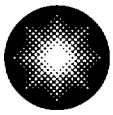
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657



Constellation
Nuclear

Calvert Cliffs
Nuclear Power Plant

A Member of the
Constellation Energy Group

May 9, 2001

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 5.6.2

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

In accordance with References (a) and (b), Calvert Cliffs Nuclear Power Plant is submitting the Annual Radiological Environmental Monitoring Report, dated March 2001.

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

Very truly yours,

C. E. Earls
General Supervisor - Chemistry

CEE/MJY/bjd

Attachment

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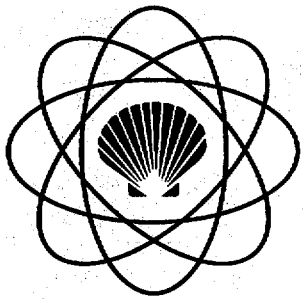
A035

Constellation Energy Group

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Annual Report

MARCH 2001



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

January 1 to December 31, 2000

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, 2000

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

CONSTELLATION ENERGY GROUP

MARCH 2001

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I. SUMMARY

During the 2000 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 (6).

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, radiochemical analyses were performed on quality assurance samples as part of an internal and external quality assurance program associated with Teledyne Brown Engineering, Environmental Services. Performance evaluation samples obtained from the Analytics' Inc. Cross-Check Program were also analyzed.

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.

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 were observed in the environment surrounding the plant during 2000. 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 and Ag-110m in oyster 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 1.81×10^{-2} mrem via liquid and gaseous pathways, which is about 0.02% of the acceptable limit of 75 mrem/yr as specified in 40 CFR 190;

b. a maximum whole body dose of 1.79×10^{-2} mrem via liquid and gaseous pathways, which is < 0.1% 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 2.11×10^{-1} mrem to the GI-Tract. This dose was <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 2000.

II. CALVERT CLIFFS NUCLEAR POWER PLANT RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

II.A. INTRODUCTION

Constellation Energy Group (CEG), previously known as Baltimore Gas and Electric Company, 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 (1, 2). On July 29, 1977 the monitoring program began operation under a combined set of Technical Specifications (3) 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 (4). 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. (5)

Results of the monitoring program for the pre-operational and previous operational periods through December 31, 1997 have been reported in a series of documents (16-51).

Results of the monitoring program for the current operational period of January 1, 2000 through December 31, 2000 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 2000 (Table 2), a compilation of the analytical data for 2000 (Appendix B), the results of the Analytics Intercomparison Program and the Quality Assurance Program (Appendix C), the results of the Land Use Census (Appendix D), and a compilation of the analytical data for extra samples collected in 2000 (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 2000.

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 (6) 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, CEG according to Calvert Cliffs Nuclear Power Plant Procedures (7).

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**

For the period 1998 through 2000, oysters have not been available at Kenwood Beach (Ia6) which is the designated control (background) location. During this time control samples were obtained from an alternate location at Hog Island (Ia10). In addition to the challenges encountered at Kenwood Beach, the amount of oysters available at the plant site location, Camp Conoy (Ia3), was greatly diminished in 1999 and 2000. Due to these ongoing problems with oyster collection, special sampling platforms were deployed in 2000. This approach should ensure that the population of oysters will be adequate to support the REMP.

II.C. RESULTS AND DISCUSSIONS

All the environmental samples collected during the year were analyzed using Constellation Power Source Generation (CPSG) laboratory procedures (8). 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 in each of the four quarters, while detectable readings were observed in the Intake (Wa1) in three of the four quarters. It is not unusual to observe occasional tritium in the Intake as a result of bay water recirculation. The concentrations observed in the discharge ranged from 78±36 to 791±45 pCi/L and the results in the intake ranged from <MDA to 68±37 pCi/L, which are similar to those ranges observed in previous years, (22-51).

Figure 1 compares tritium observed in the plant discharge and intake with annual effluent releases in 2000 as reported in the Radioactive Effluent Release Report.

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 four 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), Hog Island (sample code Ia10), and Kenwood Beach (sample code Ia6) when available. The Hog Island site was utilized as a control location in lieu of Kenwood Beach when samples were unavailable there. In addition, samples of non-commercial mussels were also taken from Camp Conoy when samples of oysters were unavailable there. (Previous studies suggest that mussels may be the biological analogue of oysters when it comes to the uptake of Ag-110m.) Edible portions of the fish, oyster and mussel samples were analyzed for gamma emitters.

Gamma spectrometric analyses of the fish exhibited no detectable concentrations of any plant-related radionuclides. Oyster and mussel samples exhibited low levels of detectable concentrations of the plant-related radionuclide, Ag-110m, in samples obtained from Camp Conoy (Ia3). These concentrations, which ranged from 29±21 to 195±17 pCi/kg, are consistent with that expected due to liquid effluents from the plant during the year 2000. Three of the five quarterly oyster samples taken from Hog Island (Ia10) and Kenwood Beach (Ia6) also exhibited low levels of Ag-110m. These concentrations, which ranged from 8±6 to 21±9 pCi/kg, are very close to the typical LLD for Ag-110m as reported in Table B-11.

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

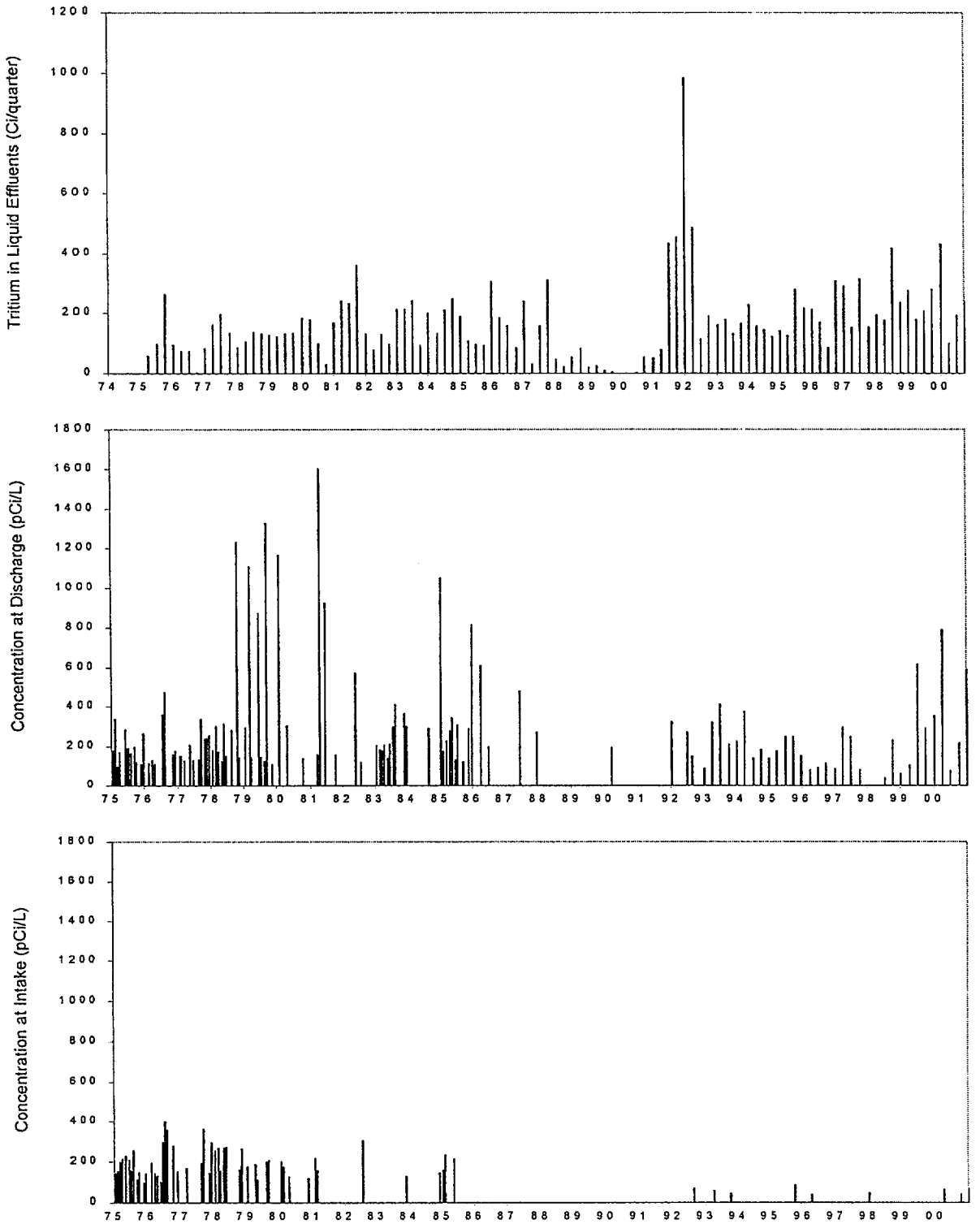
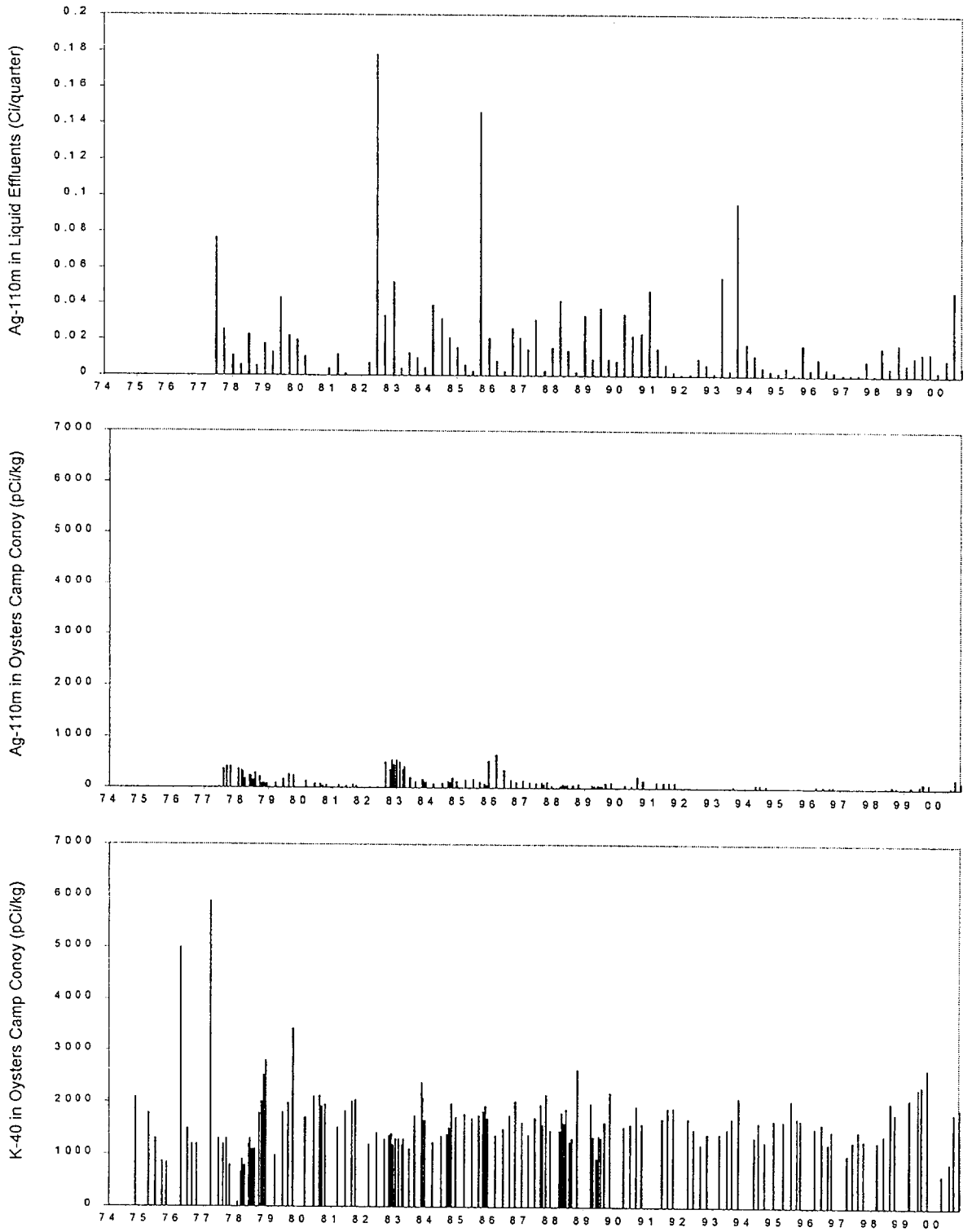


FIGURE 2
Silver-110m and Potassium-40 in Chesapeake Bay Oysters



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 (7-35). The values ranged from 0.3×10^{-2} to 3.9×10^{-2} pCi/m^3 for the indicator locations and 0.4×10^{-2} to 3.8×10^{-2} pCi/m^3 at the control location. The location with the highest overall mean of 1.7×10^{-2} pCi/m^3 was A1, Entrance to Camp Conoy.

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.

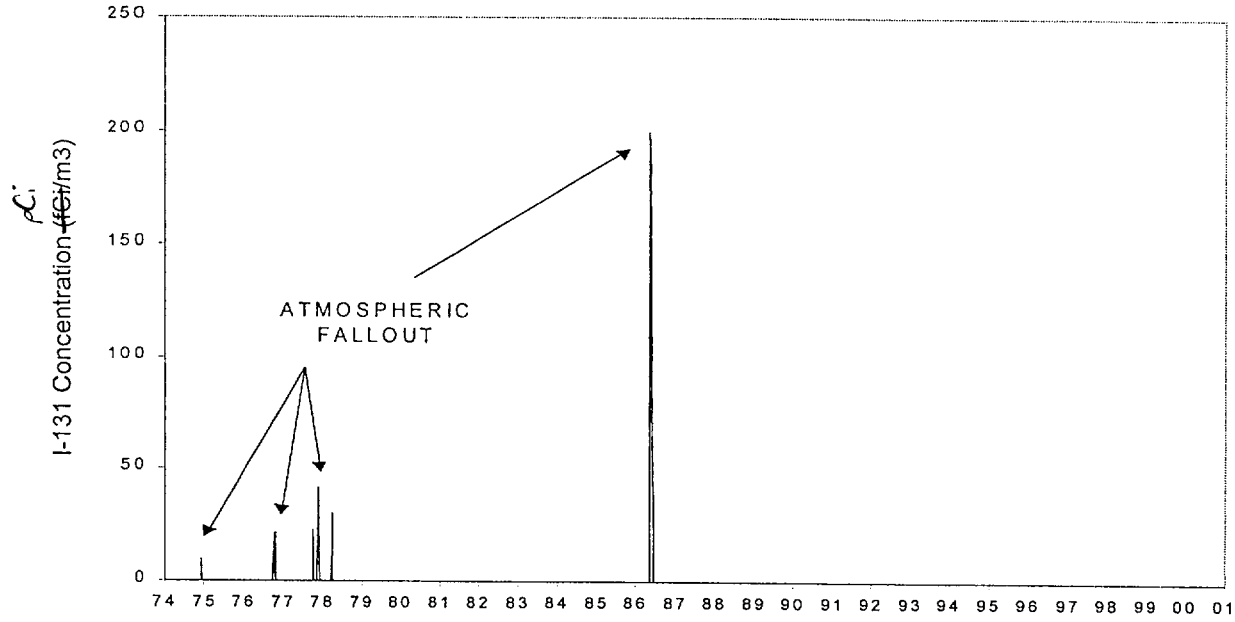
Figure 3 depicts the historical trends of radioiodine.

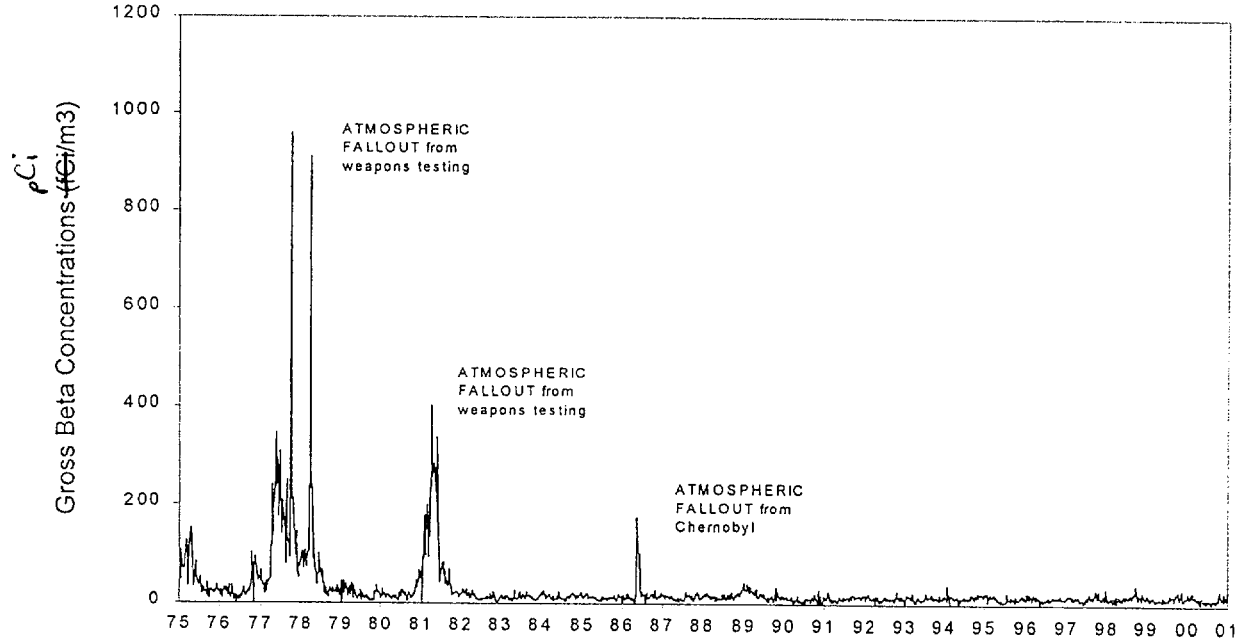
II.C.3 Terrestrial Environment

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.

