CALVERT CLIFFS NUCLEAR POWER PLANT

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

BGE

April 29, 1996

U. S. Nuclear Regulatory Commission
Washington, DC 20555

**ATTENTION**: Document Control Desk

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

**REFERENCES**: (a) Calvert Cliffs Nuclear Power Plant Technical Specification 6.9.1.7 and Section 3/4.12

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

In accordance with References (a) and (b), the Baltimore Gas and Electric Company is submitting the Annual Radiological Environmental Monitoring Report, dated March 1996.

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

Very truly yours,

for
C. E. Earls
General Supervisor - Chemistry

CEE/RCG/dlm

Attachment

030005

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
L. B. Marsh, NRC
A. W. Dromerick, NRC
T. T. Martin, NRC
Resident Inspector, NRC
R. I. McLean, DNR
J. H. Walter, PSC



IE26
1/1

# RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL REPORT

*March 1996*

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

•

*January 1 to December 31, 1995*

BGE

# RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM FOR THE CALVERT CLIFFS NUCLEAR POWER PLANT UNITS 1 AND 2 AND THE INDEPENDENT SPENT FUEL STORAGE INSTALLATION JANUARY 1 - DECEMBER 31, 1995

W. W. BAINES III
G. K. BARLEY
A. J. KAUPA
P. M. MAJETHIA

BALTIMORE GAS AND ELECTRIC COMPANY

MARCH 1996

# TABLE OF CONTENTS

LIST OF FIGURES ..... iii

LIST OF TABLES ..... v

I. SUMMARY ..... 1

II. CALVERT CLIFFS NUCLEAR POWER PLANT
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ..... 3
II.A. INTRODUCTION ..... 3
II.B. PROGRAM ..... 3
II.B.1 Objectives ..... 3
II.B.2 Sample Collection ..... 4
II.B.3 Data Interpretation ..... 4
II.B.4 Program Exceptions ..... 4
II.C. RESULTS AND DISCUSSIONS ..... 4
II.C.1 Aquatic Environment ..... 4
II.C.1.a Bay Water ..... 5
II.C.1.b Aquatic Organisms ..... 5
II.C.1.c Shoreline Sediment ..... 6
II.C.2 Atmospheric Environment ..... 9
II.C.2.a Air Particulate Filters ..... 9
II.C.2.b Air Iodine ..... 9
II.C.3 Terrestrial Environment ..... 9
II.C.3.a Vegetation ..... 11
II.C.4 Direct Radiation ..... 11
II.D. CONCLUSION ..... 13

III. INDEPENDENT SPENT FUEL STORAGE INSTALLATION
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ..... 21
III.A. INTRODUCTION ..... 21
III.B. PROGRAM ..... 21
III.B.1 Objectives ..... 21
III.B.2 Sample Collection ..... 22
III.B.3 Data Interpretation ..... 22
III.B.4 Program Exceptions ..... 22
III.C. RESULTS AND DISCUSSIONS ..... 22
III.C.1 Atmospheric Environment ..... 22
III.C.1.a Air Particulate Filters ..... 22
III.C.2 Terrestrial Environment ..... 23
III.C.2.a Vegetation ..... 23
III.C.2.b Soils ..... 23
III.C.3 Direct Radiation ..... 24
III.D. CONCLUSION ..... 25

IV. REFERENCES ..... 29

APPENDIX A ..... 33
APPENDIX B ..... 47
APPENDIX C ..... 75
APPENDIX D ..... 91
APPENDIX E ..... 93

# LIST OF FIGURES


| Figure | Title | Page |
|---|---|---|
| 1 | Tritium in Chesapeake Bay Water | 7 |
| 2 | Silver-110m and Potassium-40 in Chesapeake Bay Oysters | 8 |
| 3 | Nuclear Fallout in the Calvert Cliffs Area | 10 |
| 4 | Mean TLD Gamma Dose, Calvert Cliffs Nuclear Power Plant | 12 |
| 5 | Atmospheric Dispersion Around CCNPP 1995 Average Relative Air Concentrations | 15 |
| 6 | Atmospheric Dispersion Around CCNPP 1995 Average Relative Ground Deposition | 17 |
| 7 | Mean TLD Gamma Dose, ISFSI | 26 |
| A-1 | Map of Southern Maryland and Chesapeake Bay Showing Location of Calvert Cliffs Nuclear Power Plant | 38 |
| A-2 | Calvert Cliffs Nuclear Power Plant Sampling Locations Scale 1" = 1.35 km | 39 |
| A-3 | Calvert Cliffs Nuclear Power Plant Sampling Locations Scale 1" = 4.0 km | 41 |
| A-4 | Independent Spent Fuel Storage Installation Sampling Locations | 44 |
| A-5 | Enlarged Map of the Independent Spent Fuel Storage Installation Sampling Locations | 45 |

# 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, 1995

W. W. BAINES III
G. K. BARLEY
A. J. KAUPA
P. M. MAJETHIA

BALTIMORE GAS AND ELECTRIC COMPANY

MARCH 1996

(LEFT BLANK)

# TABLE OF CONTENTS

LIST OF FIGURES ..... iii

LIST OF TABLES ..... v

I. SUMMARY ..... 1

II. CALVERT CLIFFS NUCLEAR POWER PLANT
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ..... 3
II.A. INTRODUCTION ..... 3
II.B. PROGRAM ..... 3
II.B.1 Objectives ..... 3
II.B.2 Sample Collection ..... 4
II.B.3 Data Interpretation ..... 4
II.B.4 Program Exceptions ..... 4
II.C. RESULTS AND DISCUSSIONS ..... 4
II.C.1 Aquatic Environment ..... 4
II.C.1.a Bay Water ..... 5
II.C.1.b Aquatic Organisms ..... 5
II.C.1.c Shoreline Sediment ..... 6
II.C.2 Atmospheric Environment ..... 9
II.C.2.a Air Particulate Filters ..... 9
II.C.2.b Air Iodine ..... 9
II.C.3 Terrestrial Environment ..... 9
II.C.3.a Vegetation ..... 11
II.C.4 Direct Radiation ..... 11
II.D. CONCLUSION ..... 13

III. INDEPENDENT SPENT FUEL STORAGE INSTALLATION
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ..... 21
III.A. INTRODUCTION ..... 21
III.B. PROGRAM ..... 21
III.B.1 Objectives ..... 21
III.B.2 Sample Collection ..... 22
III.B.3 Data Interpretation ..... 22
III.B.4 Program Exceptions ..... 22
III.C. RESULTS AND DISCUSSIONS ..... 22
III.C.1 Atmospheric Environment ..... 22
III.C.1.a Air Particulate Filters ..... 22
III.C.2 Terrestrial Environment ..... 23
III.C.2.a Vegetation ..... 23
III.C.2.b Soils ..... 23
III.C.3 Direct Radiation ..... 24
III.D. CONCLUSION ..... 25

IV. REFERENCES ..... 29

APPENDIX A ..... 33
APPENDIX B ..... 47
APPENDIX C ..... 75
APPENDIX D ..... 91
APPENDIX E ..... 93

(LEFT BLANK)

# LIST OF FIGURES


| Figure | Title | Page |
|---|---|---|
| 1 | Tritium in Chesapeake Bay Water | 7 |
| 2 | Silver-110m and Potassium-40 in Chesapeake Bay Oysters | 8 |
| 3 | Nuclear Fallout in the Calvert Cliffs Area | 10 |
| 4 | Mean TLD Gamma Dose, Calvert Cliffs Nuclear Power Plant | 12 |
| 5 | Atmospheric Dispersion Around CCNPP 1995 Average Relative Air Concentrations | 15 |
| 6 | Atmospheric Dispersion Around CCNPP 1995 Average Relative Ground Deposition | 17 |
| 7 | Mean TLD Gamma Dose, ISFSI | 26 |
| A-1 | Map of Southern Maryland and Chesapeake Bay Showing Location of Calvert Cliffs Nuclear Power Plant | 38 |
| A-2 | Calvert Cliffs Nuclear Power Plant Sampling Locations Scale 1" = 1.35 km | 39 |
| A-3 | Calvert Cliffs Nuclear Power Plant Sampling Locations Scale 1" = 4.0 km | 41 |
| A-4 | Independent Spent Fuel Storage Installation Sampling Locations | 44 |
| A-5 | Enlarged Map of the Independent Spent Fuel Storage Installation Sampling Locations | 45 |

(LEFT BLANK)

# LIST OF TABLES


| Table | Title | Page |
|---|---|---|
| 1 | Synopsis of the 1995 Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program | 19 |
| 2 | Annual Summary of Radioactivity in the Environs of the Calvert Cliffs Nuclear Power Plant Units 1 and 2 | 20 |
| 3 | Synopsis of the 1995 Independent Spent Fuel Storage Installation Radiological Environmental Monitoring Program | 27 |
| 4 | Annual Summary of Radioactivity in the Environs of the Independent Spent Fuel Storage Installation | 28 |
| A-1 | Locations of Environmental Sampling Stations for the Calvert Cliffs Nuclear Power Plant | 37 |
| A-2 | Locations of Environmental Sampling Stations for the Independent Spent Fuel Storage Installation at Calvert Cliffs | 43 |
| B-1 | Concentrations of Tritium and Gamma Emitters in Bay Water | 50 |
| B-2 | Concentrations of Gamma Emitters in the Flesh of Edible Fish | 51 |
| B-3 | Concentrations of Gamma Emitters in Oyster Samples | 52 |
| B-4 | Concentrations of Gamma Emitters in Shoreline Sediment | 53 |
| B-5 | Concentrations of Iodine-131 in Filtered Air | 54 |
| B-6 | Concentrations of Beta Emitters in Air Particulates | 56 |
| B-7 | Concentrations of Gamma Emitters in Air Particulates | 60 |
| B-8a | Concentration of Gamma Emitters in Vegetation | 61 |
| B-8b | Concentrations of Gamma Emitters In Vegetation from Locations Around the ISFSI | 63 |
| B-9 | Concentrations of Gamma Emitters In Soil Samples from Locations Around the ISFSI | 64 |
| B-10 | Typical MDA Ranges for Gamma Spectrometry | 65 |
| B-11 | Typical LLDs for Gamma Spectrometry | 66 |
| B-12 | Direct Radiation | 67 |
| C-1 | Results of EPA Cross Check Program for 1995 | 79 |
| C-2 | Results of Quality Assurance Program for 1995 | 80 |
| C-3 | Teledyne Brown Engineering's Typical MDA's for Gamma Spectrometry | 89 |
| D-1 | Land Use Survey | 91 |
| E-1 | Locations of Non-Tech Spec Environmental Sampling Stations for Calvert Cliffs Nuclear Power Plant | 96 |
| E-2 | Synopsis of the 1995 Calvert Cliffs Nuclear Power Plant Non-Tech Spec Radiological Environmental Monitoring Program | 97 |
| E-3 | Annual Summary for Calvert Cliffs Nuclear Power Plant Units 1 And 2 Non-Tech Spec Radiological Environmental Monitoring Program | 98 |
| E-4 | Concentrations of Gamma Emitters in Bottom Sediment | 99 |
| E-5 | Concentrations of I-131 in Filtered Air | 100 |
| E-6 | Concentrations of Beta Emitters in Air Particulates | 102 |
| E-7 | Concentrations of Gamma Emitters in Air Particulates | 104 |

## LIST OF TABLES - CONTINUED


| Table | Title | Page |
|---|---|---|
| E-8 | Concentrations of Tritium and Gamma Emitters in Taylors Island Well Water | 105 |
| E-9 | Direct Radiation As Measured By Pressurized Ion Chamber | 106 |
| E-10 | Direct Radiation | 108 |
| E-11 | Resin Storage Area Direct Radiation | 110 |

# I. SUMMARY

During the 1995 operating period for Calvert Cliffs Nuclear Power Plant (CCNPP) Units 1 and 2, a total of 679 radiochemical analyses were performed on 611 environmental samples, and 1094 thermoluminescent dosimeters (TLDs) were analyzed for ambient radiation exposure rates. These analyses were performed to satisfy the requirements of the CCNPP Technical Specifications, Appendix A, Sections 3/4.12, Appendix B, Sections 3/4.12 and the Off-Site Dose Calculation Manual.

For the Independent Spent Fuel Storage Installation (ISFSI), 364 radiochemical analyses were performed on 304 environmental samples, 52 of which were in common with the power plant program. An additional 862 TLDs, 48 in common with the power plant program, were analyzed for ambient radiation exposure rates. These analyses were performed to satisfy the requirements of the ISFSI Technical Specifications and the Off-Site Dose Calculation Manual.

In addition, 293 analyses were performed on 191 quality assurance samples and 88 quality assurance TLDs were analyzed for ambient radiation exposure rates as part of the Environmental Protection Agency's Cross-Check Program and an internal Quality Assurance Program with Teledyne Brown Engineering Environmental Services.

Lastly, 382 analyses were performed on 334 extra environmental samples; 480 extra TLDs were analyzed for ambient radiation exposure rates; and six pressurized ion chambers (PIC) continuously monitored the environs around the plant for ambient radiation levels. A seventh PIC was installed to the west of the ISFSI from March through July in order to verify the apparent error in the mapping of three ISFSI TLD locations. All of these additional analyses reflect a commitment to maintain historical continuity for samples and sampling pathways discontinued from REMP when the Environmental Technical Specifications were changed in March, 1985.

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

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

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

Measurements of direct radiation, as required by Technical Specifications, were performed by analyzing TLDs from forty locations surrounding CCNPP and the ISFSI. Two TLD assemblies, containing two TLD elements each, were placed at each location.

Low levels of various man-made fission and activation by-products were observed in the environment surrounding the plant during the year 1995. 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).

The plant's contribution to the radiation levels of the ambient environment was assessed by performing dose calculations 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 $7.15 \times 10^{-3}$ mrem via liquid and gaseous pathways, which is 0.01% of the acceptable limit of 75 mrem/yr as specified in 40 CFR 190;

b. a maximum whole body dose of $1.71 \times 10^{-2}$ mrem via liquid and gaseous pathways, which is 0.07% 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 $1.32 \times 10^{-1}$ mrem to the GI-Tract. This dose is 0.5% 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 & 2 and the ISFSI did not cause any significant radiological impact on the surrounding environment during 1995. In addition, it should be noted that the 1995 plant contribution to ambient radiation levels was at least a factor of 2 lower than the 1994 levels. This is attributed to Calvert Cliffs' continued actions aimed at reducing radiological effluent levels to as low as reasonably achievable.

# II. CALVERT CLIFFS NUCLEAR POWER PLANT RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

## II.A. INTRODUCTION

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

Originally the Radiological Environmental Monitoring Program (REMP) was conducted under separate Environmental Technical Specifications (33, 34). On July 29, 1977 the monitoring program began operation under a combined set of Technical Specifications (35) 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 (36). Changes in the program (sample locations, sample types, and/or sampling frequencies) have been implemented to conform to these revisions.

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

Results of the monitoring program for the current operational period of January 1, 1995 through December 31, 1995 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 1995 (Table 2), a compilation of the analytical data for 1995 (Appendix B), the results of the EPA Intercomparison Program and the Quality Assurance Program (Appendix C), the results of the Land Use Survey (Appendix D), and a compilation of the analytical data for extra samples collected in 1995 (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 1995.

## 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 Technical Specifications (36) 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 personnel of, or contractors to, the Baltimore Gas and Electric Company according to BGE procedures (38).

### 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

There was one program exception during 1995. The sample garden required by Technical Specifications to be located at, or near, the site boundary is actually located closer to the plant than the site boundary. This is a more conservative location than the requirement, but still necessitated entry into the ACTION Statement as required by the Technical Specifications. The corrective action being taken is to properly describe the current garden location when the Technical Specification concerning the garden is relocated to the Offsite Dose Calculation Manual (ODCM) in 1996 (37).

## II.C. RESULTS AND DISCUSSIONS

All the environmental samples collected during the year were analyzed using BGE's laboratory procedures (40). The analytical results for this reporting period are presented in Appendix B and are also summarized in Table 2. For discussion, the analytical results are divided into four categories. The categories are the Aquatic Environment, the Atmospheric Environment, the Terrestrial Environment, and Direct Radiation. These categories are further divided into subcategories according to sample type (e.g., Bay Water, Aquatic Organisms, etc., for the Aquatic Environment).

### II.C.1 Aquatic Environment

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

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

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

The tritium analyses, performed on quarterly composites of the monthly bay water samples, showed the presence of tritium in the Discharge (Wa2) samples for all four quarters, and a single, detectable reading in the Intake (Wa1) for the third quarter. The discharge concentrations observed ranged from 155±36 to 246±36 pCi/L, which is similar to those ranges observed in previous years (7-31). The single, detectable Intake sample was 86 ± 33 pCi/L, which was approximately the same level as the few instances of detectable tritium observed at times in the Intake in 1992 and 1993. Investigation showed that this is due to the backflow of discharge water into the Intake, a phenomenon periodically observed in the summer months.

Figure 1 compares tritium observed in the plant discharge and intake with annual effluent releases in 1995 as reported in the Semi-Annual Radioactive Effluent Release Report required by Technical Specification 6.9.1.8 (also referred to as the Reg Guide 1.21 Report.)

Monthly analyses of bay water samples from both locations for gamma-emitters exhibited no detectable concentrations of any fission or activation products. Naturally occurring K-40 was detected in some of the samples.

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

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

Gamma spectrometric analyses of the fish samples exhibited no detectable concentrations of any plant-related radionuclides. All fish samples exhibited naturally occurring K-40.

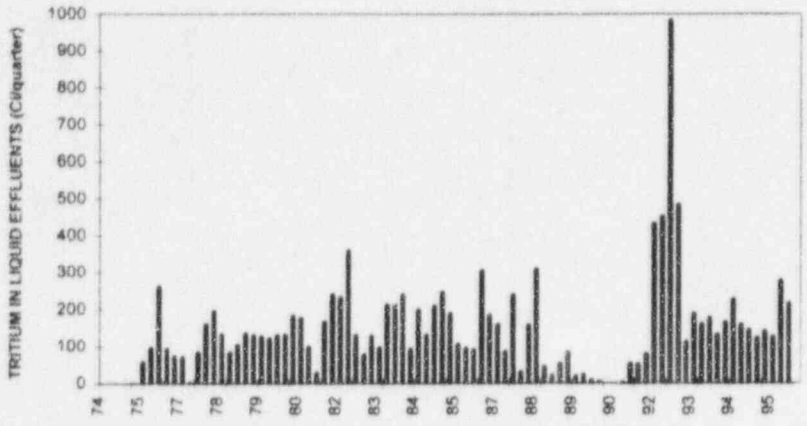
Gamma spectrographic analysis results of the oyster samples continued to exhibit a downward trending of Ag-110m, which is a plant-related radionuclide. As shown in Figure 2, this downward trend correlates with Calvert Cliffs' successful actions in reducing radiological effluents to as low as reasonably achievable. Three of four quarterly oyster results obtained in 1995 were found to be below the minimum detectable activity. This is a noticeable improvement over 1994, when only one of the four quarterly oyster results was less than minimum detectable activity. It should be further noted that the single positive 1995 result of 18 pCi/kg Ag-110m is significantly lower than the 1994 concentrations of 33 to 68 pCi/kg Ag-110m. This beneficial effect of reducing radiological effluents to a minimum will continue to be evaluated. There was naturally occurring K-40 detected in all samples of oyster flesh.

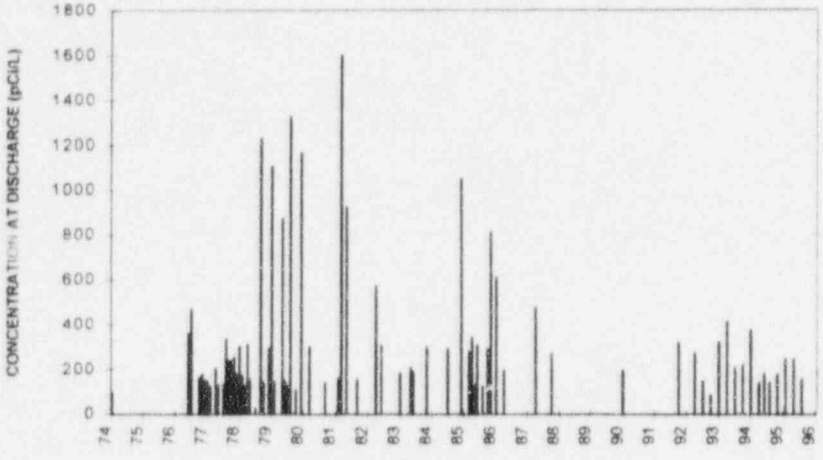
## II.C.1.c **Shoreline Sediment**

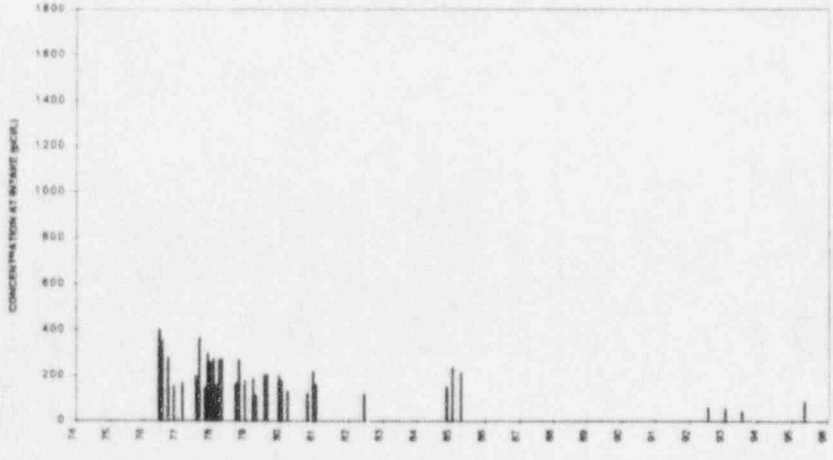
Semiannual shoreline sediment samples were taken from one location during the year. This location is the shoreline at Barge Road (sample code Wb1). The samples obtained from this location were analyzed for gamma-emitters.

Gamma spectrometric analyses of these samples exhibited no detectable concentrations of any plant-related radionuclides. All samples of shoreline sediment exhibited naturally occurring levels of K-40, and some samples contained natural Ra-226.

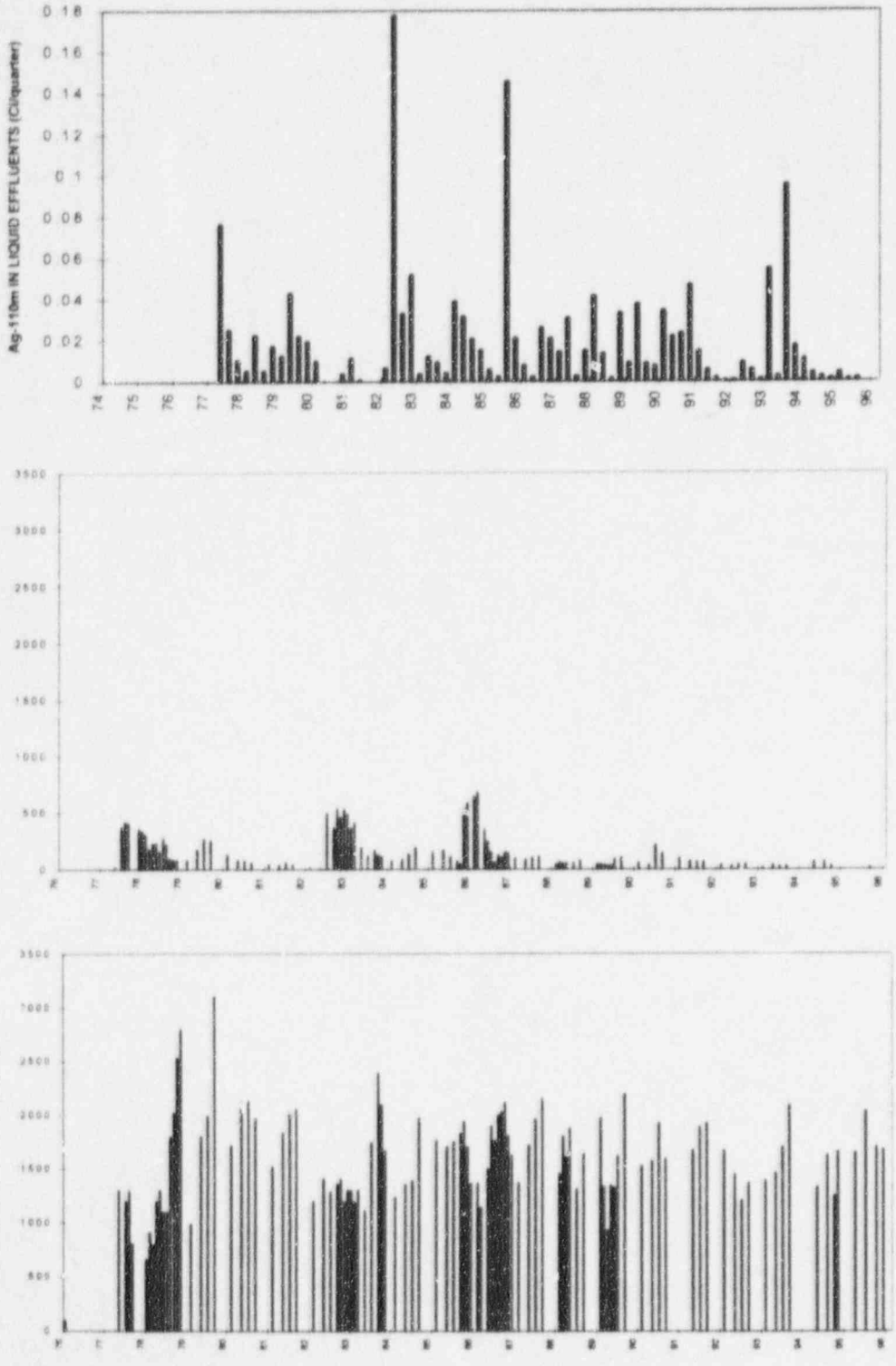
# FIGURE 1
## Tritium in Chesapeake Bay Water



## 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 near the Emergency Siren (sample code A2), Bay Breeze Road (sample code A3), 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 (7-31). The values ranged from $0.3 \times 10^{-2}$ to $2.5 \times 10^{-2}$ pCi/m$^3$ for the indicator locations and $0.6 \times 10^{-2}$ to $2.1 \times 10^{-2}$ pCi/m$^3$ at the control location. The location with the highest overall mean of $1.4 \times 10^{-2}$ pCi/m$^3$ was A4 at Lusby.

Gamma spectrometric analyses of monthly composited air particulate samples exhibited no detectable concentrations of any plant-related radionuclides in any of these samples. Most samples exhibited naturally occurring Be-7, and some contained natural K-40.

Figure 3 depicts the historical trends of beta activity.

