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APR 30 1984

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SUSQUEHANNA STEAM ELECTRIC STATION
ANNUAL ENVIRONMENTAL OPERATING REPORTS
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Docket No. 50-387

Dear Dr. Murley:

In accordance with Susquehanna SES Unit 1 Technical Specifications Section 6.9.1.10 and Environmental Protection Plan Section 5.4.1, the following reports are submitted:

Annual Radiological Environmental Operating Report
Annual Environmental Operating Report (Non-Radiological)

These reports cover the calendar year 1983.

Very truly yours,

B. D. Kenyon
Vice President-Nuclear Operations

Attachments

cc: Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
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Division of Licensing
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SUSQUEHANNA STEAM ELECTRIC STATION
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

1983 ANNUAL REPORT

Prepared for

Pennsylvania Power and Light Company

by

NUS Corporation

March 1984

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INTRODUCTION

I. INTRODUCTION

The preoperational radiological environmental monitoring program (REMP) for Pennsylvania Power and Light Company (PP&L) at the Susquehanna Steam Electric Station (SSES) was conducted from April 1972 to September 1982. On September 10, 1982, Unit #1 of the SSES became critical, thereby initiating the operational phase of the program. The preoperational phase of the program, as well as the initial phase of the operational program (September 10, 1982 through June 1983) was conducted by Radiation Management Corporation (RMC). In June 1983, NUS Corporation took over the operational REMP. The program is now being conducted by NUS under contract with Pennsylvania Power and Light.

This report covers the period December 31,1982 through January 07, 1984. In general, the data from the first half of 1983 was generated by RMC and the data from the second half of 1983 was generated by NUS. Data from programs conducted in prior years have been presented in a series of annual reports.[1-11]

A. Site and Station Description

Susquehanna SES will contain 2 BWR generating units, each with a capacity of about 1050 MWe. Unit #1 achieved initial criticality on September 10, 1982. Unit #2 is scheduled for initial criticality in 1984. This site is located on a 1075 acre tract along the Susquehanna River, five miles northeast of Berwick in Salem Township, Luzerne County, Pennsylvania.

The area surrounding the site can generally be characterized as rural, with forest and agricultural lands predominating. More specific information on the demography, hydrology, meteorology and land use characteristics of the local area may be found in the Environmental Report[12], the Safety Analysis Report[13] and the Draft Environmental Statement - O.L.[14] for Susquehanna SES.

B. Objectives and Overview of SSES Monitoring Program

United States Nuclear Regulatory Commission (USNRC) regulations require that nuclear power plants be designed, constructed, and operated to keep levels of radioactive material in effluents to unrestricted areas as low as reasonably achievable (ALARA) (10 CFR 50.34 and 10 CFR 20.1c). To assure that these criteria are met, each license authorizing reactor operation includes technical specifications (10 CFR 50.36a) governing the release of radioactive effluents.

In-plant monitoring will be used to assure that these predetermined release limits are not exceeded. However, as a precaution against unexpected and undefined processes which might allow undue accumulation of radioactivity in any sector of man's environment, a program for monitoring the plant environs is also included.

The regulations governing the quantities of radioactivity in reactor effluents allow nuclear power plants to contribute, at most, only a few percent increase above normal background radioactivity. Background levels at any one location are not constant but vary with time as they are influenced by external events such as cosmic ray bombardment, weapons test fallout, and seasonal variations. These levels also can vary spatially within relatively short distances reflecting variations in geological composition. Because of these spatial and temporal variations, the radiological surveys of the plant environs are divided into preoperational and operational phases. The preoperational phase of the program of sampling and measuring radioactivity in various media permits a general characterization of the radiation levels and concentrations prevailing prior to plant operation along with an indication of the degree of natural variation to be expected. The operational phase of the program obtains data which, when considered along with the data obtained in the preoperational phase, assist in the evaluation of the radiological impact of plant operation.

The objectives of the operational Radiological Environmental Monitoring Program are:

1. To identify, measure and evaluate existing radionuclides in the environs of the Susquehanna SES site and fluctuations in radioactivity levels which may occur.