FIGURE 3
Nuclear Fallout in the Calvert Cliffs Area

SURFACE AIR VAPORS, LUSBY, MD (A4)





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.

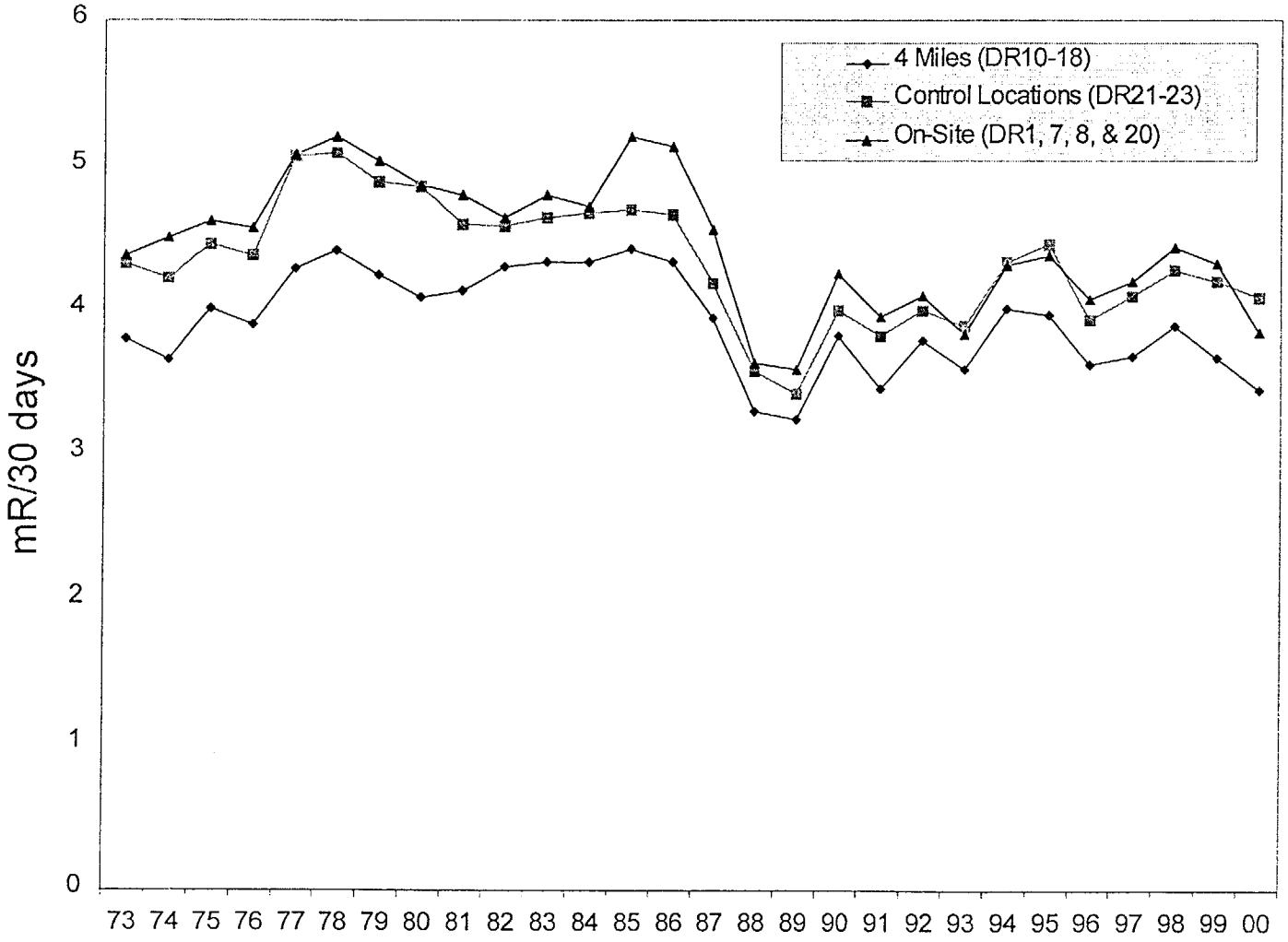
II.C.4 **Direct Radiation**

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.

Thermoluminescent dosimeters were collected quarterly 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 90 day ambient radiation measured at the indicator locations was 10.44 mR and ranged from 7.97 to 13.75 mR as reported in Table 2. The control locations showed a 90 day mean of 12.29 mR with ranges from 10.04 to 14.70 mR. The location with the highest overall mean of 14.12 was DR23, Taylors Island, Carpenters Property, which ranged from 13.49 to 14.70 mR. A comparison of the means and ranges of the current TLD data with those of both the historical data and the regional data (22-51) shows no plant-related contribution to the measured direct radiation exposure for 2000. Figure 4 shows the historical comparison of the average monthly radiation levels per calendar year for 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 man-made fission by-products were observed in the environment surrounding the plant during 2000. These by-products were related to the operation of the plant (e.g., tritium in quarterly composited bay water samples and Ag-110m in oysters and mussels).

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 no adverse radiological contributions to the surrounding environment during 2000.

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 5.05×10^{-3} mrem to a child via the plume, ground, vegetable, meat, and inhalation pathways at 2.6 km SW of the containments Calvert Cliffs. This is < 0.01% 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 2.38×10^{-4} mrem to a child at 2.1 km SE of the containments at Calvert Cliffs, which is < 0.01% 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 the skin, of 1.90×10^{-3} mrem at 2.1 km SE of the containments at Calvert Cliffs. This is <0.01% of the acceptable dose limit of 25 mrem/year as specified in 40 CFR 190.

Liquid Pathways

A maximum thyroid dose of 1.30×10^{-2} mrem to an adult for all liquid pathways, which is about 0.02% of the acceptable dose limit of 75 mrem/year as specified in 40 CFR 190.

A maximum whole body dose of 1.77×10^{-2} mrem to an adult via all liquid pathways, which is <0.1% 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 2.10×10^{-1} mrem to an adult for all pathways, 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 1.81×10^{-2} mrem via liquid and gaseous pathways, which is about 0.02% of the acceptable limit of 75 mrem/year specified in 40 CFR 190.

A maximum whole body dose of 1.79×10^{-2} mrem via liquid and gaseous pathways which is < 0.1% 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 2.11×10^{-1} mrem to the GI-Tract. This dose is <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 and there was no significant buildup of radionuclides in the environment due to Calvert Cliffs.

FIGURE 5

Atmospheric Dispersion Around CCNPP 2000 Average Relative Air Concentrations

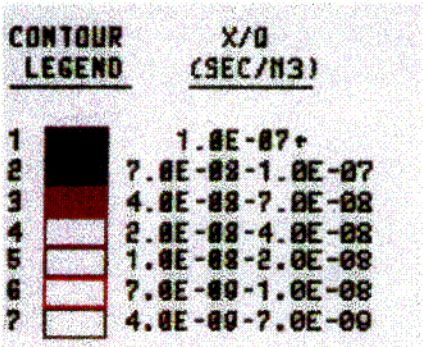


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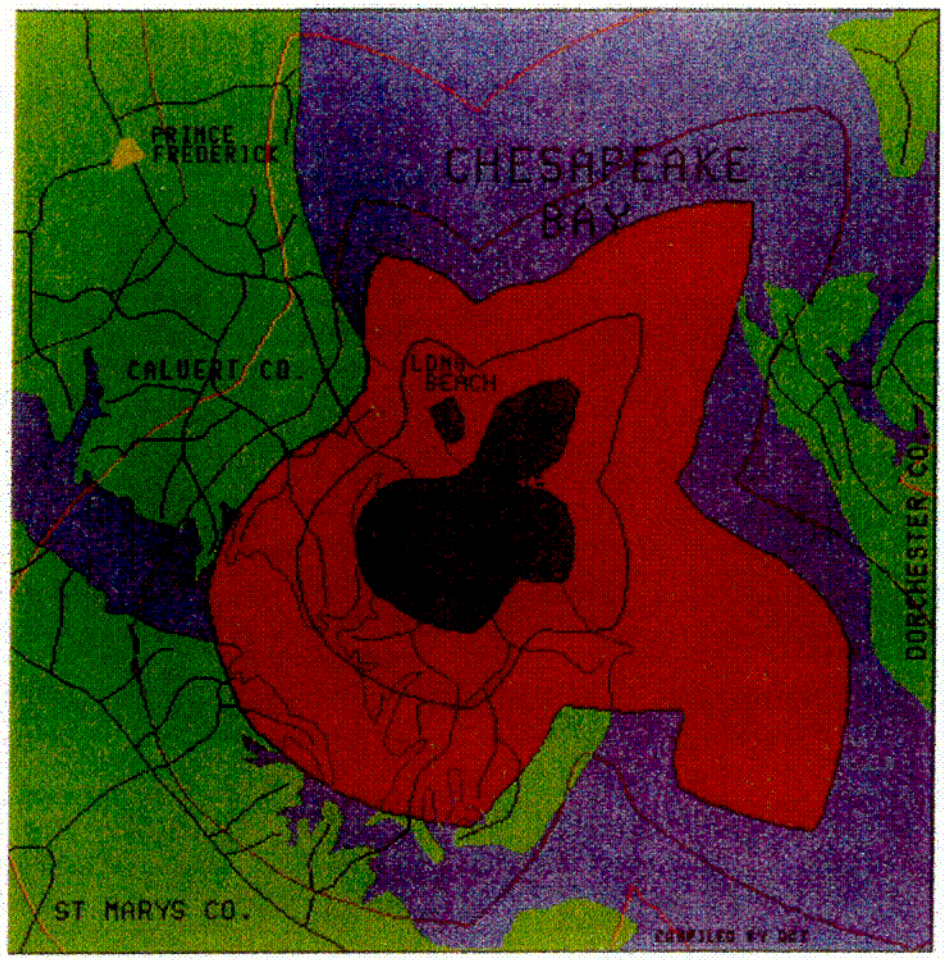
FIGURE 6

Atmospheric Dispersion Around CCNPP 2000 Average Relative Ground Deposition



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

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Table 1

Synopsis of 2000 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	3	7	Gamma	Q	7
Shoreline Sediment	SA	1	2	Gamma	SA	2
Atmospheric Environment						
Air Iodine[3]	W	5	259	I-131	W	259
Air Particulates[4]	W	5	259	Gross Beta	W	259
				Gamma	MC	60
Direct Radiation						
Ambient Radiation	Q	23	540	TLD	Q	540
Terrestrial Environment						
Vegetation[5]	M	3	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 $\geq$ 72 hour decay. Gamma spectroscopy performed on monthly composites of weekly samples
[5] Monthly during Growing Season

Table 2

Annual Summary of Radioactivity 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	419 (4/4) (78-791)	Discharge Vicinity Wa2 0.3 km N	419 (4/4) (78-791)	56 (3/4) (39-68)
Oysters (pCi/kg)	Gamma (7) Ag110m	14	125 (2/3) (119-132)	Camp Conoy Ia3 0.9 km E	125 (2/3) (119-132)	13 (3/5) (8-21)
Atmospheric Environment						
Air Particulates (10^{-2} pCi/m^3)	Gross Beta (259)	0.5	1.4 (207/207) (0.3-3.9)	Entrance to Camp Conoy A1 0.7 km SE	1.7 (51/52) (0.6-3.6)	1.6 (52/52) (0.4-3.8)
Direct Radiation						
Ambient Radiation (mR/90 days)	TLD (540)	-	10.44 (480/480) (7.97-13.75)	Taylors Island DR23 12.6 km ENE	14.12 (24/24) (13.49-14.70)	12.29 (60/60) (10.04-14.70)

[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, 2000 through December 31, 2000 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 (9). Pressurized Ion Chambers' results, however, are given in table E-9 and will continue to be a non-ODCM surveillance to satisfy our commitment to the community.

The results for 2000 were compared with that generated during the previous ISFSI pre-operational periods (10) and the current and previous CCNPP REMP periods (22-51). 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.

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 contractors to, or personnel of, CPSG personnel according to CPSG Procedures (8).

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 2000.

III.C. RESULTS AND DISCUSSIONS

All the environmental samples collected during the year were analyzed using CPSG's laboratory procedures (8). 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 Visitor's 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 (22-51). These values ranged from $0.4x10^{-2}$ to $4.6x10^{-2}$ pCi/m^3 for the indicator locations and $0.4x10^{-2}$ to $3.4x10^{-2}$ pCi/m^3 for the control location. The location with the highest overall mean of $1.8x10^{-2}$ pCi/m^3 was SFA4, South of ISFSI.

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 Visitor's 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 exhibited no detectable concentration of any plant-related radionuclides in any of these samples.

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 Visitor's 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 twelve quarterly samples from both indicator and control locations. The Cs-137 concentrations ranged from 59±25 to 727±91 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 activities of this radionuclide 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 (22-51) and in the earlier pre-operational data for the ISFSI (10).

III.C.3 **Direct Radiation**

Direct radiation is measured by a network of TLDs surrounding the ISFSI. These thermo-luminescent dosimeters are collected quarterly from seventeen locations surrounding the ISFSI, plus one control TLD location at the Visitor's 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 (sample code SFDR1); N of ISFSI (sample code SFDR2); NNE of ISFSI, sample code SFDR3; NE of ISFSI (sample code SFDR4); E of ISFSI (sample code SFDR5); ESE of ISFSI (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.

The mean 90 day ambient radiation measured at the ISFSI indicator locations was 17.13 mR and ranged from 8.57 to 39.13 mR as reported in Table 4. The control location showed a 90 day mean of 11.61 mR and ranged from 10.78 to 12.32 mR. A comparison of the mean and ranges of the current TLD data with those of both the historical data and the regional data (22-51, 10) reveals only one set of elevated TLD readings. That location with the highest overall mean of 35.67 mR with a range of 30.10 to 39.13 mR was SFDR10, North Northwest of ISFSI. These readings are consistent with those expected from the storage of spent fuel in the ISFSI (22-51, 10). A comparison of the average monthly radiation levels per calendar year of the ISFSI TLD data from the indicator locations with the ISFSI control location at the Visitor's Center, SFDR7, can be seen in Figure 7.

III.D. CONCLUSION

Low levels of Cs-137 were observed in the environment surrounding the ISFSI during the period. The Cs-137 observations were attributed to fallout from past atmospheric weapons testing.

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 (22-51).

