	1.6±0.2	1.5±0.2	**
Air Filter-A5	3/11/96	Beta	1.7±0.3	1.7±0.3	**
Air Filter-SFA1	3/11/96	Beta	1.3±0.2	1.3±0.2	**
Air Filter-SFA2	3/11/96	Beta	1.8±0.2	1.8±0.2	**
Air Filter-SFA3	3/11/96	Beta	1.8±0.2	1.7±0.2	**
Air Filter-SFA4	3/11/96	Beta	1.8±0.2	1.8±0.2	**
Air Iodine-A3	3/11/96	I-131	<0.4	<0.4	**
Air Iodine-A4	3/11/96	I-131	<0.6	<0.6	**
				pCi/kg	
Oysters-Ia3	3/25/96	Ag-110m	38±10	52±15	35±2

*Samples split with Duke Power Company, Radiological and Environmental Services, Hunterville, NC. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-2 - Continued

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Filter-A1	4/8/96	Beta	1.7±0.2	1.6±0.2	**
Air Filter-A2	4/8/96	Beta	1.4±0.2	1.4±0.2	**
Air Filter-A3	4/8/96	Beta	1.5±0.2	1.5±0.2	**
Air Filter-A4	4/8/96	Beta	2.0±0.3	1.9±0.3	**
Air Filter-A5	4/8/96	Beta	2.1±0.2	2.1±0.2	**
Air Filter-SFA1	4/8/96	Beta	1.6±0.2	1.5±0.2	**
Air Filter-SFA2	4/8/96	Beta	1.6±0.2	1.5±0.2	**
Air Filter-SFA3	4/8/96	Beta	1.9±0.2	1.7±0.2	**
Air Filter-SFA4	4/8/96	Beta	2.0±0.2	2.2±0.3	**
Air Iodine-A1	4/8/96	I-131	<0.4	<0.4	**
Air Iodine-A5	4/8/96	I-131	<0.5	<0.5	**
				pCi/L	
Bay Water-Wa2	4/15/96	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	5/6/96	Beta	0.8±0.2	0.8±0.2	**
Air Filter-A2	5/6/96	Beta	0.9±0.3	1.0±0.3	**
Air Filter-A3	5/6/96	Beta	0.9±0.3	1.0±0.3	**
Air Filter-A4	5/6/96	Beta	Low	Flow	**
Air Filter-A5	5/6/96	Beta	0.9±0.2	1.0±0.2	**
Air Filter-SFA1	5/6/96	Beta	0.8±0.2	0.9±0.2	**
Air Filter-SFA2	5/6/96	Beta	1.0±0.2	1.1±0.2	**
Air Filter-SFA3	5/6/96	Beta	1.0±0.2	0.9±0.2	**
Air Filter-SFA4	5/6/96	Beta	0.8±0.2	0.8±0.2	**
Air Iodine-A3	5/6/96	I-131	<0.5	<0.5	**
Air Iodine-A5	5/6/96	I-131	<0.5	<0.5	**

*Samples split with Duke Power Company, Radiological and Environmental Services, Hunterville, NC. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-2 - Continued

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
			pCi/kg		
Shoreline-Wb1	5/17/96	Gamma	<MDA	<MDA	<MDA
			10^{-2} pCi/m^3		
Air Filter-A1	6/10/96	Beta	1.0±0.2	1.1±0.2	**
Air Filter-A2	6/10/96	Beta	1.1±0.3	0.9±0.3	**
Air Filter-A3	6/10/96	Beta	1.4±0.3	1.5±0.4	**
Air Filter-A4	6/10/96	Beta	1.0±0.2	1.0±0.2	**
Air Filter-A5	6/10/96	Beta	0.9±0.2	1.0±0.2	**
Air Filter-SFA1	6/10/96	Beta	1.1±0.2	1.1±0.2	**
Air Filter-SFA2	6/10/96	Beta	1.1±0.2	1.1±0.2	**
Air Filter-SFA3	6/10/96	Beta	1.0±0.2	1.0±0.2	**
Air Filter-SFA4	6/10/96	Beta	0.9±0.2	1.0±0.2	**
Air Iodine-A1	6/10/96	I-131	<0.6	<0.6	**
Air Iodine-A2	6/10/96	I-131	<0.5	<0.5	**

*Samples split with Duke Power Company, Radiological and Environmental Services, Hunterville, NC. On the following table is a list of their typical MDAs.
**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-2 - Continued

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-3} pCi/m^3	
Air Filters-A1	6/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-A2	6/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-A3	6/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-A4	6/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-A5	6/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA1	6/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA2	6/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA3	6/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA4	6/15/96	Gamma	<MDA	<MDA	<MDA
				pCi/kg	
Soil-SFS2	6/7/96	Cs-137	171±28 (reanalysis 285±25)	171±29	287±15
Soil-SFS4	6/7/96	Cs-137	22±2 (reanalysis 48±17)	21±2	52±9
Vegetation-SFb2	6/7/96	Gamma	<MDA	<MDA	<MDA
Vegetation-SFb4	6/7/96	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	7/8/96	Beta	1.6±0.2	1.5±0.2	**
Air Filter-A2	7/8/96	Beta	Low	Flow	**
Air Filter-A3	7/8/96	Beta	1.1±0.3	1.1±0.3	**
Air Filter-A4	7/8/96	Beta	1.6±0.3	1.6±0.3	**
Air Filter-A5	7/8/96	Beta	2.0±0.3	2.0±0.3	**
Air Filter-SFA1	7/8/96	Beta	1.4±0.2	1.6±0.2	**
Air Filter-SFA2	7/8/96	Beta	1.7±0.2	1.5±0.2	**
Air Filter-SFA3	7/8/96	Beta	1.4±0.2	1.4±0.2	**
Air Filter-SFA4	7/8/96	Beta	1.4±0.2	1.3±0.2	**
Air Iodine-A4	7/8/96	I-131	<0.6	<0.6	**
Air Iodine-A5	7/8/96	I-131	<0.6	<0.6	**

*Samples split with Duke Power Company, Radiological and Environmental Services, Hunterville, NC. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-2 - Continued