### II.C.2.b Air Iodine

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

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

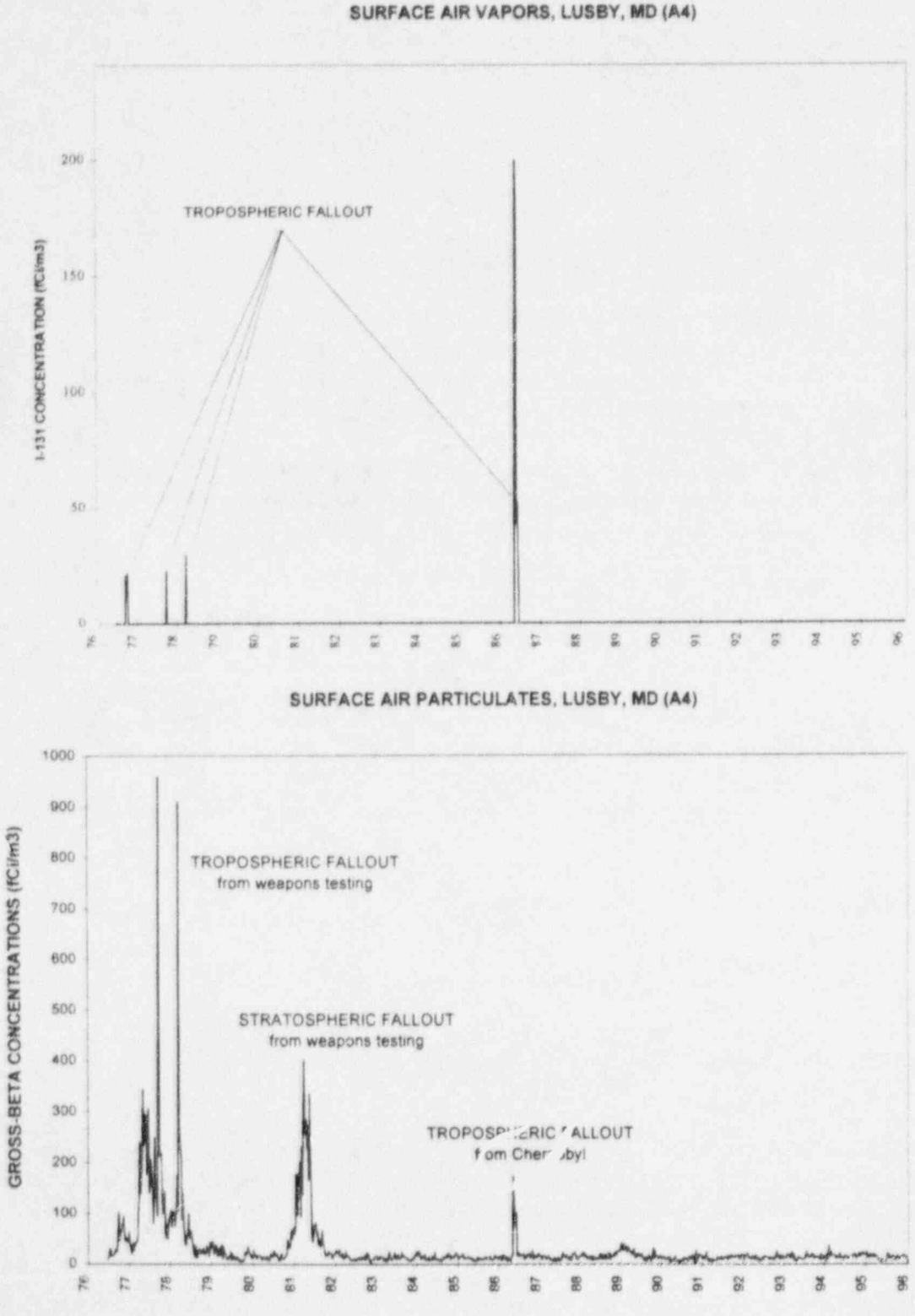
Figure 3 depicts the historical trends of radioiodine.

## II.C.3 Terrestrial Environment

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

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

# FIGURE 3
## Nuclear Fallout in the Calvert Cliffs Area



In response to the discovery of this issue, CCNPP personnel determined that the current sampling location is conservative with respect to the Technical Specification requirement and, therefore, meets the intent of the requirement. Nonetheless, this sampling location does not meet the letter of the description in the Technical Specification, and, as such, required entry into the Technical Specification ACTION statement to "...prepare and submit to the Commission...a description of the reasons for not conducting the program as required and the plans for preventing a recurrence". The present Technical Specification wording will be revised to more clearly reflect our current sampling program when the requirement is relocated to the ODCM in 1996 (37).

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

Vegetation samples were collected from three locations during the year. These locations are Bay Breeze Road (sample codes Ib1, Ib2, and Ib3), 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. Naturally occurring K-40 and Th-232 were observed in most samples.

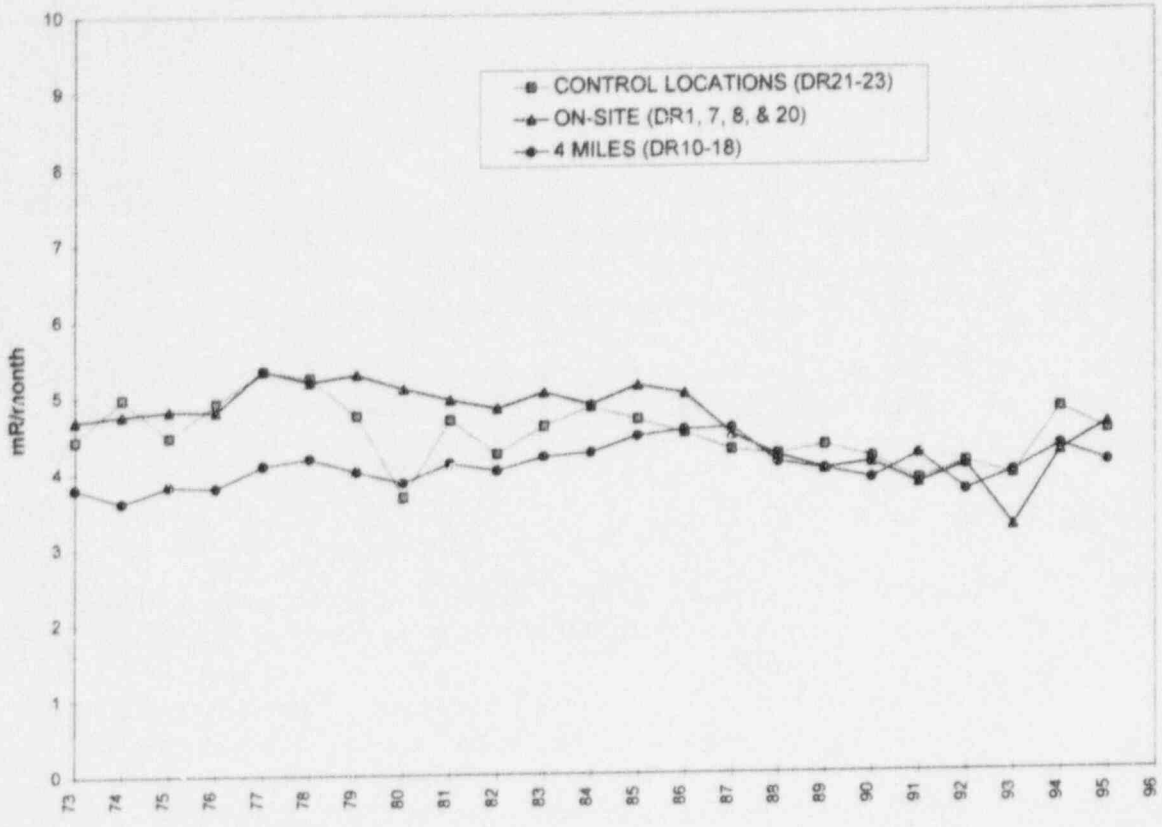
## II.C.4 **Direct Radiation**

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

Thermoluminescent dosimeters were collected monthly from twenty-three locations surrounding the plant. The twenty indicator locations are On Site Along the Cliffs (sample code DR1), Route 765 Auto Dump (sample code DR2), Giovanni's Tavern (sample code DR3), 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 near the 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 (sample code DR23).

The mean 30 day ambient radiation measured at the indicator locations was 4.02 mR and ranged from 2.66 to 5.92 mR as reported in Table 2. The control locations showed a 30 day mean of 4.46 mR with ranges from 2.97 to 6.31 mR. The indicator location with the highest overall mean of 4.83 was DR08, Camp Conoy Rd. siren, which ranged from 4.15 to 5.35 mR. A comparison of the means and ranges of the current TLD data with those of both the historical data and the regional data (7-31) shows no plant-related contribution to the measured exposure rate for 1995. Figure 4 shows the historical comparison of the yearly means of the TLDs on site, at four miles, and at the control locations.

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



## II.D. CONCLUSION

Low levels of various man-made fission and activation by-products were observed in the environment surrounding the plant during the year 1995. Some of these observations were attributed to fallout from past atmospheric weapons testing. The others cited were related to the operation of the plant (e.g. Ag-110m in oyster samples and tritium in quarterly-composited bay water samples).

Historical trends for tritium in bay water, Ag-110m and K-40 in oyster samples, nuclear fallout in the Calvert Cliffs area, and TLD data are depicted in Figures 1 through 4. As can be seen from these figures, the plant made no discernible radiological contribution to the surrounding environment during 1995. Furthermore, it can be seen that Calvert Cliffs' actions in reducing radiological effluent levels to as low as reasonably achievable is producing the desired downward trend in the presence of Ag-110m in oysters.

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 $2.65 \times 10^{-3}$ mrem to a child via the plume, ground, vegetable, meat, and inhalation pathways at 2.1 km SW of the containments at Calvert Cliffs. This is 0.004% 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 $2.38 \times 10^{-4}$ mrem to a child at 2.1 km S of the containments at Calvert Cliffs. This is 0.001% 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 $8.20 \times 10^{-4}$ mrem at 2.1 km S of the containments at Calvert Cliffs. This is 0.003% of the acceptable dose limit of 25 mrem/year as specified in 40 CFR 190.

### Liquid Pathways

A maximum thyroid dose of $4.50 \times 10^{-3}$ mrem to a teenager for all liquid pathways, which is 0.006% of the acceptable dose limit of 75 mrem/year as specified in 40 CFR 190.

A maximum whole body dose of $1.69 \times 10^{-2}$ mrem via all liquid pathways, less than 0.07% 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 $1.32 \times 10^{-1}$ mrem to an adult for all pathways, which is 0.5% of the acceptable dose limit of 25 mrem/year specified in 40 CFR 190.

**Gaseous and Liquid Pathways Combined**

A maximum thyroid dose of $7.15 \times 10^{-3}$ mrem via liquid and gaseous pathways, which is 0.01% of the acceptable limit of 75 mrem/year specified in 40 CFR 190.

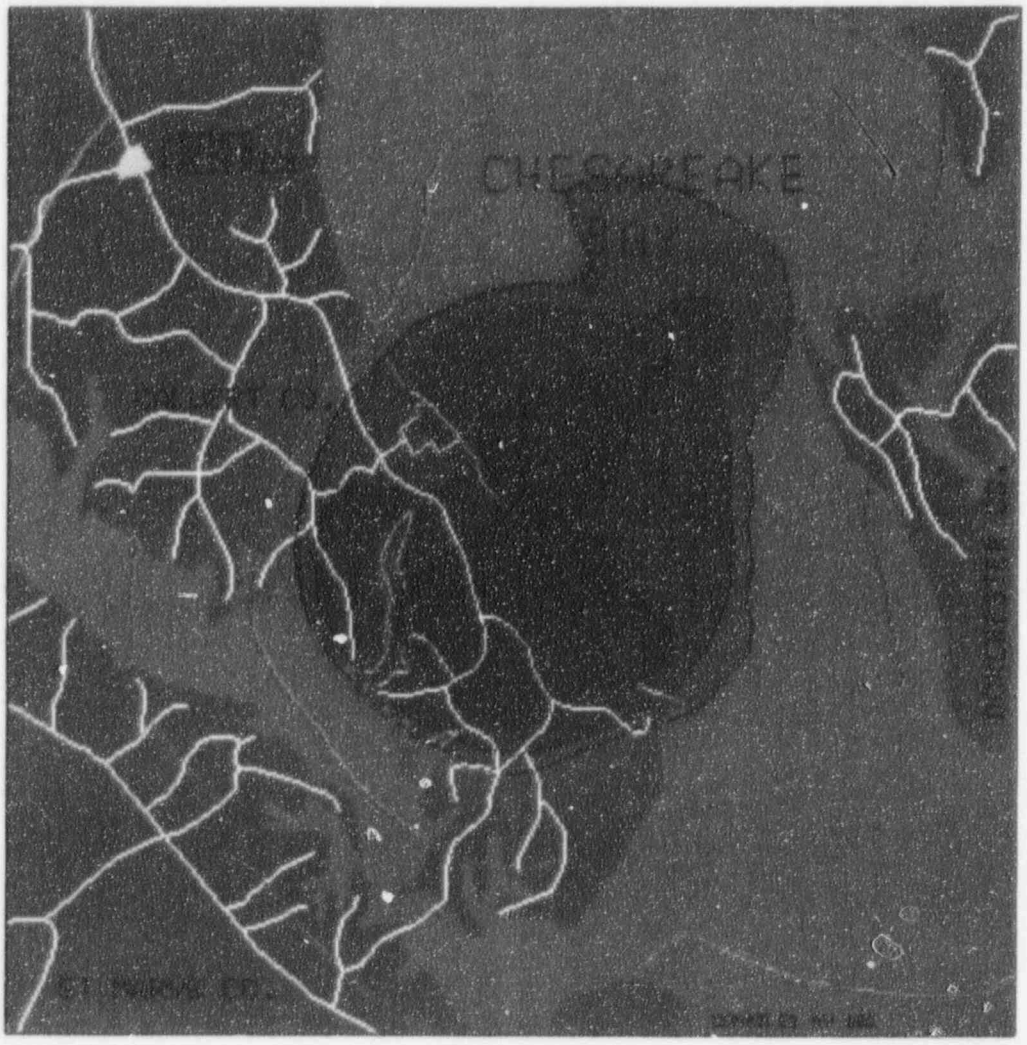
A maximum whole body dose of $1.71 \times 10^{-2}$ mrem via liquid and gaseous pathways which is 0.07% of the acceptable limit of 25 mrem/year as specified in 40 CFR 190.

A maximum calculated dose to all other organs via liquid and gaseous pathways was equal to $1.32 \times 10^{-1}$ mrem to the GI-Tract. This dose is 0.5% 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 Technical Specifications and 40 CFR Part 190. There was not any measurable buildup of long-lived radionuclides in the environment due to Calvert Cliffs. In addition, there was no statistically significant increase in the concentration of plant-related radionuclides in important pathways; conversely, there was a definite downward trend in the measured parameters that is the result of the efforts by Calvert Cliffs to reduce the amount, and concentrations, of effluents released to the environment.

## FIGURE 5

### Atmospheric Dispersion Around CCNPP 1995 Average Relative Air Concentrations




| CONTOUR LEGEND | X/Q (SEC/M3) |
|---|---|
| 1 | 4.0E-07+ |
| 2 | 2.0E-07-4.0E-07 |
| 3 | 1.0E-07-2.0E-07 |
| 4 | 7.0E-08-1.0E-07 |
| 5 | 4.0E-08-7.0E-08 |
| 6 | 2.0E-08-4.0E-08 |
| 7 | 1.0E-08-2.0E-08 |

(LEFT BLANK)

## FIGURE 6

**Atmospheric Dispersion Around CCNPP 1995 Average Relative Ground Deposition**


| CONTOUR LEGEND | D/Q (1/M2) |
|---|---|
| 1 | 4.0E-09+ |
| 2 | 2.0E-09-4.0E-09 |
| 3 | 1.0E-09-2.0E-09 |
| 4 | 7.0E-10-1.0E-09 |
| 5 | 4.0E-10-7.0E-10 |
| 6 | 2.0E-10-4.0E-10 |
| 7 | 1.0E-10-2.0E-10 |
| 8 | 7.0E-11-1.0E-10 |
| 9 | 4.0E-11-7.0E-11 |

(LEFT BLANK)

## TABLE 1

### Synopsis of 1995 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 | H-3 | QC | 8 |
| | | | | Gamma | M | 24 |
| Fish[2] | A | 2 | 4 | Gamma | A | 4 |
| Oysters | Q | 2 | 8 | Gamma | Q | 8 |
| Shoreline Sediment | SA | 1 | 2 | Gamma | SA | 2 |
| Atmospheric Environment | | | | | | |
| Air Iodine[3] | W | 5 | 264 | I-131 | W | 264 |
| Air Particulates[4] | W | 5 | 264 | Gross Beta | W | 264 |
| | | | | Gamma | MC | 60 |
| Terrestrial Environment | | | | | | |
| Vegetation[5] | M | 3 | 45 | Gamma | M | 45 |
| Direct Radiation | | | | | | |
| Ambient Radiation | M | 23 | 1094 | TLD | M | 1094 |

[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 performed after ≥ 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] | Location with Highest Annual Mean Mean (F)/ Range[1] | Control Location Mean (F)/ Range[1] |
|---|---|---|---|---|---|---|
| Aquatic Environment | | | | | | |
| Bay Water (pCi/L) | Tritium (8) | 54 | 206 (4/4) (155-246) | Discharge Wa2 0.3 km. N | 206 (4/4) (155-246) | 86 (1/4) (86) |
| Oysters (pCi/kg) | Gamma (8) Ag-110m | 14 | 18 (1/4) -- | Camp Conoy Ia3 0.9 km E | 18 (1/4) -- | -- -- |
| Atmospheric Environment | | | | | | |
| Air Particulates ($10^{-2}$ pCi/m$^3$) | Beta (259) | 0.5 | 1.2(207/207) (0.3-2.5) | EOF A5 19.3 km WNW | 1.4 (52/52) (0.6-2.1) | 1.4(52/52) (0.6-2.1) |
| Direct Radiation | | | | | | |
| Ambient Radiation (mR/30 days) | Exposure Rate (1094) | -- | 4.02(950/950) (2.66-5.92) | Camp Conoy siren DR08 2.5 km SSE | 4.83 (48/48) (4.15-5.35) | 4.46(144/144) (2.97-6.31) |

[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 Installation (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, 1995 through December 31, 1995 are included in this report.

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

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

The results for 1995 were compared with that generated during the previous ISFSI pre-operational periods (32) and the current and previous CCNPP REMP periods (7-31). These comparisons demonstrate the consistency of data throughout the CCNPP site, which are very close to the natural background levels for the region. A discussion of these results is given in Section III. C. 3.

## III.B. PROGRAM

### III.B.1 Objectives

The objectives of the REMP 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 plant-related radionuclides near the ISFSI.

### III.B.2 Sample Collection

The locations of the individual sampling sites are listed in Table A-2 and shown in Figures A-4 and A-5. All samples were collected by BGE personnel according to BGE procedures (38).

### 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 1995.

## III.C. RESULTS AND DISCUSSIONS

All the environmental samples collected during the year were analyzed using BGE's laboratory procedures (40). 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. Therefore, airborne radioiodine is not considered.

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

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

Weekly analyses for beta activity on air particulate filters collected from all five locations showed values characteristic of levels routinely observed in the REMP (7-31). These values ranged from $0.3 \times 10^{-2}$ to $2.5 \times 10^{-2}$ pCi/m$^3$ for the indicator locations and $0.5 \times 10^{-2}$ to $2.4 \times 10^{-2}$ pCi/m$^3$ for the control location. The location with the highest overall mean of $1.39 \times 10^{-2}$ pCi/m$^3$ was SFA4 at the south end of the ISFSI.

Gamma spectrometric analyses of monthly composited air particulate samples exhibited no detectable concentrations of any plant-related radionuclides in any of these samples. Most samples exhibited naturally occurring Be-7, and some contained natural K-40.

### III.C.2 **Terrestrial Environment**

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

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

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

Gamma spectrometric analyses of these samples revealed the presence of Cs-137. The range of Cs-137 concentrations observed was 23±11 to 92±21 pCi/kg. While the presence of Cs-137 in these samples may be plant-related, this range is consistent with that found to be due to the residual fallout from past atmospheric nuclear weapons testing. These activities are well below the federal limits established in 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operations" and are comparable to those observed in previous annual reporting periods for the CCNPP REMP (7-31) and in the earlier pre-operational data for the ISFSI (32). Naturally occurring K-40 and Be-7 were observed in all samples; natural Ra-226 and Th-232 were observed in a few 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 Visitors Center (sample code SFS2), NNW of the ISFSI (sample code SFS3), South of the ISFSI (sample code SFS4), and On Site before the Entrance to Camp Conoy (sample code SFS5).

Soil samples were analyzed for gamma emitting radionuclides. Cs-137 was detected, ranging from 64±37 to 1034±97 pCi/kg. While the presence of Cs-137 in these samples may be plant-related, this range is consistent with that found to be due to the residual fallout from past atmospheric nuclear weapons testing. These activities are well below the federal limits established in 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operations", and are comparable to those observed in previous annual reporting periods for the CCNPP REMP (7-31) and in the earlier pre-operational data for the ISFSI (32). Naturally occurring K-40 was observed in all samples, while most exhibited some natural level of either Be-7, Ra-226, or Th-232.

## III.C.3 **Direct Radiation**

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

The mean 30 day ambient radiation measured at the ISFSI indicator locations was 5.14 mR and ranged from 2.66 to 16.05 mR as reported in Table 4. The control location showed a 30 day mean of 4.68 mR and ranged from 3.91 to 6.04 mR.

In 1994, it was noted that an increase in the ambient radiation level monitored at SFDR10, NNW of the ISFSI, had been observed during the fourth quarter. It was speculated at the time that the cause of this increase was the presence of contaminated resin being stored in an interim spent resin storage area near the ISFSI. Subsequent investigation determined that the increase in ambient radiation level monitored at SFDR10 was not due to the storage of resin, but was caused by a slight, expected increase in ambient levels associated with the storage of spent fuel in the ISFSI.

Several actions were taken to determine the source of the slight increase in ambient radiation levels near the ISFSI at location SFDR10. First, a temporary Pressurized Ion Chamber (PIC) was located southwest of the spent resin storage area in order to confirm readings observed on permanent PICs and to further monitor the ambient radiation levels in the vicinity of the spent resin storage area. Second, additional TLDs were temporarily placed on the fence between the ISFSI and SFDR10. This location (SFDR17) was selected because it was completely shielded by the terrain separating the ISFSI and the spent resin storage area and therefore should not be influenced by the resin storage area. Lastly, a radiation survey was performed using a portable PIC near the fence along the northern perimeter of the ISFSI.

Measurements taken from the temporary PIC during the months of March through July, 1995, confirmed that the short duration elevated readings observed from permanent PICs were as expected due to resin transfer operations at the spent resin storage area. More importantly, the ambient level of about 7 μR/hr reported by the temporary PIC was consistent with other permanent PIC readings. PIC4, located near SFDR10, showed readings of 7-9 μR/hr, which were consistent with that expected due to the storage of spent fuel in the ISFSI. Therefore, PIC4 radiation levels are not being influenced by the spent resin storage area. The PIC4 readings accurately represent radiation levels from the ISFSI.

Monthly measurements during 1995 taken from SFDR17, which was shielded by the terrain, yielded levels similar to SFDR10. It was later discovered, through self assessment, that the map location of SFDR10 was depicted inaccurately in last year's Annual Report. Although the map indicated the proper sector in which SFDR10 was located, it incorrectly indicated that it was in the line-of-sight of the spent resin storage area. Field observations showed that SFDR10 was mounted on a camera post, and not in the line-of-sight of the spent resin storage area. Two other TLD map locations were also found to be depicted inaccurately in the Annual Report map. These locations have subsequently been corrected in Figure A-5, as well as a change submitted to the ODCM reflecting the proper locations (37).

A radiation survey conducted along the northern perimeter of the ISFSI using a portable PIC showed that the ambient radiation levels ranged from about 7 μR/hr to about 16 μR/hr near the middle of the fence. At the location of SFDR10 the reading was about 11 μR/hr which was consistent with monthly TLD measurements. The survey also extended towards the spent resin storage area with the ambient readings dropping rapidly to background levels. These results are all within the range expected due to storage of spent fuel in the ISFSI.

In conclusion, the upward trend in direct radiation at SFDR10 identified in 1994 was consistent with that expected from the storage of spent fuel in the ISFSI. Therefore, present monitoring continues to assure that radiation levels from the ISFSI are within regulatory limits.

A comparison of the mean ISFSI TLD data with the ISFSI control location at the Visitors Center, SFDR7, can be seen in Figure 7.

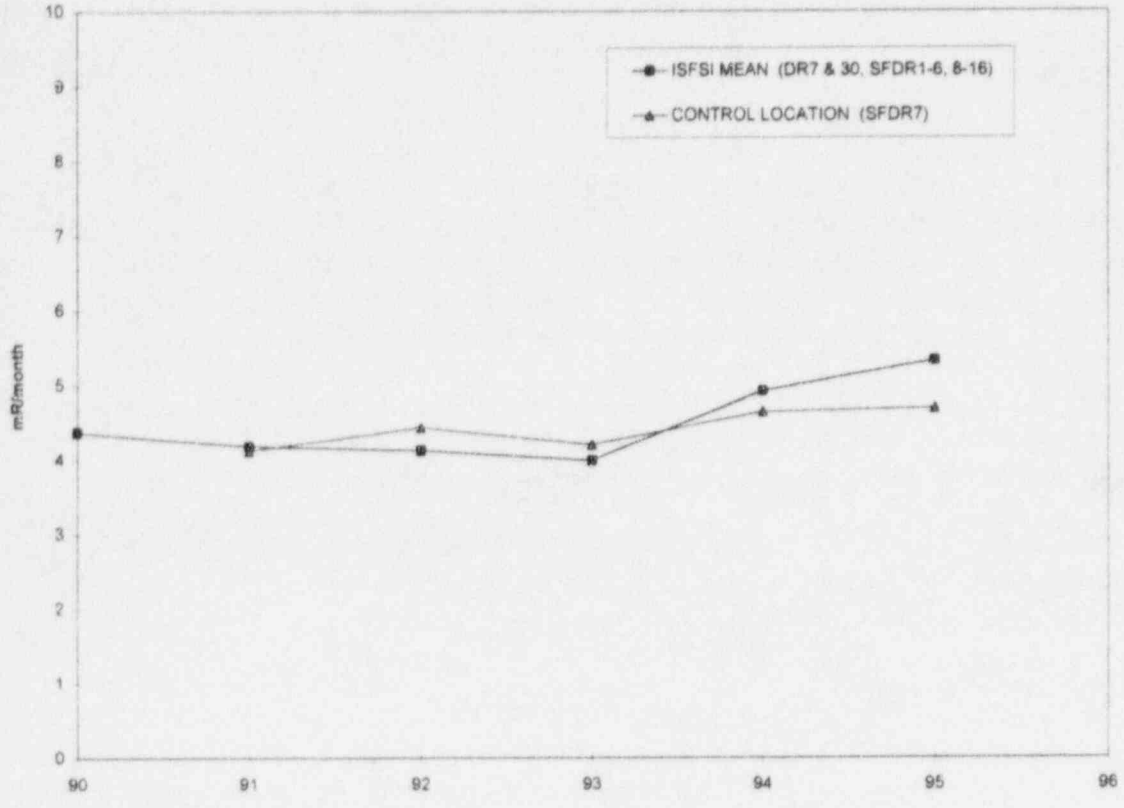
## III.D. CONCLUSION

Low levels of Cs-137 were observed in the environment surrounding the ISFSI during the report period. These observations were attributed to fallout from past atmospheric weapons testing. Therefore, it is concluded that the operation of Calvert Cliffs' ISFSI during 1995 did not result in increased introduction of Cs-137 to the environs surrounding Calvert Cliffs

In general, the results in the following tables continue to track the historical trends previously observed at the official sites of the Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program (7-31).