FIGURE 7
Mean TLD Gamma Dose, ISFSI

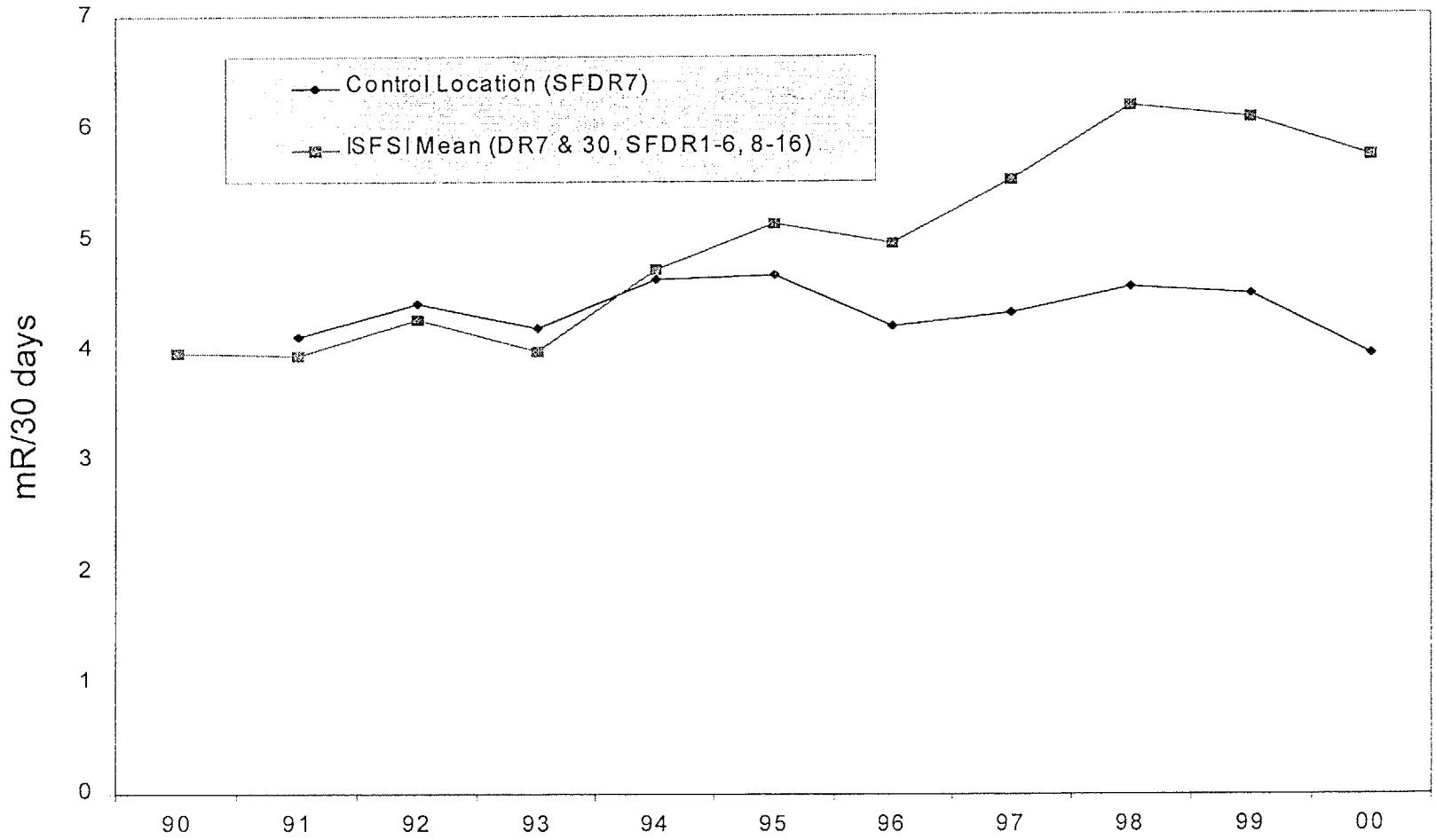

Table 3

Synopsis of 2000 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	256	Gross Beta	W	256
				Gamma	MC	60
Direct Radiation						
Ambient Radiation	Q	18	432	TLD	Q	432
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 $\geq$ 72 hour decay. Gamma spectroscopy performed on monthly composites of weekly samples

Table 4

Annual Summary of Radioactivity 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 (256)	0.5	1.6 (204/204) (0.4-4.6)	South of ISFSI SFA4 0.1 km S	1.8 (51/52) (0.5-4.6)	1.6 (52/52) (0.4-3.4)
Direct Radiation						
Ambient Radiation (mR/90 days)	TLD (432)	--	17.13 (408/408) (8.57-39.13)	NNW of ISFSI SFDR10 0.1 km NNW	35.67 (24/24) (30.10-39.13)	11.61 (24/24) (10.78-12.32)
Terrestrial Environment						
Soil (pCi/kg)	Gamma (20) Cs-137	17	413 (8/16) (208-727)	NNW of ISFSI SFS3 0.1 km NNW	457 (4/4) (208-727)	104 (4/4) (59-160)

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

(3) Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, License Nos. DPR-53 and DPR-69, Amendment No. 23 for Unit No. 1, Amendment No. 7 for Unit No. 2, Appendix A Technical Specifications; Appendix B, Environmental Technical Specifications.

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(7) CP-234, Specification and Surveillance for the Radiological Environmental Monitoring Program.

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APPENDIX A

Appendix A contains information concerning the environmental samples which were collected during the period January 1, 2000 to December 31, 2000.

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] (KM)	Distance[1] (Miles)	Direction[1] (Sector)
A1[2]	On Site before Entrance to Camp Conoy	0.7	0.4	S
A2	Camp Conoy at Emergency Siren	2.5	1.6	SSE
A3	Bay Breeze Road	2.6	1.6	SE
A4	Route 765 Lusby	2.9	1.8	SSW
A5	Emergency Operations Facility (EOF)	19.3	12.0	WNW
DR1	On Site along Cliffs	0.6	0.4	NW
DR2	Route 765, Auto Dump	2.7	1.7	WNW
DR3	Route 765, Giovanni's Tavern (Knotty Pine)	2.3	1.4	W
DR4	Route 765, across from White Sands Drive	2.0	1.2	WSW
DR5	Route 765, John's Creek	2.4	1.5	SW
DR6	Route 765 Lusby	2.9	1.8	SSW
DR7[2]	On Site before Entrance to Camp Conoy	0.7	0.4	S
DR8	Camp Conoy at Emergency Siren	2.5	1.6	SSE
DR9	Bay Breeze Road	2.6	1.6	SE
DR10	Calvert Beach Rd. and Decatur Street	6.4	4.0	NW
DR11	Dirt road off Mackall & Parran Roads	6.6	4.1	WNW
DR12	Mackall and Bowen Roads	6.7	4.2	W
DR13	Mackall Rd. near Wallville	6.1	3.8	WSW
DR14	Rodney Point	6.4	4.0	SW
DR15	Mill Bridge and Turner Roads	6.2	3.9	SSW
DR16	Across from Appeal School	6.5	4.0	S
DR17	Cove Point and Little Cove Point Roads	5.9	3.7	SSE
DR18	Cove Point	7.1	4.4	SE
DR19	Long Beach	4.4	2.7	NW
DR20	On Site near shore	0.4	0.2	NNW
DR21	Emergency Operations Facility (EOF)	19.3	12.0	WNW
DR22	Solomons Island	12.5	7.8	S
DR23	Taylors Island, Carpenter's Property	12.6	7.8	ENE
Ia1,2	Discharge Area	0.3	0.2	N
Ia3	Camp Conoy	0.9	0.6	E
Ia4,5	Patuxent River	N/A	N/A	N/A
Ia6	Kenwood Beach	10.7	6.6	NNW
Ia10	Hog Island	15.3	9.5	SSE
Ib1,2,3	Garden Off Bay Breeze Road	2.6	1.6	SSE
Ib4,5,6	On Site before Entrance to Camp Conoy	0.7	0.4	S
Ib7,8,9	Emergency Operations Facility (EOF)	19.3	12.0	WNW
Wa1	Intake Area	0.2	0.1	NNE
Wa2	Discharge Area	0.3	0.2	N
Wb1	Shoreline at Barge Rd.	0.6	0.4	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

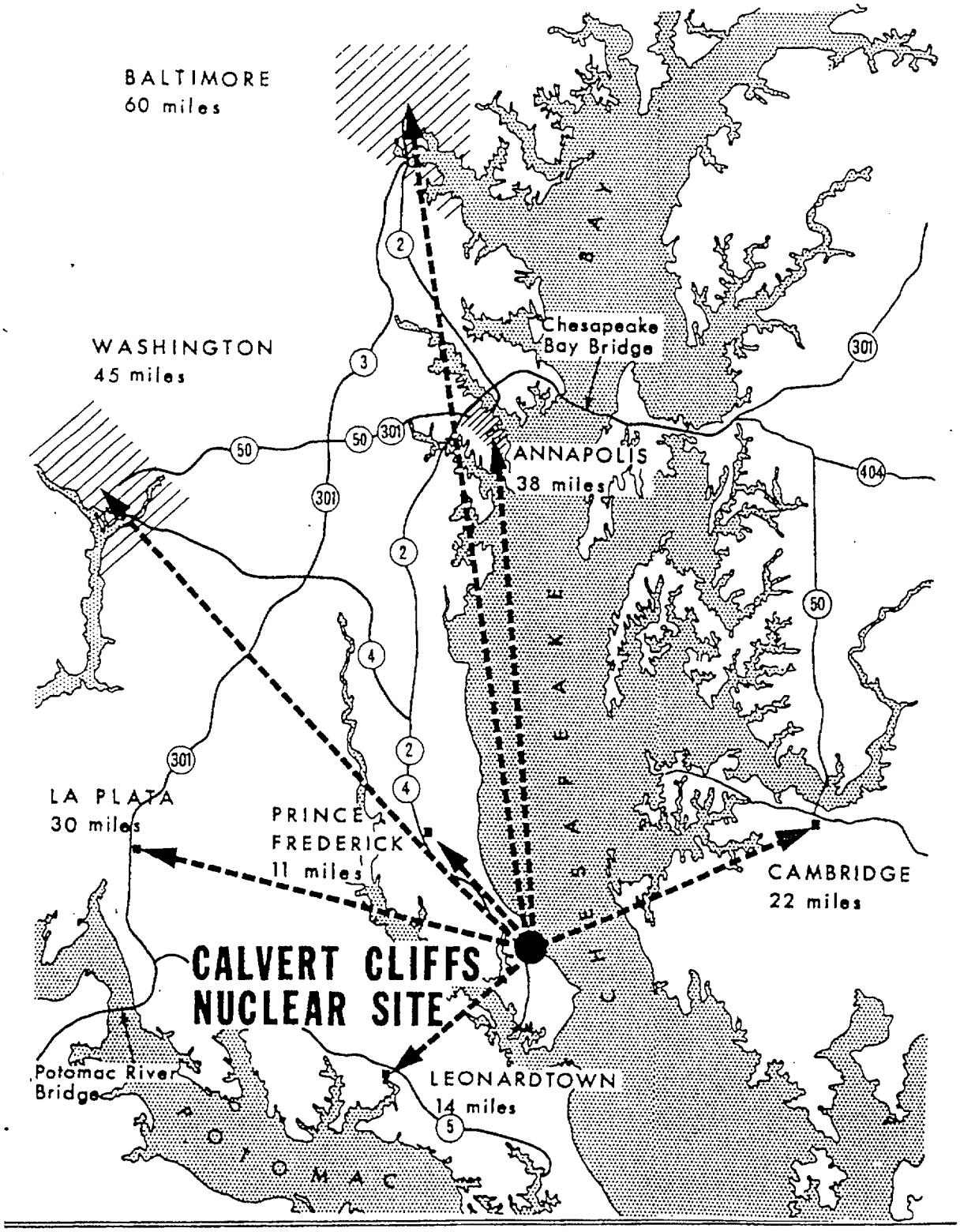

FIGURE A-2
Calvert Cliffs Nuclear Power Plant Sampling Locations
0-2 Miles

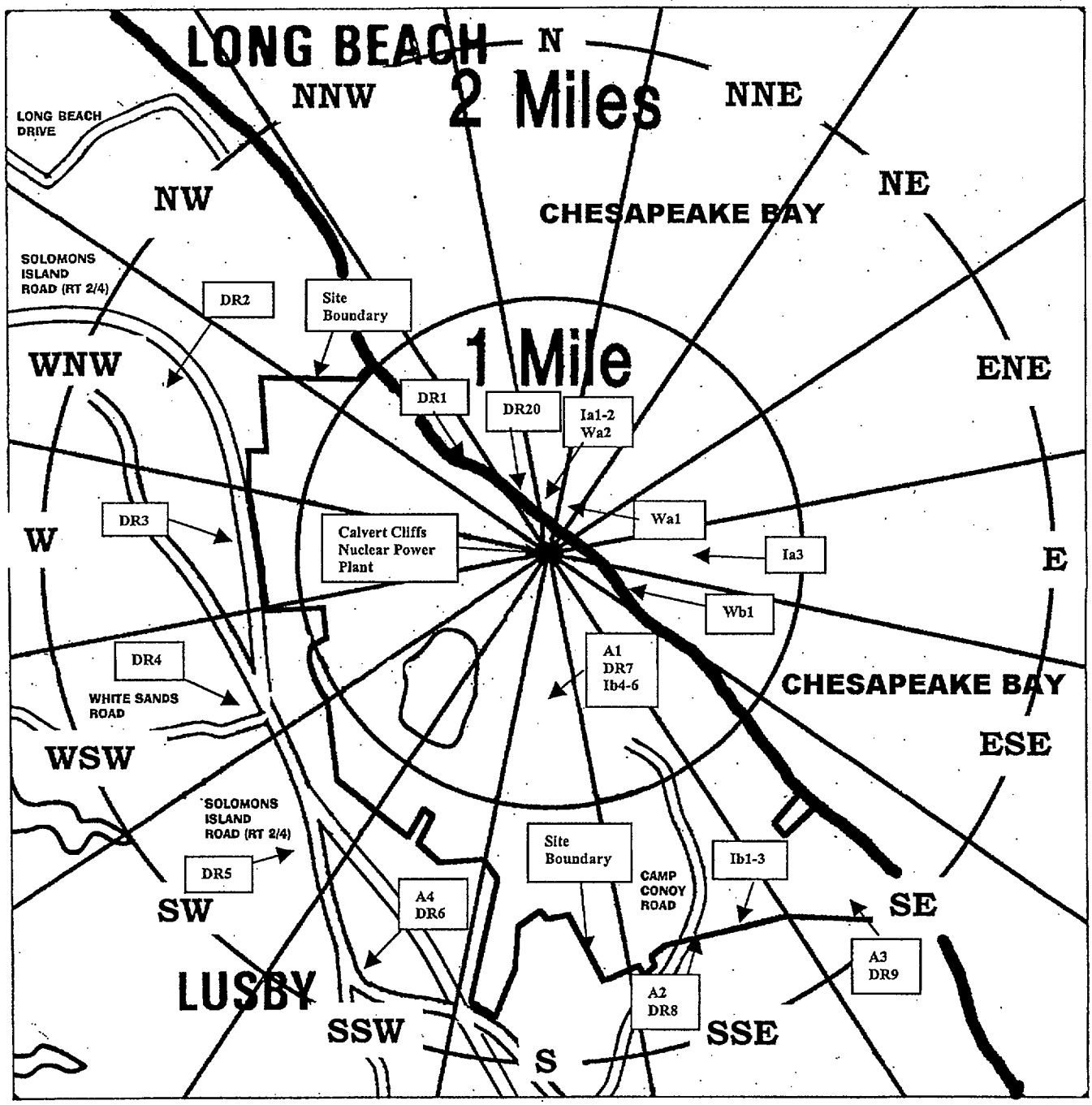

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FIGURE A-3
Calvert Cliffs Nuclear Power Plant Sampling Locations
0-10 Miles

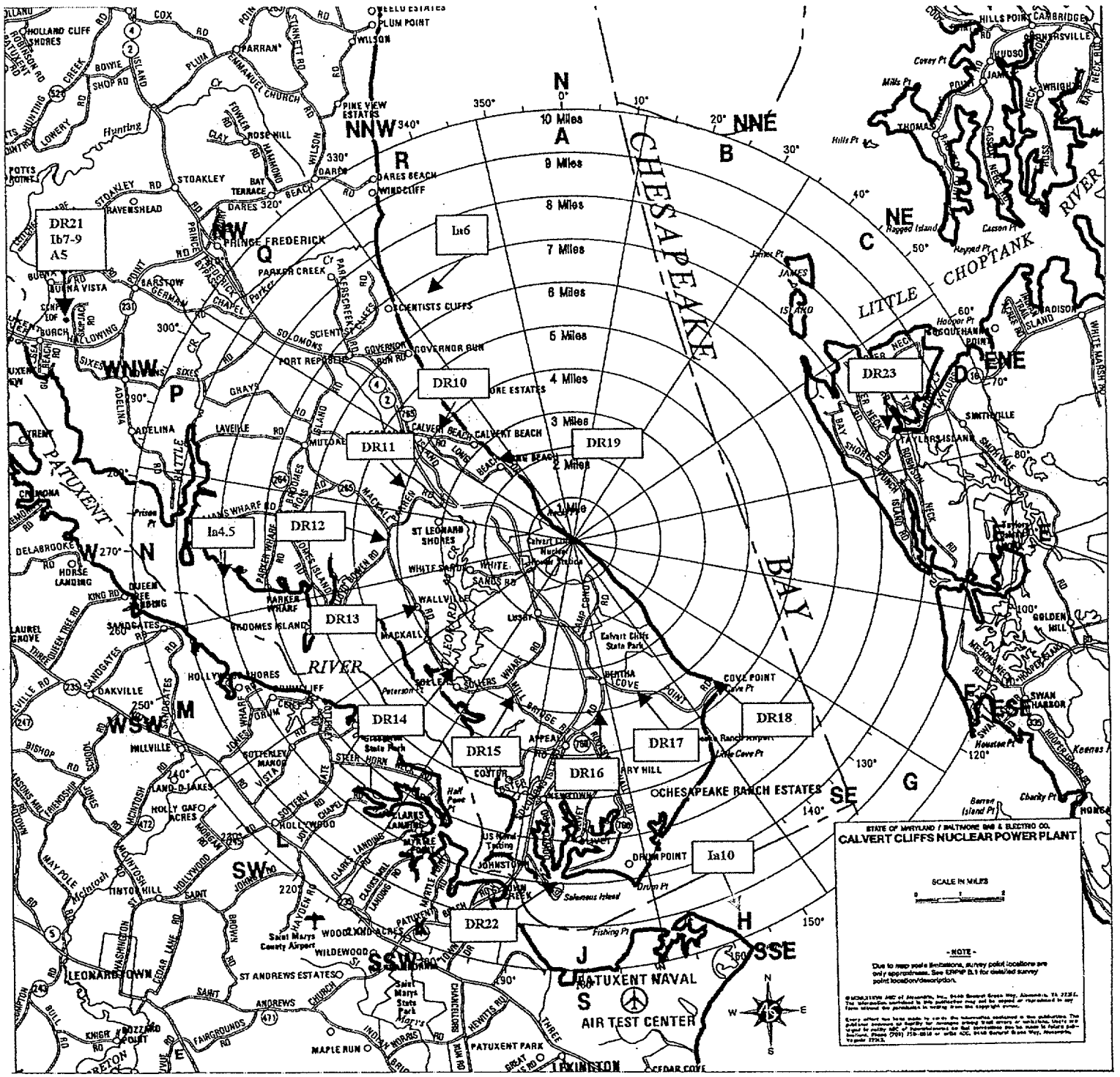

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TABLE A-2
Locations of Environmental Sampling Stations for the Independent Spent Fuel Storage Installation at Calvert Cliffs