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				pCi/L	
Bay Water-Wa2	7/15/96	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	8/19/96	Beta	1.6±0.2	1.5±0.2	**
AIr Filter-A2	8/19/96	Beta	1.1±0.2	1.1±0.2	**
Air Filter-A3	8/19/96	Beta	1.4±0.2	1.5±0.3	**
Air Filter-A4	8/19/96	Beta	1.2±0.2	1.1±0.2	**
Air Filter-A5	8/19/96	Beta	2.0±0.2	2.0±0.3	**
Air Filter-SFA1	8/19/96	Beta	1.4±0.2	1.5±0.2	**
Air Filter-SFA2	8/19/96	Beta	1.4±0.3	1.5±0.2	**
Air Filter-SFA3	8/19/96	Beta	1.5±0.2	1.5±0.2	**
Air Filter-SFA4	8/19/96	Beta	1.2±0.2	1.2±0.2	**
Air Iodine-A1	8/12/96	I-131	<0.4	<0.4	**
Air Iodine-A2	8/12/96	I-131	<0.5	<0.5	**
				pCi/kg	
Oysters-Ia3	8/19/96	Ag-110	32±8	29±10	17±2
Vegetation-Ib1	8/26/96	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib2	8/26/96	Cs-137	<MDA	<MDA	7±3
Vegetation-Ib4	8/26/96	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib5	8/26/96	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib7	8/26/96	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib8	8/26/96	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	9/16/96	Beta	1.4±0.2	1.4±0.2	**
Air Filter-A2	9/16/96	Beta	1.1±0.2	1.2±0.2	**
Air Filter-A3	9/16/96	Beta	1.3±0.2	1.4±0.2	**
Air Filter-A4	9/16/96	Beta	1.3±0.2	1.4±0.2	**
Air Filter-A5	9/16/96	Beta	1.8±0.2	2.0±0.2	**
Air Filter-SFA1	9/16/96	Beta	1.4±0.2	1.7±0.2	**
AIr Filter-SFA2	9/16/96	Beta	1.3±0.2	1.3±0.2	**
Air Filter-SFA3	9/16/96	Beta	1.7±0.2	1.7±0.2	**
Air Filter-SFA4	9/16/96	Beta	1.3±0.2	1.4±0.2	**

*Samples split with Duke Power Company, Radiological and Environmental Services, Hunterville, NC. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-2 - Continued

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Iodine-A1	9/16/96	I-131	<0.8	<0.6	**
Air Iodine-A2	9/16/96	I-131	<0.3	<0.4	**
				pCi/kg	
Fish-1a2	10/2/96	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m	
Air Filter-A1	10/14/96	Beta	1.7±0.3	1.7±0.3	**
Air Filter-A2	10/14/96	Beta	1.3±0.2	1.3±0.2	**
Air Filter-A3	10/14/96	Beta	1.4±0.2	1.5±0.3	**
Air Filter-A4	10/14/96	Beta	1.4±0.2	1.5±0.2	**
Air Filter-A5	10/14/96	Beta	1.3±0.2	1.5±0.3	**
Air Filter-SFA1	10/14/96	Beta	1.3±0.2	1.3±0.2	**
Air Filter-SFA2	10/14/96	Beta	1.5±0.3	1.5±0.3	**
Air Filter-SFA3	10/14/96	Beta	1.3±0.2	1.3±0.2	**
Air Filter-SFA4	10/14/96	Beta	1.1±0.2	1.1±0.2	**
Air Iodine-A3	10/14/96	I-131	<0.6	<0.6	**
Air Iodine-A4	10/14/96	I-131	<0.4	<0.4	**
				pCi/kg	
Vegetation-1b2	10/28/96	Gamma	<MDA	<MDA	<MDA
Vegetation-1b3	10/28/96	Gamma	<MDA	<MDA	<MDA
Vegetation-1b5	10/28/96	Gamma	<MDA	<MDA	<MDA
Vegetation-1b6	10/28/96	Gamma	<MDA	<MDA	<MDA
Vegetation-1b7	10/28/96	Gamma	<MDA	<MDA	<MDA
Vegetation-1b9	10/28/96	Gamma	<MDA	<MDA	<MDA

*Samples split with Duke Power Company, Radiological and Environmental Services, Hunterville, NC. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-2 - Continued

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				mR/30 Days	
DR22	10/31/96	TLD	2.20±0.30	2.67±0.26	**
DR24	10/31/96	TLD	3.21±0.97	3.24±0.34	**
DR25	10/31/96	TLD	3.88±0.38	3.79±0.64	**
DR26	10/31/96	TLD	3.37±0.44	3.34±0.58	**
DR27	10/31/96	TLD	3.67±0.44	3.36±0.42	**
DR30	10/31/96	TLD	3.88±0.36	3.65±0.26	**
DR32	10/31/96	TLD	3.33±0.26	2.86±0.56	**
DR33	10/31/96	TLD	4.63±0.44	4.41±0.48	**
DR34	10/31/96	TLD	2.82±0.32	2.81±0.36	**
SFDR08	10/31/96	TLD	6.45±0.88	6.14±1.12	**
SFDR09	10/31/96	TLD	3.75±0.56	3.56±0.32	**
				pCi/L	
Bay Water-Wa2	11/15/96	Tritium	84±37	75±37	<101
				10^{-2} pCi/m^3	
Air Filter-A1	11/18/96	Beta	1.3±0.3	1.4±0.3	**
Air Filter-A2	11/18/96	Beta	1.0±0.2	1.2±0.2	**
Air Filter-A3	11/18/96	Beta	1.1±0.2	1.3±0.2	**
Air Filter-A4	11/18/96	Beta	1.3±0.2	1.4±0.2	**
Air Filter-A5	11/18/96	Beta	1.6±0.3	1.7±0.3	**
Air Filter-SFA1	11/18/96	Beta	1.2±0.2	1.4±0.2	**
Air Filter-SFA2	11/18/96	Beta	1.3±0.3	1.5±0.3	**
Air Filter-SFA3	11/18/96	Beta	1.3±0.2	1.4±0.2	**
Air Filter-SFA4	11/18/96	Beta	1.2±0.2	1.4±0.2	**
				10^{-2} pCi/m^3	
Air Iodine-A2	11/11/96	I-131	<0.4	<0.4	**
Air Iodine-A3	11/11/96	I-131	<0.5	<0.5	**