2. To determine whether any significant increase occurs in the concentration of radionuclides in critical pathways.

3. To detect changes in ambient radiation levels.

4. To verify that Susquehanna SES operations have no detrimental effects on the health and safety of the public or on the environment.

5. To fulfill the obligations of the Radiological Surveillance-Environmental sections of the Environmental Technical Specifications for Susquehanna SES.

Sampling locations were selected on the basis of local ecology, meteorology, physical characteristics of the region, and demographic and land use features of the site vicinity. The REMP was designed on the basis of the USNRC Radiological Assessment Branch Technical Position on radiological environmental monitoring as revised in Revision 1 November 1979.[15]

In 1983 the radiological monitoring program included the measurement of ambient gamma radiation by thermoluminescent dosimetry; the determination of gamma emitters and gross alpha in bottom sediments; the determination of gamma emitters in fish; the determination of gross beta, gross alpha, and gamma emitters in airborne particulates; the measurement of airborne iodine-131; the measurement of gross beta, gross alpha, and gamma emitters in water; the measurement of iodine-131 and gamma emitters in milk; and, the determination of gamma emitters in game, poultry, eggs, and various fruits and vegetables.

PROGRAM DESCRIPTION

II. PROGRAM DESCRIPTION

One-hundred and eighteen (118) locations were included in the Susquehanna SES monitoring program for 1983. The number and locations of monitoring points were determined by considering the locations where the highest off-site environmental concentrations have been predicted from plant effluent source terms, site hydrology, and site meteorological conditions. Other factors considered were applicable regulations, population distribution, ease of access to sampling stations, security and future program integrity.

The operational environmental radiological program for Susquehanna SES is summarized in Table 1. Table 2 describes sample locations, associated media, and approximate distance and direction from the site. Figures 1 and 2 illustrate the locations of sampling stations relative to Susquehanna SES.

In addition to the described analytical program, a milk animal, vegetable garden, and residence survey was performed in 1983. This survey located the nearest milk animal, garden and residence in each sector (out to 5 miles) and will be updated annually.

SAMPLING METHODS AND PROCEDURES

III. SAMPLING METHODS AND PROCEDURES

To derive meaningful and useful data from the radiological environmental monitoring program, sampling methods and procedures are required which will provide samples representative of potential pathways of the area.

A. Direct Radiation

Thermoluminescent dosimeters (TLDs) were used to determine the direct (ambient) radiation levels at sixty-six (66) monitoring points as described in Tables 1 and 2. Sampling locations were chosen according to the criteria given in the USNRC Branch Technical Position on Radiological Monitoring (Revision 1, November 1979).[15]

The area around the station was divided into 16 radial sectors of 22 1/2 degrees each. TLDs were placed in all sectors. The TLDs were placed at locations designed to take advantage of local meteorologic and topographic characteristics and population distribution characteristics. There were seven (7) control locations: 3G3, 3G4, 4G1, 7G1, 7H1, 12G1, and 12G4.

For the first and second quarter, direct radiation measurements were made using thermoluminescent dosimeters (TLDs) consisting of calcium sulfate doped with thulium ($CaSO_4$:Tm).

For the third and fourth quarter, direct radiation measurements were made using TLDs consisting of $CaSO_4$:Dy in teflon cards. The dosimeters were exchanged on a quarterly basis. Additional TLDs were shipped with each quarterly batch and stored in a lead-pig for the duration of the quarter in order to determine the in-transit dose.

Individual dosimeters were calibrated by exposure to an accurately known radiation field from a calibrated Cs-137 source.

B. Fish

Fish sampling was conducted in the spring (May and June) and the fall (late September and October) at two locations for this program. Downstream of the Susquehanna SES on the Susquehanna River was selected as an indicator location (IND), and an upstream location was chosen as a control location (2H).

Available edible species were filleted at the time of collection. The edible portions were packed in dry ice and shipped to the laboratory for analysis by gamma spectrometry.

C. Sediment

Sediment samples were collected in May and September at five locations in the Susquehanna River. These were Bell Bend (7B), downstream near Hess Island (11C), the old Berwick test track (12F), upstream near Gould Island (2B) and between Shickshinny and the former State Hospital (2F). Samples were analyzed for gamma emitting nuclides, and gross alpha.