Station	Description	Distance[1] (KM)	Distance[1] (Miles)	Direction[1] (Sector)
A1[2]	On Site before Entrance to Camp Conoy	0.7	0.4	S
SFA1	Meteorological Station	0.4	0.2	NW
SFA2	CCNPP Visitor's Center	0.7	0.4	NNE
SFA3	NNW of ISFSI	0.1	<0.1	NNW
SFA4	South of ISFSI	0.1	<0.1	S
SFDR1	SW of ISFSI	0.1	<0.1	SW
SFDR2	North of ISFSI	0.1	<0.1	N
SFDR3	NNE of ISFSI	0.1	<0.1	NNE
SFDR4	NE of ISFSI	<0.1	<0.1	NE
SFDR5	East of ISFSI	<0.1	<0.1	E
SFDR6	ESE of ISFSI	0.1	<0.1	ESE
SFDR7	CCNPP Visitor's Center	0.7	0.4	NNE
SFDR8	North Northwest of ISFSI	0.1	<0.1	NNW
SFDR9	South of ISFSI	0.1	<0.1	S
SRDR10	NNW of ISFSI	0.1	<0.1	NNE
SFDR11	WNW of ISFSI	0.1	<0.1	WNW
SFDR12	West of ISFSI	<0.1	<0.1	W
SFDR13	SSW of ISFSI	<0.1	<0.1	SSW
SFDR14	SSE of ISFSI	0.1	<0.1	SSE
SFDR15	ENE of ISFSI	<0.1	<0.1	ENE
SFDR16	WSW of ISFSI	<0.1	<0.1	WSW
DR7[2]	On Site before Entrance to Camp Conoy	0.7	0.4	SE
DR30	Meteorological Station	0.4	0.2	NW
SFb1	Meteorological Station	0.4	0.2	NW
SFb2	CCNPP Visitor's Center	0.7	0.4	NNE
SFb3	NNW of ISFSI	0.1	<0.1	NNW
SFb4	South of ISFSI	0.1	<0.1	S
SFb5	On Site before Entrance to Camp Conoy	0.7	0.4	SE
SFS1	Meteorological Station	0.4	0.2	NW
SFS2	CCNPP Visitor's Center	0.7	0.4	NNE
SFS3	NNW of ISFSI	0.1	<0.1	NNW
SFS4	South of ISFSI	0.1	<0.1	S
SFS5	On Site before Entrance to Camp Conoy	0.7	<0.1	SE

[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-4
Independent Spent Fuel Storage Installation Sampling Locations

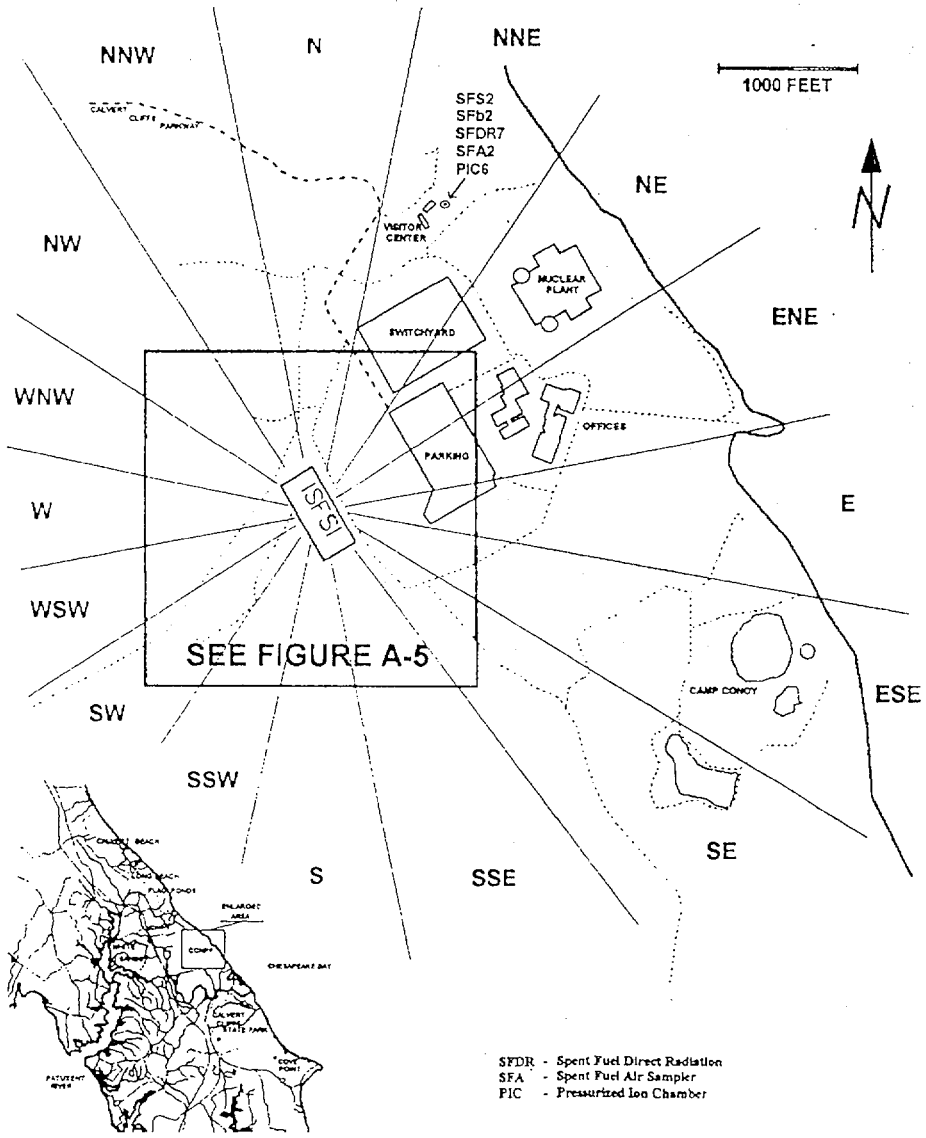
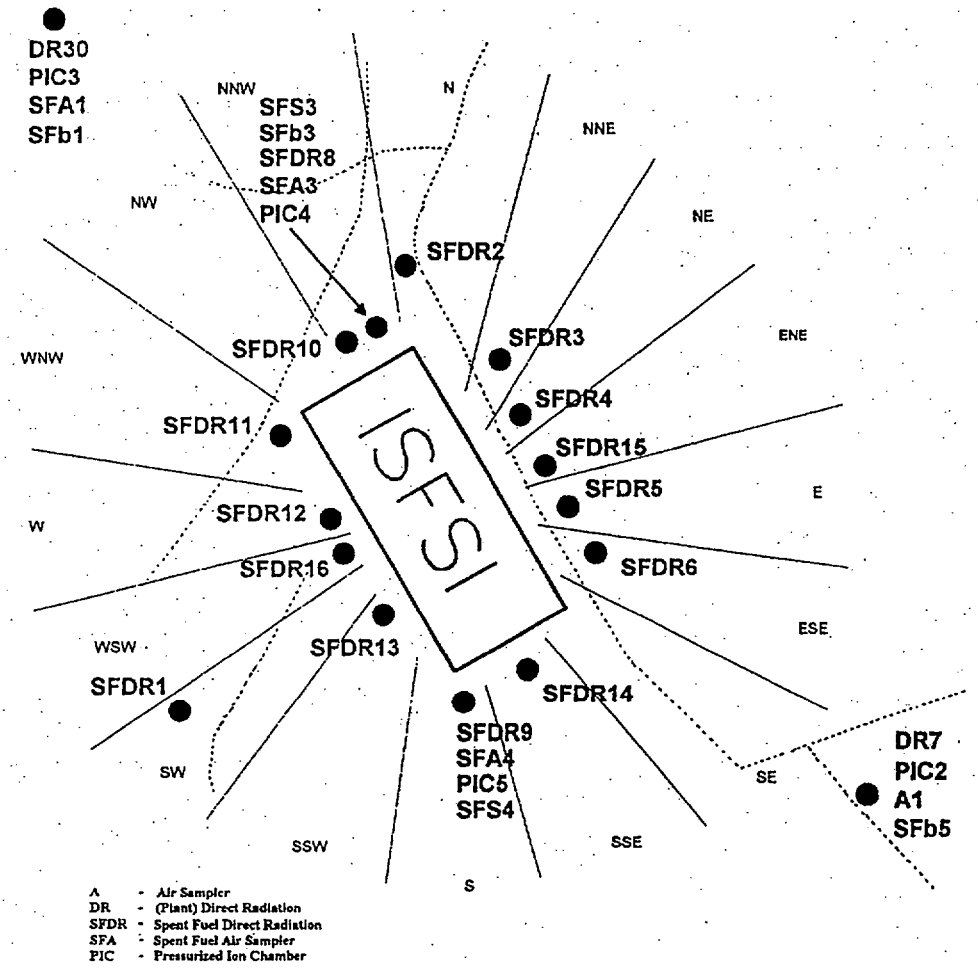


FIGURE A-5
Enlarged Map of the Independent Spent Fuel Storage Installation Sampling Locations



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APPENDIX B

Appendix B is a presentation of the analytical results of the 2000 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	01/15/2000		*
Intake Vicinity	02/15/2000		*
	03/15/2000		*
	03/31/2000	62 ± 37	
	04/15/2000		*
	05/15/2000		*
	06/15/2000		*
	06/30/2000	<37	
	07/15/2000		*
	08/15/2000		*
	09/15/2000		*
	09/30/2000	39 ± 36	
	10/15/2000		*
	11/15/2000		*
	12/15/2000		*
	12/31/2000	68 ± 37	
Wa2	01/15/2000		*
Discharge Vicinity	02/15/2000		*
	03/15/2000		*
	03/31/2000	791 ± 45	
	04/15/2000		*
	05/15/2000		*
	06/15/2000		*
	06/30/2000	78 ± 36	
	07/15/2000		*
	08/15/2000		*
	09/15/2000		*
	09/30/2000	217 ± 37	
	10/15/2000		*
	11/15/2000		*
	12/15/2000		*
	12/31/2000	590 ± 41	

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

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	07/06/2000	Striped bass	*
Ia2 Discharge Area	07/06/2000	Spot	*
Ia4[1] Patuxent River	07/11/2000	Striped bass	*
Ia5[1] Patuxent River	07/07/2000	Spot	*

* 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
Ia10[1]	03/24/2000	8 ± 6	*
Hog Island	06/20/2000	[2]	*
	08/24/2000	21 ± 9	*
Ia3	03/24/2000	Unavailable[3]	*
Camp Conoy	06/20/2000	Unavailable[3]	*
	08/11/2000	119 ± 13	*
	08/24/2000	[3]	*
	10/18/2000	132 ± 14	*
Ia6	08/11/2000	[2]	*
Kenwood Beach	10/18/2000	11 ± 9	*

* Non-Natural Gamma Emitters < MDA
[1] Control Location
[2] This Isotope < MDA
[3] Mussels were collected, 3/24 Ag-110m <MDA
6/20 Ag-110m 29 ± 21
8/24 Ag-110m 195 ± 17

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	03/20/2000	[1]
.	09/14/2000	[1]

[1] 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
01/03/2000	01/10/2000	*	*	*	*	*
01/10/2000	01/17/2000	*	*	*	*	*
01/17/2000	01/27/2000	*	*	*	*	*
01/27/2000	01/31/2000	*	*	*	*	*
01/31/2000	02/07/2000	*	*	*	*	*
02/07/2000	02/14/2000	*	*	*	*	*
02/14/2000	02/22/2000	*	*	*	*	*
02/22/2000	02/28/2000	*	*	*	*	*
02/28/2000	03/06/2000	*	*	*	*	*
03/06/2000	03/13/2000	*	*	*	*	*
03/13/2000	03/20/2000	*	*	*	*	*
03/20/2000	03/27/2000	*	*	*	*	*
03/27/2000	04/03/2000	*	*	*	*	*
04/03/2000	04/10/2000	*	*	*	*	*
04/10/2000	04/17/2000	*	*	*	*	*
04/17/2000	04/24/2000	*	*	*	*	*
04/24/2000	05/01/2000	*	*	*	*	*
05/01/2000	05/09/2000	*	*	*	*	*
05/09/2000	05/15/2000	*	*	*	*	*
05/15/2000	05/22/2000	*	*	*	*	*
05/22/2000	05/30/2000	*	*	*	*	*
05/30/2000	06/05/2000	*	*	*	*	*
06/05/2000	06/12/2000	*	*	*	*	*
06/12/2000	06/19/2000	*	*	*	*	*
06/19/2000	06/26/2000	*	*	*	*	*
06/26/2000	07/03/2000	*	*	*	*	*
07/03/2000	07/10/2000	*	*	*	*	*
07/10/2000	07/17/2000	*	*	*	*	*
07/17/2000	07/24/2000	*	*	*	*	*
07/24/2000	07/31/2000	*	*	*	*	*

* < MDA
[1] Control Location

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
07/31/2000	08/07/2000	*	*	*	*	*
08/07/2000	08/14/2000	*	*	*	*	*
08/14/2000	08/21/2000	*	*	*	*	*
08/21/2000	08/28/2000	*	*	*	*	*
08/28/2000	09/05/2000	[2]	*	*	*	*
09/05/2000	09/11/2000	*	*	*	*	*
09/11/2000	09/18/2000	*	*	*	*	*
09/18/2000	09/25/2000	*	*	*	*	*
09/25/2000	10/02/2000	*	*	*	*	*
10/02/2000	10/09/2000	*	*	*	*	*
10/09/2000	10/16/2000	*	*	*	*	*
10/16/2000	10/23/2000	*	*	*	*	*
10/23/2000	10/30/2000	*	*	*	*	*
10/30/2000	11/06/2000	*	*	*	*	*
11/06/2000	11/13/2000	*	*	*	*	*
11/13/2000	11/20/2000	*	*	*	*	*
11/20/2000	11/27/2000	*	*	*	*	*
11/27/2000	12/05/2000	*	*	*	*	*
12/05/2000	12/11/2000	*	*	*	*	*
12/11/2000	12/18/2000	*	*	*	*	*
12/18/2000	12/26/2000	*	*	*	*	*
12/26/2000	01/02/2001	*	*	*	*	*