*Samples split with Duke Power Company, Radiological and Environmental Services, Huntersville, NC. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-2 - Continued

Results of Quality Assurance Program for 1996

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Filter-A1	12/9/96	Beta	1.4±0.2	1.6±0.2	**
Air Filter-A2	12/9/96	Beta	1.2±0.2	1.3±0.2	**
Air Filter-A3	12/9/96	Beta	1.1±0.2	1.3±0.2	**
Air Filter-A4	12/9/96	Beta	1.3±0.3	1.5±0.3	**
Air Filter-A5	12/9/96	Beta	1.8±0.4	2.0±0.4	**
Air Filter-SFA1	12/9/96	Beta	1.4±0.3	1.5±0.3	**
Air Filter-SFA2	12/9/96	Beta	1.6±0.3	1.8±0.3	**
Air Filter-SFA3	12/9/96	Beta	1.8±0.3	1.9±0.3	**
Air Filter-SFA4	12/9/96	Beta	1.7±0.3	1.8±0.3	**
Air Iodine-A3	12/4/96	I-131	<0.6	<0.5	**
Air Iodine-A4	12/4/96	I-131	<0.5	<05	**
				10^{-3} pCi/m^3	
Air Filters-A1	12/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-A2	12/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-A3	12/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-A4	12/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-A5	12/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA1	12/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA2	12/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA3	12/15/96	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA4	12/15/96	Gamma	<MDA	<MDA	<MDA
				mR/30 Days	
DR01	12/31/96	TLD	4.27±0.31	4.08±0.26	**
DR02	12/31/96	TLD	3.53±0.46	3.41±0.46	**
DR03	12/31/96	TLD	3.55±0.41	3.70±0.46	**
DR04	12/31/96	TLD	4.21±0.47	4.19±0.54	**
DR05	12/31/96	TLD	3.96±0.55	3.80±0.45	**
DR06	12/31/96	TLD	3.43±0.43	3.29±0.27	**
DR23	12/31/96	TLD	4.91±0.49	4.88±0.69	**
DR28	12/31/96	TLD	4.50±0.52	4.42±0.72	**
SFDR10	12/31/96	TLD	13.55±2.04	13.86±2.38	**
SFDR11	12/31/96	TLD	7.69±1.05	8.55±1.23	**
RPDR05	12/31/96	TLD	5.39±0.59	4.99±0.57	**

*Samples split with Duke Power Company, Radiological and Environmental Services, Huntersville, NC. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Duke Power Company.

TABLE C-3

Duke Power Company's Typical MDAs for Gamma Spectrometry

Selected Nuclides	Bay Water pCi/l	Fish pCi/kg	Shellfish pCi/kg	Sediment pCi/kg	Vegetation pCi/kg	Particulates 10^{-3}pCi/m^3
H-3	175	--	--	--	--	--
Na-22	1	8	3	12	6	5
Cr-51	12	105	4	104	50	63
Mn-54	1	9	3	12	5	4
Co-58	1	9	4	9	4	5
Fe-59	3	28	9	24	10	12
Co-60	1	9	4	12	5	6
Zn-65	2	20	8	25	10	9
Nb-95	1	12	7	14	6	9
Zr-95	2	18	8	20	9	9
Ru-106	9	75	30	90	41	40
Ag-110m	1	10	10	10	5	4
Te-129m	16	131	60	162	79	95
I-131	4	65	30	35	22	74
Cs-134	1	8	4	10	5	4
Cs-137	1	9	4	10	5	4
BaLa-140	3	32	15	25	14	36
Ce-144	7	40	16	54	26	18

APPENDIX D

Appendix D contains the results of a Land Use Survey conducted around Calvert Cliffs Nuclear Power Plant during the growing season of 1996. A table listing the raw data of this survey and a discussion of the results are included in this appendix.

Table D-1
Land Use Survey

	Distance From Plant (km)	
Sector	Residence	Garden
SE	2.6	7.6
SSE	2.8	2.8
S	3.0	3.8
SSW	2.4	2.4
SW	2.3	2.5
WSW	2.0	2.0
W	2.1	3.1
WNW	2.5	2.5
NW	2.9	2.9

Discussion

A Land Use Survey was conducted during the growing season of the year 1996 to identify, within a distance of 8 km, the location of the nearest milk animal, the nearest residence, and the nearest garden greater than 50 m^2 in each of the nine sectors over land. A detailed description of the Land Use Survey is given in a separate document (45). The position of the nearest residence and garden in each sector out to 8 km are given in the adjacent table. No dairy animal was found within 8 km in any direction. There has not been any significant change in the use of local lands in the last few years.

The closest residence and garden are situated in the WSW sector, which is one of the least prevalent wind directions. In the S, SSE, and SE sectors, there is the highest probability of wind blowing from the direction of the plant. The two gardens used for vegetable samples by the Radiological Environmental Monitoring Program have been placed in the sectors with the highest X/Q. One sampling garden is located in the S sector at a distance of 0.7 km, and another is situated near the site boundary between the SSE and SE sectors at a distance of 2.6 km from the plant. These two sampling sites are considered good indicator locations for radioactive depositions around the plant.

The dose assessment using 1996 meteorological data was performed, and no significant impact from the plant was found.

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APPENDIX E

Appendix E is a presentation of the analytical results for additional samples collected in the environs of Calvert Cliffs Nuclear Power Plant during the year 1996. These extra samples are not required by the Off Site Dose Calculation Manual (38). They were collected and analyzed to maintain the historical continuity for samples and sampling pathways discontinued when the Environmental Technical Specifications were changed in March, 1985. Additionally, they include the Pressurized Ion Chambers added for the Independent Spent Fuel Storage Installation.

Table E-11 shows the direct radiation readings from TLDs placed at the perimeter of the resin storage area located to the west of the ISFSI facility. The TLD values are higher than those in the REMP program due to their proximity to the source of the radiation. However, when the direct radiation readings for the ISFSI and Site Boundary TLDs are reviewed, it is apparent that storage of the spent resin is having no significant, measurable effect on the environs surrounding Calvert Cliffs Nuclear Power Plant.