Therefore, operation of the ISFSI has not exceeded the limits specified in 40 CFR Part 190, nor has there been a buildup of long-lived radionuclides around the ISFSI. Ambient radiation levels around the ISFSI have behaved as predicted, based on the increase in the amount of stored spent fuel there, and there has been no statistically significant increase in the concentration of plant-related radionuclides near the ISFSI. The operation of the ISFSI during 1995 has not impacted the surrounding environment, and does not measurably impact the community surrounding Calvert Cliffs.

**Figure 7**
**Mean TLD Gamma Dose, ISFSI**



## TABLE 3

**Synopsis of 19 alvert Cliffs Nuclear Power Plant
Independen ent Fuel Storage Installation
Radiological E ronmental 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 | 264 | Gross Beta | W | 264 |
| | | | | Gamma | MC | 60 |
| Terrestrial Environment | | | | | | |
| Vegetation | Q | 5 | 20 | Gamma | Q | 20 |
| Soil | Q | 5 | 20 | Gamma | Q | 20 |
| Direct Radiation | | | | | | |
| Ambient Radiation | M | 18 | 862 | TLD | M | 862 |

[1] W - weekly, M - monthly, Q - quarterly, SA - semiannual, A - annual, C- composite.
[2] Beta counting is performed after ≥ 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] | Location with Highest Annual Mean Mean (F)/ Range[1] | Control Location Mean (F)/ Range[1] |
|---|---|---|---|---|---|---|
| Atmospheric Environment | | | | | | |
| Air Particulates ($10^{-2}$ pCi/$m^3$) | Beta (207) | 0.5 | 1.35(155/155) (0.3-2.5) | S of ISFSI SFA4 0.1 km S | 1.39(52/52) (0.4-2.4) | 1.37(52/52) (0.5-2.4) |
| Terrestrial Environment | | | | | | |
| Vegetation (pCi/L) | Gamma (20) Cs-137 | 27 | 48 (6/16) (23-92) | Camp Conoy SFB5 0.3 km. S | 59 (4/4) (39-92) | -- -- |
| Soil (pCi/kg) | Gamma (20) Cs-137 | 33 | 470(10/16) (64-1034) | NNW ISFSI SFS3 0.1 km S | 872 (4/4) (604-1034) | 179(4/4) (113-27) |
| Direct Radiation | | | | | | |
| Ambient Radiation (mR/30 days) | Exposure Rate (862) | -- | 5.14(814/814) (2.66-16.50) | NNW ISFSI SFDR10 0.1 km NNW | 11.99(48/48) (9.91-16.50) | 4. 68(48/48) (3.91-6.04) |

[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.

## IV. REFERENCES

(1) Cohen, L. K., "Preoperational Environmental Radioactivity Monitoring Program at Calvert Cliffs Units 1 and 2", NUS No. 882 Semiannual Report January-June 1971, December 1971; NUS No. 1025 Annual Report 1971, March 1973.

(2) Cohen, L. K., "Preoperational Environmental Radioactivity Monitoring Program at Calvert Cliffs Units 1 and 2", NUS No. 1137 Annual Report 1972, December 1973.

(3) Cohen, L. K. and Malmberg, M. S., "Preoperational Environmental Radioactivity Monitoring Program at Calvert Cliffs Units 1 and 2", NUS No. 1188, Annual Report 1973, October 1974.

(4) Radiation Management Corporation, Calvert Cliffs Nuclear Power Plant Radiological Environmental Analyses, December 1971 - December 1973 RMC-TR-74-13, August 1974.

(5) Malmberg, M. S., "Environmental Radioactivity Monitoring Program at Calvert Cliffs Nuclear Power Plant", NUS No. 1331 Annual Report 1974, February 1975.

(6) Malmberg, M. S., "Preoperational Environmental Radioactivity Monitoring Program at Calvert Cliffs Units 1 and 2", NUS No. 1333, Data Summary Report, September 1970 to September 1974, July 1975.

(7) Radiation Management Corporation, Calvert Cliffs Nuclear Power Plant - Radiological Environmental Surveillance Program, January 1 to June 30, 1974, December 1974.

(8) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant - Semiannual Operating Report, July - December 1974, March 1975.

(9) Radiation Management Corporation, Radiological Environmental Monitoring Program - Semiannual Report for Calvert Cliffs Nuclear Power Plant, July 1 through December 31, 1974, RMC-TR-75-06, August 1975.

(10) Baltimore Gas and Electric Company and Radiation Management Corporation, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Semiannual Report, January 1 - June 30, 1975, RMC-TR-75-11, September 1975.

(11) Baltimore Gas and Electric Company and Radiation Management Corporation, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Semiannual Report, July 1 - December 31, 1975, RMC-TR-76-02, March 1976.

(12) Baltimore Gas and Electric Company and Radiation Management Corporation, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Semiannual Report, January 1 - June 30, 1976, RMC-TR-76-06, September 1976.

(13) Baltimore Gas and Electric Company and Radiation Management Corporation, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Semiannual Report, July 1 - December 31, 1976, RMC-TR-77-07, March 1977.

(14) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1977, March 1978.

(15) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1978, March 1979.

(16) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1979, March 1980.

(17) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1980, March 1981.

(18) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1981, March 1982.

(19) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1982, March 1983.

(20) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1983, March 1984.

(21) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1984, March 1985.

(22) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1985, March 1986.

(23) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1986, March 1987.

(24) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1987, March 1988.

(25) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1988, March 1989.

(26) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1989, March 1990.

(27) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1990, March 1991.

(28) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1991, March 1992.

(29) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1992, March 1993.

(30) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1993, March 1994.

(31) Baltimore Gas and Electric Company, Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program Annual Report, January 1 - December 31, 1994, March 1995.

(32) Baltimore Gas and Electric Company, Radiological Environmental Monitoring Program Pre-Operational Report for the Calvert Cliffs Independent Spent Fuel Storage Installation, August 1990 - November 1993, February 1994.

(33) Calvert Cliffs Nuclear Power Plant, Unit Number 1, License No. DPR-53, Appendix A, Technical Specifications; Appendix B, Environmental Technical Specifications.

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

(35) 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.

(36) Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, License Nos. DPR-53 and DPR-69, Amendment No. 100 for Unit No. 1, Amendment No. 83 for Unit No. 2, Appendix A Technical Specifications.

(37) Offsite Dose Calculation Manual for the Baltimore Gas & Electric Company Calvert Cliffs Nuclear Power Plant.

(38) Baltimore Gas and Electric Company, Operating Procedures for Environmental Monitoring Activities at Calvert Cliffs Nuclear Power Plant, OP-2 to OP-6, 1993.

(39) Teledyne Brown Engineering Environmental Services, Laboratory Procedures, PR-032-4 to PR-032-25, 1982.

(40) Baltimore Gas and Electric Company, Laboratory Procedures Manual, Chemistry Unit, Fossil Engineering and Maintenance Dept., 1995.

(41) Calvert Cliffs Nuclear Power Plant, Docket Nos. 50-317/318 Semiannual Effluent Release Reports: January - June 1994 and July - December 1994.

(42) U.S. NRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", Revision 1, October 1977.

(43) U.S. NRC Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors", Revision 1, July 1977.

(44) Baltimore Gas and Electric Company, "Land Use Survey Around Calvert Cliffs Nuclear Power Plant", 1994.

(45) Baltimore Gas and Electric Company, "Land Use Survey Around Calvert Cliffs Nuclear Power Plant", 1995.

(46) Letter from Mr. R. E. Denton (BGE) to Mr. T. T. Martin (NRC), dated November 24, 1993, Annual Report of Changes, Tests, and Experiments - 10 CFR 72.48.

(47) Calvert Cliffs Nuclear Power Plant, Docket Nos. 50-317/318 Semiannual Effluent Release Reports: January - June 1995 and July - December 1995.

# APPENDIX A

Appendix A contains information concerning the environmental samples which were collected during the period January 1, 1995 to December 31, 1995.

Sample locations and specific information about individual locations for the CCNPP REMP 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 REMP 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.

(LEFT BLANK)

# TABLE OF CONTENTS - SAMPLING LOCATIONS


| Table | Title | Page |
|---|---|---|
| A-1 | Locations of Environmental Sampling Stations for the Calvert Cliffs Nuclear Power Plant | 37 |
| A-2 | Locations Of Environmental Sampling Stations for the Independent Spent Fuel Storage Installation At Calvert Cliffs | 43 |

| Figure | Title | Page |
|---|---|---|
| A-1 | Map of Southern Maryland and Chesapeake Bay Showing Location of Calvert Cliffs Nuclear Power Plant | 38 |
| A-2 | Calvert Cliffs Nuclear Power Plant Sampling Locations Scale 1" = 1.35 km | 39 |
| A-3 | Calvert Cliffs Nuclear Power Plant Sampling Locations Scale 1" = 4.0 km | 41 |
| A-4 | Independent Spent Fuel Storage Installation Sampling Locations | 44 |
| A-5 | Enlarged Map of the Independent Spent Fuel Storage Installation Sampling Locations | 45 |

(LEFT BLANK)

## TABLE A-1

### Locations of Environmental Sampling Stations for the Calvert Cliffs Nuclear Power Plant

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

[1] Distance, in km., and direction, by sector, from midline between containment buildings.

[2] Sample points common to both the REMP and ISFSI monitoring programs.

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

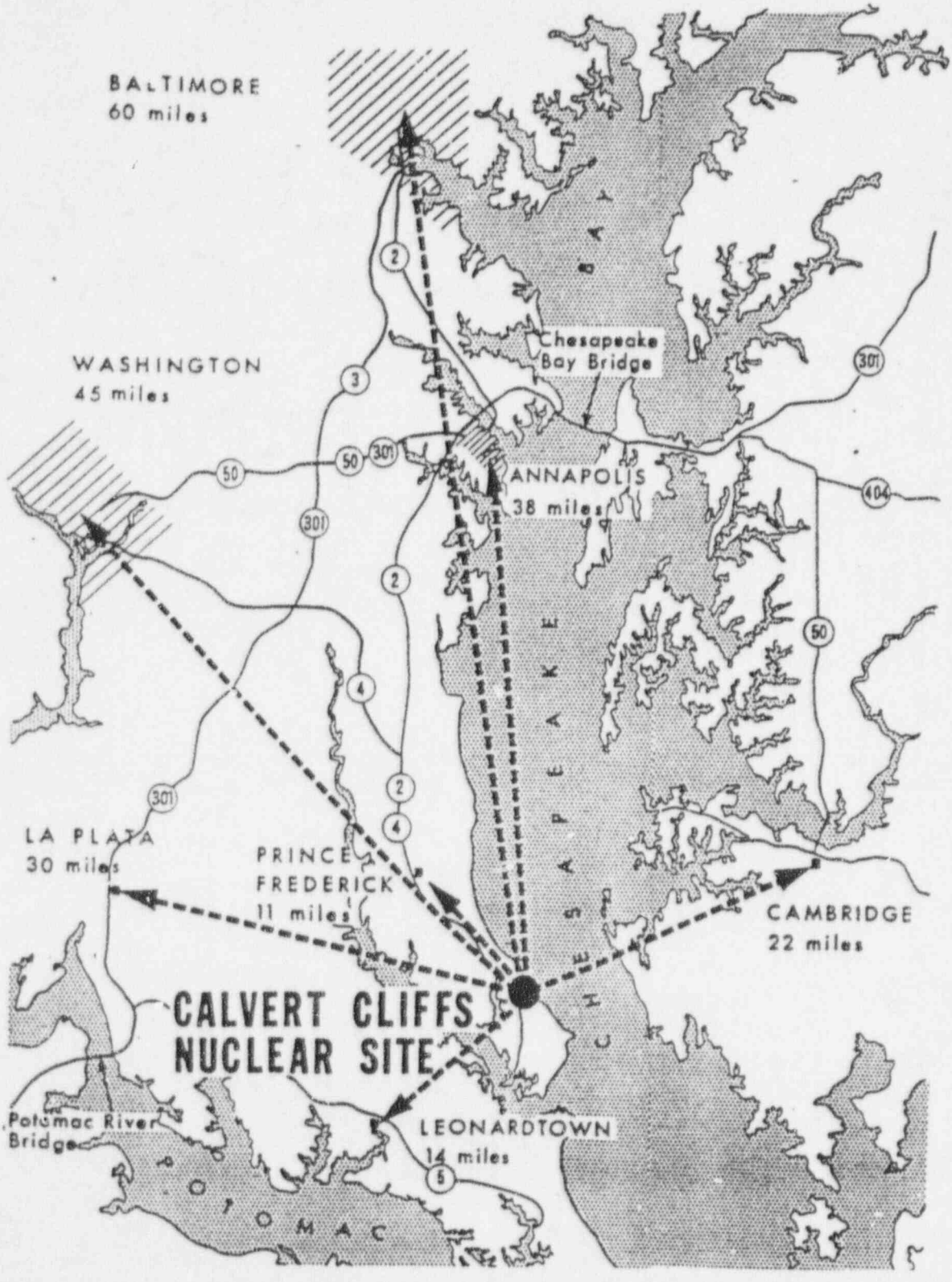
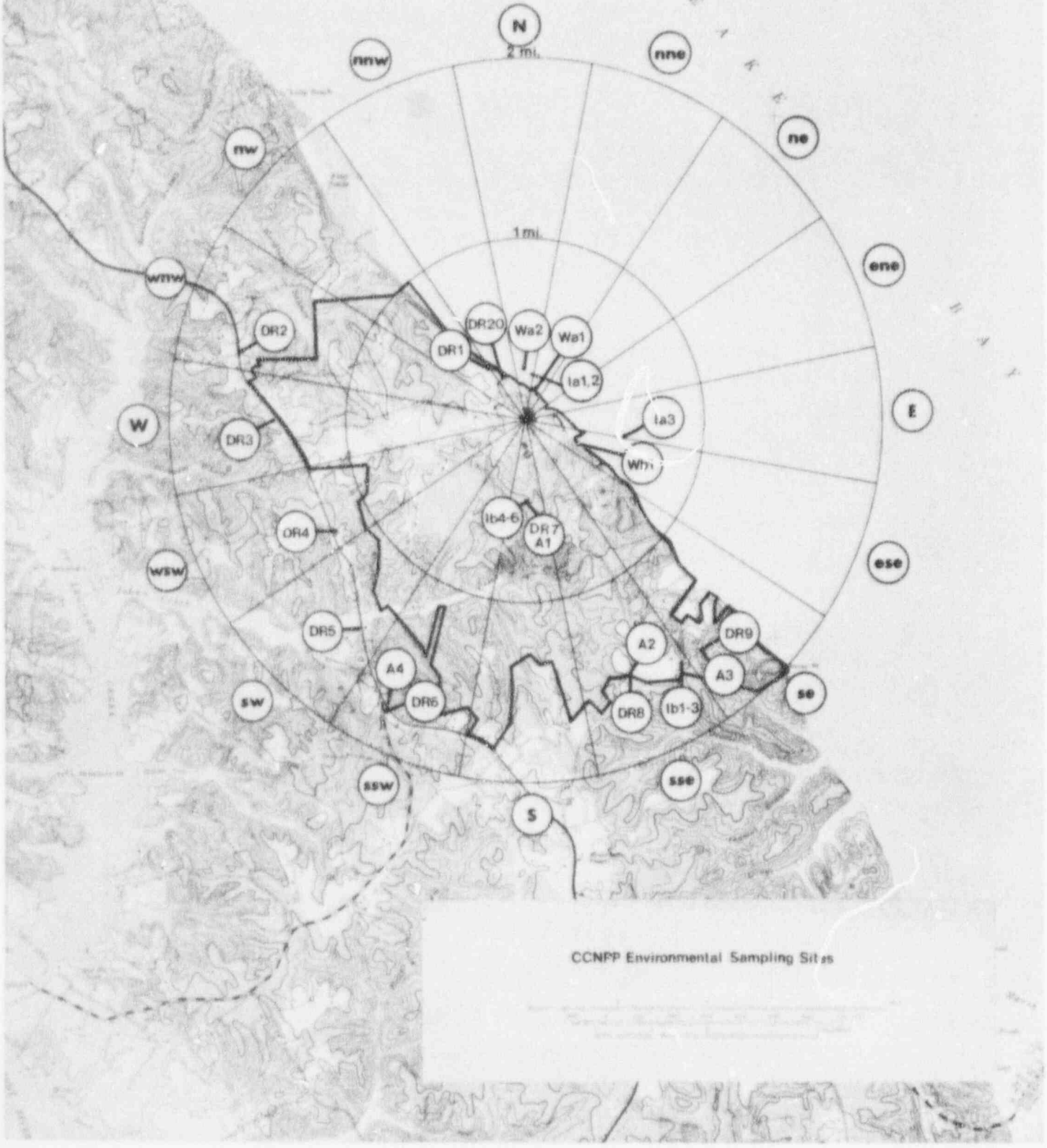
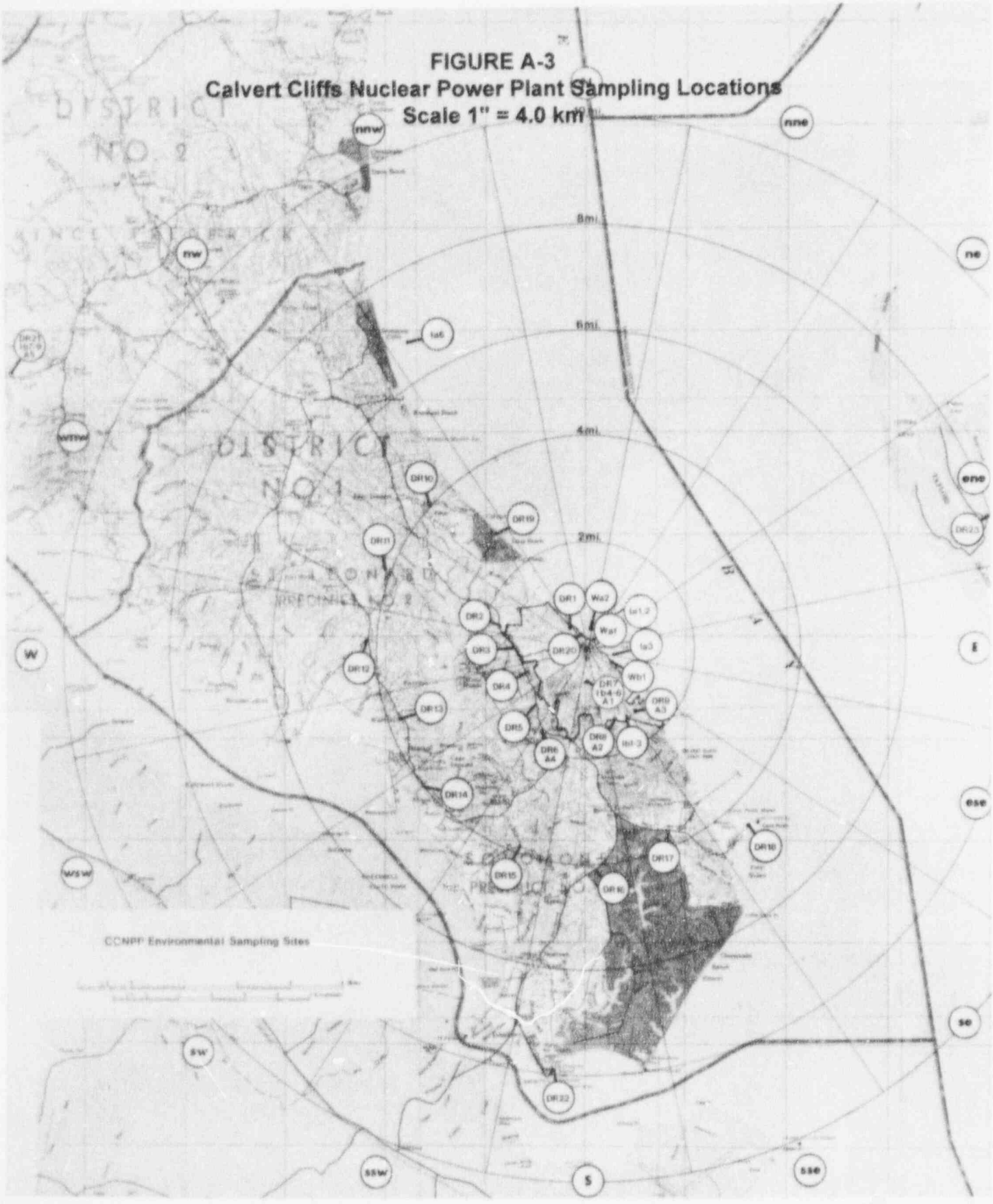


**FIGURE A-2**
**Calvert Cliffs Nuclear Power Plant Sampling Locations**
**Scale 1" = 1.35 km**



(LEFT BLANK)

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



(LEFT BLANK)

## TABLE A-2

### Locations of Environmental Sampling Stations for the Independent Spent Fuel Storage Installation at Calvert Cliffs

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

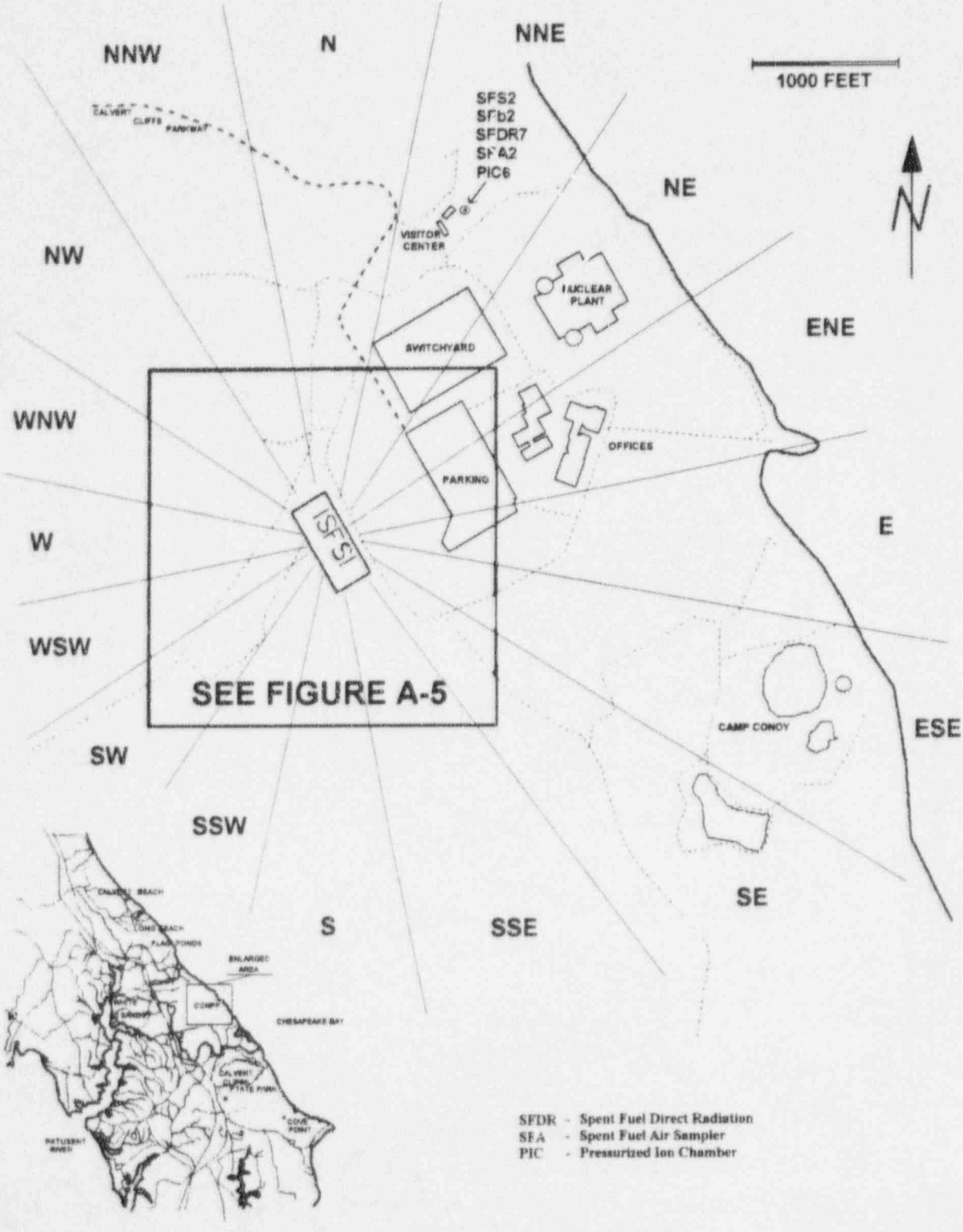
[1] Distance, in km., and direction, by sector, from centerline of ISFSI facility.

[2] Common to both the REMP and ISFSI monitoring programs.

[3] Formerly part of non-Tech Spec program, now in ISFSI program.