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

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
01/03/2000	01/10/2000	1.9 ± 0.2	1.4 ± 0.2	1.7 ± 0.2	2.0 ± 0.2	1.8 ± 0.2
01/10/2000	01/17/2000	1.7 ± 0.2	1.7 ± 0.2	1.6 ± 0.2	1.5 ± 0.2	1.6 ± 0.2
01/17/2000	01/27/2000	2.9 ± 0.2	2.4 ± 0.2	2.1 ± 0.2	2.5 ± 0.2	2.5 ± 0.2
01/27/2000	01/31/2000	2.2 ± 0.3	1.1 ± 0.3	1.8 ± 0.3	1.6 ± 0.3	1.8 ± 0.3
01/31/2000	02/07/2000	2.2 ± 0.2	2.1 ± 0.2	2.2 ± 0.2	2.4 ± 0.2	2.0 ± 0.2
02/07/2000	02/14/2000	2.6 ± 0.3	2.4 ± 0.2	2.7 ± 0.2	3.0 ± 0.2	2.1 ± 0.2
02/14/2000	02/22/2000	1.6 ± 0.2	1.5 ± 0.2	1.4 ± 0.2	1.7 ± 0.2	1.6 ± 0.2
02/22/2000	02/28/2000	1.4 ± 0.2	1.3 ± 0.2	1.4 ± 0.2	1.9 ± 0.2	1.4 ± 0.2
02/28/2000	03/06/2000	1.8 ± 0.2	1.5 ± 0.2	1.6 ± 0.2	1.8 ± 0.2	1.7 ± 0.2
03/06/2000	03/13/2000	1.6 ± 0.2	1.9 ± 0.2	1.7 ± 0.2	2.1 ± 0.2	1.6 ± 0.2
03/13/2000	03/20/2000	1.2 ± 0.2	1.4 ± 0.2	1.3 ± 0.2	1.6 ± 0.2	1.4 ± 0.2
03/20/2000	03/27/2000	1.4 ± 0.2	0.9 ± 0.2	1.2 ± 0.2	1.3 ± 0.2	1.1 ± 0.2
03/27/2000	04/03/2000	1.5 ± 0.2	1.3 ± 0.2	1.4 ± 0.2	1.6 ± 0.2	1.7 ± 0.2
04/03/2000	04/10/2000	1.3 ± 0.2	1.0 ± 0.2	1.4 ± 0.2	1.6 ± 0.2	1.1 ± 0.2
04/10/2000	04/17/2000	1.1 ± 0.2	0.8 ± 0.1	1.0 ± 0.2	1.2 ± 0.2	1.0 ± 0.2
04/17/2000	04/24/2000	0.6 ± 0.2	0.3 ± 0.1	0.4 ± 0.2	0.4 ± 0.1	0.4 ± 0.2
04/24/2000	05/01/2000	1.2 ± 0.2	0.8 ± 0.1	1.2 ± 0.2	1.1 ± 0.2	1.2 ± 0.2
05/01/2000	05/09/2000	2.3 ± 0.2	1.2 ± 0.2	1.1 ± 0.2	1.8 ± 0.2	1.9 ± 0.2
05/09/2000	05/15/2000	1.7 ± 0.3	1.1 ± 0.2	1.2 ± 0.2	1.5 ± 0.2	1.5 ± 0.2
05/15/2000	05/22/2000	1.0 ± 0.2	0.6 ± 0.2	1.2 ± 0.2	1.1 ± 0.2	0.8 ± 0.2
05/22/2000	05/30/2000	0.8 ± 0.2	0.6 ± 0.3	0.9 ± 0.2	0.8 ± 0.2	1.0 ± 0.2
05/30/2000	06/05/2000	1.2 ± 0.2	0.6 ± 0.2	0.8 ± 0.2	1.0 ± 0.2	0.9 ± 0.2
06/05/2000	06/12/2000	1.8 ± 0.2	1.1 ± 0.2	1.0 ± 0.2	1.4 ± 0.2	1.7 ± 0.2
06/12/2000	06/19/2000	0.6 ± 0.2	0.5 ± 0.2	0.4 ± 0.2	0.6 ± 0.2	0.7 ± 0.2
06/19/2000	06/26/2000	1.3 ± 0.2	0.9 ± 0.2	0.6 ± 0.2	1.2 ± 0.2	1.2 ± 0.2
06/26/2000	07/03/2000	1.5 ± 0.2	0.8 ± 0.2	0.6 ± 0.2	1.1 ± 0.2	1.6 ± 0.2
07/03/2000	07/10/2000	1.5 ± 0.2	0.9 ± 0.2	0.3 ± 0.2	1.4 ± 0.2	1.5 ± 0.2
07/10/2000	07/17/2000	1.0 ± 0.2	0.8 ± 0.2	1.1 ± 0.2	1.2 ± 0.2	1.1 ± 0.2
07/17/2000	07/24/2000	1.5 ± 0.2	0.8 ± 0.2	0.9 ± 0.2	1.2 ± 0.2	1.4 ± 0.2
07/24/2000	07/31/2000	0.8 ± 0.2	0.6 ± 0.2	0.5 ± 0.2	0.4 ± 0.2	0.7 ± 0.2
07/31/2000	08/07/2000	1.1 ± 0.2	0.4 ± 0.2	0.5 ± 0.2	0.6 ± 0.2	1.5 ± 0.2
08/07/2000	08/14/2000	0.7 ± 0.2	0.6 ± 0.2	1.0 ± 0.2	1.3 ± 0.2	1.4 ± 0.2
08/14/2000	08/21/2000	1.4 ± 0.2	0.5 ± 0.2	0.9 ± 0.3	1.2 ± 0.2	1.5 ± 0.2
08/21/2000	08/28/2000	1.9 ± 0.2	0.7 ± 0.2	1.1 ± 0.3	1.0 ± 0.2	1.2 ± 0.2

[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	A1 Entrance to Camp Conoy	A2 Camp Conoy Siren	A3 Bay Breeze Rd	A4 Route 765 at Lusby	A5[1] EOF
08/28/2000	09/05/2000	[2]	0.3 ± 0.2	0.5 ± 0.2	0.8 ± 0.2	0.8 ± 0.2
09/05/2000	09/11/2000	1.3 ± 0.2	0.4 ± 0.2	0.9 ± 0.3	1.2 ± 0.2	1.4 ± 0.2
09/11/2000	09/18/2000	2.1 ± 0.3	0.5 ± 0.2	1.0 ± 0.2	1.3 ± 0.2	1.3 ± 0.2
09/18/2000	09/25/2000	1.1 ± 0.2	0.3 ± 0.2	0.9 ± 0.2	1.2 ± 0.2	1.5 ± 0.2
09/25/2000	10/02/2000	1.8 ± 0.2	0.5 ± 0.2	1.1 ± 0.2	1.3 ± 0.2	1.5 ± 0.2
10/02/2000	10/09/2000	2.6 ± 0.3	0.6 ± 0.2	1.0 ± 0.3	2.1 ± 0.3	1.9 ± 0.2
10/09/2000	10/16/2000	3.6 ± 0.3	1.2 ± 0.2	2.0 ± 0.2	3.0 ± 0.3	3.2 ± 0.3
10/16/2000	10/23/2000	2.8 ± 0.2	1.0 ± 0.3	1.8 ± 0.2	2.5 ± 0.3	3.3 ± 0.3
10/23/2000	10/30/2000	2.0 ± 0.2	1.0 ± 0.3	1.8 ± 0.2	1.8 ± 0.2	2.5 ± 0.3
10/30/2000	11/06/2000	1.6 ± 0.2	1.2 ± 0.2	1.4 ± 0.2	1.6 ± 0.2	1.7 ± 0.2
11/06/2000	11/13/2000	1.6 ± 0.2	1.7 ± 0.2	1.4 ± 0.2	1.4 ± 0.2	2.1 ± 0.2
11/13/2000	11/20/2000	3.3 ± 0.3	3.6 ± 0.3	2.5 ± 0.2	2.7 ± 0.2	3.2 ± 0.3
11/20/2000	11/27/2000	1.0 ± 0.2	1.8 ± 0.2	1.1 ± 0.2	1.0 ± 0.1	1.3 ± 0.2
11/27/2000	12/05/2000	1.9 ± 0.2	2.3 ± 0.2	1.8 ± 0.2	1.9 ± 0.2	2.2 ± 0.2
12/05/2000	12/11/2000	2.0 ± 0.2	2.7 ± 0.3	1.8 ± 0.2	2.0 ± 0.2	2.2 ± 0.2
12/11/2000	12/18/2000	1.3 ± 0.2	1.8 ± 0.2	1.1 ± 0.2	1.2 ± 0.2	2.0 ± 0.2
12/18/2000	12/26/2000	3.4 ± 0.2	3.9 ± 0.3	3.1 ± 0.2	3.2 ± 0.2	3.8 ± 0.2
12/26/2000	01/02/2001	1.7 ± 0.2	2.2 ± 0.2	1.8 ± 0.2	1.8 ± 0.2	2.1 ± 0.2

[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	SFA1 MET Station	SFA2[1] Visitors Center	SFA3 NNW of ISFSI	SFA4 South of ISFSI
01/03/2000	01/10/2000	1.9 ± 0.2	1.3 ± 0.2	1.0 ± 0.2	2.3 ± 0.2
01/10/2000	01/17/2000	1.8 ± 0.2	1.9 ± 0.2	1.8 ± 0.2	1.8 ± 0.2
01/17/2000	01/27/2000	2.4 ± 0.2	3.0 ± 0.2	2.5 ± 0.2	4.6 ± 0.4
01/27/2000	01/31/2000	[2]	1.3 ± 0.3	1.0 ± 0.3	1.6 ± 0.3
01/31/2000	02/07/2000	2.4 ± 0.2	2.2 ± 0.2	2.2 ± 0.3	3.0 ± 0.3
02/07/2000	02/14/2000	1.6 ± 0.2	2.8 ± 0.3	1.8 ± 0.2	3.3 ± 0.3
02/14/2000	02/22/2000	1.4 ± 0.2	1.8 ± 0.2	1.5 ± 0.2	2.1 ± 0.2
02/22/2000	02/28/2000	1.2 ± 0.2	0.7 ± 0.3	1.4 ± 0.2	2.0 ± 0.2
02/28/2000	03/06/2000	1.4 ± 0.2	1.9 ± 0.2	1.7 ± 0.2	2.1 ± 0.2
03/06/2000	03/13/2000	1.5 ± 0.2	1.9 ± 0.2	1.8 ± 0.2	1.7 ± 0.2
03/13/2000	03/20/2000	1.0 ± 0.2	1.2 ± 0.2	1.3 ± 0.2	1.6 ± 0.2
03/20/2000	03/27/2000	1.1 ± 0.2	1.2 ± 0.2	1.4 ± 0.2	1.7 ± 0.2
03/27/2000	04/03/2000	1.5 ± 0.2	1.5 ± 0.2	1.5 ± 0.2	2.0 ± 0.2
04/03/2000	04/10/2000	1.5 ± 0.2	1.0 ± 0.2	1.2 ± 0.2	1.8 ± 0.2
04/10/2000	04/17/2000	0.9 ± 0.2	1.0 ± 0.2	0.9 ± 0.2	1.5 ± 0.3
04/17/2000	04/24/2000	0.4 ± 0.1	0.4 ± 0.1	0.5 ± 0.2	[2]
04/24/2000	05/01/2000	1.2 ± 0.2	1.1 ± 0.2	1.2 ± 0.2	1.2 ± 0.2
05/01/2000	05/09/2000	1.9 ± 0.2	1.6 ± 0.2	1.9 ± 0.2	1.6 ± 0.2
05/09/2000	05/15/2000	1.6 ± 0.2	1.5 ± 0.2	1.6 ± 0.2	1.3 ± 0.2
05/15/2000	05/22/2000	1.1 ± 0.2	1.6 ± 0.2	0.8 ± 0.2	1.0 ± 0.2
05/22/2000	05/30/2000	1.0 ± 0.2	1.0 ± 0.2	0.9 ± 0.1	1.1 ± 0.2
05/30/2000	06/05/2000	0.9 ± 0.2	1.1 ± 0.2	1.0 ± 0.2	0.9 ± 0.2
06/05/2000	06/12/2000	1.9 ± 0.2	1.8 ± 0.2	1.6 ± 0.2	1.8 ± 0.2
06/12/2000	06/19/2000	0.7 ± 0.2	0.5 ± 0.2	[2]	0.5 ± 0.2
06/19/2000	06/26/2000	1.4 ± 0.2	1.2 ± 0.2	1.1 ± 0.2	1.2 ± 0.2
06/26/2000	07/03/2000	1.7 ± 0.2	1.6 ± 0.2	1.6 ± 0.2	1.4 ± 0.2
07/03/2000	07/10/2000	1.3 ± 0.2	1.3 ± 0.2	1.3 ± 0.2	1.3 ± 0.2
07/10/2000	07/17/2000	0.9 ± 0.2	0.9 ± 0.1	0.8 ± 0.1	1.1 ± 0.2
07/17/2000	07/24/2000	1.2 ± 0.2	1.3 ± 0.2	1.3 ± 0.2	1.2 ± 0.2
07/24/2000	07/31/2000	0.6 ± 0.2	0.7 ± 0.2	0.8 ± 0.2	0.6 ± 0.2
07/31/2000	08/07/2000	0.7 ± 0.2	0.8 ± 0.2	0.8 ± 0.2	0.7 ± 0.2
08/07/2000	08/14/2000	1.2 ± 0.2	0.9 ± 0.2	1.0 ± 0.2	1.2 ± 0.2
08/14/2000	08/21/2000	1.6 ± 0.2	1.3 ± 0.2	1.4 ± 0.2	1.5 ± 0.2
08/21/2000	08/28/2000	1.3 ± 0.2	1.2 ± 0.2	1.3 ± 0.2	1.9 ± 0.2

[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	SFA1 MET Station	SFA2[1] Visitors Center	SFA3 NNW of ISFSI	SFA4 South of ISFSI
08/28/2000	09/05/2000	0.9 ± 0.2	0.8 ± 0.2	1.1 ± 0.2	1.0 ± 0.2
09/05/2000	09/11/2000	1.3 ± 0.2	1.4 ± 0.2	1.3 ± 0.2	1.5 ± 0.2
09/11/2000	09/18/2000	1.3 ± 0.2	1.3 ± 0.2	1.3 ± 0.2	1.2 ± 0.2
09/18/2000	09/25/2000	1.3 ± 0.2	1.2 ± 0.2	1.0 ± 0.2	0.9 ± 0.2
09/25/2000	10/02/2000	1.7 ± 0.2	1.5 ± 0.2	1.7 ± 0.2	1.5 ± 0.2
10/02/2000	10/09/2000	2.2 ± 0.3	2.2 ± 0.3	2.0 ± 0.3	2.1 ± 0.2
10/09/2000	10/16/2000	3.2 ± 0.3	3.3 ± 0.2	3.3 ± 0.2	3.2 ± 0.3
10/16/2000	10/23/2000	3.1 ± 0.3	3.2 ± 0.2	3.1 ± 0.3	2.8 ± 0.2
10/23/2000	10/30/2000	2.1 ± 0.2	2.1 ± 0.2	1.9 ± 0.2	2.1 ± 0.2
10/30/2000	11/06/2000	1.8 ± 0.2	1.5 ± 0.2	1.5 ± 0.2	1.6 ± 0.2
11/06/2000	11/13/2000	1.8 ± 0.2	1.6 ± 0.2	1.8 ± 0.2	1.9 ± 0.2
11/13/2000	11/20/2000	3.3 ± 0.2	2.9 ± 0.2	3.0 ± 0.2	2.9 ± 0.2
11/20/2000	11/27/2000	1.1 ± 0.2	1.0 ± 0.2	1.1 ± 0.2	1.3 ± 0.2
11/27/2000	12/05/2000	2.2 ± 0.2	2.0 ± 0.2	2.0 ± 0.2	2.2 ± 0.2
12/05/2000	12/11/2000	2.1 ± 0.2	2.0 ± 0.2	2.1 ± 0.2	2.2 ± 0.2
12/11/2000	12/18/2000	1.2 ± 0.2	1.4 ± 0.2	1.4 ± 0.2	1.5 ± 0.2
12/18/2000	12/26/2000	3.3 ± 0.2	3.5 ± 0.2	3.5 ± 0.2	3.8 ± 0.2
12/26/2000	01/02/2001	1.9 ± 0.2	1.7 ± 0.2	1.8 ± 0.2	2.0 ± 0.2

[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
01/15/2000	*	*	*	*	*
02/15/2000	*	*	*	*	*
03/15/2000	*	*	*	*	*
04/15/2000	*	*	*	*	*
05/15/2000	*	*	*	*	*
06/15/2000	*	*	*	*	*
07/15/2000	*	*	*	*	*
08/15/2000	*	*	*	*	*
09/15/2000	*	*	*	*	*
10/15/2000	*	*	*	*	*
11/15/2000	*	*	*	*	*
12/15/2000	*	*	*	*	*

Sample Date	SFA1 MET Station	SFA2 Visitors Center	SFA3 NNW of ISFSI	SFA4 South of ISFSI
01/15/2000	*	*	*	*
02/15/2000	*	*	*	*
03/15/2000	*	*	*	*
04/15/2000	*	*	*	*
05/15/2000	*	*	*	*
06/15/2000	*	*	*	*
07/15/2000	*	*	*	*
08/15/2000	*	*	*	*
09/15/2000	*	*	*	*
10/15/2000	*	*	*	*
11/15/2000	*	*	*	*
12/15/2000	*	*	*	*

[1] Control Location

* Non-Natural Gamma Emitters < MDA

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	06/26/2000	Collards	*
Bay Breeze Rd	07/31/2000	Collards	*
	08/28/2000	Collards	*
	09/28/2000	Collards	*
	10/30/2000	Collards	*
Ib2	06/26/2000	Cabbage	*
Bay Breeze Rd	07/31/2000	Cabbage	*
	08/28/2000	Cabbage	*
	09/28/2000	Cabbage	*
	10/30/2000	Broccoli	*
Ib3	06/26/2000	Cauliflower	*
Bay Breeze Rd	07/31/2000	Brussels sprouts	*
	08/28/2000	Broccoli	*
	09/28/2000	Broccoli	*
	10/30/2000	Cauliflower	*
Ib4	06/26/2000	Collards	*
Camp Conoy Entrance	07/31/2000	Collards	*
	08/28/2000	Collards	*
	09/28/2000	Collards	*
	10/30/2000	Collards	*
Ib5	06/26/2000	Cabbage	*
Camp Conoy Entrance	07/31/2000	Cabbage	*
	08/28/2000	Cabbage	*
	09/28/2000	Cabbage	*
	10/30/2000	Broccoli	*
Ib6	06/26/2000	Cauliflower	*
Camp Conoy Entrance	07/31/2000	Brussels sprouts	*
	08/28/2000	Broccoli	*
	09/28/2000	Broccoli	*
	10/30/2000	Cauliflower	*
Ib7[1]	06/26/2000	Collards	*
EOF	07/31/2000	Collards	*
	08/28/2000	Collards	*
	09/28/2000	Collards	*
	10/30/2000	Collards	*

* 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
Ib8[1]	06/26/2000	Cabbage	*
EOF	07/31/2000	Cabbage	*
	08/28/2000	Cabbage	*
	09/28/2000	Cabbage	*
	10/30/2000	Broccoli	*
Ib9[1]	06/26/2000	Cauliflower	*
EOF	07/31/2000	Brussels sprouts	*
	08/28/2000	Broccoli	*
	09/28/2000	Broccoli	*
	10/30/2000	Cauliflower	*

[1] Control Location

* Non-Natural Gamma Emitters <MDA

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	Gamma Emitters
SFb1	03/06/2000	*
MET Station	06/12/2000	*
	08/21/2000	*
	11/06/2000	*
SFb2[1]	03/06/2000	*
Visitor's Center	06/12/2000	*
	08/21/2000	*
	11/06/2000	*
SFb3	03/06/2000	*
NNW of ISFSI	06/12/2000	*
	08/21/2000	*
	11/06/2000	*
SFb4	03/06/2000	*
South of ISFSI	06/12/2000	*
	08/21/2000	*
	11/06/2000	*
SFb5	03/06/2000	*
On Site before Entrance	06/12/2000	*
to Camp Conoy	08/21/2000	*
	11/06/2000	*