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TABLE OF CONTENTS - ANALYTICAL RESULTS

TABLE E-1

Locations of Non-Tech Spec Environmental Sampling Stations for Calvert Cliffs Nuclear Power Plant

Description	(Kilometers)	Distance* (Sector)	Direction* Station
A6	Long Beach	4.4	NW
A7	Taylors Island, Carpenter's Property	12.6	ENE
A8	Cambridge, U of MD Estuarine Center	32.0	NE
DR24	Route 4 and Parran Road	3.0	SW
DR25	Camp Conoy Guard House	1.0	S
DR26	Route 235 & Clarks Landing Rd.	20.5	SW
DR27	Route 231 & Route 4	23.0	NW
DR28	Taylors Island Emergency Siren #35	12.3	ENE
DR29	Taylors Island Emergency Siren #38	12.5	E
DR31	Cambridge, U of MD Estuarine Center	32.0	NE
DR32	Twining Property, Taylors Island	12.3	NE
DR33	P.A. Ransome Property, Taylors Island	14.8	ESE
DR34	Shoreline at Barge Road	0.2	NE
PIC1	Taylors Island, Carpenter's Property	12.6	ENE
PIC2	On Site before Entrance to Camp Conoy	0.7	S
PIC3	Meteorological Station	0.8	WSW
PIC4	NNW of ISFSI	0.6	SW
PIC5	South of ISFSI	0.6	SW
PIC8	CCNPP Visitors Center	0.3	NW
Wbs1	Intake Area	0.2	NE
Wbs2	Discharge Area	0.3	N
Wbs3	Long Beach	4.4	NW
Wbs4	Camp Conoy/Rocky Point	3.0	SE
Ww1	Taylors Island, Carpenter's Property	12.6	ENE

*Distance and direction from the central point between the two containment buildings.

TABLE E-2

Synopsis of 1996 Calvert Cliffs Nuclear Power Plant
Non-Tech Spec Radiological Environmental Monitoring Program

Sample Type	Sampling Frequency [1]	Number of Locations	Number Collected	Analysis	Analysis Frequency [1]	Number Analyzed
Aquatic Environment						
Bottom Sediment	Q	4	16	Gamma	Q	16
Atmospheric Environment						
Air iodine [2]	W	7	364	I-131	W	364
Air Particulates [3]	W	3	156	Gross Beta	W	156
				Gamma	MC	36
Direct Radiation						
Pressurized Ion Chamber	M	6	69	Gamma	M	69
Ambient Radiation	M	18	976	TLD	M	976
Terrestrial Environment						
Ground water	M	1	12	Gamma	M	12
				H-3	M	12

[1] W-weekly, M-monthly, Q-quarterly, SA-semiannual, A-annual, C-composite

[2] The collection device contains silver zeolite

[3] Beta counting is perfomed after >= 72 hour decay. Gamma spectroscopy performed on monthly composites of weekly samples

TABLE E-3

Annual Summary for Calvert Cliffs Nuclear Power Plant Units 1 & 2
Non-Tech Spec Radiological Environmental Monitoring Program

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	Indicator Locations Mean (F)/ Range [1]	Location with Highest Annual Mean Name/ Distance & Direction [2]	Highest Annual Mean (F) / Range [1]	Control Locations Mean (F)/ Range [1]
Aquatic Environment						
Bottom Sediment (pCi/kg)	Gamma (16) Cs-137	33	200 (12/12) (84-394)	Long Beach Wbs3 4.4 km NW	257 (4/4) (218-309)	141 (4/4) (56-234)
Atmospheric Environment						
Air Particulates (10^{-2} pCi/m^3)	Gross Beta (156)	0.5	1.6 (104/104) (0.5-3.1)	Long Beach A6 4.4 km NW	1.6 (52/52) (0.5-2.9)	1.6 (52/52) (0.7-3.1)
Direct Radiation						
Ambient Radiation (mR/30 days)	TLD (976)	--	4.07 (976/976) (2.51-5.62)	West Fence Left RPDR08 km	24.15 (50/50) (3.71-66.25)	-- --
Pressurized Ion Chamber (mR/30 days)	Ionization Chamber (69)	--	5 (60/60) (4-9)	NNW of ISFSI PIC4 0.6 km SW	8 (12/12) (8-9)	6 (9/9) (5-6)

[1] Mean and range based upon detectable measurements only. Fraction (F) of detectable measurements at specified location is indicated in parentheses.
[2] From the centerpoint between the two containment buildings.

TABLE E-4

Concentration of Gamma Emitters in Bottom Sediment
(Results in units of pCi/kg (wet) +/- 2σ)

SAMPLE CODE	Sample Date	Cs-137	Other Gamma Emitters
Wbs1	3/25/96	89 +/- 31	*
Intake Area	6/3/96	93 +/- 35	*
	8/19/96	105 +/- 19	*
	10/2/96	184 +/- 24	*
Wbs2	3/25/96	84 +/- 32	*
Discharge Area	6/3/96	214 +/- 39	*
	8/19/96	211 +/- 37	*
	10/2/96	394 +/- 41	*
Wbs3	3/25/96	220 +/- 42	*
Long Beach	6/3/96	218 +/- 51	*
	8/19/96	309 +/- 36	*
	10/2/96	280 +/- 38	*
Wbs4 [1]	3/25/96	69 +/- 28	*
Camp Conoy/ Rocky Point	6/3/96	56 +/- 23	*
	8/19/96	204 +/- 34	*
	10/2/96	234 +/- 31	*