D. Water

The waterborne pathways of exposure from Susquehanna SES were evaluated by analyzing samples of surface water, well water, drinking water.

Surface Water

The Susquehanna River was sampled monthly at seven locations. Daily grab samples were collected at 12H1 (Merck Company) then composited into a monthly sample. Monthly samples were also composited from weekly grabs at location 5S8 (under the power line) and location 6S5 (outfall area). Monthly grab samples were collected at location 1D3 (Mocanaqua Substation), location 12F1 (Berwick Bridge), location 12G2 (between Bloomsburg and Berwick), and location 1D5 (Shickshinny Sewage Treatment facility). Monthly grab samples were also obtained fron Glen Brook Reservoir (13E1). Monthly surface water samples were analyzed for gross beta, gamma emitters and iodine-131. Quarterly composites were analyzed for tritium.

Automatic water samplers were installed at stations 6S6 and 6S7 (see program changes). Weekly sampling at 6S6 and 6S7 was begun during October 1983 and the samples were analyzed for iodine-131. Monthly composites of the weekly samples were analyzed for gross beta and gamma emitters. Quarterly composites (from the monthly composites) were analyzed for tritium.

Well Water

Eight wells, the Energy Information Center (2S6), the Riverlands Security Office (3S5), the peach stand on-site (4S2), the Training Center (4S4), the EOF Building (11S5), the Serafin Farm (15A4), the Berwick Hospital (12E4) and the Berwick Water Company (12F3), were sampled monthly. The Berwick Water Company (12F3) actually draws a portion of its water from the Glen Brook Reservoir (a surface water location 13E1). 12F3 is included here because its sampling regime is that for well water. Gross beta and gamma analyses were performed on the monthly samples. Gross alpha and tritium analyses were performed on quarterly composites of monthly grab samples.

Drinking Water

During the first two quarters, drinking water was sampled monthly at two locations, the Berwick Water Company (12F3) and the Danville Water Company (12H2). In addition, weekly samples were collected from location 12H2 for iodine-131 analysis. Gross beta and gamma emitters were analyzed monthly. Gross alpha and tritium were analyzed as quarterly composites for location 12F3 and monthly for location 12H2.

During the second two quarters, drinking water was sampled monthly at 12F3 and 12H2 RAW and weekly at 12H2 TREATED until October. In October weekly sampling at 12H2 RAW and 12H2 TREATED was begun. The weekly samples were analyzed for iodine-131. Composites of the 12H2 RAW and 12H2 TREATED samples were made on a monthly basis and analyzed for gross beta, gamma emitters, gross alpha, and tritium. Station 12F3 was analyzed for gross beta, gamma emitters, and iodine-131 monthly and gross alpha, and tritium on a quarterly basis.

E. Airborne Particulates/Air Iodine-131/Precipitation

Airborne pathways were examined by analyzing air particulates, air iodine and precipitation. Air particulates were collected on Gelman type-A/E, glass fiber filters with low volume air samplers. Air iodine was collected on one inch deep Science Applications, Inc. charcoal cartridges. Air sample volumes were measured with temperature-compensated dry-gas meters.

The samplers were run continuously and the filters and charcoal cartridges exchanged weekly. The elapsed time of sampling was recorded on an elapsed-time meter. The initial and final volumes as registered on the dry gas meter, were recorded by the sample' collector.

Precipitation samples were collected monthly in previously unused two gallon plastic containers.

Atmospheric pathway samples were collected at eleven locations; the Information Center (2S2), the biological laboratory (5S4), the Golomb House (11S2), the transmission line at site 15 (15S4), the transmission line east of route 11 (9B1), the Mocanaqua Substation (1D2), near Pond Hill (3D1), the Berwick Hospital (12E1), the Hazelton Chemistry Lab (7G1), at Bloomsburg (12G1) and the PP&L roof in Allentown (7H1). The last three locations, 7G1, 12G1, and 7H1 were the controls. Air filters were analyzed weekly for gross beta and quarterly for gamma emitters, gross alpha. Air iodine was collected on charcoal cartridges in series with the air particulate filter at all locations. The charcoal cartridges are warranted to have an efficiency of removal of elemental iodine of 99%. Precipitation samples were collected monthly from locations 5S4, 11S2, 1D2 and 12G1 and composited and analyzed quarterly for tritium and gamma emitters. Precipitation samples were also collected from 12E1, 9B1, 2S2, 3D1, 15S4, and 7G1 (control) beginning with the second quarter.