* Non-Natural Gamma Emitters < MDA
[1] 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	Cs-137	Gamma Emitters
SFS1	03/06/2000	[1]	*
MET Station	06/12/2000	[1]	*
	08/21/2000	[1]	*
	11/06/2000	[1]	*
SFS2[2]	03/06/2000	130 ± 39	*
Visitors Center	06/12/2000	59 ± 25	*
	08/21/2000	65 ± 23	*
	11/06/2000	160 ± 59	*
SFS3	03/06/2000	208 ± 64	*
NNW of ISFSI	06/12/2000	353 ± 49	*
	08/21/2000	539 ± 64	*
	11/06/2000	727 ± 91	*
SFS4	03/06/2000	[1]	*
South of ISFSI	06/12/2000	[1]	*
	08/21/2000	[1]	*
	11/06/2000	[1]	*
SFS5	03/06/2000	546 ± 56	*
Entrance to	06/12/2000	261 ± 37	*
Camp Conoy	08/21/2000	253 ± 39	*
	11/06/2000	414 ± 55	*

* Non-Natural Gamma Emitters < MDA
[1] This Isotope < MDA
[2] 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 – 4.0	22- 34	11 - 36	18 - 56	18 - 51	19 - 98	1.2 - 7.7
Cr-51	13 - 35	110 - 155	81 - 269	106 - 252	97 - 194	117 - 634	13 - 98
Mn-54	1.6 - 3.2	13 - 22	10 - 30	16 - 49	15 - 36	17 - 106	1.2 - 9.2
Co-58	1.5 - 3.5	17 - 24	10 - 33	15 - 43	14 - 35	16 - 94	1.4 - 9.7
Fe-59	3.6 - 9.4	47 - 69	27 - 76	31 - 90	31 - 88	12 - 203	3.6 - 24.9
Co-60	1.7 - 3.6	18 - 28	11 - 33	17 - 44	18 - 45	19 - 114	1.1 - 7.3
Zn-65	3.2 - 8.0	23 - 51	24 - 69	43 - 134	34 - 92	47 - 256	2.2 - 16.7
Nb-95	1.7 - 4.3	19 - 28	12 - 40	20 - 49	15 - 34	19 - 109	1.9 - 13.7
Zr-95	2.8 - 6.0	29 - 41	22 - 59	28 - 78	27 - 58	27 - 180	2.5 - 15.8
Ru-106	13 - 26	116-177	74 - 254	123 - 384	117 - 284	127 - 851	8.0 - 56.4
Ag-110m	1.5 - 2.8	14 - 18	9 - 27	14 - 39	12 - 33	16 - 121	0.9 - 16.6
Te-129m	20 - 49	175 - 280	123 - 425	174 - 422	142 - 345	203 - 1160	2.2 - 133
I-131	2 - 23	28 - 84	18 - 117	14 - 34	14 - 38	21 - 137	*
Cs-134	1.8 - 2.6	12 - 16	10 - 25	19 - 52	16 - 36	19 - 88	1.2 - 8.6
Cs-137	1.5 - 2.7	13 - 18	8 - 27	16 - 43	14 - 35	12 - 99	0.9 - 6.0
Ba-140	6 - 34	90 - 183	58 - 242	49 - 135	44 - 125	70 - 339	13.2 - 105
Ce-144	9 - 14	34 - 51	29 - 120	74 - 138	59- 119	71 - 342	3.2 - 49.1

*The MDA range for I-131 measured on silver zeolite cartridge is typically 2.5 x 10^{-3} to 4.1 x 10^{-2} 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/90 days ± 2σ)

Site Code	Location	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
DR01	On Site, along Cliffs	12.07 ± 1.36	12.62 ± 0.80	11.34 ± 0.72	11.94 ± 1.27
DR02	Route 765, Auto Dump	8.78 ± 1.06	8.91 ± 0.91	8.44 ± 0.40	9.24 ± 0.70
DR03	Route 765, Giovanni's Tavern	9.99 ± 1.23	9.82 ± 0.78	9.05 ± 0.65	10.18 ± 0.75
DR04	Route 765, across from White Sands Drive.	10.89 ± 1.92	11.23 ± 0.83	10.57 ± 1.14	11.74 ± 1.05
DR05	Route 765, St. John's Creek	11.25 ± 1.31	11.03 ± 0.94	10.22 ± 1.31	11.18 ± 1.15
DR06	Route 765 at Lusby	9.28 ± 0.20	9.33 ± 1.17	8.84 ± 0.72	9.49 ± 0.53
DR07	Entrance to Camp Conoy	9.20 ± 1.20	9.16 ± 0.79	8.57 ± 1.12	9.23 ± 1.09
DR08	Camp Conoy Rd at Emergency Siren	13.17 ± 0.62	13.75 ± 1.37	12.70 ± 1.23	13.44 ± 0.67
DR09	Bay Breeze Rd	10.26 ± 0.83	9.77 ± 0.90	9.74 ± 0.62	10.09 ± 0.86
DR10	Decatur St. and Calvert Beach Rd.	9.39 ± 0.28	9.62 ± 1.06	9.26 ± 0.82	9.68 ± 0.42
DR11	Dirt road off Mackall & Parren Rd	10.16 ± 1.27	10.15 ± 1.10	9.06 ± 0.87	10.17 ± 0.76
DR12	Mackall & Bowen Rds	9.61 ± 0.69	9.86 ± 0.92	9.31 ± 1.07	10.22 ± 0.82
DR13	Mackall Rd, near Wallville	10.30 ± 1.06	11.24 ± 1.23	10.30 ± 0.44	11.00 ± 1.42
DR14	Rodney Point	12.30 ± 1.06	12.12 ± 0.63	11.37 ± 0.58	12.80 ± 1.44
DR15	Mill Bridge & Turner Rds	11.24 ± 1.39	11.08 ± 1.18	10.34 ± 0.26	11.41 ± 1.06

Table B-12

Direct Radiation
(Results in Units of mR/90 days ± 2σ)

Site Code	Location	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
DR16	Across from Appeal School	10.02 ± 0.60	10.70 ± 2.42	9.30 ± 0.30	9.85 ± 1.10
DR17	Cove Point & Little Cove Point Rds	11.62 ± 0.98	11.74 ± 1.18	10.55 ± 1.01	11.64 ± 0.50
DR18	Cove Point	9.00 ± 0.25	8.82 ± 0.96	7.97 ± 0.27	8.82 ± 0.36
DR19	Long Beach	10.14 ± 0.48	9.87 ± 1.06	9.20 ± 0.51	9.96 ± 1.39
DR20	On site, near Shore	12.14 ± 0.87	12.03 ± 1.30	11.24 ± 1.11	12.35 ± 1.14
DR21[1]	EOF	11.64 ± 1.38	11.56 ± 1.02	11.10 ± 0.97	11.81 ± 1.59
DR22[1]	Solomons Island	[2]	10.30 ± 0.61	[2]	10.04 ± 0.94
DR23[1]	Taylors Island	14.08 ± 0.82	14.70 ± 1.81	13.49 ± 1.35	14.20 ± 2.44
DR30	MET Station	11.58 ± 0.32	12.08 ± 1.53	10.99 ± 0.86	10.61 ± 0.75
SFDR01	SW of ISFSI	14.56 ± 1.46	14.10 ± 1.75	13.26 ± 1.23	13.75 ± 2.57
SFDR02	North of ISFSI	17.05 ± 2.31	16.54 ± 2.08	15.35 ± 1.38	15.77 ± 1.20
SFDR03	NNE of ISFSI	22.90 ± 0.69	23.21 ± 4.32	24.21 ± 2.80	26.94 ± 2.31
SFDR04	NE of ISFSI	16.14 ± 1.44	16.36 ± 2.52	16.50 ± 2.19	15.85 ± 3.36
SFDR05	East of ISFSI	12.56 ± 0.70	12.42 ± 2.13	11.97 ± 0.42	12.42 ± 0.65

[1] Control Location
[2] Missing Data

Table B-12

Direct Radiation
(Results in Units of mR/90 days ± 2σ)

Site Code	Location	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
SFDR06	ESE of ISFSI	13.75 ± 0.99	13.21 ± 0.99	12.58 ± 0.79	12.47 ± 1.05
SFDR07	Visitor's Center	11.84 ± 1.01	12.32 ± 2.00	11.51 ± 1.01	10.78 ± 1.22
SFDR08	NNW of ISFSI	21.23 ± 3.80	22.60 ± 1.56	20.68 ± 0.80	22.11 ± 2.86
SFDR09	South of ISFSI	11.09 ± 1.32	10.43 ± 1.07	10.22 ± 1.60	9.81 ± 0.49
SFDR10	NNW of ISFSI	39.13 ± 2.31	35.91 ± 6.48	37.53 ± 9.35	30.10 ± 2.83
SFDR11	WNW ISFSI	23.18 ± 4.84	22.96 ± 2.39	23.73 ± 1.51	26.53 ± 4.63
SFDR12	West of ISFSI	22.58 ± 2.49	26.42 ± 1.93	24.24 ± 2.17	30.28 ± 3.00
SFDR13	SSW of ISFSI	12.69 ± 0.85	12.89 ± 0.64	12.87 ± 1.00	12.58 ± 0.22
SFDR14	SSE of ISFSI	10.75 ± 0.93	10.79 ± 1.95	10.61 ± 0.80	10.69 ± 0.35
SFDR15	ENE of ISFSI	14.63 ± 1.08	13.62 ± 1.20	14.48 ± 0.91	14.88 ± 1.00
SFDR16	WSW of ISFSI	19.44 ± 2.81	20.76 ± 1.43	19.30 ± 3.43	18.11 ± 2.90

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APPENDIX C

Appendix C is a summary of CPSG 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 Radiological Environmental Cross-Check Program during the period January 1, 2000 to December 31, 2000. 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 Teledyne Brown Engineering's Environmental Services during the same period. The Teledyne Brown Engineering operating procedures pertinent to these analyses are described in Reference (11).

All CPSG Laboratory's results contained in Table C-1 agree with Analytics' results with the exception of five isotopes for the filter sample type on 6/22/00. Reanalysis of the filter did not result in agreement within the 3 sigma control limit, however, three of the five original results were in agreement when using the NRC Resolution Test Criteria[1]. The supplier was contacted to obtain the results of all participants in this cross check. Evaluation of all the data showed the presence of a systematic error and that the CPSG Laboratory data was consistent with other participants.

All the results contained in Table C-2 agree with the Laboratory replicates and split samples submitted to Teledyne Brown Engineering, where appropriate. Samples whose nature precludes splitting them with Teledyne Brown Engineering are marked "**" in the Split Analysis column.

Although the CPSG Laboratory participated in the 12th International Intercomparison of Environmental Dosimeters, the results were unavailable at the time of this report. The results will be included in next year's report.

[1] NRC Inspection Manual, Inspection Procedure 84750, March 15, 1994

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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 2000

Sample Date	Sample Type and Units	Isotope Observed	Reported Laboratory' s Results[1]	Analytics' Results[1]
3/23/00	Water-pCi/L	H-3	4142±104	4170±209
3/23/00	Water-pCi/L	Cs-134	123±21	139±7
		Cs-137	132±28	128±6
		Ce-141	441±45	427±21
		Zn-65	193±62	196±10
		Cr-51	232±158	238±12
		Mn-54	163±34	159±8
		Fe-59	93±43	92±5
		Co-60	118±21	116±6
		I-131	82±38	74±4
6/22/00	Water-pCi/L	I-131	79±41	84±4
		Ce-141	65±28	74±4
		Cr-51	211±168	226±11
		Cs-134	84±18	98±5
		Cs-137	208±33	204±10
		Co-58	112±27	111±6
		Mn-54	121±28	68±3
		Fe-59	57±32	54±3
		Zn-65	162±57	158±8
		Co-60	161±24	152±8
6/22/00	Filter-pCi/filter	Beta	53±3	59±3
6/22/00	Filter-pCi/filter	Ce-141	109±9[2]	93±5
		Cr-51	334±82	284±14
		Cs-134	113±6	123±6
		Cs-137	286±18	256±13
		Mn-54	189±14[2]	140±7
		Fe-59	90±18[2]	68±3
		Zn-65	250±27[2]	199±10
		Co-60	223±12[2]	191±10

[1] Laboratory precision 3 sigma
[2] See discussion at the beginning of this Appendix

TABLE C-1 - Continued

Results of Participation in Analytics Cross Check Program for 2000

Sample Date	Sample Type and Units	Isotope Observed	Reported Laboratory's Results[1]	Analytics' Results[1]
9/21/00	Water-pCi/L	H-3	8756±92	8947±447
9/21/00	Water-pCi/L	Cs-134	114±18	128±6
		Cs-137	213±36	218±113
		Ce-141	197±33	191±10
		Zn-65	127±57	134±7
		Cr-51	242±180	230±12
		Mn-54	96±30	89±4
		Fe-59	61±34	54±3
		Co-60	254±30	246±12
		I-131	73±27	75±4
12/07/00	Water-pCi/L	Cs-134	80±20	90±5
		Cs-137	223±34	201±11
		Ce-141	379±44	376±19
		Zn-65	168±62	156±8
		Cr-51	535±237	532±27
		Mn-54	165±33	161±8
		Fe-59	77±52	86±4
		Co-60	200±27	194±10
		I-131	72±39	60±3
		Co-58	78±26	81±4

[1] Laboratory precision 3 sigma

TABLE C-2

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Iodine-A1	1/10/00	I-131	<0.3	<0.3	**
Air Iodine-A2	1/10/00	I-131	<0.5	<0.5	**
Air Filter -A1	1/10/00	Beta	1.9±0.2	2.1±0.2	**
Air Filter -A2	1/10/00	Beta	1.4±0.2	1.5±0.2	**
Air Filter -A3	1/10/00	Beta	1.7±0.2	1.8±0.2	**
Air Filter -A4	1/10/00	Beta	2.0±0.2	2.1±0.2	**
Air Filter -A5	1/10/00	Beta	1.8±0.2	1.9±0.2	**
Air Filter -SFA1	1/10/00	Beta	1.9±0.2	1.9±0.2	**
Air Filter -SFA2	1/10/00	Beta	1.3±0.2	1.4±0.2	**
Air Filter -SFA3	1/10/00	Beta	1.0±0.2	1.1±0.2	**
Air Filter -SFA4	1/10/00	Beta	2.3±0.2	2.4±0.2	**
				pCi/L	
Bay Water-Wa2	1/15/00	Gamma	<MDA	<MDA	<MDA
Bay Water-Wa2	2/15/00	Tritium	791±45	731±44	670±130
				10^{-2} pCi/m^3	
Air Filter-A1	2/14/00	Beta	2.6±0.2	2.7±0.2	**
Air Filter-A2	2/14/00	Beta	2.4±0.2	2.5±0.2	**
Air Filter-A3	2/14/00	Beta	2.7±0.2	2.7±0.2	**
Air Filter-A4	2/14/00	Beta	3.0±0.2	2.8±0.2	**
Air Filter-A5	2/14/00	Beta	2.1±0.2	2.1±0.2	**
Air Filter-SFA1	2/14/00	Beta	1.6±0.2	1.7±0.2	**
Air Filter-SFA2	2/14/00	Beta	2.8±0.2	2.7±0.2	**
Air Filter-SFA3	2/14/00	Beta	1.8±0.2	1.8±0.2	**
Air Filter-SFA4	2/14/00	Beta	3.3±0.3	3.3±0.3	**
Air Iodine-A3	2/14/00	I-131	<0.2	<0.2	**
Air Iodine-A4	2/14/00	I-131	<0.4	<0.4	**

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.
**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-2 - Continued

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				pCi /kg	
Soil-SFS2	3/06/00	Cs-137	130±39	114±33	134±32
Soil-SFS3	3/06/00	Cs-137	207±64	263±74	213±42
Vegetation-SFb2	3/06/00	Gamma	<MDA	<MDA	<MDA
Vegetation-SFb3	3/06/00	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	3/20/00	Beta	1.2±0.2	1.2±0.2	**
Air Filter-A2	3/20/00	Beta	1.4±0.2	1.3±0.2	**
Air Filter-A3	3/20/00	Beta	1.3±0.2	1.2±0.2	**
Air Filter-A4	3/20/00	Beta	1.6±0.2	1.6±0.2	**
Air Filter-A5	3/20/00	Beta	1.4±0.2	1.2±0.2	**
Air Filter-SFA1	3/20/00	Beta	1.0±0.2	0.8±0.2	**
Air Filter-SFA2	3/20/00	Beta	1.2±0.2	1.2±0.2	**
Air Filter-SFA3	3/20/00	Beta	1.3±0.2	1.2±0.2	**
Air Filter-SFA4	3/20/00	Beta	1.6±0.2	1.5±0.2	**
Air Iodine-A1	3/13/00	I-131	<0.2	<0.2	**
Air Iodine-A3	3/13/00	I-131	<0.4	<0.4	**
				pCi /kg	
Shoreline-Wb1	3/20/00	Gamma	<MDA	<MDA	<MDA
Oysters-Ia10	3/24/00	Ag-110m	8±6	10±8	<30
				10^{-2} pCi/m^3	
Air Iodine-A2	4/10/00	I-131	<0.2	<0.2	**
Air Iodine-A5	4/10/00	I-131	<0.4	<0.4	**