* Non-Natural Gamma Emitters < MDA
[1] Control Location

TABLE E-5

Concentration of Iodine-131 in Filtered Air
(Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Start Date	Stop Date	A6 Long Beach	A7 [1] Taylors Island	A8 Cambridge	SFA1 MET Station	SFA2 [1] Visitors Center	SFA3 NNW of ISFSI	SFA4 South of ISFSI
1/2/96	1/11/96	*	*	*	*	*	*	*
1/11/96	1/16/96	*	*	*	*	*	*	*
1/16/96	1/22/96	*	*	*	*	*	*	*
1/22/96	1/29/96	*	*	*	*	*	*	*
1/29/96	2/5/96	*	*	*	*	*	*	*
2/5/96	2/12/96	*	*	*	*	*	*	*
2/12/96	2/20/96	*	*	*	*	*	*	*
2/20/96	2/26/96	*	*	*	*	*	*	*
2/26/96	3/4/96	*	*	*	*	*	*	*
3/4/96	3/11/96	*	*	*	*	*	*	*
3/11/96	3/18/96	*	*	*	*	*	*	*
3/18/96	3/25/96	*	*	*	*	*	*	*
3/25/96	4/1/96	*	*	*	*	*	*	*
4/1/96	4/8/96	*	*	*	*	*	*	*
4/8/96	4/15/96	*	*	*	*	*	*	*
4/15/96	4/22/96	*	*	*	*	*	*	*
4/22/96	4/29/96	*	*	*	*	*	*	*
4/29/96	5/6/96	*	*	*	*	*	*	*
5/6/96	5/13/96	*	*	*	*	*	*	*
5/13/96	5/20/96	*	*	*	*	*	*	*
5/20/96	5/28/96	*	*	*	*	*	*	*
5/28/96	6/3/96	*	*	*	*	*	*	*
6/3/96	6/10/96	*	*	*	*	*	*	*
6/10/96	6/17/96	*	*	*	*	*	*	*
6/17/96	6/24/96	*	*	*	*	*	*	*
6/24/96	7/1/96	*	*	*	*	*	*	*
7/1/96	7/8/96	*	*	*	*	*	*	*
7/8/96	7/15/96	*	*	*	*	*	*	*
7/15/96	7/22/96	*	*	*	*	*	*	*
7/22/96	7/29/96	*	*	*	*	*	*	*

* < MDA
[1] Control Location

TABLE E-5 - Continued

Concentration of Iodine-131 in Filtered Air
(Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Start Date	Stop Date	A6 Long Beach	A7 [1] Taylors Island	A8 Cambridge	SFA1 MET Station	SFA2 [1] Visitors Center	SFA3 NNW of ISFSI	SFA4 South of ISFSI
7/29/96	8/5/96	*	*	*	*	*	*	*
8/5/96	8/12/96	*	*	*	*	*	*	*
8/12/96	8/19/96	*	*	*	*	*	*	*
8/19/96	8/26/96	*	*	*	*	*	*	*
8/26/96	9/3/96	*	*	*	*	*	*	*
9/3/96	9/9/96	*	*	*	*	*	*	*
9/9/96	9/16/96	*	*	*	*	*	*	*
9/16/96	9/23/96	*	*	*	*	*	*	*
9/23/96	9/30/96	*	*	*	*	*	*	*
9/30/96	10/7/96	*	*	*	*	*	*	*
10/7/96	10/14/96	*	*	*	*	*	*	*
10/14/96	10/21/96	*	*	*	*	*	*	*
10/21/96	10/28/96	*	*	*	*	*	*	*
10/28/96	11/4/96	*	*	*	*	*	*	*
11/4/96	11/11/96	*	*	*	*	*	*	*
11/11/96	11/18/96	*	*	*	*	*	*	*
11/18/96	11/25/96	*	*	*	*	*	*	*
11/25/96	12/2/96	*	*	*	*	*	*	*
12/2/96	12/9/96	*	*	*	*	*	*	*
12/9/96	12/16/96	*	*	*	*	*	*	*
12/16/96	12/23/96	*	*	*	*	*	*	*
12/23/96	12/30/96	*	*	*	*	*	*	*

* < MDA
[1] Control Location

TABLE E-6

Concentration of Beta Emitters in Air Particulates
(Results in units of 10^{-2} pCi/m^3 +/- 2σ)

Start Date	Stop Date	A6 Long Beach	A7 [1] Taylors Island	A8 Cambridge
1/2/96	1/11/96	2.7 +/- 0.3	3.1 +/- 0.3	2.7 +/- 0.3
1/11/96	1/16/96	2.8 +/- 0.4	2.6 +/- 0.5	3.1 +/- 0.4
1/16/96	1/22/96	2.0 +/- 0.3	1.8 +/- 0.3	1.7 +/- 0.3
1/22/96	1/29/96	1.7 +/- 0.2	1.9 +/- 0.3	1.9 +/- 0.3
1/29/96	2/5/96	2.9 +/- 0.3	3.0 +/- 0.4	2.9 +/- 0.4
2/5/96	2/12/96	2.2 +/- 0.3	2.2 +/- 0.3	2.7 +/- 0.3
2/12/96	2/20/96	1.7 +/- 0.2	1.7 +/- 0.3	1.9 +/- 0.3
2/20/96	2/26/96	0.5 +/- 0.2	1.1 +/- 0.3	1.1 +/- 0.3
2/26/96	3/4/96	0.7 +/- 0.2	2.4 +/- 0.3	2.3 +/- 0.3
3/4/96	3/11/96	2.2 +/- 0.3	2.1 +/- 0.3	2.0 +/- 0.3
3/11/96	3/18/96	1.8 +/- 0.3	2.2 +/- 0.3	2.3 +/- 0.4
3/18/96	3/25/96	2.3 +/- 0.3	1.8 +/- 0.3	1.4 +/- 0.3
3/25/96	4/1/96	1.5 +/- 0.3	1.5 +/- 0.3	1.2 +/- 0.3
4/1/96	4/8/96	1.8 +/- 0.3	1.7 +/- 0.3	1.9 +/- 0.3
4/8/96	4/15/96	1.6 +/- 0.3	1.7 +/- 0.3	1.4 +/- 0.3
4/15/96	4/22/96	1.7 +/- 0.2	1.6 +/- 0.2	1.5 +/- 0.2
4/22/96	4/29/96	1.4 +/- 0.2	1.0 +/- 0.2	0.8 +/- 0.2
4/29/96	5/6/96	1.3 +/- 0.2	1.3 +/- 0.2	1.1 +/- 0.2
5/6/96	5/13/96	0.8 +/- 0.2	0.8 +/- 0.2	0.9 +/- 0.2
5/13/96	5/20/96	1.1 +/- 0.2	1.6 +/- 0.3	1.4 +/- 0.2
5/20/96	5/28/96	1.0 +/- 0.2	1.1 +/- 0.2	0.7 +/- 0.2
5/28/96	6/3/96	0.7 +/- 0.2	0.9 +/- 0.2	0.9 +/- 0.2
6/3/96	6/10/96	0.9 +/- 0.2	1.1 +/- 0.2	1.0 +/- 0.2
6/10/96	6/17/96	1.3 +/- 0.2	1.4 +/- 0.2	0.6 +/- 0.2
6/17/96	6/24/96	1.2 +/- 0.2	0.7 +/- 0.2	0.7 +/- 0.2
6/24/96	7/1/96	0.9 +/- 0.2	1.1 +/- 0.2	1.1 +/- 0.2
7/1/96	7/8/96	1.1 +/- 0.2	1.6 +/- 0.3	1.3 +/- 0.2
7/8/96	7/15/96	1.5 +/- 0.2	1.0 +/- 0.2	0.9 +/- 0.2
7/15/96	7/22/96	1.6 +/- 0.2	1.2 +/- 0.2	0.8 +/- 0.2
7/22/96	7/29/96	1.0 +/- 0.2	0.8 +/- 0.2	1.0 +/- 0.2
7/29/96	8/5/96	1.3 +/- 0.2	1.3 +/- 0.3	1.2 +/- 0.3
8/5/96	8/12/96	1.7 +/- 0.2	0.9 +/- 0.2	0.7 +/- 0.2
8/12/96	8/19/96	1.7 +/- 0.2	1.3 +/- 0.2	0.9 +/- 0.2
8/19/96	8/26/96	2.0 +/- 0.2	2.3 +/- 0.3	1.7 +/- 0.2
8/26/96	9/3/96	2.0 +/- 0.2	1.8 +/- 0.2	1.4 +/- 0.2