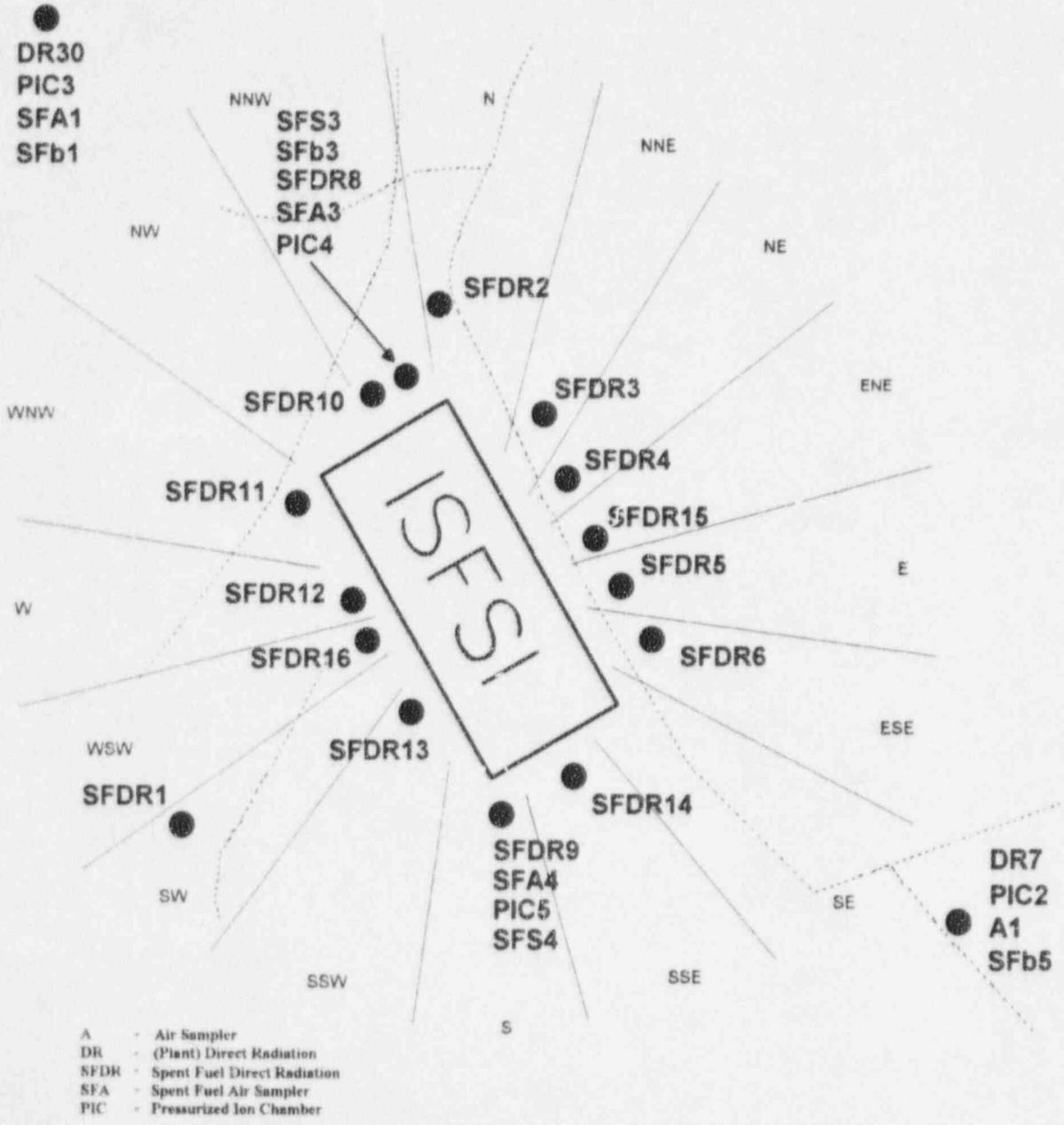
# FIGURE A-4

## Independent Spent Fuel Storage Installation Sampling Locations



## FIGURE A-5

### Enlarged Map of the Independent Spent Fuel Storage Installation Sampling Locations



(LEFT BLANK)

# APPENDIX B

Appendix B is a presentation of the analytical results of the 1995 Calvert Cliffs Nuclear Power Plant and the Independent Spent Fuel Storage Installation environmental monitoring programs.

(LEFT BLANK)

# TABLE OF CONTENTS - ANALYTICAL RESULTS


| Table | Title | Page |
|---|---|---|
| B-1 | Concentrations of Tritium and Gamma Emitters in Bay Water | 50 |
| B-2 | Concentrations of Gamma Emitters in the Flesh of Edible Fish | 51 |
| B-3 | Concentrations of Gamma Emitters in Oyster Samples | 52 |
| B-4 | Concentrations of Gamma Emitters in Shoreline Sediment | 53 |
| B-5 | Concentrations of Iodine-131 in Filtered Air | 54 |
| B-6 | Concentrations of Beta Emitters in Air Particulates | 56 |
| B-7 | Concentrations of Gamma Emitters in Air Particulates | 60 |
| B-8a | Concentration of Gamma Emitters in Vegetation | 61 |
| B-8b | Concentrations of Gamma Emitters In Vegetation from Locations Around the ISFSI | 63 |
| B-9 | Concentrations of Gamma Emitters In Soil Samples from Locations Around the ISFSI | 64 |
| B-10 | Typical MDA Ranges for Gamma Spectrometry | 65 |
| B-11 | Typical LLDs for Gamma Spectrometry | 66 |
| B-12 | Direct Radiation | 67 |

## TABLE B-1

### Concentration of Tritium and Gamma Emitters in Bay Water
### (Results in Units of pCi/L ± 2σ)

| Sample Code | Sample Date | H-3[1] | Gamma Emitters |
|---|---|---|---|
| Wa1 | 1/15/95 | * | * |
| Intake Vicinity | 2/15/95 | * | * |
| | 3/15/95 | * | * |
| | 3/31/95 | <37 | * |
| | 4/15/95 | * | * |
| | 5/15/95 | * | * |
| | 6/15/95 | * | * |
| | 6/29/95 | <35 | * |
| | 7/15/95 | * | * |
| | 8/15/95 | * | * |
| | 9/15/95 | * | * |
| | 9/29/95 | 86 +/- 33 | * |
| | 10/15/95 | * | * |
| | 11/15/95 | * | * |
| | 12/15/95 | * | * |
| | 12/28/95 | <36 | * |
| | | | * |
| Wa2 | 1/15/95 | * | * |
| Discharge Vicinity | 2/15/95 | * | * |
| | 3/15/95 | * | * |
| | 3/31/95 | 177 +/- 36 | * |
| | 4/15/95 | * | * |
| | 5/15/95 | * | * |
| | 6/15/95 | * | * |
| | 6/29/95 | 246 +/- 36 | * |
| | 7/15/95 | * | * |
| | 8/15/95 | * | * |
| | 9/15/95 | * | * |
| | 9/29/95 | 246 +/- 35 | * |
| | 10/15/95 | * | * |
| | 11/15/95 | * | * |
| | 12/15/95 | * | * |
| | 12/28/95 | 155 +/- 36 | * |

[1] Quarterly composites of monthly samples.

* Non-natural gamma emitters were < 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 Vicinity | 9/7/95 | Striped Bass | * |
| Ia2 Discharge Vicinity | 9/19/95 | Eel | * |
| Ia4[1] Patuxent River | 9/21/95 | Striped Bass | * |
| Ia5[1] Patuxent River | 9/21/95 | Eel | * |

[1] Control location.

* Non-natural gamma emitters were < MDA.

## TABLE B-3

### Concentration of Gamma Emitters in Oyster Samples
### (Results in Units of pCi/kg (wet) ± 2σ)

| Sample Code | Date | Ag110m | Gamma Emitters |
|---|---|---|---|
| Ia3 | 3/29/95 | [2] | * |
| Camp Conoy | 6/26/95 | [2] | * |
| | 8/23/95 | 18 +/- 7 | * |
| | 10/10/95 | [2] | * |
| Ia6[1] | 3/29/95 | [2] | * |
| Kenwood Beach | 6/27/95 | [2] | * |
| | 8/24/95 | [2] | * |
| | 10/9/95 | [2] | * |

[1] Control location.

[2] This isotope was < MDA.

* Non-natural gamma emitters were < MDA.

## TABLE B-4

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

| Sample Code | Sample Date | Gamma Emitters |
|---|---|---|
| Wb1 Shoreline at Barge Rd. | 5/19/95 | * |
| | 11/22/95 | * |

* Non-natural gamma emitters were < MDA.

## TABLE B-5

### Concentrations of Iodine-131 in Filtered Air

### (Results in units of $10^{-3}$ pCi/$m^3$ $\pm$ 2$\sigma$)

| Start Date | Stop Date | A1 Entrance to Camp Conoy | A2 Camp Conoy Siren | A3 Bay Breeze Rd | A4 Frank's Garage Lusby | A5[1] EOF |
|---|---|---|---|---|---|---|
| 12/27/94 | 1/3/95 | * | * | * | * | * |
| 1/3/95 | 1/9/95 | * | * | * | * | * |
| 1/9/95 | 1/16/95 | * | * | * | * | * |
| 1/16/95 | 1/23/95 | * | * | * | * | * |
| 1/23/95 | 1/30/95 | * | * | * | * | * |
| 1/30/95 | 2/6/95 | * | * | * | * | * |
| 2/6/95 | 2/13/95 | * | * | * | * | * |
| 2/13/95 | 2/20/95 | * | * | * | * | * |
| 2/20/95 | 2/27/95 | * | * | * | * | * |
| 2/27/95 | 3/6/95 | * | * | * | * | * |
| 3/6/95 | 3/13/95 | * | * | * | * | * |
| 3/13/95 | 3/20/95 | * | * | * | * | * |
| 3/20/95 | 3/27/95 | * | * | * | * | * |
| 3/27/95 | 4/3/95 | * | * | * | * | * |
| 4/3/95 | 4/10/95 | * | * | * | * | * |
| 4/10/95 | 4/17/95 | * | * | * | * | * |
| 4/17/95 | 4/24/95 | * | * | * | * | * |
| 4/24/95 | 5/1/95 | * | * | [2] | * | * |
| 5/1/95 | 5/8/95 | * | * | * | * | * |
| 5/8/95 | 5/15/95 | * | * | * | * | * |
| 5/15/95 | 5/22/95 | * | * | * | * | * |
| 5/22/95 | 5/30/95 | * | * | * | * | * |
| 5/30/95 | 6/5/95 | * | * | * | * | * |
| 6/5/95 | 6/12/95 | * | * | * | * | * |
| 6/12/95 | 6/19/95 | * | * | * | * | * |
| 6/19/95 | 6/26/95 | * | * | * | * | * |

[1] Control location.

[2] Air sampler malfunction/power outage.

* < MDA.

## TABLE B-5 - Continued

### Concentrations 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 Frank's Garage Lusby | A5[1] EOF |
|---|---|---|---|---|---|---|
| 6/26/95 | 7/3/95 | * | * | * | * | * |
| 7/3/95 | 7/10/95 | * | * | * | * | * |
| 7/10/95 | 7/17/95 | * | * | * | * | * |
| 7/17/95 | 7/24/95 | * | * | * | * | * |
| 7/24/95 | 7/31/95 | * | * | * | * | * |
| 7/31/95 | 8/7/95 | * | * | * | * | * |
| 8/7/95 | 8/14/95 | * | * | * | * | * |
| 8/14/95 | 8/21/95 | * | * | * | * | * |
| 8/21/95 | 8/28/95 | * | * | * | * | * |
| 8/28/95 | 9/5/95 | * | * | * | * | * |
| 9/5/95 | 9/11/95 | * | * | * | * | * |
| 9/11/95 | 9/18/95 | * | * | * | * | * |
| 9/18/95 | 9/25/95 | * | * | * | * | * |
| 9/25/95 | 10/2/95 | * | * | * | * | * |
| 10/2/95 | 10/9/95 | * | * | * | * | * |
| 10/9/95 | 10/16/95 | * | * | * | * | * |
| 10/16/95 | 10/23/95 | * | * | * | * | * |
| 10/23/95 | 10/31/95 | * | * | * | * | * |
| 10/31/95 | 11/6/95 | * | * | * | * | * |
| 11/6/95 | 11/13/95 | * | * | * | * | * |
| 11/13/95 | 11/20/95 | * | * | * | * | * |
| 11/20/95 | 11/27/95 | * | * | * | * | * |
| 11/27/95 | 12/4/95 | * | * | * | * | * |
| 12/4/95 | 12/11/95 | * | * | * | * | * |
| 12/11/95 | 12/18/95 | * | * | * | * | * |
| 12/18/95 | 12/26/95 | * | * | * | * | * |
| 12/26/95 | 1/2/96 | * | * | * | * | * |

[1] Control location.

* < MDA.

## TABLE B-6

### Concentrations 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 Frank's Garage Lusby | A5[1] EOF |
|---|---|---|---|---|---|---|
| 12/27/94 | 1/3/95 | 1.6 +/- 0.2 | 1.4 +/- 0.2 | 1.4 +/- 0.2 | 1.9 +/- 0.3 | 2.0 +/- 0.3 |
| 1/3/95 | 1/9/95 | 1.6 +/- 0.3 | 1.5 +/- 0.3 | 1.5 +/- 0.3 | 2.1 +/- 0.3 | 2.1 +/- 0.4 |
| 1/9/95 | 1/16/95 | 1.7 +/- 0.2 | 1.6 +/- 0.2 | 1.7 +/- 0.2 | 2.5 +/- 0.3 | 1.9 +/- 0.3 |
| 1/16/95 | 1/23/95 | 0.5 +/- 0.2 | 0.6 +/- 0.2 | 0.5 +/- 0.2 | 0.7 +/- 0.2 | 0.6 +/- 0.2 |
| 1/23/95 | 1/30/95 | 1.2 +/- 0.2 | 1.3 +/- 0.2 | 1.3 +/- 0.2 | 1.7 +/- 0.3 | 1.7 +/- 0.3 |
| 1/30/95 | 2/6/95 | 0.8 +/- 0.2 | 1.1 +/- 0.2 | 0.9 +/- 0.2 | 1.4 +/- 0.3 | 2.0 +/- 0.3 |
| 2/6/95 | 2/13/95 | 1.5 +/- 0.2 | 1.6 +/- 0.2 | 1.8 +/- 0.2 | 2.1 +/- 0.3 | 1.9 +/- 0.3 |
| 2/13/95 | 2/20/95 | 1.2 +/- 0.2 | 1.5 +/- 0.2 | 1.4 +/- 0.2 | 1.8 +/- 0.3 | 1.8 +/- 0.3 |
| 2/20/95 | 2/27/95 | 1.1 +/- 0.3 | 1.3 +/- 0.3 | 1.2 +/- 0.3 | 1.5 +/- 0.3 | 1.5 +/- 0.3 |
| 2/27/95 | 3/6/95 | 0.8 +/- 0.2 | 1.1 +/- 0.3 | 1.2 +/- 0.2 | 1.6 +/- 0.3 | 1.4 +/- 0.4 |
| 3/6/95 | 3/13/95 | 1.7 +/- 0.2 | 1.5 +/- 0.2 | 1.4 +/- 0.2 | 2.0 +/- 0.3 | 1.8 +/- 0.3 |
| 3/13/95 | 3/20/95 | 1.5 +/- 0.2 | 1.8 +/- 0.2 | 1.8 +/- 0.2 | 2.1 +/- 0.3 | 2.0 +/- 0.3 |
| 3/20/95 | 3/27/95 | 1.0 +/- 0.2 | 1.1 +/- 0.2 | 1.3 +/- 0.2 | 1.5 +/- 0.3 | 1.4 +/- 0.2 |
| 3/27/95 | 4/3/95 | 1.1 +/- 0.2 | 1.1 +/- 0.2 | 1.3 +/- 0.2 | 1.6 +/- 0.3 | 1.4 +/- 0.3 |
| 4/3/95 | 4/10/95 | 1.4 +/- 0.2 | 1.6 +/- 0.2 | 1.6 +/- 0.3 | 1.9 +/- 0.3 | 1.9 +/- 0.3 |
| 4/10/95 | 4/17/95 | 1.4 +/- 0.3 | 1.1 +/- 0.2 | 1.0 +/- 0.2 | 1.2 +/- 0.3 | 1.2 +/- 0.3 |
| 4/17/95 | 4/24/95 | 0.9 +/- 0.2 | 1.0 +/- 0.2 | 0.7 +/- 0.2 | 1.1 +/- 0.2 | 1.1 +/- 0.3 |
| 4/24/95 | 5/1/95 | 0.7 +/- 0.2 | 0.7 +/- 0.2 | [2] | 0.8 +/- 0.2 | 0.8 +/- 0.2 |
| 5/1/95 | 5/8/95 | 0.8 +/- 0.2 | 0.7 +/- 0.2 | 1.2 +/- 0.3 | 0.9 +/- 0.2 | 1.0 +/- 0.2 |
| 5/8/95 | 5/15/95 | 0.5 +/- 0.2 | 0.4 +/- 0.2 | 0.4 +/- 0.2 | 0.5 +/- 0.2 | 0.8 +/- 0.2 |
| 5/15/95 | 5/22/95 | 1.0 +/- 0.3 | 1.1 +/- 0.3 | 1.0 +/- 0.3 | 1.1 +/- 0.3 | 1.1 +/- 0.2 |
| 5/22/95 | 5/30/95 | 0.8 +/- 0.2 | 1.0 +/- 0.2 | 0.8 +/- 0.2 | 0.9 +/- 0.2 | 0.8 +/- 0.2 |
| 5/30/95 | 6/5/95 | 0.5 +/- 0.2 | 0.5 +/- 0.2 | 0.4 +/- 0.3 | 0.5 +/- 0.2 | 0.7 +/- 0.3 |
| 6/5/95 | 6/12/95 | 1.0 +/- 0.3 | 0.8 +/- 0.2 | 0.7 +/- 0.2 | 0.7 +/- 0.2 | 0.8 +/- 0.2 |
| 6/12/95 | 6/19/95 | 0.9 +/- 0.2 | 1.1 +/- 0.3 | 0.7 +/- 0.2 | 0.8 +/- 0.3 | 1.0 +/- 0.2 |
| 6/19/95 | 6/26/95 | 0.4 +/- 0.2 | 0.5 +/- 0.2 | 0.4 +/- 0.2 | 0.6 +/- 0.3 | 0.6 +/- 0.2 |

[1] Control location.

[2] Air sampler malfunction/power outage.

## TABLE B-6 - Continued

### Concentrations of Beta Emitters in Air Particulates
### (Results in Units of $10^{-2}$ pCi/$m^3$ $\pm$ 2$\sigma$)

| Start Date | Stop Date | A1 Entrance to Camp Conoy | A2 Camp Conoy Siren | A3 Bay Breeze Rd | A4 Frank's Garage Lusby | A5[1] EOF |
|---|---|---|---|---|---|---|
| 6/26/95 | 7/3/95 | 0.6 +/- 0.3 | 0.4 +/- 0.3 | 0.3 +/- 0.2 | 0.6 +/- 0.2 | 0.7 +/- 0.2 |
| 7/3/95 | 7/10/95 | 1.1 +/- 0.3 | 0.7 +/- 0.2 | 0.5 +/- 0.3 | 1.1 +/- 0.3 | 1.1 +/- 0.2 |
| 7/10/95 | 7/17/95 | 2.1 +/- 0.3 | 1.4 +/- 0.3 | 1.0 +/- 0.3 | 2.4 +/- 0.3 | 2.0 +/- 0.3 |
| 7/17/95 | 7/24/95 | 1.2 +/- 0.2 | 1.2 +/- 0.3 | 0.7 +/- 0.2 | 1.2 +/- 0.3 | 2.0 +/- 0.3 |
| 7/24/95 | 7/31/95 | 1.1 +/- 0.3 | 1.3 +/- 0.3 | 0.7 +/- 0.2 | 1.2 +/- 0.3 | 1.6 +/- 0.2 |
| 7/31/95 | 8/7/95 | 1.1 +/- 0.2 | 1.4 +/- 0.2 | 0.9 +/- 0.2 | 1.1 +/- 0.3 | 1.3 +/- 0.2 |
| 8/7/95 | 8/14/95 | 1.1 +/- 0.3 | 0.6 +/- 0.2 | 1.0 +/- 0.2 | 1.1 +/- 0.2 | 1.3 +/- 0.2 |
| 8/14/95 | 8/21/95 | 1.6 +/- 0.2 | 2.0 +/- 0.3 | 1.8 +/- 0.3 | 1.9 +/- 0.3 | 1.9 +/- 0.2 |
| 8/21/95 | 8/28/95 | 0.7 +/- 0.3 | 0.5 +/- 0.3 | 0.6 +/- 0.3 | 0.9 +/- 0.3 | 0.8 +/- 0.3 |
| 8/28/95 | 9/5/95 | 1.1 +/- 0.2 | 1.4 +/- 0.2 | 1.1 +/- 0.2 | 1.4 +/- 0.2 | 1.9 +/- 0.2 |
| 9/5/95 | 9/11/95 | 1.1 +/- 0.3 | 1.0 +/- 0.3 | 1.1 +/- 0.3 | 1.4 +/- 0.3 | 1.6 +/- 0.3 |
| 9/11/95 | 9/18/95 | 0.9 +/- 0.2 | 0.8 +/- 0.2 | 0.7 +/- 0.2 | 1.2 +/- 0.2 | 1.0 +/- 0.2 |
| 9/18/95 | 9/25/95 | 0.8 +/- 0.3 | 1.0 +/- 0.2 | 0.9 +/- 0.2 | 0.7 +/- 0.2 | 0.8 +/- 0.2 |
| 9/25/95 | 10/2/95 | 1.6 +/- 0.3 | 2.1 +/- 0.3 | 2.1 +/- 0.3 | 1.9 +/- 0.2 | 2.1 +/- 0.3 |
| 10/2/95 | 10/9/95 | 1.2 +/- 0.2 | 1.3 +/- 0.3 | 1.0 +/- 0.3 | 1.1 +/- 0.2 | 1.7 +/- 0.3 |
| 10/9/95 | 10/16/95 | 1.2 +/- 0.2 | 1.1 +/- 0.2 | 1.1 +/- 0.2 | 1.4 +/- 0.3 | 1.3 +/- 0.2 |
| 10/16/95 | 10/23/95 | 0.9 +/- 0.2 | 0.7 +/- 0.2 | 0.8 +/- 0.2 | 0.9 +/- 0.2 | 0.9 +/- 0.2 |
| 10/23/95 | 10/31/95 | 1.0 +/- 0.2 | 1.0 +/- 0.2 | 1.0 +/- 0.2 | 1.3 +/- 0.3 | 1.0 +/- 0.2 |
| 10/31/95 | 11/6/95 | 1.1 +/- 0.2 | 0.9 +/- 0.2 | 1.1 +/- 0.2 | 1.2 +/- 0.3 | 1.6 +/- 0.3 |
| 11/6/95 | 11/13/95 | 1.3 +/- 0.2 | 1.2 +/- 0.2 | 1.3 +/- 0.2 | 1.7 +/- 0.3 | 1.6 +/- 0.2 |
| 11/13/95 | 11/20/95 | 1.7 +/- 0.2 | 1.5 +/- 0.3 | 1.2 +/- 0.2 | 1.5 +/- 0.3 | 1.4 +/- 0.2 |
| 11/20/95 | 11/27/95 | 1.8 +/- 0.2 | 2.0 +/- 0.2 | 1.6 +/- 0.2 | 2.0 +/- 0.2 | 2.1 +/- 0.2 |
| 11/27/95 | 12/4/95 | 1.6 +/- 0.2 | 1.4 +/- 0.3 | 1.3 +/- 0.2 | 1.6 +/- 0.3 | 1.5 +/- 0.2 |
| 12/4/95 | 12/11/91 | 1.2 +/- 0.2 | 1.4 +/- 0.2 | 1.1 +/- 0.2 | 1.3 +/- 0.3 | 1.9 +/- 0.3 |
| 12/11/91 | 12/18/95 | 1.9 +/- 0.2 | 1.7 +/- 0.3 | 1.1 +/- 0.2 | 1.7 +/- 0.3 | 1.6 +/- 0.3 |
| 12/18/95 | 12/26/95 | 1.4 +/- 0.2 | 1.3 +/- 0.2 | 1.1 +/- 0.2 | 1.2 +/- 0.2 | 1.2 +/- 0.2 |
| 12/26/95 | 1/2/96 | 0.7 +/- 0.2 | 0.9 +/- 0.2 | 0.6 +/- 0.2 | 1.1 +/- 0.2 | 1.3 +/- 0.3 |

[1] Control location.

## TABLE B-6 - Continued

### Concentrations of Beta Emitters in Air Particulates
### (Results in Units of $10^{-2}$ pCi/$m^3$ $\pm 2\sigma$)

| Start Date | Stop Date | SFA1 MET Station | SFA2[1] Visitors Center | SFA3 NNW Corner of ISFSI | SFA4 S Corner of ISFSI |
|---|---|---|---|---|---|
| 12/27/94 | 1/3/95 | 1.9 +/- 0.3 | 2.0 +/- 0.3 | 1.7 +/- 0.2 | 2.0 +/- 0.3 |
| 1/3/95 | 1/9/95 | 2.0 +/- 0.3 | 2.2 +/- 0.4 | 2.0 +/- 0.3 | 2.1 +/- 0.4 |
| 1/9/95 | 1/16/95 | 2.1 +/- 0.3 | 2.0 +/- 0.3 | 1.7 +/- 0.3 | 2.3 +/- 0.3 |
| 1/16/95 | 1/23/95 | [2] | 0.7 +/- 0.3 | 0.6 +/- 0.2 | 0.7 +/- 0.2 |
| 1/23/95 | 1/30/95 | 2.5 +/- 0.4 | 1.9 +/- 0.3 | 1.6 +/- 0.2 | 1.9 +/- 0.3 |
| 1/30/95 | 2/6/95 | 1.8 +/- 0.4 | 1.4 +/- 0.3 | 1.0 +/- 0.2 | 1.2 +/- 0.3 |
| 2/6/95 | 2/13/95 | 3.5 +/- 0.5 | 2.2 +/- 0.3 | 1.5 +/- 0.2 | 2.0 +/- 0.3 |
| 2/13/95 | 2/20/95 | 1.7 +/- 0.3 | 1.7 +/- 0.3 | 2.1 +/- 0.3 | 1.3 +/- 0.2 |
| 2/20/95 | 2/27/95 | 2.5 +/- 0.6 | 1.4 +/- 0.3 | 1.0 +/- 0.2 | 1.4 +/- 0.3 |
| 2/27/95 | 3/6/95 | 2.2 +/- 0.4 | 1.6 +/- 0.3 | 1.2 +/- 0.2 | 1.4 +/- 0.3 |
| 3/6/95 | 3/13/95 | 1.9 +/- 0.3 | 1.8 +/- 0.3 | 1.5 +/- 0.2 | 2.0 +/- 0.3 |
| 3/13/95 | 3/20/95 | 2.0 +/- 0.3 | 2.2 +/- 0.3 | 1.6 +/- 0.2 | 2.2 +/- 0.3 |
| 3/20/95 | 3/27/95 | 1.2 +/- 0.3 | 1.5 +/- 0.3 | 1.3 +/- 0.2 | 1.4 +/- 0.3 |
| 3/27/95 | 4/3/95 | 1.5 +/- 0.3 | 1.7 +/- 0.3 | 1.3 +/- 0.2 | 1.5 +/- 0.2 |
| 4/3/95 | 4/10/95 | 1.9 +/- 0.3 | 2.0 +/- 0.3 | 1.7 +/- 0.2 | 2.0 +/- 0.3 |
| 4/10/95 | 4/17/95 | 1.1 +/- 0.2 | 1.2 +/- 0.3 | 1.0 +/- 0.2 | 1.3 +/- 0.2 |
| 4/17/95 | 4/24/95 | 0.7 +/- 0.2 | 0.9 +/- 0.2 | 0.9 +/- 0.2 | 1.0 +/- 0.2 |
| 4/24/95 | 5/1/95 | 0.6 +/- 0.2 | 0.8 +/- 0.2 | 0.8 +/- 0.2 | 0.9 +/- 0.2 |
| 5/1/95 | 5/8/95 | 0.8 +/- 0.2 | 1.1 +/- 0.3 | 0.8 +/- 0.2 | 1.0 +/- 0.2 |
| 5/8/95 | 5/15/95 | 0.6 +/- 0.2 | 0.8 +/- 0.2 | 0.3 +/- 0.2 | 0.4 +/- 0.2 |
| 5/15/95 | 5/22/95 | 1.0 +/- 0.2 | 1.2 +/- 0.3 | 1.0 +/- 0.2 | 1.0 +/- 0.2 |
| 5/22/95 | 5/30/95 | 0.8 +/- 0.2 | 0.9 +/- 0.2 | 0.7 +/- 0.2 | 1.1 +/- 0.2 |
| 5/30/95 | 6/5/95 | 0.5 +/- 0.2 | 0.7 +/- 0.3 | 0.5 +/- 0.2 | 0.4 +/- 0.2 |
| 6/5/95 | 6/12/95 | 0.8 +/- 0.2 | 0.8 +/- 0.2 | 0.9 +/- 0.2 | 1.2 +/- 0.2 |
| 6/12/95 | 6/19/95 | 0.7 +/- 0.2 | 1.0 +/- 0.3 | 0.7 +/- 0.2 | 0.8 +/- 0.2 |
| 6/19/95 | 6/26/95 | 0.5 +/- 0.2 | 0.6 +/- 0.2 | 0.4 +/- 0.2 | 0.5 +/- 0.2 |

[1] Control location.