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-2 - Continued

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Filter-A1	4/10/00	Beta	1.3±0.2	1.3±0.2	**
Air Filter-A2	4/10/00	Beta	1.0±0.2	1.0±0.2	**
Air Filter-A3	4/10/00	Beta	1.4±0.2	1.4±0.2	**
Air Filter-A4	4/10/00	Beta	1.6±0.2	1.6±0.2	**
Air Filter-A5	4/10/00	Beta	1.1±0.2	1.2±0.2	**
Air Filter-SFA1	4/10/00	Beta	1.5±0.2	1.0±0.2	**
Air Filter-SFA2	4/10/00	Beta	1.0±0.2	1.1±0.2	**
Air Filter-SFA3	4/10/00	Beta	1.2±0.2	1.2±0.2	**
Air Filter-SFA4	4/10/00	Beta	1.8±0.2	1.6±0.2	**
				pCi /L	
Bay Water-Wa2	4/15/00	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	5/09/00	Beta	2.2±0.2	2.0±0.2	**
Air Filter-A2	5/09/00	Beta	1.2±0.2	1.1±0.2	**
Air Filter-A3	5/09/00	Beta	1.1±0.2	1.1±0.2	**
Air Filter-A4	5/09/00	Beta	1.8±0.2	1.7±0.2	**
Air Filter-A5	5/09/00	Beta	1.9±0.2	2.0±0.2	**
Air Filter-SFA1	5/09/00	Beta	1.8±0.2	1.8±0.2	**
Air Filter-SFA2	5/09/00	Beta	1.6±0.2	1.6±0.2	**
Air Filter-SFA3	5/09/00	Beta	1.9±0.2	1.8±0.2	**
Air Filter-SFA4	5/09/00	Beta	1.6±0.2	1.5±0.2	**
Air Iodine-A1	5/09/00	I-131	<0.3	<0.3	**
Air Iodine-A2	5/09/00	I-131	<0.4	<0.4	**

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.
**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-2 - Continued

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				pCi/kg	
Soil-SFS1	6/12/00	Gamma	<MDA	<MDA	24
Soil-SFS3	6/12/00	Cs-137	353±49	450±59	409±46
Vegetation-SFb3	6/12/00	Gamma	<MDA	<MDA	<MDA
Vegetation-SFb4	6/12/00	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	6/12/00	Beta	1.8±0.2	1.6±0.2	**
Air Filter-A2	6/12/00	Beta	1.1±0.2	0.9±0.2	**
Air Filter-A3	6/12/00	Beta	1.0±0.2	1.0±0.2	**
Air Filter-A4	6/12/00	Beta	1.4±0.2	1.5±0.2	**
Air Filter-A5	6/12/00	Beta	1.7±0.2	1.6±0.2	**
Air Filter-SFA1	6/12/00	Beta	1.9±0.2	1.8±0.2	**
Air Filter-SFA2	6/12/00	Beta	1.8±0.2	1.6±0.2	**
Air Filter-SFA3	6/12/00	Beta	1.6±0.2	1.5±0.2	**
Air Filter-SFA4	6/12/00	Beta	1.8±0.2	1.8±0.2	**
Air Iodine-A2	6/12/00	I-131	<0.3	<0.3	**
Air Iodine-A3	6/12/00	I-131	<0.3	<0.3	**
				10^{-3} pCi/m^3	
Air Filters-A1	6/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-A2	6/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-A3	6/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-A4	6/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-A5	6/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA1	6/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA2	6/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA3	6/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA4	6/15/00	Gamma	<MDA	<MDA	<MDA

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.
**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-2 - Continued

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				mR/90 Days	
DR15	6/30/00	TLD	11.08±1.18	11.17±1.27	**
DR16	6/30/00	TLD	10.70±2.42	9.91±0.71	**
DR17	6/30/00	TLD	11.74±1.18	11.51±0.82	**
DR18	6/30/00	TLD	8.82±0.96	8.88±0.97	**
DR19	6/30/00	TLD	9.87±1.06	9.76±1.21	**
DR20	6/30/00	TLD	12.03±1.30	12.70±0.96	**
DR29	6/30/00	TLD	12.33±1.54	12.64±1.14	**
DR31	6/30/00	TLD	14.14±1.83	13.41±1.16	**
SFDR08	6/30/00	TLD	22.60±1.56	21.74±1.57	**
SFDR09	6/30/00	TLD	10.43±1.07	10.77±1.75	**
RPDR12	6/30/00	TLD	23.87±3.90	22.99±2.48	**
				pCi/kg	
Fish-la1	7/6/00	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	7/10/00	Beta	1.5±0.2	1.6±0.2	**
Air Filter-A2	7/10/00	Beta	0.9±0.2	1.0±0.2	**
Air Filter-A3	7/10/00	Beta	0.2±0.2	0.4±0.2	**
Air Filter-A4	7/10/00	Beta	1.4±0.2	1.5±0.2	**
Air Filter-A5	7/10/00	Beta	1.5±0.2	1.6±0.2	**
Air Filter-SFA1	7/10/00	Beta	1.3±0.2	1.4±0.2	**
Air Filter-SFA2	7/10/00	Beta	1.3±0.2	1.3±0.2	**
Air Filter-SFA3	7/10/00	Beta	1.3±0.2	1.4±0.2	**
Air Filter-SFA4	7/10/00	Beta	1.3±0.2	1.5±0.2	**
Air Iodine-A1	7/10/00	I-131	<0.6	<0.8	**
Air Iodine-A2	7/10/00	I-131	<0.7	<0.8	**
				pCi/L	
Bay Water-Wa2	7/15/00	Gamma	<MDA	<MDA	<MDA

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.
**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-2 - Continued

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Filter-A1	8/14/00	Beta	0.7±0.2	0.8±0.2	**
Air Filter-A2	8/14/00	Beta	0.6±0.2	0.6±0.2	**
Air Filter-A3	8/14/00	Beta	1.0±0.2	1.0±0.2	**
Air Filter-A4	8/14/00	Beta	1.3±0.2	1.4±0.2	**
Air Filter-A5	8/14/00	Beta	1.4±0.2	1.5±0.2	**
Air Filter-SFA1	8/14/00	Beta	1.2±0.2	1.2±0.2	**
Air Filter-SFA2	8/14/00	Beta	0.9±0.2	1.0±0.2	**
Air Filter-SFA3	8/14/00	Beta	1.0±0.2	1.1±0.2	**
Air Filter-SFA4	8/14/00	Beta	1.2±0.2	1.3±0.2	**
				10^{-2} pCi/m^3	
Air Iodine-A3	8/14/00	I-131	<1	<1	**
Air Iodine-A4	8/14/00	I-131	<0.7	<0.7	**
				pCi/L	
Bay Water-Wa2	8/15/00	Tritium	217±37	261±38	<200
				pCi /kg	
Vegetation-Ib1	8/28/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib2	8/28/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib3	8/28/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib4	8/28/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib6	8/28/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib7	8/28/00	Gamma	<MDA	<MDA	<MDA

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.
**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-2 - Continued

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Filter-A2	9/5/00	Beta	0.3±0.2	0.2±0.2	**
Air Filter-A3	9/5/00	Beta	0.6±0.2	0.5±0.2	**
Air Filter-A4	9/5/00	Beta	0.8±0.2	0.8±0.2	**
Air Filter-A5	9/5/00	Beta	0.8±0.2	0.9±0.2	**
Air Filter-SFA1	9/5/00	Beta	0.9±0.2	0.8±0.2	**
Air Filter-SFA2	9/5/00	Beta	0.8±0.2	0.7±0.2	**
Air Filter-SFA3	9/5/00	Beta	1.1±0.2	1.0±0.2	**
Air Filter-SFA4	9/5/00	Beta	1.0±0.2	0.9±0.2	**
Air Iodine-A1	9/11/00	I-131	<0.8	<0.9	**
Air Iodine-A2	9/11/00	I-131	<0.4	<0.4	**
				10^{-2} pCi/m^3	
Air Filter-A1	10/16/00	Beta	3.6±0.3	3.7±0.3	**
Air Filter-A2	10/16/00	Beta	1.2±0.2	0.6±0.2	**
Air Filter-A3	10/16/00	Beta	2.0±0.2	2.0±0.2	**
Air Filter-A4	10/16/00	Beta	3.0±0.3	3.2±0.3	**
Air Filter-A5	10/16/00	Beta	3.2±0.3	3.0±0.2	**
Air Filter-SFA1	10/16/00	Beta	3.2±0.3	3.3±0.3	**
Air Filter-SFA2	10/16/00	Beta	3.3±0.2	3.3±0.2	**
Air Filter-SFA3	10/16/00	Beta	3.3±0.2	3.4±0.2	**
Air Filter-SFA4	10/16/00	Beta	3.2±0.3	3.3±0.3	**
				pCi/kg	
Oysters-Ia3	10/18/00	Ag-110m	132±14	102±11	115±7
Vegetation-Ib1	10/30/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib2	10/30/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib4	10/30/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib5	10/30/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib6	10/30/00	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib7	10/30/00	Gamma	<MDA	<MDA	<MDA

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-2 - Continued

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-2} pCi/m^3	
Air Filter-A1	11/13/00	Beta	1.6±0.2	1.7±0.2	**
Air Filter-A2	11/13/00	Beta	1.6±0.2	1.7±0.2	**
Air Filter-A3	11/13/00	Beta	1.4±0.2	1.4±0.2	**
Air Filter-A4	11/13/00	Beta	1.4±0.2	1.5±0.2	**
Air Filter-A5	11/13/00	Beta	2.1±0.2	2.0±0.2	**
Air Filter-SFA1	11/13/00	Beta	1.8±0.2	1.7±0.2	**
Air Filter-SFA2	11/13/00	Beta	1.6±0.2	1.6±0.2	**
Air Filter-SFA3	11/13/00	Beta	1.8±0.2	1.8±0.2	**
Air Filter-SFA4	11/13/00	Beta	1.9±0.2	1.7±0.2	**
				10^{-2} pCi/m^3	
Air Iodine-A4	11/13/00	I-131	<1.0	<1.1	**
Air Iodine-A5	11/13/00	I-131	<1.4	<1.2	**
				pCi/L	
Bay Water-Wa2	11/15/00	Gamma	<MDA	<MDA	<MDA
				10^{-2} pCi/m^3	
Air Filter-A1	12/11/00	Beta	2.0±0.2	2.3±0.2	**
Air Filter-A2	12/11/00	Beta	2.7±0.3	2.9±0.3	**
Air Filter-A3	12/11/00	Beta	1.8±0.2	2.1±0.2	**
Air Filter-A4	12/11/00	Beta	2.0±0.2	2.2±0.2	**
Air Filter-A5	12/11/00	Beta	2.2±0.2	2.5±0.3	**
Air Filter-SFA1	12/11/00	Beta	2.1±0.2	2.2±0.2	**
Air Filter-SFA2	12/11/00	Beta	2.0±0.2	2.4±0.3	**
Air Filter-SFA3	12/11/00	Beta	2.1±0.2	2.3±0.2	**
Air Filter-SFA4	12/11/00	Beta	2.2±0.2	2.5±0.2	**
Air Iodine-A2	12/11/00	I-131	<1.4	<1.4	**
Air Iodine-A3	12/11/00	I-131	<1.3	<1.2	**

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.

**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-2 - Continued

Results of Quality Assurance Program for 2000

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split* Analysis
				10^{-3} pCi/m^3	
Air Filters-A1	12/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-A2	12/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-A3	12/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-A4	12/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-A5	12/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA1	12/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA2	12/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA3	12/15/00	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA4	12/15/00	Gamma	<MDA	<MDA	<MDA
				mR/90 Days	
DR21	12/31/00	TLD	11.81±1.59	11.04±0.59	**
DR22	12/31/00	TLD	10.04±0.94	8.96±1.06	**
DR24	12/31/00	TLD	9.86±0.38	10.52±1.01	**
DR25	12/31/00	TLD	11.39±1.53	11.08±0.84	**
DR26	12/31/00	TLD	9.02±0.98	9.23±0.45	**
DR27	12/31/00	TLD	10.07±0.80	9.98±1.14	**
DR32	12/31/00	TLD	8.82±0.63	8.65±0.54	**
DR33	12/31/00	TLD	13.14±1.39	13.04±0.91	**
SFDR10	12/31/00	TLD	30.10±2.83	33.50±5.68	**
SFDR11	12/31/00	TLD	26.53±4.63	25.49±4.32	**
RPDR05	12/31/00	TLD	19.73±2.05	21.15±2.69	**

*Samples split with Teledyne Brown Engineering, Environmental Services, Knoxville, TN. On the following table is a list of their typical MDAs.
**The nature of these samples precluded splitting them with Teledyne Brown Engineering.

TABLE C-3

Teledyne Brown Engineering'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 Census conducted around Calvert Cliffs Nuclear Power Plant during August 2000. A table listing the raw data of this census and a discussion of the results are included in this appendix.

Discussion

A Land Use Census was conducted during August 2000 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 Census is given in a separate document (12). 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.

Table D-1
Land Use Census

	Distance From Plant (km)	
Sector	Residence	Garden
SE	2.7	2.7
SSE	2.9	2.9
S	3.1	3.1
SSW	2.6	2.9
SW	2.1	2.6
WSW	1.9	1.9
W	2.1	2.4
WNW	2.6	2.6
NW	2.9	2.9

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 D/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 2000 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 2000. These extra samples are not required by the Off Site Dose Calculation Manual (6). 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-9 shows the average monthly direct radiation as measured by the pressurized ion chamber at five locations.

Table E-11 shows the direct radiation readings from TLDs placed at the perimeter of the interim resin storage area located to the west of the ISFSI facility. This storage area is located inside the owner-controlled area. Public access to this area is limited. 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-ODCM Environmental Sampling Stations
for Calvert Cliffs Nuclear Power Plant

Station	Description	Distance[1] (KM)	Distance[1] (Miles)	Direction[1] (Sector)
A6	Long Beach	4.4	2.7	NW
A7	Taylors Island, Carpenter's Property	12.6	7.8	ENE
A8	Cambridge, U of MD Estuarine Center	32.0	19.9	NE
DR24	Route 4 and Parran Road	3.0	1.9	SW
DR25	Camp Conoy Guard House	1.0	0.6	S
DR26	Route 234 & Clarks Landing Rd.	20.5	12.7	SW
DR27	Route 231 & Route 4	23.0	14.3	NW
DR28	Taylors Island Emergency Siren #35	12.3	7.6	ENE
DR29	Taylors Island Emergency Siren #38	12.5	7.8	E
DR31	Cambridge, U of MD Estuarine Center	32.0	19.9	NE
DR32	Twining Property, Taylors Island	12.3	7.6	NE
DR33	P.A. Ransome Property, Taylors Island	14.8	9.2	ESE
DR34	Shoreline at Barge Road	0.2	0.1	NE
PIC1	Taylors Island, Carpenter's Property	12.6	7.8	ENE
PIC2	On Site before Entrance to Camp Conoy	0.7	0.4	S
PIC3	Meteorological Station	0.8	0.5	WSW
PIC4	NNW of ISFSI	0.6	0.4	SW
PIC5	South of ISFSI	0.6	0.4	SW
PIC8	CCNPP Visitor's Center	0.3	0.2	NW
Wbs1	Intake Area	0.2	0.1	NE
Wbs2	Discharge Area	0.3	0.2	N
Wbs3	Long Beach	4.4	2.7	NW
Wbs4	Camp Conoy/Rocky Point	3.0	1.9	SE
Ww1	Taylors Island, Carpenter's Property	12.6	7.8	ENE

[1] Distance and direction from the central point between the two containment buildings.