[1] Control Location

TABLE E-6 - Continued

Concentration of Beta Emitters in Air Particulates
(Results in units of 10^{-2} pCi/m^3 +/- 2σ)

Start Date	Stop Date	A6 Long Beach	A7 [1] Taylors Island	A8 Cambridge
9/3/96	9/9/96	1.7 +/- 0.3	1.6 +/- 0.3	1.6 +/- 0.3
9/9/96	9/16/96	1.5 +/- 0.2	0.8 +/- 0.2	1.0 +/- 0.2
9/16/96	9/23/96	2.3 +/- 0.3	1.2 +/- 0.2	1.9 +/- 0.3
9/23/96	9/30/96	1.6 +/- 0.2	1.5 +/- 0.2	1.7 +/- 0.2
9/30/96	10/7/96	1.6 +/- 0.2	1.3 +/- 0.2	0.8 +/- 0.2
10/7/96	10/14/96	1.5 +/- 0.3	1.9 +/- 0.2	2.0 +/- 0.3
10/14/96	10/21/96	1.9 +/- 0.3	1.6 +/- 0.2	2.3 +/- 0.3
10/21/96	10/28/96	2.2 +/- 0.3	2.5 +/- 0.3	2.7 +/- 0.3
10/28/96	11/4/96	2.2 +/- 0.3	2.3 +/- 0.3	2.7 +/- 0.4
11/4/96	11/11/96	1.4 +/- 0.2	1.3 +/- 0.2	1.3 +/- 0.2
11/11/96	11/18/96	1.5 +/- 0.2	1.7 +/- 0.2	1.4 +/- 0.3
11/18/96	11/25/96	2.3 +/- 0.3	1.2 +/- 0.3	1.9 +/- 0.3
11/25/96	12/2/96	1.7 +/- 0.2	1.4 +/- 0.3	1.4 +/- 0.3
12/2/96	12/9/96	1.7 +/- 0.3	1.8 +/- 0.3	2.0 +/- 0.3
12/9/96	12/16/96	1.3 +/- 0.2	1.3 +/- 0.3	1.3 +/- 0.3
12/16/96	12/23/96	1.5 +/- 0.3	1.9 +/- 0.3	2.3 +/- 0.4
12/23/96	12/30/96	2.0 +/- 0.2	2.4 +/- 0.3	2.2 +/- 0.3

[1] Control Location

TABLE E-7

Concentration of Gamma Emitters in Air Particulates
(Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Sample Date	A6 Long Beach	A7 [1] Taylors Island	CAM Cambridge, Maryland
1/15/96	*	*	*
2/15/96	*	*	*
3/15/96	*	*	*
4/15/96	*	*	*
5/15/96	*	*	*
6/15/96	*	*	*
7/15/96	*	*	*
8/15/96	*	*	*
9/15/96	*	*	*
10/15/96	*	*	*
11/15/96	*	*	*
12/15/96	*	*	*

* Non-Natural Gamma Emitters < MDA
[1] Control Location

TABLE E-8

Concentration of Tritium and Gamma Emitters in Taylors Island Well Water (Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Sample Date	H-3	Gamma Emitters
1/31/96	<34	*
2/29/96	<35	*
3/29/96	<35	*
5/1/96	<36	*
5/31/96	<36	*
6/28/96	<36	*
7/31/96	<38	*
8/29/96	<38	*
10/2/96	<38	*
10/31/96	<38	*
12/3/96	<37	*
12/31/96	<38	*

* Non-Natural Gamma Emitters < MDA

TABLE E-9

Direct Radiation as Measured in Pressurized Ion Chamber
(Results in units of mR/30 days +/- 10%)