[2] Air sampler malfunction/power outage.

## TABLE B-6 - Continued

### Concentrations of Beta Emitters in Air Particulates
### (Results in Units of $10^{-2}$ pCi/$m^3$ $\pm 2\sigma$)

| Start Date | Stop Date | SFA1 MET Station | SFA2[1] Visitors Center | SFA3 NNW Corner ISFSI | SFA4 S Corner ISFSI |
|---|---|---|---|---|---|
| 6/26/95 | 7/3/95 | 0.5 +/- 0.2 | 0.5 +/- 0.2 | 0.5 +/- 0.2 | 0.5 +/- 0.2 |
| 7/3/95 | 7/10/95 | 1.0 +/- 0.2 | 1.1 +/- 0.3 | 1.0 +/- 0.2 | 1.1 +/- 0.3 |
| 7/10/95 | 7/17/95 | 1.9 +/- 0.3 | 2.2 +/- 0.3 | 1.7 +/- 0.2 | 2.2 +/- 0.3 |
| 7/17/95 | 7/24/95 | 1.1 +/- 0.2 | 1.7 +/- 0.3 | 1.9 +/- 0.2 | 1.7 +/- 0.3 |
| 7/24/95 | 7/31/95 | 1.0 +/- 0.2 | 1.4 +/- 0.2 | 1.6 +/- 0.2 | 1.2 +/- 0.2 |
| 7/31/95 | 8/7/95 | 1.2 +/- 0.2 | 1.3 +/- 0.3 | 1.2 +/- 0.3 | 1.1 +/- 0.2 |
| 8/7/95 | 8/14/95 | 1.0 +/- 0.2 | 1.2 +/- 0.2 | 1.2 +/- 0.3 | 0.9 +/- 0.3 |
| 8/14/95 | 8/21/95 | 1.7 +/- 0.2 | 2.1 +/- 0.3 | 2.0 +/- 0.3 | 1.7 +/- 0.2 |
| 8/21/95 | 8/28/95 | 0.9 +/- 0.2 | 1.0 +/- 0.3 | 0.9 +/- 0.3 | 1.0 +/- 0.2 |
| 8/28/95 | 9/5/95 | 1.4 +/- 0.2 | 1.9 +/- 0.2 | 2.2 +/- 0.2 | 1.6 +/- 0.2 |
| 9/5/95 | 9/11/95 | 1.5 +/- 0.3 | 1.9 +/- 0.3 | 2.0 +/- 0.3 | 1.7 +/- 0.3 |
| 9/11/95 | 9/18/95 | 1.0 +/- 0.2 | 0.8 +/- 0.3 | 1.4 +/- 0.3 | 1.1 +/- 0.2 |
| 9/18/95 | 9/25/95 | 1.2 +/- 0.2 | 1.1 +/- 0.2 | 0.9 +/- 0.2 | 0.9 +/- 0.2 |
| 9/25/95 | 10/2/95 | 1.8 +/- 0.2 | 2.4 +/- 0.3 | 2.5 +/- 0.2 | 2.0 +/- 0.2 |
| 10/2/95 | 10/9/95 | 2.3 +/- 0.4 | 1.4 +/- 0.2 | 1.5 +/- 0.2 | 1.3 +/- 0.2 |
| 10/9/95 | 10/16/95 | 1.0 +/- 0.2 | 1.1 +/- 0.2 | 1.6 +/- 0.2 | 1.5 +/- 0.2 |
| 10/16/95 | 10/23/95 | 0.8 +/- 0.2 | 1.0 +/- 0.2 | 1.0 +/- 0.2 | 1.2 +/- 0.2 |
| 10/23/95 | 10/31/95 | 1.1 +/- 0.2 | 0.9 +/- 0.2 | 1.1 +/- 0.2 | 1.3 +/- 0.3 |
| 10/31/95 | 11/6/95 | 1.3 +/- 0.2 | 1.2 +/- 0.2 | 1.5 +/- 0.2 | 1.8 +/- 0.2 |
| 11/6/95 | 11/13/95 | 0.9 +/- 0.2 | 1.1 +/- 0.2 | 1.5 +/- 0.3 | 1.7 +/- 0.3 |
| 11/13/95 | 11/20/95 | 1.1 +/- 0.2 | 1.2 +/- 0.2 | 1.5 +/- 0.2 | 1.6 +/- 0.2 |
| 11/20/95 | 11/27/95 | 1.7 +/- 0.2 | 1.9 +/- 0.3 | 2.1 +/- 0.3 | 2.4 +/- 0.2 |
| 11/27/95 | 12/4/95 | 1.4 +/- 0.2 | 1.3 +/- 0.2 | 1.7 +/- 0.3 | 1.9 +/- 0.3 |
| 12/4/95 | 12/11/91 | 1.1 +/- 0.2 | 1.4 +/- 0.2 | 1.3 +/- 0.2 | 1.5 +/- 0.2 |
| 12/11/91 | 12/18/95 | 1.2 +/- 0.2 | 1.4 +/- 0.2 | 1.9 +/- 0.3 | 1.8 +/- 0.3 |
| 12/18/95 | 12/26/95 | 1.1 +/- 0.2 | 1.0 +/- 0.2 | 1.2 +/- 0.2 | 1.5 +/- 0.2 |
| 12/26/95 | 1/2/96 | 0.8 +/- 0.2 | 0.9 +/- 0.2 | 1.3 +/- 0.2 | 1.1 +/- 0.3 |

[1] Control location.

## TABLE B-7

### Concentration of Gamma Emitters in Air Particulates
### (Results in Units of $10^{-3}$ pCi/$m^3$ ± 2σ)

| Sample Date | A1 Entrance to Camp Conoy | A2 Camp Conoy Siren | A3 Bay Breeze Rd. | A4 Frank's Garage Lusby | A5[1] EOF |
|---|---|---|---|---|---|
| 1/15/95 | * | * | * | * | * |
| 2/15/95 | * | * | * | * | * |
| 3/15/95 | * | * | * | * | * |
| 4/15/95 | * | * | * | * | * |
| 5/15/95 | * | * | * | * | * |
| 6/15/95 | * | * | * | * | * |
| 7/15/95 | * | * | * | * | * |
| 8/15/95 | * | * | * | * | * |
| 9/15/95 | * | * | * | * | * |
| 10/15/95 | * | * | * | * | * |
| 11/15/95 | * | * | * | * | * |
| 12/15/95 | * | * | * | * | * |

| Sample Date | SFA1 MET Station | SFA2[1] Visitors Center | SFA3 NNW Corner of ISFSI | SFA4 S Corner of ISFSI |
|---|---|---|---|---|
| 1/15/95 | * | * | * | * |
| 2/15/95 | * | * | * | * |
| 3/15/95 | * | * | * | * |
| 4/15/95 | * | * | * | * |
| 5/15/95 | * | * | * | * |
| 6/15/95 | * | * | * | * |
| 7/15/95 | * | * | * | * |
| 8/15/95 | * | * | * | * |
| 9/15/95 | * | * | * | * |
| 10/15/95 | * | * | * | * |
| 11/15/95 | * | * | * | * |
| 12/15/95 | * | * | * | * |

[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 | 6/26/95 | Collards | * |
| Bay Breeze Rd | 7/27/95 | Collards | * |
| | 8/23/95 | Collards | * |
| | 9/25/95 | Collards | * |
| | 10/30/95 | Collards | * |
| Ib2 | 6/26/95 | Cabbage | * |
| Bay Breeze Rd | 7/27/95 | Cabbage | * |
| | 8/23/95 | Cabbage | * |
| | 9/25/95 | Cabbage | * |
| | 10/30/95 | Cabbage | * |
| Ib3 | 6/26/95 | Broccoli | * |
| Bay Breeze Rd | 7/27/95 | Broccoli | * |
| | 8/23/95 | Brussel Sprouts | * |
| | 9/25/95 | Brussel Sprouts | * |
| | 10/30/95 | Brussel Sprouts | * |
| Ib4 | 6/26/95 | Collards | * |
| Camp Conoy | 7/27/95 | Collards | * |
| Entrance | 8/23/95 | Collards | * |
| | 9/25/95 | Collards | * |
| | 10/30/95 | Collards | * |
| Ib5 | 6/26/95 | Cabbage | * |
| Camp Conoy | 7/27/95 | Cabbage | * |
| Entrance | 8/23/95 | Cabbage | * |
| | 9/25/95 | Cabbage | * |
| | 10/30/95 | Cabbage | * |
| Ib6 | 6/26/95 | Broccoli | * |
| Camp Conoy | 7/27/95 | Broccoli | * |
| Entrance | 8/23/95 | Brussel Sprouts | * |
| | 9/25/95 | Brussel Sprouts | * |
| | 10/30/95 | Brussel Sprouts | * |

* Non-natural gamma emitters < MDA.

## TABLE B-8a - Continued

### Concentration of Gamma Emitters in Vegetation Samples
### (Results in Units of pCi/kg (wet) ± 2σ)

| Sample Code | Sample Date | Sample Type | Gamma Emitters |
|---|---|---|---|
| Ib7 | 6/26/95 | Collards | * |
| EOF[1] | 7/27/95 | Collards | * |
| | 8/23/95 | Collards | * |
| | 9/25/95 | Collards | * |
| | 10/30/95 | Collards | * |
| Ib8 | 6/26/95 | Cabbage | * |
| EOF[1] | 7/27/95 | Cabbage | * |
| | 8/23/95 | Cabbage | * |
| | 9/25/95 | Cabbage | * |
| | 10/30/95 | Cabbage | * |
| Ib9 | 6/26/95 | Broccoli | * |
| EOF[1] | 7/27/95 | Broccoli | * |
| | 8/23/95 | Brussel Sprouts | * |
| | 9/25/95 | Brussel Sprouts | * |
| | 10/30/95 | Brussel Sprouts | * |

[1] Control location.

* Non-natural gamma emitters < MDA.

## TABLE B-8b

### Concentration of Gamma Emitters in Vegetation From Locations Around the ISFSI (Results in Units of pCi/kg (wet) ± 2σ)

| Sample Code | Sample Date | Cs-137 |
|---|---|---|
| SFb1 | 2/24/95 | * |
| MET Station | 6/19/95 | * |
| | 9/18/95 | * |
| | 12/18/95 | * |
| SFb2[1] | 2/24/95 | * |
| Visitors Center | 6/19/95 | * |
| | 9/18/95 | * |
| | 12/18/95 | * |
| SFb3 | 2/24/95 | 23 +/- 11 |
| NNW Corner | 6/19/95 | * |
| of ISFSI | 9/18/95 | * |
| | 12/18/95 | 30 +/- 16 |
| SFb4 | 2/24/95 | * |
| S of ISFSI | 6/19/95 | * |
| | 9/18/95 | * |
| | 12/18/95 | * |
| SFb5 | 2/24/95 | 92 +/- 21 |
| Camp Conoy | 6/19/95 | 38 +/- 17 |
| Entrance | 9/18/95 | 55 +/- 20 |
| | 12/18/95 | 51 +/- 17 |

[1] Control location.

* All other non-natural gamma emitters < MDA.

## TABLE B-9

### Concentrations 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 |
|---|---|---|
| SFS1 | 2/24/95 | * |
| MET Station | 6/19/95 | * |
| | 9/18/95 | * |
| | 12/18/95 | * |
| SFS2[1] | 2/24/95 | 113 +/- 43 |
| Visitors Center | 6/19/95 | 150 +/- 41 |
| | 9/18/95 | 227 +/- 48 |
| | 12/18/95 | 225 +/- 51 |
| SFS3 | 2/24/95 | 1034 +/- 97 |
| NNW Corner | 6/19/95 | 877 +/- 100 |
| of ISFSI | 9/18/95 | 604 +/- 57 |
| | 12/18/95 | 971 +/- 86 |
| SFS4 | 2/24/95 | 64 +/- 37 |
| South of | 6/19/95 | 76 +/- 23 |
| ISFSI | 9/18/95 | * |
| | 12/18/95 | * |
| SFS5 | 2/24/95 | 187 +/- 36 |
| Entrance to | 6/19/95 | 278 +/- 33 |
| Camp Conoy | 9/18/95 | 258 +/- 29 |
| | 12/18/95 | 349 +/- 41 |

[1] Control location.

* All other non-natural gamma emitters were < MDA.

## TABLE B-10

### Typical MDA Ranges for Gamma Spectrometry

| Selected Nuclides | Bay Water pCi/l | Fish pCi/kg | Shellfish pCi/kg | Shoreline pCi/kg | Vegetation pCi/kg | Soil pCi/kg | Particulates $10^{-3}$ pCi/m$^3$ |
|---|---|---|---|---|---|---|---|
| Na-22 | 1.8-3.8 | 27-34 | 11-36 | 26-31 | 18-51 | 19-88 | 1.2-7.7 |
| Cr-51 | 13-35 | 119-155 | 81-269 | 151-199 | 97-190 | 185-541 | 13-98 |
| Mn-54 | 1.6-3.0 | 13-22 | 10-30 | 22-27 | 15-35 | 24-70 | 1.2-9.2 |
| Co-58 | 1.5-3.5 | 19-24 | 10-33 | 23-39 | 14-34 | 25-69 | 1.4-9.7 |
| Fe-59 | 3.6-9.4 | 50-69 | 27-76 | 50-53 | 31-88 | 47-153 | 3.6-24.9 |
| Co-60 | 1.7-3.6 | 23-28 | 12-33 | 26-29 | 18-45 | 28-83 | 1.1-7.3 |
| Zn-65 | 3.2-8.0 | 23-27 | 24-69 | 43-55 | 34-89 | 52-160 | 2.2-16.7 |
| Nb-95 | 1.7-4.0 | 20-28 | 12-40 | 24-31 | 15-31 | 26-76 | 1.9-13.7 |
| Zr-95 | 2.8-6.0 | 32-41 | 22-59 | 37-39 | 27-58 | 42-122 | 2.5-15.8 |
| Ru-106 | 13-26 | 141-177 | 74-254 | 172-252 | 117-271 | 204-736 | 8.0-56.4 |
| Ag-110m | 1.5-2.8 | 15-18 | 9-27 | 18-25 | 12-31 | 22-92 | .9-16.6 |
| Te-129m | 20-49 | 199-280 | 123-425 | 226-295 | 142-331 | 297-969 | 2.2-133 |
| I-131 | 2-19 | 28-84 | 25-117 | 29-33 | 14-34 | 28-137 | [1] |
| Cs-134 | 1.8-2.6 | 14-16 | 10-25 | 22-33 | 16-28 | 25-80 | 1.2-8.6 |
| Cs-137 | 1.5-2.7 | 16-18 | 8-27 | 19-22 | 14-32 | 27-90 | .9-6.0 |
| Ba-140 | 6-33 | 90-183 | 58-242 | 99-101 | 44-114 | 98-334 | 13.2-105 |
| Ce-144 | 9-14 | 44-51 | 31-120 | 74-109 | 59-119 | 94-342 | 3.2-46.4 |

[1] The MDA range for I-131 on silver zeolite cartridge is 1.4 X $10^{-3}$ to 8.6 X $10^{-3}$ pCi/m$^3$.

# TABLE B-11

## Typical LLDs for Gamma Spectrometry

| Selected Nuclides | Bay Water pCi/l | Fish pCi/kg | Shellfish pCi/kg | Sediment pCi/kg | Particulate $10^{-3}$pCi/m$^3$ | Precipitation pCi/l | Vegetation pCi/kg | Soil pCi/kg | Well Water pCi/l |
|---|---|---|---|---|---|---|---|---|---|
| Na-22 | 2.9 | 22 | 22 | 45 | 2.9 | 2.9 | 35 | 45 | 2.9 |
| Cr-51 | 17 | 88 | 88 | 201 | 12 | 17 | 162 | 201 | 17 |
| Mn-54 | 2.4 | 17 | 17 | 35 | 2.1 | 2.4 | 27 | 35 | 2.4 |
| Co-58 | 2.4 | 16 | 16 | 33 | 2.0 | 2.4 | 25 | 33 | 2.4 |
| Fe-59 | 5.2 | 37 | 37 | 71 | 4.6 | 5.2 | 60 | 71 | 5.2 |
| Co-60 | 2.8 | 22 | 22 | 41 | 2.7 | 2.8 | 33 | 41 | 2.8 |
| Zn-65 | 5.6 | 23 | 23 | 67 | 2.8 | 5.6 | 66 | 67 | 5.6 |
| Nb-95 | 2.2 | 15 | 15 | 35 | 1.9 | 2.2 | 25 | 35 | 2.2 |
| Zr-95 | 3.8 | 27 | 27 | 56 | 3.3 | 3.8 | 44 | 56 | 3.8 |
| Ru-106 | 20 | 135 | 135 | 285 | 17 | 20 | 223 | 285 | 20 |
| Ag-110m | 2.1 | 14 | 14 | 37 | 1.8 | 2.1 | 25 | 37 | 2.1 |
| Te-129m | 26 | 149 | 149 | 353 | 20 | 26 | 265 | 353 | 26 |
| I-131 | 2.0 | 11 | 11 | 25 | 1.5[1] | 2.0 | 20 | 25 | 2.0 |
| Cs-134 | 2.2 | 15 | 15 | 34 | 1.9 | 2.2 | 24 | 34 | 2.2 |
| Cs-137 | 2.3 | 15 | 15 | 33 | 1.8 | 2.3 | 27 | 33 | 2.3 |
| Ba-140 | 7.3 | 48 | 48 | 106 | 6.1 | 7.3 | 80 | 106 | 7.3 |
| La-140 | 4.1 | 26 | 26 | 56 | 3.4 | 4.1 | 41 | 56 | 4.1 |
| Ce-144 | 12 | 43 | 43 | 117 | 5.5 | 12 | 101 | 117 | 12 |

[1] The LLD for I-131 on silver zeolite cartridges is $7.9 \times 10^{-3}$ pCi/m$^3$ for NaI1 Detector, and $5.3 \times 10^{-3}$ pCi/m$^3$ for NaI2 Detector.

## TABLE B-12

### Direct Radiation
### (Results in Units of mR/30 days ± 2σ)

| | | | | |
|---|---|---|---|---|
| DR01 | JAN | 4.34 +/- 1.00 | FEB | 5.92 +/- 2.40 |
| On Site, Along Cliffs | MAR | 4.53 +/- 0.60 | APR | 4.82 +/- 1.26 |
| | MAY | 3.93 +/- 0.76 | JUN | 4.72 +/- 0.62 |
| | JUL | 4.25 +/- 0.94 | AUG | 4.70 +/- 1.32 |
| | SEP | 4.32 +/- 1.22 | OCT | 4.67 +/- 0.94 |
| | NOV | 4.18 +/- 0.50 | DEC | 4.25 +/- 0.30 |
| DR02 | JAN | 3.57 +/- 1.62 | FEB | 3.31 +/- 0.08 |
| Route 765, Auto Dump | MAR | 3.91 +/- 0.20 | APR | 4.40 +/- 1.42 |
| | MAY | 3.57 +/- 0.84 | JUN | 3.25 +/- 0.70 |
| | JUL | 3.49 +/- 0.20 | AUG | 3.92 +/- 0.80 |
| | SEP | 3.57 +/- 0.54 | OCT | 4.26 +/- 0.94 |
| | NOV | 3.61 +/- 0.40 | DEC | 3.85 +/- 0.56 |
| DR03 | JAN | 3.89 +/- 0.40 | FEB | 3.38 +/- 0.66 |
| Route 765 | MAR | 3.52 +/- 0.66 | APR | [1] |
| Giovanni's Tavern | MAY | 3.70 +/- 0.46 | JUN | 3.08 +/- 0.14 |
| | JUL | 3.61 +/- 1.76 | AUG | 3.78 +/- 0.68 |
| | SEP | 3.81 +/- 0.56 | OCT | 4.10 +/- 0.54 |
| | NOV | 3.50 +/- 0.52 | DEC | 3.92 +/- 0.60 |
| DR04 | JAN | 3.65 +/- 1.34 | FEB | 4.16 +/- 1.64 |
| Route 765, across from | MAR | 4.00 +/- 0.78 | APR | 4.38 +/- 1.16 |
| White Sands Dr. | MAY | 4.21 +/- 0.14 | JUN | 3.48 +/- 0.52 |
| | JUL | 3.89 +/- 0.40 | AUG | 4.86 +/- 1.48 |
| | SEP | 4.67 +/- 0.82 | OCT | 4.86 +/- 3.14 |
| | NOV | 4.23 +/- 0.28 | DEC | 3.82 +/- 1.04 |
| DR05 | JAN | 5.38 +/- 4.80 | FEB | 4.42 +/- 1.32 |
| Route 765, | MAR | 3.76 +/- 1.28 | APR | 3.79 +/- 0.32 |
| St. John's Creek | MAY | 3.68 +/- 0.54 | JUN | 4.05 +/- 0.14 |
| | JUL | 3.64 +/- 0.46 | AUG | 4.33 +/- 0.42 |
| | SEP | 4.52 +/- 0.96 | OCT | 4.68 +/- 0.52 |
| | NOV | 4.03 +/- 0.86 | DEC | 4.53 +/- 0.82 |

[1] Missing TLDs.

## TABLE B-12 - Continued

**Direct Radiation**
**(Results in Units of mR/30 days ± 2σ)**

| | | | | |
|---|---|---|---|---|
| DR06 | JAN | 3.62 +/- 0.74 | FEB | 3.51 +/- 0.38 |
| (Frank's Garage, Lusby) | MAR | 3.43 +/- 2.02 | APR | 4.14 +/- 1.86 |
| | MAY | 3.71 +/- 0.66 | JUN | 3.37 +/- 0.72 |
| | JUL | 3.30 +/- 0.30 | AUG | 3.73 +/- 0.62 |
| | SEP | 3.90 +/- 0.58 | OCT | 4.10 +/- 1.10 |
| | NOV | 3.35 +/- 0.72 | DEC | 3.66 +/- 0.52 |
| DR07 | JAN | 3.20 +/- 0.66 | FEB | 3.09 +/- 0.66 |
| (Entrance to | MAR | 3.36 +/- 0.62 | APR | 3.61 +/- 0.58 |
| Camp Conoy) | MAY | 3.63 +/- 0.48 | JUN | 2.66 +/- 0.26 |
| | JUL | 3.33 +/- 0.32 | AUG | 3.74 +/- 0.88 |
| | SEP | 3.96 +/- 1.14 | OCT | 4.29 +/- 1.02 |
| | NOV | 3.35 +/- 0.82 | DEC | 3.69 +/- 0.40 |
| DR08 | JAN | 4.75 +/- 1.02 | FEB | 4.65 +/- 0.62 |
| (Camp Conoy Rd siren) | MAR | 4.15 +/- 0.58 | APR | 4.68 +/- 1.04 |
| | MAY | 4.88 +/- 0.78 | JUN | 4.68 +/- 0.06 |
| | JUL | 4.85 +/- 1.08 | AUG | 5.05 +/- 0.96 |
| | SEP | 5.31 +/- 1.06 | OCT | 5.35 +/- 0.64 |
| | NOV | 4.61 +/- 0.84 | DEC | 4.98 +/- 0.54 |
| DR09 | JAN | 3.68 +/- 0.70 | FEB | 3.57 +/- 0.92 |
| (Bay Breeze Rd) | MAR | 3.74 +/- 0.58 | APR | 3.78 +/- 0.60 |
| | MAY | 4.09 +/- 0.22 | JUN | 3.72 +/- 0.06 |
| | JUL | 3.68 +/- 0.92 | AUG | 4.46 +/- 2.44 |
| | SEP | 4.06 +/- 0.76 | OCT | 3.96 +/- 1.44 |
| | NOV | 3.50 +/- 0.12 | DEC | 4.29 +/- 1.04 |
| DR10 | JAN | 3.74 +/- 0.04 | FEB | 3.69 +/- 0.94 |
| (Calvert Beach Rd. | MAR | 3.48 +/- 0.02 | APR | 3.76 +/- 0.70 |
| and Decatur St.) | MAY | 3.75 +/- 0.02 | JUN | 4.49 +/- 2.80 |
| | JUL | 3.59 +/- 0.22 | AUG | 4.64 +/- 0.18 |
| | SEP | 3.98 +/- 0.86 | OCT | 3.86 +/- 1.68 |
| | NOV | 3.47 +/- 0.86 | DEC | 3.83 +/- 0.96 |
| DR11 | JAN | 3.66 +/- 0.56 | FEB | 3.39 +/- 0.26 |
| (Dirt road off Mackall | MAR | 3.44 +/- 0.46 | APR | 3.29 +/- 0.10 |
| & Parran Rds.) | MAY | 3.63 +/- 1.00 | JUN | 4.01 +/- 0.54 |
| | JUL | 3.62 +/- 0.46 | AUG | 4.29 +/- 0.82 |
| | SEP | 4.01 +/- 0.80 | OCT | 4.13 +/- 0.12 |
| | NOV | 3.87 +/- 0.14 | DEC | 3.69 +/- 0.36 |

## TABLE B-12 - Continued

### Direct Radiation
### (Results in Units of mR/30 days ± 2σ)

| | | | | | |
|---|---|---|---|---|---|
| DR12 | JAN | 3.37 +/- 0.20 | FEB | 3.42 +/- 0.10 |
| Bowen & Mackall Rds. | MAR | 3.49 +/- 0.50 | APR | 3.83 +/- 0.08 |
| | MAY | 3.39 +/- 0.44 | JUN | 3.30 +/- 0.76 |
| | JUL | 3.50 +/- 0.60 | AUG | 3.48 +/- 0.90 |
| | SEP | 3.97 +/- 0.46 | OCT | 4.79 +/- 0.56 |
| | NOV | 3.30 +/- 0.02 | DEC | 3.81 +/- 0.56 |
| DR13 | JAN | 3.47 +/- 0.52 | FEB | 4.90 +/- 2.56 |
| Mackall Rd., | MAR | 3.82 +/- 0.00 | APR | 4.21 +/- 0.42 |
| near Wallville | MAY | 4.47 +/- 1.30 | JUN | 3.22 +/- 1.12 |
| | JUL | 3.54 +/- 1.34 | AUG | 3.62 +/- 1.38 |
| | SEP | 3.89 +/- 1.12 | OCT | 4.59 +/- 0.16 |
| | NOV | 3.12 +/- 0.64 | DEC | 3.94 +/- 0.82 |
| DR14 | JAN | 3.85 +/- 0.18 | FEB | 4.21 +/- 0.18 |
| Rodney Point | MAR | 4.11 +/- 0.38 | APR | 4.60 +/- 1.06 |
| | MAY | 4.58 +/- 1.70 | JUN | 4.70 +/- 0.66 |
| | JUL | 3.87 +/- 0.44 | AUG | 4.50 +/- 1.00 |
| | SEP | 4.22 +/- 0.94 | OCT | 4.54 +/- 0.20 |
| | NOV | 4.33 +/- 1.54 | DEC | 4.34 +/- 0.38 |
| DR15 | JAN | 4.02 +/- 0.20 | FEB | 4.09 +/- 0.68 |
| Mill Bridge & Turner Rds. | MAR | 3.78 +/- 0.66 | APR | 4.39 +/- 0.32 |
| | MAY | 4.07 +/- 0.02 | JUN | 4.10 +/- 1.04 |
| | JUL | 4.02 +/- 0.46 | AUG | 4.72 +/- 1.68 |
| | SEP | 4.12 +/- 0.34 | OCT | 4.41 +/- 1.22 |
| | NOV | 3.78 +/- 0.74 | DEC | 4.57 +/- 0.94 |
| DR16 | JAN | [1] | FEB | 4.29 +/- 0.36 [1] |
| Across from | MAR | 3.41 +/- 1.36 | APR | 4.40 +/- 0.94 |
| Appeal School | MAY | 4.00 +/- 0.32 | JUN | 4.11 +/- 2.20 |
| | JUL | 3.67 +/- 0.24 | AUG | 3.09 +/- 1.30 |
| | SEP | 4.83 +/- 1.04 | OCT | 4.21 +/- 1.34 |
| | NOV | 3.33 +/- 0.44 | DEC | 4.10 +/- 0.50 |

[1] Missing TLDs.