Table E-2

Synopsis of 2000 Calvert Cliffs Nuclear Power Plant
Non-ODCM 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	360	I-131	W	360
Air Particulates[3]	W	3	155	Gross Beta	W	155
				Gamma	MC	36
Direct Radiation						
Pressurized Ion Chamber	M	6	66	Gamma	M	66
Ambient Radiation	Q	18	426	TLD	Q	426
Terrestrial Environment						
Ground water	M	2	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-ODCM 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	161 (10/12) (20-255)	Discharge Area Wbs2 0.3 km N	217 (4/4) (162-255)	145 (4/4) (121-167)
Atmospheric Environment						
Air Particulates (10^{-2} pCi/m^3)	Gross Beta (155)	0.5	1.7 (103/103) (0.4-3.8)	Cambridge A8 32 km NE	1.8 (51/52) (0.4-3.8)	1.5 (52/52) (0.4-3.8)
Direct Radiation						
Ambient Radiation (mR/90 days)	TLD (438)	--	17.14 (426/426) (8.23-39.92)	South Fence Lower RPDR10 km	36.58 (24/24) (32.55-39.92)	-- --
Pressurized Ion Chamber (mR/30 days)	Ionization Chamber (66)	--	5.65 (55/55) (3.68-10.26)	NNW of ISFSI PIC4 0.6 km SW	9.23 (11/11) (8.88-10.26)	5.74 (11/11) (5.44-6.09)

[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 (dry) ± 2σ)

Sample Code	Sample Date	Cs-137	Gamma Emitters
Wbs1	03/24/2000	[1]	*
Intake Area	06/20/2000	[1]	*
	08/11/2000	20 ± 14	*
	10/18/2000	31 ± 21	*
Wbs2	03/24/2000	162 ± 47	*
Discharge Area	06/20/2000	207 ± 39	*
	08/11/2000	255 ± 56	*
	10/18/2000	244 ± 56	*
Wbs3	03/24/2000	165 ± 42	*
Long Beach	06/20/2000	172 ± 50	*
	08/11/2000	196 ± 44	*
	10/18/2000	160 ± 45	*
Wbs4[2]	03/24/2000	136 ± 45	*
Camp Conoy/ Rocky Point	06/20/2000	167 ± 43	*
	08/11/2000	155 ± 43	*
	10/18/2000	121 ± 44	*

* Non-Natural Gamma Emitters < MDA
[1] This Isotope < MDA
[2] 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
01/03/2000	01/10/2000	*	*	*	*	*	*	*
01/10/2000	01/17/2000	*	*	*	*	*	*	*
01/17/2000	01/27/2000	*	*	*	*	*	*	*
01/27/2000	01/31/2000	*	*	*	2	*	*	*
01/31/2000	02/07/2000	*	*	*	*	*	*	*
02/07/2000	02/14/2000	*	*	*	*	*	*	*
02/14/2000	02/22/2000	*	*	*	*	*	*	*
02/22/2000	02/28/2000	*	*	*	*	*	*	*
02/28/2000	03/06/2000	*	*	*	*	*	*	*
03/06/2000	03/13/2000	*	*	*	*	*	*	*
03/13/2000	03/20/2000	*	*	2	*	*	*	*
03/20/2000	03/27/2000	*	*	*	*	*	*	*
03/27/2000	04/03/2000	*	*	*	*	*	*	*
04/03/2000	04/10/2000	*	*	*	*	*	*	*
04/10/2000	04/17/2000	*	*	*	*	*	*	*
04/17/2000	04/24/2000	*	*	*	*	*	*	2
04/24/2000	05/01/2000	*	*	*	*	*	*	*
05/01/2000	05/09/2000	*	*	*	*	*	*	*
05/09/2000	05/15/2000	*	*	*	*	*	*	*
05/15/2000	05/22/2000	*	*	*	*	*	*	*
05/22/2000	05/30/2000	*	*	*	*	*	*	*
05/30/2000	06/05/2000	*	*	*	*	*	*	*
06/05/2000	06/12/2000	*	*	*	*	*	*	*
06/12/2000	06/19/2000	*	*	*	*	*	2	*
06/19/2000	06/26/2000	*	*	*	*	*	*	*
06/26/2000	07/03/2000	*	*	*	*	*	*	*
07/03/2000	07/10/2000	*	*	*	*	*	*	*
07/10/2000	07/17/2000	*	*	*	*	*	*	*
07/17/2000	07/24/2000	*	*	*	*	*	*	*
07/24/2000	07/31/2000	*	*	*	*	*	*	*
07/31/2000	08/07/2000	*	*	*	*	*	*	*
08/07/2000	08/14/2000	*	*	*	*	*	*	*
08/14/2000	08/21/2000	*	*	*	*	*	*	*
08/21/2000	08/28/2000	*	*	*	*	*	*	*

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

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
08/28/2000	09/05/2000	*	*	*	*	*	*	*
09/05/2000	09/11/2000	*	*	*	*	*	*	*
09/11/2000	09/18/2000	*	*	*	*	*	*	*
09/18/2000	09/25/2000	*	*	*	*	*	*	*
09/25/2000	10/02/2000	*	*	*	*	*	*	*
10/02/2000	10/09/2000	*	*	*	*	*	*	*
10/09/2000	10/16/2000	*	*	*	*	*	*	*
10/16/2000	10/23/2000	*	*	*	*	*	*	*
10/23/2000	10/30/2000	*	*	*	*	*	*	*
10/30/2000	11/06/2000	*	*	*	*	*	*	*
11/06/2000	11/13/2000	*	*	*	*	*	*	*
11/13/2000	11/20/2000	*	*	*	*	*	*	*
11/20/2000	11/27/2000	*	*	*	*	*	*	*
11/27/2000	12/05/2000	*	*	*	*	*	*	*
12/05/2000	12/11/2000	*	*	*	*	*	*	*
12/11/2000	12/18/2000	*	*	*	*	*	*	*
12/18/2000	12/26/2000	*	*	*	*	*	*	*
12/26/2000	01/02/2001	*	*	*	*	*	*	*

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
01/03/2000	01/10/2000	1.7 ± 0.2	1.5 ± 0.2	2.1 ± 0.2
01/10/2000	01/17/2000	1.7 ± 0.2	1.6 ± 0.2	1.9 ± 0.3
01/17/2000	01/27/2000	3.2 ± 0.2	3.1 ± 0.3	3.1 ± 0.4
01/27/2000	01/31/2000	1.3 ± 0.3	1.4 ± 0.2	1.9 ± 0.2
01/31/2000	02/07/2000	2.2 ± 0.2	3.8 ± 0.4	2.5 ± 0.2
02/07/2000	02/14/2000	2.5 ± 0.2	1.8 ± 0.2	2.6 ± 0.3
02/14/2000	02/22/2000	1.5 ± 0.1	1.6 ± 0.2	1.8 ± 0.3
02/22/2000	02/28/2000	1.5 ± 0.2	1.4 ± 0.2	1.5 ± 0.2
02/28/2000	03/06/2000	1.5 ± 0.2	1.4 ± 0.2	1.7 ± 0.2
03/06/2000	03/13/2000	1.8 ± 0.2	1.4 ± 0.2	3.1 ± 0.3
03/13/2000	03/20/2000	1.4 ± 0.2	1.0 ± 0.2	[2]
03/20/2000	03/27/2000	1.0 ± 0.2	1.2 ± 0.2	1.1 ± 0.2
03/27/2000	04/03/2000	1.4 ± 0.2	1.5 ± 0.2	1.7 ± 0.3
04/03/2000	04/10/2000	1.0 ± 0.1	1.6 ± 0.2	1.5 ± 0.2
04/10/2000	04/17/2000	1.0 ± 0.2	1.0 ± 0.2	1.1 ± 0.2
04/17/2000	04/24/2000	0.4 ± 0.1	0.4 ± 0.2	0.4 ± 0.2
04/24/2000	05/01/2000	1.3 ± 0.2	1.4 ± 0.2	1.3 ± 0.2
05/01/2000	05/09/2000	1.8 ± 0.2	2.2 ± 0.3	2.2 ± 0.3
05/09/2000	05/15/2000	1.6 ± 0.2	1.7 ± 0.2	1.2 ± 0.2
05/15/2000	05/22/2000	1.0 ± 0.2	1.1 ± 0.2	0.9 ± 0.2
05/22/2000	05/30/2000	0.7 ± 0.1	1.0 ± 0.2	0.9 ± 0.2
05/30/2000	06/05/2000	0.9 ± 0.2	0.7 ± 0.1	0.5 ± 0.2
06/05/2000	06/12/2000	1.6 ± 0.2	0.4 ± 0.1	1.2 ± 0.2
06/12/2000	06/19/2000	0.6 ± 0.2	0.5 ± 0.2	0.5 ± 0.2
06/19/2000	06/26/2000	1.3 ± 0.2	0.6 ± 0.1	0.7 ± 0.2
06/26/2000	07/03/2000	1.2 ± 0.2	1.6 ± 0.3	1.1 ± 0.3
07/03/2000	07/10/2000	1.1 ± 0.2	0.9 ± 0.1	0.9 ± 0.2
07/10/2000	07/17/2000	1.1 ± 0.2	0.8 ± 0.2	1.8 ± 0.3
07/17/2000	07/24/2000	1.8 ± 0.2	1.3 ± 0.2	1.6 ± 0.2
07/24/2000	07/31/2000	0.6 ± 0.2	0.6 ± 0.1	0.8 ± 0.2
07/31/2000	08/07/2000	0.6 ± 0.2	1.4 ± 0.2	1.6 ± 0.2
08/07/2000	08/14/2000	0.8 ± 0.2	0.9 ± 0.2	0.9 ± 0.2
08/14/2000	08/21/2000	1.2 ± 0.2	1.3 ± 0.2	1.8 ± 0.2
08/21/2000	08/28/2000	1.5 ± 0.2	1.5 ± 0.2	2.2 ± 0.3

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

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
08/28/2000	09/05/2000	0.8 ± 0.1	0.9 ± 0.2	1.1 ± 0.2
09/05/2000	09/11/2000	1.4 ± 0.2	1.2 ± 0.2	1.8 ± 0.2
09/11/2000	09/18/2000	1.3 ± 0.2	1.4 ± 0.2	1.6 ± 0.2
09/18/2000	09/25/2000	1.0 ± 0.2	0.8 ± 0.1	0.6 ± 0.2
09/25/2000	10/02/2000	1.7 ± 0.2	1.6 ± 0.2	2.1 ± 0.2
10/02/2000	10/09/2000	2.1 ± 0.2	2.0 ± 0.2	2.4 ± 0.3
10/09/2000	10/16/2000	3.4 ± 0.3	3.4 ± 0.3	3.8 ± 0.3
10/16/2000	10/23/2000	2.6 ± 0.3	2.6 ± 0.2	3.1 ± 0.3
10/23/2000	10/30/2000	2.1 ± 0.2	2.2 ± 0.2	2.2 ± 0.2
10/30/2000	11/06/2000	1.5 ± 0.2	1.7 ± 0.2	1.7 ± 0.2
11/06/2000	11/13/2000	1.4 ± 0.2	1.0 ± 0.2	1.5 ± 0.2
11/13/2000	11/20/2000	2.9 ± 0.2	3.8 ± 0.3	3.7 ± 0.3
11/20/2000	11/27/2000	1.3 ± 0.2	1.4 ± 0.2	1.4 ± 0.2
11/27/2000	12/05/2000	2.0 ± 0.2	2.4 ± 0.2	2.3 ± 0.2
12/05/2000	12/11/2000	2.3 ± 0.2	2.1 ± 0.2	2.3 ± 0.2
12/11/2000	12/18/2000	1.5 ± 0.2	2.2 ± 0.2	2.5 ± 0.2
12/18/2000	12/26/2000	3.6 ± 0.2	1.4 ± 0.1	3.5 ± 0.2
12/26/2000	01/02/2001	2.0 ± 0.2	2.2 ± 0.2	2.4 ± 0.2

Table E-7

Concentration of Gamma Emitters in Air Particulates
(Results in units of 10^{-3} pCi/m^3 $\pm 2\sigma$)

Sample Date	A6 Long Beach	A7[1] Taylors Island	A8 Cambridge
01/15/2000	*	*	*
02/15/2000	*	*	*
03/15/2000	*	*	*
04/15/2000	*	*	*
05/15/2000	*	*	*
06/15/2000	*	*	*
07/15/2000	*	*	*
08/15/2000	*	*	*
09/15/2000	*	*	*
10/15/2000	*	*	*
11/15/2000	*	*	*
12/15/2000	*	*	*

* 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
02/01/2000	<39	[1]
02/29/2000	<39	[1]
03/29/2000	<38	[1]
05/02/2000	<37	[1]
05/30/2000	<37	[1]
06/28/2000	<37	[1]
08/01/2000	<37	[1]
08/29/2000	<37	[1]
09/26/2000	<38	[1]
10/31/2000	<38	[1]
12/05/2000	<37	[1]

[1] 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[1]	JAN	5.85 ± 0.60	FEB	5.80 ± 0.58
Taylor's Island	MAR	6.09 ± 0.61	APR	5.70 ± 0.57
	MAY	5.78 ± 0.59	JUN	5.70 ± 0.57
	JULY	Unavailable	AUG	5.44 ± 0.54
	SEP	5.44 ± 0.54	OCT	5.63 ± 0.56
	NOV	5.88 ± 0.60	DEC	5.84 ± 0.58
PIC2	JAN	3.97 ± 0.40	FEB	3.87 ± 0.39
Entrance to Camp	MAR	4.00 ± 0.40	APR	3.97 ± 0.40
Conoy	MAY	3.93 ± 0.39	JUN	3.88 ± 0.39
	JULY	Unavailable	AUG	3.70 ± 0.37
	SEP	3.68 ± 0.37	OCT	3.77 ± 0.34
	NOV	4.02 ± 0.40	DEC	4.32 ± 0.43
PIC3	JAN	4.88 ± 0.49	FEB	4.95 ± 0.50
MET Station	MAR	5.19 ± 0.52	APR	5.51 ± 0.55
	MAY	5.00 ± 0.50	JUN	4.62 ± 0.46
	JULY	Unavailable	AUG	5.28 ± 0.53
	SEP	4.86 ± 0.49	OCT	4.96 ± 0.50
	NOV	4.95 ± 0.50	DEC	4.91 ± 0.49
PIC4	JAN	8.88 ± 0.89	FEB	8.96 ± 0.90
NNW of ISFSI	MAR	9.16 ± 0.92	APR	9.22 ± 0.92
	MAY	9.03 ± 0.90	JUN	8.93 ± 0.89
	JULY	Unavailable	AUG	9.03 ± 0.90
	SEP	9.01 ± 0.90	OCT	9.38 ± 0.94
	NOV	9.68 ± 0.97	DEC	10.26 ± 1.03
PIC5	JAN	4.77 ± 0.48	FEB	4.68 ± 0.47
S of ISFSI	MAR	4.84 ± 0.48	APR	4.80 ± 0.48
	MAY	5.19 ± 0.52	JUN	5.14 ± 0.51
	JULY	Unavailable	AUG	5.20 ± 0.52
	SEP	5.20 ± 0.52	OCT	5.28 ± 0.53
	NOV	5.10 ± 0.51	DEC	4.82 ± 0.48
PIC8	JAN	5.08 ± 0.51	FEB	4.98 ± 0.50
Visitor's Center	MAR	5.22 ± 0.52	APR	5.42 ± 0.54
	MAY	5.27 ± 0.53	JUN	5.16 ± 0.52
	JULY	Unavailable	AUG	4.94 ± 0.49
	SEP	4.94 ± 0.49	OCT	5.10 ± 0.51
	NOV	5.04 ± 0.50	DEC	4.91 ± 0.49

[1] Control Location

Table E-10

Direct Radiation
(Results in units of mR/90 days ± 2σ)

Site Code	Location	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
DR24	Rt. 4 and Parran Rd.	10.98 ± 0.82	10.50 ± 1.74	9.86 ± 0.38	10.84 ± 1.46
DR25	Camp Conoy Guard House	13.11 ± 3.02	11.31 ± 0.60	11.39 ± 1.53	12.33 ± 1.20
DR26	Rt. 234 and Clark's Landing Road	10.65 ± 0.64	9.36 ± 0.32	9.02 ± 0.98	10.11 ± 0.99
DR27	Rt. 231 and Rt. 4	10.95 ± 1.89	[1]	10.07 ± 0.80	10.77 ± 0.98
DR28	Taylors Is. Siren #35	13.41 ± 1.19	12.42 ± 0.49	12.18 ± 0.99	12.69 ± 1.79
DR29	Taylors Is. Siren #38	12.33 ± 1.54	12.41 ± 1.61	12.12 ± 0.58	13.06 ± 0.91
DR31	Cambridge	14.14 ± 1.83	13.66 ± 0.96	12.34 ± 2.06	14.24 ± 1.20
DR32	Twining Property, Taylors Island	9.30 ± 1.14	9.31 ± 0.94	8.82 ± 0.63	9.28 ± 0.49
DR33	P. A. Ransome Property	13.82 ± 1.35	13.83 ± 2.11	13.14 ± 1.39	14.34 ± 1.76
DR34	Shoreline at Barge Rd.	8.74 ± 0.43	8.23 ± 0.25	8.23 ± 0.44	9.62 ± 1.03

[1] Missing Data

Table E-11

Direct Radiation from Interim Resin Storage Area
(Results in units of mR/90 days ± 2σ)

Site Code	Location	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
RPDR05	North Fence Lower	18.94 ± 2.55	28.54 ± 1.73	19.73 ± 2.05	23.10 ± 2.33
RPDR06	North Fence Upper	35.94 ± 4.34	28.48 ± 4.74	19.73 ± 0.82	17.30 ± 1.72
RPDR07	West Fence Right	23.92 ± 1.78	13.82 ± 1.28	23.20 ± 2.59	16.73 ± 0.61
RPDR08	West Fence Left	19.84 ± 1.14	24.86 ± 2.56	14.58 ± 1.52	18.69 ± 1.77
RPDR09	South Fence Upper	31.63 ± 1.78	29.80 ± 3.45	32.33 ± 5.02	27.35 ± 3.39
RPDR10	South Fence Lower	37.91 ± 4.30	35.95 ± 3.07	32.55 ± 4.02	39.92 ± 4.55
RPDR11	East Fence Left	17.50 ± 1.39	12.46 ± 1.43	12.18 ± 1.46	23.52 ± 1.65
RPDR12	East Fence Right	24.62 ± 1.53	27.58 ± 3.35	24.55 ± 1.19	20.67 ± 1.27