Sample Code	Month		Month	
PIC1	JAN	5.37 +/- 0.54	FEB	5.64 +/- 0.56
Taylor's Island	MAR	5.79 +/- 0.58	APR	5.74 +/- 0.57
	MAY	[1]	JUN	[1]
	JUL	[1]	AUG	5.74 +/- 0.57
	SEP	5.91 +/- 0.59	OCT	5.65 +/- 0.56
	NOV	5.82 +/- 0.58	DEC	5.74 +/- 0.57
PIC2	JAN	3.91 +/- 0.39	FEB	4.07 +/- 0.41
Entrance to Camp	MAR	4.01 +/- 0.40	APR	3.99 +/- 0.40
Conoy	MAY	4.02 +/- 0.40	JUN	4.07 +/- 0.41
	JUL	4.03 +/- 0.40	AUG	3.97 +/- 0.40
	SEP	4.05 +/- 0.41	OCT	4.01 +/- 0.40
	NOV	3.93 +/- 0.39	DEC	4.00 +/- 0.40
PIC3	JAN	4.64 +/- 0.46	FEB	4.74 +/- 0.47
MET Station	MAR	4.76 +/- 0.48	APR	4.74 +/- 0.47
	MAY	4.74 +/- 0.47	JUN	4.91 +/- 0.49
	JUL	5.10 +/- 0.51	AUG	4.89 +/- 0.49
	SEP	4.93 +/- 0.49	OCT	4.95 +/- 0.50
	NOV	4.91 +/- 0.49	DEC	4.89 +/- 0.49
PIC4	JAN	8.02 +/- 0.80	FEB	8.12 +/- 0.81
NNW of ISFSI	MAR	8.18 +/- 0.82	APR	8.19 +/- 0.82
	MAY	8.19 +/- 0.82	JUN	7.70 +/- 0.77
	JUL	7.79 +/- 0.78	AUG	7.68 +/- 0.77
	SEP	8.01 +/- 0.80	OCT	8.69 +/- 0.87
	NOV	9.10 +/- 0.91	DEC	9.35 +/- 0.94
PIC5	JAN	4.69 +/- 0.47	FEB	4.93 +/- 0.49
S of ISFSI	MAR	4.98 +/- 0.50	APR	4.93 +/- 0.49
	MAY	4.91 +/- 0.49	JUN	4.94 +/- 0.49
	JUL	4.99 +/- 0.50	AUG	4.96 +/- 0.49
	SEP	5.02 +/- 0.50	OCT	5.01 +/- 0.50
	NOV	5.12 +/- 0.51	DEC	5.24 +/- 0.52
PIC8	JAN	5.23 +/- 0.52	FEB	5.29 +/- 0.53
Visitors Center	MAR	5.34 +/- 0.53	APR	6.03 +/- 0.60
	MAY	5.39 +/- 0.54	JUN	5.11 +/- 0.51
	JUL	5.24 +/- 0.52	AUG	5.22 +/- 0.52
	SEP	5.29 +/- 0.53	OCT	5.17 +/- 0.52
	NOV	5.05 +/- 0.51	DEC	5.06 +/- 0.51

[1] Instrument being serviced

TABLE E-10

Direct Radiation
(Results in units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
DR24	JAN	3.26 +/- 0.56	FEB	3.72 +/- 0.68
Rt. 4 and Parran Rd.	MAR	3.85 +/- 0.26	APR	3.95 +/- 0.19
	MAY	4.47 +/- 0.33	JUN	3.29 +/- 0.86
	JUL	4.03 +/- 0.13	AUG	3.65 +/- 0.22
	SEP	3.30 +/- 0.58	OCT	3.21 +/- 0.97
	NOV	4.05 +/- 0.72	DEC	4.34 +/- 0.90
DR25	JAN	3.76 +/- 1.26	FEB	3.98 +/- 1.25
Camp Conoy	MAR	3.85 +/- 0.58	APR	4.23 +/- 0.44
Guard House	MAY	4.35 +/- 0.33	JUN	4.08 +/- 0.30
	JUL	4.52 +/- 2.07	AUG	4.11 +/- 0.74
	SEP	3.70 +/- 0.50	OCT	3.88 +/- 0.37
	NOV	4.35 +/- 0.50	DEC	4.06 +/- 0.66
DR26	JAN	3.59 +/- 0.61	FEB	3.70 +/- 0.39
Rt. 235 and Clark's	MAR	3.05 +/- 0.03	APR	4.06 +/- 0.80
Landing Road	MAY	4.35 +/- 0.15	JUN	3.26 +/- 0.67
	JUL	3.62 +/- 0.42	AUG	3.78 +/- 1.15
	SEP	3.11 +/- 0.15	OCT	3.37 +/- 0.44
	NOV	3.67 +/- 0.22	DEC	3.60 +/- 0.42
DR27	JAN	4.22 +/- 0.80	FEB	3.56 +/- 0.66
Rt. 231 and Rt. 4	MAR	3.86 +/- 0.06	APR	3.76 +/- 0.21
	MAY	4.05 +/- 0.57	JUN	3.81 +/- 0.45
	JUL	3.52 +/- 0.60	AUG	3.40 +/- 0.66
	SEP	3.35 +/- 0.52	OCT	3.67 +/- 0.44
	NOV	3.81 +/- 0.52	DEC	3.86 +/- 0.46
DR28	JAN	4.24 +/- 0.59	FEB	4.51 +/- 0.08
Taylors Is. Siren #35	MAR	4.35 +/- 1.13	APR	4.06 +/- 0.35
	MAY	5.24 +/- 0.71	JUN	4.36 +/- 0.72
	JUL	4.48 +/- 0.26	AUG	4.29 +/- 0.93
	SEP	4.02 +/- 0.22	OCT	4.18 +/- 0.93
	NOV	4.65 +/- 0.35	DEC	4.50 +/- 0.52
DR29	JAN	4.52 +/- 0.84	FEB	4.89 +/- 2.62
Taylors Is. Siren #38	MAR	4.07 +/- 0.85	APR	4.43 +/- 0.07
	MAY	5.29 +/- 0.76	JUN	4.40 +/- 0.20
	JUL	3.81 +/- 0.13	AUG	4.31 +/- 0.80
	SEP	3.92 +/- 0.61	OCT	4.51 +/- 1.41
	NOV	4.80 +/- 0.96	DEC	4.71 +/- 0.11