## TABLE B-12 - Continued

### Direct Radiation
### (Results in Units of mR/30 days ± 2σ)

| | | | | |
|---|---|---|---|---|
| DR17 | JAN | 4.06 +/- 0.70 | FEB | 3.50 +/- 0.80 |
| Cove Point & | MAR | 4.57 +/- 1.20 | APR | 4.63 +/- 0.48 |
| Little Cove Point Rds. | MAY | 4.50 +/- 0.80 | JUN | 4.20 +/- 1.58 |
| | JUL | 3.94 +/- 0.54 | AUG | 5.15 +/- 0.56 |
| | SEP | 4.34 +/- 0.88 | OCT | 4.45 +/- 1.28 |
| | NOV | 3.90 +/- 0.04 | DEC | 4.57 +/- 0.68 |
| DR18 | JAN | 3.26 +/- 0.28 | FEB | 3.60 +/- 0.56 |
| Cove Point | MAR | 3.59 +/- 0.94 | APR | 4.13 +/- 0.12 |
| | MAY | 3.39 +/- 0.52 | JUN | 3.67 +/- 0.26 |
| | JUL | 3.38 +/- 0.46 | AUG | 4.05 +/- 0.38 |
| | SEP | 3.97 +/- 1.60 | OCT | 4.53 +/- 0.04 |
| | NOV | 3.39 +/- 1.14 | DEC | 3.85 +/- 0.58 |
| DR19 | JAN | 4.06 +/- 2.26 | FEB | 3.31 +/- 0.88 |
| Long Beach | MAR | 3.81 +/- 0.58 | APR | 3.97 +/- 1.40 |
| | MAY | 3.81 +/- 0.02 | JUN | 3.38 +/- 0.78 |
| | JUL | 3.63 +/- 1.00 | AUG | 4.29 +/- 3.50 |
| | SEP | 3.70 +/- 0.24 | OCT | 5.01 +/- 1.96 |
| | NOV | 3.27 +/- 1.18 | DEC | 3.85 +/- 0.52 |
| DR20 | JAN | 4.26 +/- 0.16 | FEB | 4.43 +/- 0.76 |
| On site, near shore | MAR | 4.62 +/- 0.96 | APR | 5.04 +/- 1.88 |
| | MAY | 4.49 +/- 0.76 | JUN | 4.75 +/- 1.24 |
| | JUL | 4.43 +/- 0.56 | AUG | 4.87 +/- 1.32 |
| | SEP | 4.53 +/- 0.16 | OCT | 5.32 +/- 2.36 |
| | NOV | 4.42 +/- 1.02 | DEC | 4.69 +/- 0.32 |
| DR21[1] | JAN | 4.73 +/- 2.34 | FEB | 3.77 +/- 1.14 |
| EOF | MAR | 4.05 +/- 0.46 | APR | 4.65 +/- 1.52 |
| | MAY | 4.71 +/- 0.20 | JUN | 3.97 +/- 0.58 |
| | JUL | 4.23 +/- 0.82 | AUG | 4.44 +/- 0.20 |
| | SEP | 4.63 +/- 0.10 | OCT | 4.88 +/- 1.78 |
| | NOV | 3.76 +/- 0.70 | DEC | 4.28 +/- 0.16 |

[1] Control location.

## TABLE B-12 - Continued

### Direct Radiation
### (Results in Units of mP/30 days ± 2σ)

| | | | | |
|---|---|---|---|---|
| DR22[1] | JAN | 3.25 +/- 0.30 | FEB | 3.02 +/- 0.68 |
| Solomons Island | MAR | 3.18 +/- 1.02 | APR | 3.92 +/- 1.64 |
| | MAY | 3.89 +/- 1.22 | JUN | 3.41 +/- 0.18 |
| | JUL | 2.97 +/- 0.44 | AUG | 4.95 +/- 5.60 |
| | SEP | 3.33 +/- 0.72 | OCT | 3.78 +/- 0.90 |
| | NOV | 3.39 +/- 0.72 | DEC | 4.06 +/- 1.04 |
| DR23[1] | JAN | 5.23 +/- 1.30 | FEB | 5.53 +/- 3.00 |
| Taylors Island | MAR | 4.65 +/- 1.36 | APR | 5.52 +/- 0.54 |
| | MAY | 5.60 +/- 0.94 | JUN | 5.02 +/- 0.80 |
| | JUL | 6.31 +/- 0.56 | AUG | 5.55 +/- 1.28 |
| | SEP | 5.69 +/- 1.60 | OCT | 6.04 +/- 3.72 |
| | NOV | 4.56 +/- 0.58 | DEC | 5.70 +/- 1.58 |
| DR30 | JAN | 4.61 +/- 0.58 | FEB | 3.79 +/- 0.56 |
| MET Station | MAR | 4.02 +/- 1.40 | APR | 5.38 +/- 2.62 |
| | MAY | 4.63 +/- 1.16 | JUN | 4.04 +/- 0.58 |
| | JUL | 3.88 +/- 0.18 | AUG | 3.93 +/- 0.46 |
| | SEP | 4.19 +/- 1.10 | OCT | 4.54 +/- 0.90 |
| | NOV | 3.53 +/- 0.34 | DEC | 4.37 +/- 0.74 |
| SFDR01 | JAN | 4.68 +/- 0.34 | FEB | 6.10 +/- 2.48 |
| Collocated w/ | MAR | 4.61 +/- 0.44 | APR | 5.53 +/- 1.00 |
| Plant TLD #159 | MAY | 5.77 +/- 3.66 | JUN | 4.40 +/- 0.80 |
| | JUL | 4.26 +/- 0.92 | AUG | 4.68 +/- 2.22 |
| | SEP | 5.02 +/- 1.44 | OCT | 5.10 +/- 1.18 |
| | NOV | 4.01 +/- 0.96 | DEC | 5.06 +/- 1.10 |
| SFDR02 | JAN | 4.77 +/- 0.56 | FEB | 4.97 +/- 0.10 |
| Collocated w/ | MAR | 5.14 +/- 0.82 | APR | 5.72 +/- 0.32 |
| Plant TLD #160 | MAY | 7.05 +/- 0.78 | JUN | 5.02 +/- 0.62 |
| | JUL | 5.33 +/- 0.70 | AUG | 5.66 +/- 1.14 |
| | SEP | 6.17 +/- 2.96 | OCT | 5.82 +/- 1.00 |
| | NOV | 4.63 +/- 0.26 | DEC | 5.53 +/- 1.46 |

[1] Control location.

## TABLE B-12 - Continued

### Direct Radiation
### (Results in Units of mR/30 days ± 2σ)

| | | | | |
|---|---|---|---|---|
| SFDR03 | JAN | 4.62 +/- 0.56 | FEB | 4.94 +/- 1.16 |
| Collocated w/ | MAR | 4.58 +/- 0.46 | APR | 4.94 +/- 0.90 |
| Plant TLD #161 | MAY | 4.71 +/- 1.78 | JUN | 4.76 +/- 1.10 |
| | JUL | 4.78 +/- 0.54 | AUG | 5.12 +/- 0.78 |
| | SEP | 4.97 +/- 0.10 | OCT | 4.82 +/- 1.70 |
| | NOV | 4.24 +/- 0.16 | DEC | 4.78 +/- 0.56 |
| SFDR04 | JAN | 4.11 +/- 0.16 | FEB | 4.97 +/- 0.78 |
| Collocated w/ | MAR | 4.63 +/- 0.40 | APR | 5.34 +/- 0.34 |
| Plant TLD #162 | MAY | 4.95 +/- 1.10 | JUN | 3.92 +/- 1.42 |
| | JUL | 5.04 +/- 0.34 | AUG | 4.33 +/- 0.68 |
| | SEP | 4.66 +/- 0.82 | OCT | 4.73 +/- 0.48 |
| | NOV | 5.14 +/- 1.26 | DEC | 5.18 +/- 1.74 |
| SFDR05 | JAN | 4.49 +/- 1.82 | FEB | 4.16 +/- 1.18 |
| Collocated w/ | MAR | 4.13 +/- 1.30 | APR | 3.88 +/- 0.24 [2] |
| Plant TLD #163 | MAY | 4.12 +/- 0.68 | JUN | 3.91 +/- 0.76 |
| | JUL | 4.25 +/- 0.96 | AUG | 3.80 +/- 1.56 |
| | SEP | 4.36 +/- 1.16 | OCT | 4.36 +/- 0.04 |
| | NOV | 3.97 +/- 0.46 | DEC | 5.20 +/- 4.92 |
| SFDR06 | JAN | 4.85 +/- 0.88 | FEB | 4.48 +/- 0.04 |
| Collocated w/ | MAR | 5.29 +/- 1.64 | APR | 5.14 +/- 1.96 |
| Plant TLD #164 | MAY | 4.34 +/- 1.28 | JUN | 4.43 +/- 0.72 |
| | JUL | 4.91 +/- 1.04 | AUG | 4.40 +/- 0.40 |
| | SEP | 4.00 +/- 0.22 | OCT | 4.69 +/- 1.36 |
| | NOV | 4.53 +/- 1.00 | DEC | 4.92 +/- 0.64 |
| SFDR07[1] | JAN | 4.12 +/- 0.92 | FEB | 5.68 +/- 0.16 |
| Visitors Center | MAR | 4.29 +/- 0.50 | APR | 6.04 +/- 0.08 |
| | MAY | 4.37 +/- 0.70 | JUN | 4.17 +/- 1.74 |
| | JUL | 4.23 +/- 0.50 | AUG | 4.65 +/- 2.18 |
| | SEP | 4.25 +/- 1.08 | OCT | 5.15 +/- 1.02 |
| | NOV | 3.91 +/- 0.98 | DEC | 5.25 +/- 1.56 |

[1] Control location.

[2] Missing TLDs.

## TABLE B-12 - Continued

### Direct Radiation
### (Results in Units of mR/30 days ± 2σ)

| | | | | |
|---|---|---|---|---|
| SFDR08 | JAN | 5.97 +/- 1.68 | FEB | 7.38 +/- 2.50 |
| NNW of ISFSI | MAR | 6.62 +/- 2.00 | APR | 5.30 +/- 2.24 |
| | MAY | 6.83 +/- 1.26 | JUN | 5.78 +/- 0.54 |
| | JUL | 6.71 +/- 0.16 | AUG | 6.58 +/- 1.18 |
| | SEP | 7.27 +/- 0.22 | OCT | 6.60 +/- 1.50 |
| | NOV | 5.62 +/- 1.18 | DEC | 6.74 +/- 2.06 |
| SFDR09 | JAN | 4.19 +/- 1.02 | FEB | 5.61 +/- 2.28 |
| S of ISFSI | MAR | 3.94 +/- 0.90 | APR | 3.50 +/- 0.50 |
| | MAY | 3.88 +/- 0.06 | JUN | 3.97 +/- 2.00 |
| | JUL | 3.99 +/- 0.80 | AUG | 3.87 +/- 0.62 |
| | SEP | 4.04 +/- 1.12 | OCT | 4.19 +/- 0.70 |
| | NOV | 3.58 +/- 0.28 | DEC | 4.74 +/- 1.36 |
| SFDR10 | JAN | 10.63 +/- 0.68 | FEB | 13.36 +/- 3.50 |
| NNW of ISFSI | MAR | 11.08 +/- 0.24 | APR | 10.47 +/- 1.42 |
| | MAY | 11.49 +/- 1.70 | JUN | 11.15 +/- 0.16 |
| | JUL | 11.52 +/- 3.36 | AUG | 10.90 +/- 2.74 |
| | SEP | 15.14 +/- 0.24 | OCT | 16.50 +/- 5.28 |
| | NOV | 9.91 +/- 4.18 | DEC | 11.74 +/- 1.80 |
| SFDR11 | JAN | 5.76 +/- 2.14 | FEB | 6.14 +/- 1.42 |
| WNW of ISFSI | MAR | 6.46 +/- 0.50 | APR | 6.46 +/- 1.66 |
| | MAY | 6.89 +/- 1.40 | JUN | 6.07 +/- 0.50 |
| | JUL | 6.71 +/- 2.68 | AUG | 6.10 +/- 0.16 |
| | SEP | 7.45 +/- 2.90 | OCT | 6.40 +/- 1.36 |
| | NOV | 5.70 +/- 0.46 | DEC | 6.79 +/- 0.72 |
| SFDR12 | JAN | 3.64 +/- 0.40 | FEB | 4.37 +/- 1.78 |
| W of ISFSI | MAR | 4.37 +/- 1.20 | APR | 4.12 +/- 1.02 |
| | MAY | 4.83 +/- 1.22 | JUN | 4.72 +/- 1.58 |
| | JUL | 4.06 +/- 0.36 | AUG | 3.74 +/- 0.72 |
| | SEP | 4.90 +/- 0.96 | OCT | 4.44 +/- 0.10 |
| | NOV | 4.21 +/- 1.84 | DEC | 3.90 +/- 0.94 |
| SFDR13 | JAN | 4.14 +/- 0.84 | FEB | 3.98 +/- 1.50 |
| SSW of ISFSI | MAR | 4.22 +/- 0.38 | APR | 3.78 +/- 0.64 |
| | MAY | 4.55 +/- 2.68 | JUN | 3.77 +/- 0.32 |
| | JUL | 4.15 +/- 0.08 | AUG | 3.64 +/- 1.24 |
| | SEP | 4.83 +/- 0.92 | OCT | 4.34 +/- 0.68 |
| | NOV | 3.62 +/- 0.74 | DEC | 4.74 +/- 2.32 |

## TABLE B-12 - Continued

**Direct Radiation**
**(Results in Units of mR/30 days ± 2σ)**

| | | | | |
|---|---|---|---|---|
| SFDR14 | JAN | 3.71 +/- 0.78 | FEB | 3.79 +/- 1.16 |
| SSE of ISFSI | MAR | 4.16 +/- 0.64 | APR | 4.08 +/- 0.66 |
| | MAY | 3.90 +/- 0.16 | JUN | 4.04 +/- 0.94 |
| | JUL | 3.81 +/- 0.06 | AUG | 6.85 +/- 3.94 |
| | SEP | 4.30 +/- 0.24 | OCT | 4.04 +/- 0.66 |
| | NOV | 3.83 +/- 0.74 | DEC | 3.96 +/- 0.42 |
| SFDR15 | JAN | 4.15 +/- 0.86 | FEB | 3.72 +/- 1.20 |
| ENE of ISFSI | MAR | 4.54 +/- 2.58 | APR | 3.95 +/- 0.20 |
| | MAY | 4.02 +/- 0.62 | JUN | 4.28 +/- 1.26 |
| | JUL | 3.93 +/- 0.60 | AUG | 5.09 +/- 2.56 |
| | SEP | 4.76 +/- 1.50 | OCT | 4.74 +/- 0.74 |
| | NOV | 3.91 +/- 0.34 | DEC | 4.41 +/- 0.44 |
| SFDR16 | JAN | 4.79 +/- 0.66 | FEB | 4.08 +/- 0.60 |
| WSW of ISFSI | MAR | 4.67 +/- 0.58 | APR | 4.55 +/- 0.38 |
| | MAY | 4.88 +/- 0.92 | JUN | 4.86 +/- 0.48 |
| | JUL | 4.86 +/- 1.50 | AUG | 5.19 +/- 1.08 |
| | SEP | 5.77 +/- 0.40 | OCT | 5.00 +/- 1.16 |
| | NOV | 4.82 +/- 1.42 | DEC | 4.96 +/- 0.62 |

# APPENDIX C

Appendix C is a summary of BGE laboratory's quality assurance program. It consists of Table C-1 which is a compilation of the results of the laboratory's participation in the Environmental Protection Agency's (EPA) Cross-Check Program during the period January 1 through December 31, 1995. It also includes Tables C-2 and C-3 which together form the results of the laboratory's participation in a quality assurance program with Teledyne Brown Engineering during the same period. The Teledyne operating procedures are described in reference 39.

The reported laboratory's results contained in Table C-1 agree quite well with the EPA Cross-Check results, except for the results obtained for Cs-137 on the filter sampled on August 25, 1995. An internal audit prompted by this disparity revealed that after calibration of the detector earlier that month, an incorrect value for the amount of standard was entered in the calibration certificate file for all geometries. This resulted in all subsequent results to be off by the ratio between the incorrect standard weight entered, and the actual standard weight. The efficiency calibration was corrected, and verified. All analyses affected by this error in calibration were recalculated, and the results reviewed for correctness. Table C-2 was amended to include an additional column, "Corrected Laboratory Results", which shows the corrected results used in the quality assurance program. These corrected results showed good agreement with the EPA results.

All of the results contained in Table C-2 also agree quite well with the laboratory replicates and split samples submitted to Teledyne, where appropriate. Samples whose nature precludes splitting them with Teledyne Engineering are marked as "N/A" in the Split Analysis column.

(LEFT BLANK)

# TABLE OF CONTENTS - ANALYTICAL RESULTS


| Table | Title | Page |
|---|---|---|
| C-1 | Results of EPA Cross-Check Program for 1995 | 79 |
| C-2 | Results of Quality Assurance Program for 1995 | 80 |
| C-3 | Teledyne Brown Engineering Typical MDAs for Gamma Spectrometry | 89 |

(LEFT BLANK)

## TABLE C-1

### Results of EPA Cross Check Program for 1995

| Sample Date | Sample Type and Units | Isotope Observed | Reported Laboratory's Results | Corrected* Laboratory's Results | EPA's Results |
|---|---|---|---|---|---|
| 2/3/95 | Water-pCi/L | I-131 | 157±83 | - | 100±17 |
| 3/10/95 | Water-pCi/L | H-3 | 6455±646 | - | 7435±744 |
| 4/18/95 | Water-pCi/L | Co-60 | 30±5 | - | 29±9 |
| | | Cs-134 | 22±5 | - | 20±9 |
| | | Cs-137 | 12±4 | - | 11±9 |
| 6/9/95 | Water-pCi/L | Co-60 | 39±6 | - | 40±5 |
| | | Zn-65 | 81±12 | - | 76±8 |
| | | Cs-134 | 47±6 | - | 50±5 |
| | | Cs-137 | 35±5 | - | 35±5 |
| | | Ba-133 | 72±6 | - | 79±8 |
| 8/4/95 | Water-pCi/L | H-3 | 4965±497 | - | 4872±487 |
| 8/25/95 | Filter-pCi/filter | Beta | 71±7 | - | 87±10 |
| | | Cs-137 | 124±13 | 26±3 | 25±5 |
| 9/29/95 | Milk-pCi/L | I-131 | 118±19 | 102±16 | 99±10 |
| | | Cs-137 | 55±9 | 45±7 | 50±5 |
| 10/6/95 | Water-pCi/L | I-131 | 177±17 | 152±15 | 148±15 |
| 10/17/95 | Water-pCi/L | Co-60 | 57±5 | 48±4 | 49±5 |
| | | Cs-134 | 40±4 | 32±3 | 40±5 |
| | | Cs-137 | 31±5 | 25±4 | 30±5 |
| 11/3/95 | Water-pCi/L | Co-60 | 68±3 | 57±5 | 60±5 |
| | | Zn-65 | 99±11 | 93±14 | 125±13 |
| | | Cs-134 | 40±5 | 31±4 | 40±4 |
| | | Cs-137 | 52±1 | 42±5 | 49±5 |
| | | Ba-133 | 99±2 | 88±7 | 99±10 |

* Reported results were corrected following a correction to the efficiency calibration of the gamma detector.

## TABLE C-2

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | $10^{-2}$ pCi/m$^3$ | | |
| Air Filter -A1 | 1/23/95 | Beta | 0.5±0.2 | 0.6±0.2 | N/A |
| Air Filter -A2 | 1/23/95 | Beta | 0.6±0.2 | 0.7±0.2 | N/A |
| Air Filter -A3 | 1/23/95 | Beta | 0.5±0.2 | 0.6±0.2 | N/A |
| Air Filter -A4 | 1/23/95 | Beta | 0.7±0.2 | 0.7±0.2 | N/A |
| Air Filter -A5 | 1/23/95 | Beta | 0.6±0.2 | 0.8±0.2 | N/A |
| Air Filter -SFA1 | 1/23/95 | Beta | 1.2±0.6 | 1.4±0.5 | N/A |
| Air Filter -SFA2 | 1/23/95 | Beta | 0.7±0.3 | 0.9±0.3 | N/A |
| Air Filter -SFA3 | 1/23/95 | Beta | 0.6±0.2 | 0.7±0.2 | N/A |
| Air Filter -SFA4 | 1/23/95 | Beta | 0.7±0.2 | 0.7±0.2 | N/A |
| Air Iodine-A3 | 1/23/95 | I-131 | <0.3 | <0.3 | N/A |
| Air Iodine-A5 | 1/23/95 | I-131 | <0.6 | <0.6 | N/A |
| | | | pCi/L | | |
| Bay Water-Wa1 | 1/15/95 | Gamma | <MDA | <MDA | <MDA |
| Bay Water-Wa1 | 2/15/95 | Tritium | <36.9 | <36.7 | <MDA |
| Air Filter-A1 | 2/27/95 | Beta | 1.1±0.3 | 1.3±0.3 | N/A |
| Air Filter-A2 | 2/27/95 | Beta | 1.2±0.3 | 1.2±0.3 | N/A |
| Air Filter-A3 | 2/27/95 | Beta | 1.2±0.3 | 1.4±0.3 | N/A |
| Air Filter-A4 | 2/27/95 | Beta | 1.5±0.3 | 1.4±0.3 | N/A |
| Air Filter-A5 | 2/27/95 | Beta | 1.5±0.3 | 1.5±0.3 | N/A |
| Air Filter-SFA1 | 2/27/95 | Beta | 2.5±0.6 | 2.8±0.6 | N/A |
| Air Filter-SFA2 | 2/27/95 | Beta | 1.4±0.3 | 1.4±0.3 | N/A |
| Air Filter-SFA3 | 2/27/95 | Beta | 1.0±0.2 | 1.2±0.2 | N/A |
| Air Filter-SFA4 | 2/27/95 | Beta | 1.4±0.3 | 1.4±0.3 | N/A |
| Air Iodine-A3 | 2/21/95 | I-131 | <0.4 | <0.3 | N/A |
| Air Iodine-A5 | 2/21/95 | I-131 | <0.5 | <0.5 | N/A |
| | | | pCi/kg | | |
| Soil-SFS2 | 2/24/95 | Cs-137 | 113±43 | 122±41 | 141±27 |
| Soil-SFS4 | 2/24/95 | Cs-137 | 64±37 | <MDA | 89±23 |

## TABLE C-2 - Continued

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | pCi/kg | | |
| Vegetation-SFb3 | 2/24/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-SFb5 | 2/24/95 | Cs-137 | 92±21 | 85±19 | 138±14 |
| | | | $10^{-2}$ pCi/$m^3$ | | |
| Air Filter-A1 | 3/20/95 | Beta | 1.5±0.2 | 1.5±0.2 | N/A |
| Air Filter-A2 | 3/20/95 | Beta | 1.8±0.2 | 1.8±0.2 | N/A |
| Air Filter-A3 | 3/20/95 | Beta | 1.8±0.2 | 1.8±0.3 | N/A |
| Air Filter-A4 | 3/20/95 | Beta | 2.1±0.3 | 2.0±0.3 | N/A |
| Air Filter-A5 | 3/20/95 | Beta | 2.0±0.3 | 2.1±0.3 | N/A |
| Air Filter-SFA1 | 3/20/95 | Beta | 2.0±0.3 | 2.1±0.3 | N/A |
| Air Filter-SFA2 | 3/20/95 | Beta | 2.2±0.3 | 2.3±0.3 | N/A |
| Air Filter-SFA3 | 3/20/95 | Beta | 1.6±0.2 | 1.8±0.2 | N/A |
| Air Filter-SFA4 | 3/20/95 | Beta | 2.2±0.3 | 2.2±0.3 | N/A |
| Air Iodine-A2 | 3/20/95 | I-131 | <0.3 | <0.3 | N/A |
| Air Iodine-A4 | 3/20/95 | I-131 | <0.5 | <0.5 | N/A |
| | | | pCi/kg | | |
| Oysters-Ia3 | 3/29/95 | Gamma | <MDA | <MDA | <MDA |
| | | | $10^{-2}$ pCi/$m^3$ | | |
| Air Filter-A1 | 4/17/95 | Beta | 1.4±0.3 | 1.3±0.2 | N/A |
| Air Filter-A2 | 4/17/95 | Beta | 1.1±0.2 | 1.0±0.2 | N/A |
| Air Filter-A3 | 4/17/95 | Beta | 1.0±0.2 | 1.0±0.2 | N/A |
| Air Filter-A4 | 4/17/95 | Beta | 1.2±0.2 | 1.3±0.3 | N/A |
| Air Filter-A5 | 4/17/95 | Beta | 1.2±0.2 | 1.2±0.3 | N/A |
| Air Filter-SFA1 | 4/17/95 | Beta | 1.1±0.2 | 1.1±0.2 | N/A |
| Air Filter-SFA2 | 4/17/95 | Beta | 1.2±0.2 | 1.2±0.2 | N/A |
| Air Filter-SFA3 | 4/17/95 | Beta | 1.0±0.2 | 1.0±0.2 | N/A |
| Air Filter-SFA4 | 4/17/95 | Beta | 1.3±0.2 | 1.2±0.2 | N/A |