TABLE E-10 - Continued

Direct Radiation
(Results in units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
DR31	JAN	4.70 +/- 0.12	FEB	4.83 +/- 0.65
Cambridge	MAR	4.76 +/- 0.76	APR	5.34 +/- 1.17
	MAY	5.20 +/- 0.87	JUN	5.49 +/- 1.57
	JUL	4.64 +/- 1.61	AUG	4.22 +/- 2.10
	SEP	4.56 +/- 0.49	OCT	4.52 +/- 1.00
	NOV	5.46 +/- 0.70	DEC	4.90 +/- 0.80
DR32	JAN	3.31 +/- 0.15	FEB	3.15 +/- 0.78
Twinings Property,	MAR	3.83 +/- 1.28	APR	4.15 +/- 1.59
Taylor Island	MAY	3.30 +/- 1.12	JUN	3.39 +/- 0.70
	JUL	3.58 +/- 1.29	AUG	3.60 +/- 0.68
	SEP	2.90 +/- 0.49	OCT	3.33 +/- 0.25
	NOV	3.34 +/- 0.30	DEC	3.36 +/- 0.67
DR33	JAN	4.98 +/- 0.29	FEB	4.71 +/- 0.46
P. A. Ransome Property	MAR	4.93 +/- 0.54	APR	5.00 +/- 0.97
	MAY	5.62 +/- 1.22	JUN	5.08 +/- 0.96
	JUL	5.43 +/- 0.45	AUG	5.48 +/- 0.21
	SEP	4.27 +/- 0.69	OCT	4.63 +/- 0.44
	NOV	5.05 +/- 0.60	DEC	4.74 +/- 0.54
DR34	JAN	3.18 +/- 0.66	FEB	3.41 +/- 1.30
Shoreline at Barge	MAR	3.34 +/- 0.34	APR	3.77 +/- 0.99
Rd.	MAY	4.23 +/- 0.28	JUN	3.41 +/- 0.78
	JUL	3.37 +/- 1.08	AUG	3.57 +/- 0.52
	SEP	2.51 +/- 0.30	OCT	2.82 +/- 0.32
	NOV	3.29 +/- 0.20	DEC	3.22 +/- 0.50

TABLE E-11

Direct Radiation from Resin Storage Area
(Results in units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
RPDR05	JAN	*	FEB	3.55 +/- 0.94
North Fence Lower	MAR	3.65 +/- 0.36	APR	4.64 +/- 0.67
	MAY	6.05 +/- 0.35	JUN	4.60 +/- 0.39
	JUL	10.47 +/- 4.36	AUG	3.69 +/- 0.41
	SEP	4.53 +/- 0.88	OCT	5.12 +/- 0.65
	NOV	5.97 +/- 1.77	DEC	5.39 +/- 0.59
RPDR06	JAN	*	FEB	3.63 +/- 0.77
North Fence Upper	MAR	3.76 +/- 1.24	APR	4.25 +/- 1.83
	MAY	5.66 +/- 1.42	JUN	5.55 +/- 0.94
	JUL	18.50 +/- 7.83	AUG	4.55 +/- 0.61
	SEP	5.95 +/- 0.50	OCT	6.77 +/- 0.25
	NOV	7.30 +/- 0.79	DEC	6.47 +/- 0.45
RPDR07	JAN	*	FEB	4.32 +/- 1.02
West Fence Right	MAR	4.33 +/- 0.27	APR	5.11 +/- 0.59
	MAY	7.05 +/- 0.41	JUN	11.32 +/- 3.54
	JUL	14.61 +/- 1.71	AUG	8.78 +/- 1.91
	SEP	19.04 +/- 1.69	OCT	19.02 +/- 2.51
	NOV	18.62 +/- 2.42	DEC	16.34 +/- 1.41
RPDR08	JAN	*	FEB	3.71 +/- 0.51
West Fence Left	MAR	4.39 +/- 0.74	APR	4.94 +/- 0.76
	MAY	6.17 +/- 0.79	JUN	10.17 +/- 2.84
	JUL	12.05 +/- 0.93	AUG	7.50 +/- 1.06
	SEP	39.06 +/- 8.30	OCT	59.03 +/- 6.78
	NOV	66.25 +/- 8.29	DEC	52.35 +/- 2.22
RPDR09	JAN	*	FEB	4.49 +/- 2.06
South Fence Lower	MAR	4.07 +/- 0.41	APR	4.75 +/- 1.96
	MAY	4.63 +/- 2.86	JUN	7.09 +/- 0.52
	JUL	4.94 +/- 0.36	AUG	23.06 +/- 0.24
	SEP	6.98 +/- 0.87	OCT	3.79 +/- 2.19
	NOV	8.71 +/- 1.06	DEC	8.61 +/- 0.61
RPDR10	JAN	*	FEB	4.59 +/- 3.74
South Fence Upper	MAR	4.67 +/- 0.37	APR	5.96 +/- 0.50
	MAY	6.79 +/- 1.86	JUN	8.96 +/- 0.80
	JUL	8.44 +/- 15.60	AUG	7.84 +/- 1.33
	SEP	4.85 +/- 0.58	OCT	5.00 +/- 1.30
	NOV	5.80 +/- 2.02	DEC	5.57 +/- 1.11

* TLDs deployed in February 1996

TABLE E-11 - Continued

Direct Radiation from Resin Storage Area
(Results in units of mR/30 days +/- 2σ)

Sample Code	Month		Month	
RPDR11	JAN	*	FEB	3.52 +/- 1.27
East Fence Left	MAR	3.41 +/- 0.58	APR	7.91 +/- 2.43
	MAY	12.26 +/- 1.46	JUN	9.81 +/- 1.66
	JUL	9.56 +/- 2.05	AUG	7.15 +/- 0.52
	SEP	8.06 +/- 0.91	OCT	6.82 +/- 0.73
	NOV	8.02 +/- 0.85	DEC	7.80 +/- 0.67
RPDR12	JAN	*	FEB	3.90 +/- 2.14
East Fence Right	MAR	3.42 +/- 0.12	APR	4.46 +/- 1.77
	MAY	8.99 +/- 3.22	JUN	4.90 +/- 0.54
	JUL	5.63 +/- 1.67	AUG	3.70 +/- 0.49
	SEP	3.89 +/- 0.19	OCT	3.85 +/- 0.67
	NOV	4.65 +/- 0.58	DEC	4.68 +/- 0.64

* TLDs deployed in February 1996