## TABLE C-2 - Continued

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | | $10^{-2}$ pCi/m$^3$ | |
| Air Iodine-A3 | 4/10/95 | I-131 | <0.4 | <0.4 | N/A |
| Air Iodine-A4 | 4/10/95 | I-131 | <0.5 | <0.5 | N/A |
| | | | | pCi/L | |
| Bay Water-Wa2 | 4/15/95 | Gamma | <MDA | <MDA | <MDA |
| | | | | $10^{-2}$ pCi/m$^3$ | |
| Air Filter-A1 | 5/15/95 | Beta | 0.5±0.2 | 0.5±0.2 | N/A |
| Air Filter-A2 | 5/15/95 | Beta | 0.4±0.2 | 0.5±0.2 | N/A |
| Air Filter-A3 | 5/15/95 | Beta | 0.4±0.2 | 0.5±0.2 | N/A |
| Air Filter-A4 | 5/15/95 | Beta | 0.4±0.2 | 0.5±0.2 | N/A |
| Air Filter-A5 | 5/15/95 | Beta | 0.8±0.2 | 0.8±0.2 | N/A |
| Air Filter-SFA1 | 5/15/95 | Beta | 0.6±0.2 | 0.7±0.2 | N/A |
| Air Filter-SFA2 | 5/15/95 | Beta | 0.8±0.2 | 0.9±0.2 | N/A |
| Air Filter-SFA3 | 5/15/95 | Beta | 0.3±0.2 | 0.4±0.2 | N/A |
| Air Filter-SFA4 | 5/15/95 | Beta | 0.4±0.2 | 0.5±0.2 | N/A |
| Air Iodine-A4 | 5/8/95 | I-131 | <0.5 | <0.5 | N/A |
| Air Iodine-A5 | 5/8/95 | I-131 | <0.4 | <0.4 | N/A |
| | | | | pCi/kg | |
| Shoreline-Wb1 | 5/19/95 | Gamma | <MDA | <MDA | <MDA |
| | | | | $10^{-2}$ pCi/m$^3$ | |
| Air Filter-A1 | 6/12/95 | Beta | 1.0±0.3 | 0.9±0.3 | N/A |
| Air Filter-A2 | 6/12/95 | Beta | 0.8±0.2 | 0.8±0.2 | N/A |
| Air Filter-A3 | 6/12/95 | Beta | 0.7±0.2 | 0.6±0.2 | N/A |
| Air Filter-A4 | 6/12/95 | Beta | 0.7±0.2 | 0.8±0.2 | N/A |
| Air Filter-A5 | 6/12/95 | Beta | 0.8±0.2 | 0.8±0.2 | N/A |
| Air Filter-SFA1 | 6/12/95 | Beta | 0.8±0.2 | 0.8±0.2 | N/A |
| Air Filter-SFA2 | 6/12/95 | Beta | 0.8±0.2 | 0.8±0.2 | N/A |
| Air Filter-SFA3 | 6/12/95 | Beta | 0.9±0.2 | 0.8±0.2 | N/A |
| Air Filter-SFA4 | 6/12/95 | Beta | 1.2±0.2 | 1.1±0.2 | N/A |

## TABLE C-2 - Continued

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | $10^{-2}$ pCi/m$^3$ | | |
| Air Iodine-A1 | 6/12/95 | I-131 | <0.6 | <0.6 | N/A |
| Air Iodine-A2 | 6/12/95 | I-131 | <0.4 | <0.3 | N/A |
| | | | $10^{-3}$ pCi/m$^3$ | | |
| Air Filters-A1 | 6/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-A2 | 6/15/96 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-A3 | 6/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-A4 | 6/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-A5 | 6/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-SFA1 | 6/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-SFA2 | 6/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-SFA3 | 6/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-SFA4 | 6/15/95 | Gamma | <MDA | <MDA | <MDA |
| | | | pCi/kg | | |
| Soil-SFS1 | 6/19/95 | Gamma | <MDA | <MDA | <MDA |
| Soil-SFS2 | 6/19/95 | Cs-137 | 150±41 | 154±36 | 182±44 |
| Vegetation-SFb1 | 6/19/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-SFb2 | 6/19/95 | Gamma | <MDA | <MDA | <MDA |
| | | | $10^{-2}$ pCi/m$^3$ | | |
| Air Filter-A1 | 7/10/95 | Beta | 1.1±0.3 | 1.1±0.2 | N/A |
| Air Filter-A2 | 7/10/95 | Beta | 0.7±0.2 | 0.8±0.2 | N/A |
| Air Filter-A3 | 7/10/95 | Beta | 0.5±0.2 | 0.5±0.2 | N/A |
| Air Filter-A4 | 7/10/95 | Beta | 1.1±0.3 | 1.1±0.3 | N/A |
| Air Filter-A5 | 7/10/95 | Beta | 1.1±0.2 | 1.1±0.2 | N/A |
| Air Filter-SFA1 | 7/10/95 | Beta | 1.0±0.2 | 1.1±0.2 | N/A |
| Air Filter-SFA2 | 7/10/95 | Beta | 1.1±0.2 | 1.2±0.2 | N/A |
| Air Filter-SFA3 | 7/10/95 | Beta | 1.0±0.2 | 1.1±0.2 | N/A |
| Air Filter-SFA4 | 7/10/95 | Beta | 1.1±0.3 | 1.3±0.3 | N/A |
| Air Iodine-A4 | 7/10/95 | I-131 | <0.4 | <0.4 | N/A |
| Air Iodine-A5 | 7/10/95 | I-131 | <0.5 | <0.5 | N/A |

## TABLE C-2 - Continued

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | pCi/L | | |
| Bay Water-Wa2 | 7/15/95 | Gamma | <MDA | <MDA | <MDA |
| | | | mR/30 Days | | |
| DR08 | 8/2/95 | TLD | 4.85±1.09 | 5.68±2.62 | N/A |
| DR09 | 8/2/95 | TLD | 3.68±0.91 | 4.26±0.81 | N/A |
| DR10 | 8/2/95 | TLD | 3.59±0.22 | 4.39±0.70 | N/A |
| DR11 | 8/2/95 | TLD | 3.62±0.46 | 3.57±0.88 | N/A |
| DR12 | 8/2/95 | TLD | 3.50±0.59 | 3.24±0.43 | N/A |
| DR13 | 8/2/95 | TLD | 3.54±1.34 | 4.11±0.87 | N/A |
| DR14 | 8/2/95 | TLD | 3.87±0.44 | 4.65±1.02 | N/A |
| SFDR01 | 8/2/95 | TLD | 4.26±0.91 | 4.52±0.97 | N/A |
| SFDR02 | 8/2/95 | TLD | 5.33±0.71 | 6.36±1.25 | N/A |
| SFDR03 | 8/2/95 | TLD | 4.78±0.53 | 5.14±1.06 | N/A |
| SFDR17 | 8/2/95 | TLD | 7.77±0.39 | 8.91±1.81 | N/A |
| | | | $10^{-2}$ pCi/$m^3$ | | |
| Air Filter-A1 | 8/22/95 | Beta | 1.6±0.2 | 1.4±0.2 | N/A |
| Air Filter-A2 | 8/22/95 | Beta | 2.0±0.3 | 1.5±0.2 | N/A |
| Air Filter-A3 | 8/22/95 | Beta | 1.8±0.2 | 1.5±0.2 | N/A |
| Air Filter-A4 | 8/22/95 | Beta | 1.9±0.2 | 1.8±0.2 | N/A |
| Air Filter-A5 | 8/22/95 | Beta | 1.9±0.2 | 1.8±0.2 | N/A |
| Air Filter-SFA1 | 8/22/95 | Beta | 1.7±0.2 | 1.7±0.2 | N/A |
| Air Filter-SFA2 | 8/22/95 | Beta | 2.1±0.2 | 1.9±0.2 | N/A |
| Air Filter-SFA3 | 8/22/95 | Beta | 2.0±0.3 | 1.8±0.2 | N/A |
| Air Filter-SFA4 | 8/22/95 | Beta | 1.7±0.2 | 1.8±0.2 | N/A |
| Air Iodine-A1 | 8/22/95 | I-131 | <0.3 | <0.3 | N/A |
| Air Iodine-A2 | 8/22/95 | I-131 | <0.5 | <0.5 | N/A |
| | | | pCi/kg | | |
| Oysters-Ia3 | 8/23/95 | Ag-110 | 18±7 | 22±12 | <MDA |

## TABLE C-2 - Continued

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | pCi/kg | | |
| Vegetation-Ib1 | 8/23/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib2 | 8/23/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib4 | 8/23/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib5 | 8/23/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib7 | 8/23/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib8 | 8/23/95 | Gamma | <MDA | <MDA | <MDA |
| | | | $10^{-2}$ pCi/m$^3$ | | |
| Air Filter-A1 | 9/11/95 | Beta | 1.1±0.2 | 1.0±0.2 | N/A |
| Air Filter-A2 | 9/11/95 | Beta | 1.0±0.3 | 1.1±0.3 | N/A |
| Air Filter-A3 | 9/11/95 | Beta | 1.1±0.3 | 1.2±0.3 | N/A |
| Air Filter-A4 | 9/11/95 | Beta | 1.4±0.3 | 1.6±0.3 | N/A |
| Air Filter-A5 | 9/11/95 | Beta | 1.6±0.3 | 1.6±0.3 | N/A |
| Air Filter-SFA1 | 9/11/95 | Beta | 1.5±0.2 | 1.7±0.3 | N/A |
| Air Filter-SFA2 | 9/11/95 | Beta | 1.9±0.3 | 1.9±0.3 | N/A |
| Air Filter-SFA3 | 9/11/95 | Beta | 2.0±0.3 | 2.2±0.3 | N/A |
| Air Filter-SFA4 | 9/11/95 | Beta | 1.7±0.3 | 1.8±0.3 | N/A |
| Air Iodine-A3 | 9/11/95 | I-131 | <0.4 | <0.4 | N/A |
| Air Iodine-A4 | 9/11/95 | I-131 | <0.6 | <0.6 | N/A |
| | | | pCi/kg | | |
| Fish-Ia1 | 9/7/95 | Gamma | <MDA | <MDA | <MDA |
| | | | mR/30 Days | | |
| DR15 | 9/28/95 | TLD | 4.12±0.34 | 4.79±1.88 | N/A |
| DR16 | 9/28/95 | TLD | 4.83±1.03 | 4.41±0.22 | N/A |
| DR17 | 9/28/95 | TLD | 4.34±0.87 | 4.72±1.00 | N/A |
| DR18 | 9/28/95 | TLD | 3.97±1.61 | 3.62±0.56 | N/A |
| DR19 | 9/28/95 | TLD | 3.69±0.24 | 4.12±1.24 | N/A |
| DR20 | 9/28/95 | TLD | 4.53±0.16 | 5.17±1.80 | N/A |
| DR21 | 9/28/95 | TLD | 4.63±0.09 | 4.53±1.53 | N/A |

## TABLE C-2 - Continued

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | mR/30 Days | | |
| SFDR04 | 9/28/95 | TLD | 4.66±0.81 | 5.17±0.69 | N/A |
| SFDR05 | 9/28/95 | TLD | 4.36±1.16 | 4.29±1.48 | N/A |
| SFDR06 | 9/28/95 | TLD | 4.00±0.22 | 5.04±1.71 | N/A |
| SFDR07 | 9/28/95 | TLD | 4.24±1.08 | 4.08±0.94 | N/A |
| | | | $10^{-2}$ pCi/m$^3$ | | |
| Air Filter-A1 | 10/23/95 | Beta | 0.9±0.2 | 1.1±0.2 | N/A |
| Air Filter-A2 | 10/23/95 | Beta | 0.7±0.2 | 0.8±0.2 | N/A |
| Air Filter-A3 | 10/23/95 | Beta | 0.8±0.2 | 1.1±0.2 | N/A |
| Air Filter-A4 | 10/23/95 | Beta | 0.9±0.2 | 1.2±0.2 | N/A |
| Air Filter-A5 | 10/23/95 | Beta | 0.9±0.2 | 1.1±0.2 | N/A |
| Air Filter-SFA1 | 10/23/95 | Beta | 0.8±0.2 | 0.8±0.2 | N/A |
| Air Filter-SFA2 | 10/23/95 | Beta | 1.0±0.1 | 1.2±0.2 | N/A |
| Air Filter-SFA3 | 10/23/95 | Beta | 1.0±0.2 | 1.1±0.2 | N/A |
| Air Filter-SFA4 | 10/23/95 | Beta | 1.2±0.2 | 1.3±0.2 | N/A |
| Air Iodine-A2 | 10/9/95 | I-131 | <0.5 | <0.5 | N/A |
| Air Iodine-A5 | 10/9/95 | I-131 | <0.4 | <0.4 | N/A |
| | | | pCi/L | | |
| Bay Water-Wa2 | 8/15/95 | Tritium | 246±35 | 266±35 | <MDA |
| | | | pCi/kg | | |
| Oysters-Ia3 | 10/10/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib1 | 10/30/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib2 | 10/30/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib4 | 10/30/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib5 | 10/30/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib7 | 10/30/95 | Gamma | <MDA | <MDA | <MDA |
| Vegetation-Ib8 | 10/30/95 | Gamma | <MDA | <MDA | <MDA |

## TABLE C-2 - Continued

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | $10^{-2}$ pCi/m$^3$ | | |
| Air Filter-A1 | 11/6/95 | Beta | 1.1±0.2 | 1.2±0.2 | N/A |
| Air Filter-A2 | 11/6/95 | Beta | 0.9±0.2 | 1.0±0.2 | N/A |
| Air Filter-A3 | 11/6/95 | Beta | 1.1±0.2 | 1.2±0.2 | N/A |
| | | | $10^{-2}$ pCi/m$^3$ | | |
| Air Filter-A4 | 11/6/95 | Beta | 1.2±0.2 | 1.4±0.3 | N/A |
| Air Filter-A5 | 11/6/95 | Beta | 1.6±0.3 | 1.6±0.3 | N/A |
| Air Filter-SFA1 | 11/6/95 | Beta | 1.3±0.2 | 1.2±0.2 | N/A |
| Air Filter-SFA2 | 11/6/95 | Beta | 1.2±0.2 | 1.3±0.2 | N/A |
| Air Filter-SFA3 | 11/6/95 | Beta | 1.5±0.2 | 1.7±0.2 | N/A |
| Air Filter-SFA4 | 11/6/95 | Beta | 1.8±0.2 | 1.7±0.2 | N/A |
| Air Iodine-A3 | 11/13/95 | I-131 | <0.4 | <0.4 | N/A |
| Air Iodine-A4 | 11/13/95 | I-131 | <0.6 | <0.6 | N/A |
| | | | pCi/L | | |
| Bay Water-Wa2 | 11/15/95 | Gamma | <MDA | <MDA | <MDA |
| | | | $10^{-2}$ pCi/m$^3$ | | |
| Air Filter-A1 | 12/11/95 | Beta | 1.2±0.2 | 1.3±0.2 | N/A |
| Air Filter-A2 | 12/11/95 | Beta | 1.4±0.2 | 1.6±0.2 | N/A |
| Air Filter-A3 | 12/11/95 | Beta | 1.1±0.2 | 1.2±0.2 | N/A |
| Air Filter-A4 | 12/11/95 | Beta | 1.3±0.2 | 1.4±0.2 | N/A |
| Air Filter-A5 | 12/11/95 | Beta | 1.9±0.3 | 2.0±0.3 | N/A |
| Air Filter-SFA1 | 12/11/95 | Beta | 1.1±0.2 | 1.3±0.2 | N/A |
| Air Filter-SFA2 | 12/11/95 | Beta | 1.4±0.2 | 1.5±0.2 | N/A |
| Air Filter-SFA3 | 12/11/95 | Beta | 1.3±0.2 | 1.5±0.2 | N/A |
| Air Filter-SFA4 | 12/11/95 | Beta | 1.4±0.2 | 1.7±0.2 | N/A |
| Air Iodine-A2 | 12/11/95 | I-131 | <0.3 | <0.3 | N/A |
| Air Iodine-A3 | 12/11/95 | I-131 | <0.5 | <0.5 | N/A |

## TABLE C-2 - Continued

### Results of Quality Assurance Program for 1995

| Sample Type And Location | Sample Date | Type of Analysis | Original Analysis | Replicate Analysis | Split Analysis |
|---|---|---|---|---|---|
| | | | $10^{-3}$ pCi/$m^3$ | | |
| Air Filters-A1 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-A2 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-A3 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-A4 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-A5 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-SFA1 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-SFA2 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-SFA3 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |
| Air Filters-SFA4 | 12/15/95 | Gamma | <MDA | <MDA | <MDA |

## 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 | Particulate $10^{-3}$pCi/m$^3$ |
|---|---|---|---|---|---|---|
| H-3 | 200 | -- | -- | -- | -- | -- |
| Be-7 | 30 | 100 | 200 | 300 | 200 | - |
| K-40 | 70 | -- | -- | -- | -- | 10 |
| Mn-54 | 3 | 10 | 10 | 30 | 7 | 7 |
| Co-58 | 3 | 10 | 20 | 30 | 7 | 8 |
| Fe-59 | 7 | 30 | 40 | 70 | 20 | 20 |
| Co-60 | 3 | 10 | 20 | 30 | 7 | 7 |
| Zn-65 | 7 | 20 | 30 | 70 | 20 | 20 |
| Zr-95 | 3 | 10 | 20 | 40 | 8 | 9 |
| Ru-103 | 4 | 20 | 20 | 40 | 9 | 9 |
| Ru-106 | 30 | 100 | 100 | 300 | 60 | 60 |
| I-131 | 10 | -- | -- | -- | -- | 70 |
| Cs-134 | 3 | 10 | 10 | 40 | 7 | 7 |
| Cs-137 | 3 | 10 | 10 | 30 | 7 | 7 |
| Ba-140 | 7 | 40 | 90 | 70 | 20 | 40 |
| Ce-141 | 7 | 20 | 40 | 60 | 10 | 10 |
| Ce-144 | 20 | 70 | 100 | 200 | 40 | 30 |

(LEFT BLANK)

# APPENDIX D

Appendix D contains the results of a Land Use Survey conducted around Calvert Cliffs Nuclear Power Plant during the growing season of 1995. A table listing the raw data of this survey and a discussion of the results are included in this appendix.

Discussion

A Land Use Survey was conducted during the growing season of the year 1995 to identify, within a distance of 8 km, the location of the nearest milk animal, the nearest residence, and the nearest garden greater than 50 $m^2$ in each of the nine sectors over land. A detailed description of the Land Use Survey is given in a separate document (45). The position of the nearest residence and garden in each sector out to 8 km are given in the adjacent table. No garden was found within 8 km in the S direction. 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 Survey**

| | Distance From Plant (km) | |
|---|---|---|
| Sector | Residence | Garden |
| SE | 2.7 | 7.6 |
| SSE | 2.8 | 2.8 |
| S | 3.0 | N/A |
| SSW | 1.8 | 2.4 |
| SW | 2.3 | 1.8 |
| WSW | 2.0 | 2.0 |
| W | 2.1 | 2.1 |
| WNW | 2.5 | 2.5 |
| NW | 2.9 | 2.9 |

The closest residence and garden are situated in the SSW and SW sectors, respectively. In the S, SSE, and SE sectors, there is the highest probability of wind blowing over land from the direction of the plant. There are two gardens used for vegetable samples by the Radiological Environmental Monitoring Program. The first is located in the S sector at a distance of 0.7 km, and the other is situated near the site boundary in the SSE sector 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 1995 meteorological data was performed, and no significant impact from the plant was found.

(LEFT BLANK)

# 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 1995. These extra samples are not required by the Environmental Technical Specifications (32-35) or the Offsite Dose Calculation Manual (36). 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 (PIC) added for the Independent Spent Fuel Storage Installation.

A new table, Table E-11, was added to show the direct radiation readings from TLDs placed at the perimeter of the resin storage area located to the west of the ISFSI facility. The large range of values is due to the streaming effects produced when resin containers were momentarily removed from the shipping casks, and placed into the storage casks. 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 for the times when the resin storage TLDs read high, it is apparent that storage of the spent resin is having no significant, measurable effect on the environs surrounding Calvert Cliffs Nuclear Power Plant.

In general, the results in the following tables continue to follow the historical trends previously observed (7-31).

(LEFT BLANK)

# TABLE OF CONTENTS - ANALYTICAL RESULTS


| Table | Title | Page |
|---|---|---|
| E-1 | Locations of Non-Tech Spec Environmental Sampling Stations for Calvert Cliffs Nuclear Power Plant | 96 |
| E-2 | Synopsis of the 1995 Calvert Cliffs Nuclear Power Plant Non-Tech Spec Radiological Environmental Monitoring Program | 97 |
| E-3 | Annual Summary for Calvert Cliffs Nuclear Power Plant Units 1 And 2 Non-Tech Spec Radiological Environmental Monitoring Program | 98 |
| E-4 | Concentrations of Gamma Emitters in Bottom Sediment | 99 |
| E-5 | Concentrations of I-131 in Filtered Air | 100 |
| E-6 | Concentrations of Beta Emitters in Air Particulates | 102 |
| E-7 | Concentrations of Gamma Emitters in Air Particulates | 104 |
| E-8 | Concentrations of Tritium and Gamma Emitters in Taylors Island Well Water | 105 |
| E-9 | Direct Radiation As Measured By Pressurized Ion Chamber | 106 |
| E-10 | Direct Radiation | 108 |
| E-11 | Resin Storage Area Direct Radiation | 110 |

# TABLE E-1

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

| Station | Description | Distance[1] | Direction[1] |
|---|---|---|---|
| A6 | Long Beach | 4.4 | NW |
| A7 | Taylors Island, Carpenter's Property | 12.6 | ENE |
| A8 | Cambridge, Univ. of MD | 32.0 | NE |
| DR24 | Route 4 and Parran Rd. | 3.0 | SW |
| DR25 | Camp Conoy Guardhouse | 1.0 | S |
| DR26 | Rt. 235 & Clarks Landing Rd. | 20.5 | SW |
| DR27 | Rt. 231 & Rt. 4 | 23.0 | NW |
| DR28 | Taylors Island Siren #35 | 12.3 | ENE |
| DR29 | Taylors Island Siren #38 | 12.5 | E |
| DR31 | Cambridge, Univ. of MD | 32.0 | NE |
| DR32 | Taylors Island, Twining Property | 12.3 | NE |
| DR33 | Ransome Property | 14.8 | ESE |
| DR34 | Shoreline at Barge Rd. | 0.2 | NE |
| PIC1 | Taylors Island, Carpenter's Property | 12.6 | ENE |
| PIC2 | Entrance to Camp Conoy | 0.7 | S |
| PIC3 | MET Station | 0.8 | WSW |
| PIC4 | NNW of ISFSI | 0.6 | SW |
| PIC5 | S of ISFSI | 0.6 | SW |
| PIC8 | Visitors Center | 0.3 | NW |
| Wbs1 | Intake Area | 0.2 | NE |
| Wbs2 | Discharge Area | 0.3 | N |
| Wbs3 | Long Beach | 4.4 | NW |
| Wbs4 | Rocky Point (Camp Conoy) | 3.0 | SE |
| Ww1 | Taylors Island, Carpenter's Property | 12.6 | ENE |

[1] Distance, in kilometers, and direction, by sector, are from the midpoint between the containment buildings.

## TABLE E-2

### Synopsis of 1995 Calvert Cliffs Nuclear Power Plant
### Non-Tech Spec Radiological Environmental Monitoring Program

| Sample Type | Sampling Frequency[1] | Number of Locations | Number Collected | Analysis | Analysis Frequency[1] | Number Analyzed |
|---|---|---|---|---|---|---|
| Aquatic Environment | | | | | | |
| Bottom Sediment | Q | 4 | 16 | Gamma | Q | 16 |
| Atmospheric Environment | | | | | | |
| Air Iodine[2] | W | 3 | 153 | I-131 | W | 153 |
| Air Particulates[3] | W | 3 | 153 | Gross Beta | W | 153 |
| | | | | Gamma | MC | 36 |
| Terrestrial Environment | | | | | | |
| Ground Water | M | 1 | 12 | Tritium | M | 12 |
| | | | | Gamma | M | 12 |
| Direct Radiation | | | | | | |
| Ambient Radiation | RT | 6 | 72 | PIC[4] | M | 72 |
| Ambient Radiation | M | 10 | 480 | TLD | M | 480 |

[1] W - weekly, M - monthly, Q - quarterly, SA - semiannual, A - annual, C - composite, RT - real time monitoring.
[2] The collection device contains silver zeolite.
[3] Beta counting is performed after ≥ 72 hour decay. Gamma spectroscopy performed on monthly composites of weekly samples.
[4] PIC= pressurized ion chamber.

## TABLE E-3

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

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | Indicator Locations Mean (F)/ Range[1] | Location with Highest Annual Mean Name/ Distance & Direction[2] | Location with Highest Annual Mean Mean (F)/ Range[1] | Control Location Mean (F) Range |
|---|---|---|---|---|---|---|
| Aquatic Environment | | | | | | |
| Bottom Sediment (pCi/kg) | Gamma (16) Cs-137 | 33 | 202(12/12) (61-377) | Long Beach Wbs3 4.4 km NW | 296(4/4) (225-377) | 232(4/4) (153-329) |
| Atmospheric Environment | | | | | | |
| Air Particulates ($10^{-2}$ pCi/$m^3$) | Beta (149) | 0.5 | 1.35(99/99) (0.4-3.5) | U of MD-Cambridge 32.0 km NE | 1.4(47/47) (0.4-2.5) | 1.4(50/50) (0.3-2.6) |
| Direct Radiation | | | | | | |
| Ambient Radiation (mR/30 days) | Exposure Rate (480) | -- | 4.49(480/480) (2.96-6.99) | Ransome Property DR33 14.8 km ESE | 5.46(48/48) (4.40-6.14) | 4.46(144/144)[3] (2.97-6.31) |
| PIC[4] (mR/30 days) | Exposure Rate (72) | -- | 5.42(48/48) (3.95-8.46) | NNW of ISFSI PIC4 0.6 km SW | 8.08(12/12) (7.57-8.46) | 5.84(24/24) (5.38-6.46) |

[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.
[3] REMP Control location data used for calculation.
[4] PIC = Pressurized Ion Chamber.

# TABLE E-4

## Concentration of Gamma Emitters in Bottom Sediment
## (Results in Units of pCi/kg (dry) ± 2σ)

| Sample Code | Sample Date | Cs-137[2] |
|---|---|---|
| Wbs1 | 3/29/95 | 249 +/- 67 |
| Intake Vicinity | 6/26/95 | 221 +/- 60 |
| | 8/23/95 | 155 +/- 34 |
| | 10/10/95 | 171 +/- 38 |
| Wbs2 | 3/29/95 | 176 +/- 69 |
| Discharge Vicinity | 6/26/95 | 109 +/- 42 |
| | 8/23/95 | 61 +/- 30 |
| | 10/10/95 | 95 +/- 35 |
| Wbs3 | 3/29/95 | 377 +/- 88 |
| Long Beach | 6/26/95 | 355 +/- 88 |
| | 8/23/95 | 225 +/- 50 |
| | 10/10/95 | 225 +/- 61 |
| Wbs4[1] | 3/29/95 | 291 +/- 96 |
| Camp Conoy | 6/26/95 | 329 +/- 70 |
| | 8/23/95 | 153 +/- 46 |
| | 10/10/95 | 155 +/- 35 |

[1] Control location.

[2] All other non-natural gamma emitters were < MDA.

## TABLE E-5

### Concentrations of I-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 Tower | SFA2 Visitors Center | SFA3 NNW of ISFSI | SFA4 S of ISFSI |
|---|---|---|---|---|---|---|---|---|
| 12/27/94 | 1/3/95 | * | * | * | * | * | * | * |
| 1/3/95 | 1/9/95 | * | * | * | * | * | * | * |
| 1/9/95 | 1/16/95 | * | * | * | * | * | * | * |
| 1/16/95 | 1/23/95 | * | * | * | [2] | * | * | * |
| 1/23/95 | 1/30/95 | * | * | * | * | * | * | * |
| 1/30/95 | 2/6/95 | * | * | * | * | * | * | * |
| 2/6/95 | 2/13/95 | * | * | * | * | * | * | * |
| 2/13/95 | 2/20/95 | * | * | * | * | * | * | * |
| 2/20/95 | 2/27/95 | * | * | * | * | * | * | * |
| 2/27/95 | 3/6/95 | * | * | * | * | * | * | * |
| 3/6/95 | 3/13/95 | * | * | * | * | * | * | * |
| 3/13/95 | 3/20/95 | * | * | * | * | * | * | * |
| 3/20/95 | 3/27/95 | * | * | * | * | * | * | * |
| 3/27/95 | 4/3/95 | * | * | * | * | * | * | * |
| 4/3/95 | 4/10/95 | * | * | * | * | * | * | * |
| 4/10/95 | 4/17/95 | * | * | * | * | * | * | * |
| 4/17/95 | 4/24/95 | * | * | * | * | * | * | * |
| 4/24/95 | 5/1/95 | * | * | * | * | * | * | * |
| 5/1/95 | 5/8/95 | * | * | * | * | * | * | * |
| 5/8/95 | 5/15/95 | * | * | * | * | * | * | * |
| 5/15/95 | 5/22/95 | * | * | * | * | * | * | * |
| 5/22/95 | 5/30/95 | * | * | [2] | * | * | * | * |
| 5/30/95 | 6/5/95 | * | * | [2] | * | * | * | * |
| 6/5/95 | 6/12/95 | * | * | [2] | * | * | * | * |
| 6/12/95 | 6/19/95 | * | * | [2] | * | * | * | * |
| 6/19/95 | 6/26/95 | * | * | * | * | * | * | * |

[1] Control location.

[2] Air sampler malfunction/power outage.

* <MDA.

## TABLE E-5 - Continued

### Concentrations of I-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 Tower | SFA2 Visitors Center | SFA3 NNW of ISFSI | SFA4 S of ISFSI |
|---|---|---|---|---|---|---|---|---|
| 6/26/95 | 7/3/95 | * | * | * | * | * | * | * |
| 7/3/95 | 7/10/95 | * | * | * | * | * | * | * |
| 7/10/95 | 7/17/95 | * | * | * | * | * | * | * |
| 7/17/95 | 7/24/95 | * | * | * | * | * | * | * |
| 7/24/95 | 7/31/95 | * | * | * | * | * | * | * |
| 7/31/95 | 8/7/95 | * | * | * | * | * | * | * |
| 8/7/95 | 8/14/95 | * | * | * | * | * | * | * |
| 8/14/95 | 8/21/95 | * | * | * | * | * | * | * |
| 8/21/95 | 8/28/95 | * | * | * | * | * | * | * |
| 8/28/95 | 9/5/95 | * | * | * | * | * | * | * |
| 9/5/95 | 9/11/95 | * | * | * | * | * | * | * |
| 9/11/95 | 9/18/95 | * | * | * | * | * | * | * |
| 9/18/95 | 9/25/95 | * | * | * | * | * | * | * |
| 9/25/95 | 10/2/95 | * | * | * | * | * | * | * |
| 10/2/95 | 10/9/95 | * | * | * | * | * | * | * |
| 10/9/95 | 10/16/95 | * | * | * | * | * | * | * |
| 10/16/95 | 10/23/95 | * | * | * | * | * | * | * |
| 10/23/95 | 10/31/95 | * | * | * | * | * | * | * |
| 10/31/95 | 11/6/95 | * | * | * | * | * | * | * |
| 11/6/95 | 11/13/95 | * | * | * | * | * | * | * |
| 11/13/95 | 11/20/95 | * | * | * | * | * | * | * |
| 11/20/95 | 11/27/95 | * | [2] | * | * | * | * | * |
| 11/27/95 | 12/4/95 | * | * | * | * | * | * | * |
| 12/4/95 | 12/11/95 | * | * | * | * | * | * | * |
| 12/11/95 | 12/18/95 | * | * | * | * | * | * | * |
| 12/18/95 | 12/26/95 | * | * | * | * | * | * | * |
| 12/26/95 | 1/2/96 | * | * | * | * | * | * | * |

[1] Control location.

[2] Air sampler malfunction/power outage.

* <MDA.

# TABLE E-6

## Concentrations of Beta Emitters in Air Particulates
## (Results in Units of $10^{-2}$ pCi/$m^3$ $\pm$ 2$\sigma$)

| Start Date | Stop Date | A6 Long Beach | A7[1] Taylors Island | A8 Cambridge |
|---|---|---|---|---|
| 12/27/94 | 1/3/95 | 1.9 +/- 0.3 | 1.5 +/- 0.2 | 2.2 +/- 0.4 |
| 1/3/95 | 1/9/95 | 1.9 +/- 0.3 | 1.5 +/- 0.3 | 2.4 +/- 0.4 |
| 1/9/95 | 1/16/95 | 2.3 +/- 0.3 | 1.4 +/- 0.2 | 1.5 +/- 0.3 |
| 1/16/95 | 1/23/95 | 0.5 +/- 0.2 | 0.8 +/- 0.2 | 0.9 +/- 0.2 |
| 1/23/95 | 1/30/95 | 1.6 +/- 0.3 | 1.4 +/- 0.2 | 2.0 +/- 0.3 |
| 1/30/95 | 2/6/95 | 1.2 +/- 0.3 | 1.2 +/- 0.3 | 1.3 +/- 0.3 |
| 2/6/95 | 2/13/95 | 1.7 +/- 0.3 | 1.9 +/- 0.3 | 2.3 +/- 0.3 |
| 2/13/95 | 2/20/95 | 1.6 +/- 0.3 | 2.0 +/- 0.3 | 1.6 +/- 0.3 |
| 2/20/95 | 2/27/95 | 1.2 +/- 0.3 | 0.5 +/- 0.2 | 1.4 +/- 0.4 |
| 2/27/95 | 3/6/95 | 1.4 +/- 0.2 | 1.3 +/- 0.3 | 1.4 +/- 0.3 |
| 3/6/95 | 3/13/95 | 1.4 +/- 0.3 | 2.6 +/- 0.4 | 2.5 +/- 0.3 |
| 3/13/95 | 3/20/95 | 1.9 +/- 0.3 | 1.4 +/- 0.3 | 1.5 +/- 0.3 |
| 3/20/95 | 3/27/95 | 1.2 +/- 0.2 | 1.4 +/- 0.3 | 1.6 +/- 0.3 |
| 3/27/95 | 4/3/95 | 1.3 +/- 0.2 | 1.6 +/- 0.2 | 1.4 +/- 0.3 |
| 4/3/95 | 4/10/95 | 1.8 +/- 0.3 | 2.2 +/- 0.3 | 1.7 +/- 0.3 |
| 4/10/95 | 4/17/95 | 1.1 +/- 0.3 | 1.4 +/- 0.2 | 1.1 +/- 0.3 |
| 4/17/95 | 4/24/95 | 0.8 +/- 0.2 | 1.1 +/- 0.2 | 1.1 +/- 0.3 |
| 4/24/95 | 5/1/95 | 0.4 +/- 0.2 | 0.8 +/- 0.2 | 0.6 +/- 0.3 |
| 5/1/95 | 5/8/95 | 1.1 +/- 0.2 | 0.9 +/- 0.3 | 1.2 +/- 0.3 |
| 5/8/95 | 5/15/95 | 0.8 +/- 0.2 | 0.6 +/- 0.2 | 0.7 +/- 0.3 |
| 5/15/95 | 5/22/95 | 0.9 +/- 0.2 | 1.3 +/- 0.2 | 1.4 +/- 0.3 |
| 5/22/95 | 5/30/95 | 0.6 +/- 0.2 | 1.2 +/- 0.2 | [2] |
| 5/30/95 | 6/5/95 | 0.6 +/- 0.2 | 0.8 +/- 0.3 | [2] |
| 6/5/95 | 6/12/95 | 1.0 +/- 0.2 | 1.0 +/- 0.2 | [2] |
| 6/12/95 | 6/19/95 | 0.8 +/- 0.2 | 1.0 +/- 0.2 | [2] |
| 6/19/95 | 6/26/95 | 0.4 +/- 0.2 | 0.5 +/- 0.2 | 0.4 +/- 0.3 |

[1] Control location.

[2] Air sampler malfunction/power outage.

## TABLE E-6 - Continued

### Concentrations of Beta Emitters in Air Particulates
### (Results in Units of $10^{-2}$ pCi/$m^3$ $\pm$ 2$\sigma$)

| Start Date | Stop Date | A6 Long Beach | A7[1] Taylors Island | A8 Cambridge |
|---|---|---|---|---|
| 6/26/95 | 7/3/95 | 0.5 +/- 0.2 | 0.3 +/- 0.2 | 0.4 +/- 0.3 |
| 7/3/95 | 7/10/95 | 0.7 +/- 0.2 | 1.2 +/- 0.3 | 1.0 +/- 0.3 |
| 7/10/95 | 7/17/95 | 1.3 +/- 0.2 | 1.0 +/- 0.2 | 1.0 +/- 0.2 |
| 7/17/95 | 7/24/95 | 0.9 +/- 0.2 | 0.9 +/- 0.2 | 1.3 +/- 0.3 |
| 7/24/95 | 7/31/95 | 1.0 +/- 0.2 | 1.7 +/- 0.2 | 1.5 +/- 0.3 |
| 7/31/95 | 8/7/95 | 1.3 +/- 0.2 | 0.9 +/- 0.3 | 0.9 +/- 0.3 |
| 8/7/95 | 8/14/95 | 1.1 +/- 0.2 | 1.2 +/- 0.2 | 1.2 +/- 0.3 |
| 8/14/95 | 8/21/95 | 1.5 +/- 0.2 | 1.5 +/- 0.3 | 1.9 +/- 0.3 |
| 8/21/95 | 8/28/95 | 0.7 +/- 0.3 | 0.9 +/- 0.2 | 1.0 +/- 0.2 |
| 8/28/95 | 9/5/95 | 1.5 +/- 0.2 | 1.3 +/- 0.2 | 1.9 +/- 0.3 |
| 9/5/95 | 9/11/95 | 1.5 +/- 0.3 | 1.4 +/- 0.3 | 2.1 +/- 0.3 |
| 9/11/95 | 9/18/95 | 0.9 +/- 0.2 | 1.2 +/- 0.3 | 0.8 +/- 0.2 |
| 9/18/95 | 9/25/95 | 0.7 +/- 0.2 | 0.9 +/- 0.2 | 1.1 +/- 0.3 |
| 9/25/95 | 10/2/95 | 2.0 +/- 0.2 | 2.3 +/- 0.3 | 2.3 +/- 0.3 |
| 10/2/95 | 10/9/95 | 1.2 +/- 0.2 | 1.0 +/- 0.2 | 1.1 +/- 0.3 |
| 10/9/95 | 10/16/95 | 1.2 +/- 0.2 | 1.5 +/- 0.3 | 1.6 +/- 0.3 |
| 10/16/95 | 10/23/95 | 1.1 +/- 0.2 | 1.1 +/- 0.3 | 1.3 +/- 0.3 |
| 10/23/95 | 10/31/95 | 1.5 +/- 0.2 | 1.2 +/- 0.2 | 1.4 +/- 0.3 |
| 10/31/95 | 11/6/95 | 1.4 +/- 0.3 | 1.4 +/- 0.2 | 2.0 +/- 0.3 |
| 11/6/95 | 11/13/95 | 1.7 +/- 0.3 | 1.4 +/- 0.2 | 1.0 +/- 0.2 |
| 11/13/95 | 11/20/95 | 1.7 +/- 0.3 | 1.5 +/- 0.3 | 1.5 +/- 0.3 |
| 11/20/95 | 11/27/95 | 2.3 +/- 0.3 | [2] | 2.2 +/- 0.3 |
| 11/27/95 | 12/4/95 | 1.9 +/- 0.3 | 2.2 +/- 0.4 | 2.0 +/- 0.3 |
| 12/4/95 | 12/11/95 | 1.9 +/- 0.3 | 2.2 +/- 0.3 | 1.9 +/- 0.3 |
| 12/11/95 | 12/18/95 | 2.0 +/- 0.3 | 1.2 +/- 0.3 | 1.1 +/- 0.3 |
| 12/18/95 | 12/26/95 | 1.4 +/- 0.2 | 1.5 +/- 0.3 | [2] |
| 12/26/95 | 1/2/96 | 1.5 +/- 0.3 | 1.2 +/- 0.3 | 1.4 +/- 0.3 |

[1] Control location.

[2] Air sampler malfunction/power outage.

## TABLE E-7

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

| Dates | A6 Long Beach | A7[1] Taylors Island | A8 Cambridge |
|---|---|---|---|
| 1/15/95 | * | * | * |
| 2/15/95 | * | * | * |
| 3/15/95 | * | * | * |
| 4/15/95 | * | * | * |
| 5/15/95 | * | * | * |
| 6/15/95 | * | * | * |
| 7/15/95 | * | * | * |
| 8/15/95 | * | * | * |
| 9/15/95 | * | * | * |
| 10/15/95 | * | * | * |
| 11/15/95 | * | * | * |
| 12/15/95 | * | * | * |

[1] Control location.

* All gamma emitters were < MDA.

## TABLE E-8

**Concentrations of Tritium and Gamma Emitters in Taylors Island Well Water**
**(Results in Units of $10^{-3}$ pCi/$m^3$ $\pm$ 2$\sigma$)**

| Date | H-3 | Gamma Emitters |
|---|---|---|
| 1/31/95 | < 36 | * |
| 2/28/95 | < 37 | * |
| 4/4/95 | < 36 | * |
| 4/27/95 | < 36 | * |
| 6/1/95 | < 36 | * |
| 6/29/95 | < 35 | * |
| 8/2/95 | < 34 | * |
| 9/30/95 | < 34 | * |
| 10/3/95 | < 34 | * |
| 10/31/95 | < 36 | * |
| 11/30/95 | < 36 | * |
| 12/28/95 | < 36 | * |

* All non-natural gamma emitters were < MDA.

# TABLE E-9

## Direct Radiation as Measured by Pressurized Ion Chamber
## (Results in Units of mR/30 days ± 10%)

| | | | | |
|---|---|---|---|---|
| PIC1[1] | JAN | 6.11+/-0.61 | FEB | 5.95+/-0.59 |
| Taylors Island | MAR | 5.84+/-0.58 | APR | 5.98+/-0.59 |
| | MAY | 5.86+/-0.59 | JUN | 5.96+/-0.59 |
| | JUL | 6.21+/-0.62 | AUG | 6.24+/-0.62 |
| | SEP | 6.46+/-0.64 | OCT | 5.99+/-0.59 |
| | NOV | 6.13+/-0.61 | DEC | 5.90+/-0.59 |
| PIC2 | JAN | 4.06+/-0.40 | FEB | 4.07+/-0.40 |
| Entrance to | MAR | 3.96+/-0.39 | APR | 4.00+/-0.40 |
| Camp Conoy | MAY | 4.02+/-0.40 | JUN | 3.95+/-0.39 |
| | JUL | 3.98+/-0.39 | AUG | 3.95+/-0.39 |
| | SEP | 3.99+/-0.39 | OCT | 3.96+/-0.39 |
| | NOV | 4.05+/-0.40 | DEC | 4.07+/-0.40 |
| PIC3 | JAN | 4.77+/-0.47 | FEB | 4.73+/-0.47 |
| MET Station | MAR | 4.65+/-0.46 | APR | 4.69+/-0.46 |
| | MAY | 4.77+/-0.47 | JUN | 4.76+/-0.47 |
| | JUL | 4.73+/-0.47 | AUG | 4.70+/-0.47 |
| | SEP | 4.72+/-0.47 | OCT | 4.68+/-0.46 |
| | NOV | 4.78+/-0.47 | DEC | 4.82+/-0.48 |
| PIC4 | JAN | 7.57+/-0.75 | FEB | 7.75+/-0.77 |
| NNW of ISFSI | MAR | 7.66+/-0.76 | APR | 7.76+/-0.77 |
| | MAY | 8.06+/-0.80 | JUN | 8.22+/-0.82 |
| | JUL | 8.26+/-0.82 | AUG | 8.44+/-0.84 |
| | SEP | 8.46+/-0.84 | OCT | 8.22+/-0.82 |
| | NOV | 8.27+/-0.82 | DEC | 8.28+/-0.82 |
| PIC5 | JAN | 4.91+/-0.49 | FEB | 4.92+/-0.49 |
| S of ISFSI | MAR | 4.81+/-0.48 | APR | 4.88+/-0.48 |
| | MAY | 4.89+/-0.48 | JUN | 4.85+/-0.48 |
| | JUL | 4.83+/-0.48 | AUG | 4.82+/-0.48 |
| | SEP | 4.85+/-0.48 | OCT | 4.81+/-0.48 |
| | NOV | 4.96+/-0.49 | DEC | 5.01+/-0.50 |

[1] Control location.

## TABLE E-9 - Continued

**Direct Radiation as Measured by Pressurized Ion Chamber**
**(Results in Units of mR/30 days ± 10%)**

| | | | | |
|---|---|---|---|---|
| PIC8[1] | JAN | 5.92+/-0.59 | FEB | 5.91+/-0.59 |
| Visitors Center | MAR | 5.92+/-0.59 | APR | 6.11+/-0.61 |
| | MAY | 5.64+/-0.56 | JUN | 5.39+/-0.53 |
| | JUL | 5.41+/-0.54 | AUG | 5.42+/-0.54 |
| | SEP | 5.48+/-0.54 | OCT | 5.38+/-0.53 |
| | NOV | 5.41+/-0.54 | DEC | 5.47+/-0.54 |
| Test PIC[2] | MAR | 5.13+/-0.51 | | |
| WSW of ISFSI | APR | 5.16+/-0.51 | | |
| | MAY | 5.28+/-0.52 | | |
| | JUN | 5.22+/-0.52 | | |
| | JUL | 5.05+/-0.50 | | |

[1] Control location.

[2] Temporary PIC placed to quantify effects of temporary storage of resin.

## TABLE E-10

### Direct Radiation
### (Results in Units of mR/30 days ± 2σ)

| | | | | |
|---|---|---|---|---|
| DR24 | JAN | 4.08 +/- 1.18 | FEB | 3.79 +/- 0.82 |
| Rt. 4 and | MAR | 3.60 +/- 0.74 | APR | 4.05 +/- 1.00 |
| Parran Rd. | MAY | 4.10 +/- 1.26 | JUN | 3.78 +/- 0.94 |
| | JUL | 4.17 +/- 0.18 | AUG | 4.16 +/- 0.08 |
| | SEP | 4.58 +/- 1.24 | OCT | 4.39 +/- 1.06 |
| | NOV | 3.74 +/- 0.14 | DEC | 4.33 +/- 0.66 |
| DR25 | JAN | 4.20 +/- 0.36 | FEB | 4.00 +/- 0.64 |
| On site | MAR | 4.41 +/- 2.88 | APR | 4.54 +/- 0.26 |
| Guardhouse | MAY | 5.64 +/- 1.48 | JUN | 3.86 +/- 0.20 |
| Camp Conoy | JUL | 4.62 +/- 1.20 | AUG | 5.13 +/- 0.44 |
| | SEP | 5.12 +/- 0.28 | OCT | 4.87 +/- 0.74 |
| | NOV | 3.89 +/- 0.60 | DEC | 4.65 +/- 2.54 |
| DR26 | JAN | 3.48 +/- 0.53 | FEB | 3.31 +/- 0.80 |
| Rt. 235 & | MAR | 3.91 +/- 0.56 | APR | 4.02 +/- 0.96 |
| Clark's Landing Rd. | MAY | 3.75 +/- 0.82 | JUN | 3.52 +/- 0.16 |
| | JUL | 3.68 +/- 0.56 | AUG | 3.60 +/- 0.66 |
| | SEP | 4.53 +/- 1.06 | OCT | 4.24 +/- 0.10 |
| | NOV | 3.58 +/- 0.34 | DEC | 4.12 +/- 0.98 |
| DR27 | JAN | 4.25 +/- 0.12 | FEB | 3.86 +/- 0.96 |
| Rt. 231 | MAR | 3.41 +/- 0.84 | APR | 3.97 +/- 1.22 |
| & Rt. 4 | MAY | 4.07 +/- 1.26 | JUN | 3.56 +/- 0.20 |
| | JUL | 4.05 +/- 1.16 | AUG | 4.48 +/- 0.90 |
| | SEP | 4.47 +/- 0.08 | OCT | 4.21 +/- 0.68 |
| | NOV | 3.60 +/- 0.88 | DEC | 4.25 +/- 0.72 |
| DR28 | JAN | 4.86 +/- 1.50 | FEB | 4.93 +/- 0.18 |
| Taylors Island | MAR | 5.23 +/- 0.66 | APR | 5.18 +/- 0.58 |
| Siren #35 | MAY | 5.58 +/- 1.42 | JUN | 4.60 +/- 0.24 |
| Pine Tap Rd. | JUL | 5.50 +/- 1.68 | AUG | 5.57 +/- 0.30 |
| | SEP | 6.39 +/- 1.92 | OCT | 6.40 +/- 1.24 |
| | NOV | 4.53 +/- 0.78 | DEC | 5.66 +/- 0.04 |

## TABLE E-10 - Continued

### Direct Radiation
### (Results in Units of mR/30 days ± 2σ)

| | | | | |
|---|---|---|---|---|
| DR29 | JAN | 4.32 +/- 1.08 | FEB | 4.23 +/- 0.18 |
| Taylors Island | MAR | 5.02 +/- 1.64 | APR | 7.72 +/- 4.56 |
| Siren #38 | MAY | 4.29 +/- 0.48 | JUN | 4.72 +/- 1.04 |
| Punch Is. Rd. | JUL | 4.97 +/- 1.34 | AUG | 4.69 +/- 0.92 |
| | SEP | 6.46 +/- 1.66 | OCT | 5.16 +/- 2.64 |
| | NOV | 4.54 +/- 0.70 | DEC | 5.07 +/- 0.96 |
| DR31 | JAN | 5.05 +/- 3.18 | FEB | 4.65 +/- 0.28 |
| Cambridge | MAR | 5.69 +/- 3.38 | APR | 6.99 +/- 3.12 |
| U of MD | MAY | 5.60 +/- 3.08 | JUN | 4.63 +/- 0.94 |
| | JUL | 4.71 +/- 0.24 | AUG | 5.07 +/- 0.40 |
| | SEP | 5.70 +/- 0.16 | OCT | 6.18 +/- 3.70 |
| | NOV | 4.96 +/- 1.16 | DEC | 5.43 +/- 1.60 |
| DR32 | JAN | 3.26 +/- 0.70 | FEB | 3.15 +/- 0.26 |
| Twining Property | MAR | 4.00 +/- 1.28 | APR | 4.12 +/- 0.06 |
| Taylors Island | MAY | 3.34 +/- 0.44 | JUN | 3.15 +/- 0.42 |
| | JUL | 3.06 +/- 0.88 | AUG | 4.19 +/- 2.26 |
| | SEP | 4.26 +/- 1.38 | OCT | 4.52 +/- 2.80 |
| | NOV | 3.49 +/- 0.40 | DEC | 3.55 +/- 0.34 |
| DR33 | JAN | 4.82 +/- 1.56 | FEB | 4.40 +/- 0.66 |
| Ransome Property | MAR | 5.72 +/- 2.26 | APR | 5.41 +/- 1.14 |
| | MAY | 6.14 +/- 2.18 | JUN | 5.09 +/- 1.64 |
| | JUL | 5.64 +/- 1.52 | AUG | 5.85 +/- 1.26 |
| | SEP | 5.96 +/- 0.44 | OCT | 6.14 +/- 0.74 |
| | NOV | 4.57 +/- 0.46 | DEC | 5.73 +/- 0.50 |
| DR34 | JAN | 3.20 +/- 0.38 | FEB | 3.27 +/- 0.12 |
| Shoreline, | MAR | 3.11 +/- 0.54 | APR | 3.52 +/- 0.66 |
| at Barge Rd. | MAY | 4.49 +/- 1.38 | JUN | 2.96 +/- 0.18 |
| | JUL | 4.11 +/- 3.20 | AUG | 3.71 +/- 0.84 |
| | SEP | 3.14 +/- 1.92 | OCT | 3.71 +/- 0.12 |
| | NOV | 3.14 +/- 1.10 | DEC | 3.29 +/- 0.86 |

# TABLE E-11

## Direct Radiation from Resin Storage Area
## (Results in Units of mR/30 days ± 2σ)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| North Resin Fence | JAN | 11.39 | +/- 4.28 | FEB | | * | |
| RPDR01 | MAR | 19.70 | +/- 0.55 | APR | 12.91 | +/- | 8.40 |
| | MAY | 13.14 | +/- 1.99 | JUN | 11.38 | +/- | 0.40 |
| | JUL | 8.94 | +/- 4.57 | AUG | 6.12 | +/- | 0.99 |
| | SEP | 3.87 | +/- 0.72 | OCT | 3.98 | +/- | 0.14 |
| | NOV | 3.43 | +/- 0.45 | DEC | 3.62 | +/- | 0.91 |
| East Resin Fence | JAN | 10.86 | +/- 0.48 | FEB | 5.63 | +/- | 0.04 * |
| RPDR02 | MAR | 12.14 | +/- 3.19 | APR | 15.40 | +/- | 1.27 |
| | MAY | 61.05 | +/- 6.37 | JUN | 36.14 | +/- | 5.49 |
| | JUL | 17.56 | +/- 1.38 | AUG | 6.18 | +/- | 1.52 |
| | SEP | 3.58 | +/- 0.17 | OCT | 3.93 | +/- | 1.21 |
| | NOV | 3.60 | +/- 1.73 | DEC | 3.80 | +/- | 0.39 |
| South Resin Fence | JAN | 6.84 | +/- 0.89 | FEB | 6.19 | +/- | 0.96 |
| RPDR03 | MAR | 8.06 | +/- 0.14 | APR | 5.02 | +/- | 0.98 |
| | MAY | 15.89 | +/- 5.10 | JUN | 29.79 | +/- | 1.34 |
| | JUL | 6.96 | +/- 1.04 | AUG | 4.91 | +/- | 0.30 |
| | SEP | 4.39 | +/- 0.52 | OCT | 4.34 | +/- | 0.63 |
| | NOV | 4.40 | +/- 0.19 | DEC | 4.15 | +/- | 0.31 |
| West Resin Fence | JAN | 12.85 | +/- 0.93 | FEB | 9.87 | +/- | 0.89 |
| RPDR04 | MAR | 38.20 | +/- 4.59 | APR | 46.85 | +/- | 16.20 |
| | MAY | 49.52 | +/- 1.29 | JUN | 56.40 | +/- | 5.25 |
| | JUL | 53.37 | +/- 6.03 | AUG | 35.25 | +/- | 13.95 |
| | SEP | 5.78 | +/- 0.74 | OCT | 7.96 | +/- | 3.01 |
| | NOV | 5.83 | +/- 0.11 | DEC | 6.48 | +/- | 1.49 |

* TLD(s) missing.