F. Milk/Pasture Grass

Cow milk samples were collected monthly from eight locations; 12B2, 12B3, 6C1, 10D1, 12D2, 5E1, 13E3 and 10G1 (control). Samples were collected semi-monthly from April through October from locations 12B2, 5E1, 13E3, and 10G1. Each monthly sample was analyzed for iodine-131 and gamma emitters.

Goat milk was sampled at one location (8D1) quarterly. Goat milk was analyzed for iodine-131 only.

Pasture grass was collected monthly at the closest farm (15A1). Pasture grass samples from location 8D1 were collected when the goat milk was unavailable. Each sample was analyzed by gamma spectrometry.

G. Food Products

Fruits and Vegetables

Gamma spectrometry was used to analyze various types of food products collected from farmers within the vicinity of Susquehanna SES. These included apples, honey, corn, cabbage, lettuce, potatoes, squash, spinach, string beans, tomatoes, endive, strawberries, peppers and swiss chard. Locations that were sampled were 11D1, 7S5, 12S4, 7B2, 12B1, and 2H2 (2H2 was a substitution for 2H1).

Meat

Meat samples consisting of eggs and chicken were collected from a local farm (12B1). The edible portion was analyzed for gamma emitters.

Game

Three deer samples and eight squirrel samples were collected in the fall and the flesh was analyzed for gamma emitters. Stations that were sampled were 1A, 2A, 15A, 16A, 1B, and 16B.

SUMMARY AND DISCUSSION OF 1983 ANALYTICAL RESULTS

IV. SUMMARY AND DISCUSSION OF 1983 ANALYTICAL RESULTS

Data from the radiological analyses of environmental media collected during the report period are tabulated and discussed below. The procedures and specifications followed in the laboratory for these analyses are as required in Section 5.0 of the NUS Environmental Services Division Quality Assurance Manual, and are detailed in the NUS Radiological Laboratory Work Instructions. NUS analytical methods are summarized in Appendix B. Analytical methods used by RMC during its portion of the program were the same as those reported previously.(11,19)

Radiological analyses of environmental media characteristically approach and frequently fall below the detection limits of state-of-the-art measurement methods.[16] The use of "LT" in the data tables is the equivalent of the less than symbol (<) and is consistent with the NUS Radiological Laboratory practice of data reporting. The number following the "LT" is a result of the lower limit of detection (LLD) calculation as defined in Appendix C. "ND" (Not Detected) is used periodically in the tables presenting gamma analysis results for various media. It primarily appears under the "Others" column, where it indicates that no other detectable gamma emitting nuclides were identified. NUS analytical methods meet the LLD requirements addressed in Table 2 of the USNRC Branch Technical Position of Radiological Monitoring (November 1979, Revision 1).[15]

Tables 3 through 21 give the radioanalytical results for individual samples. A statistical summary of the results appears in Table 22. The reported averages are based only on concentrations above the limit of detection. In Table 22, the fraction (f) of the total number of analyses which were detectable follows the average in parentheses. Also given in parentheses are the minimum and maximum values of detectable activity during the report period.

A. Direct Radiation

Environmental radiation exposure rates determined by thermoluminescent dosimeters (TLDs) are given in Table 3. The results for the first two quarters are from RMC and results from the last two quarters are from NUS. In both cases TLD packets or badges of four readout areas each were deployed quarterly at 66 locations. The mean values of four readings (corrected individually for response to a known dose and for in-transit exposure) are reported in this table, unless indicated otherwise. In the individual data table RMC data had been reported as mrad/day while NUS data had been reported as mR/day. RMC's conversion from mR to mrad had been initially made by dividing mR by 0.955. This conversion was incorporated into NUS data for averaging and statistical summaries as well as for the discussion which follows. A description of the TLD system used by NUS is contained in Appendix B.

A statistical summary of the 1983 data is included in Table 22. Individual measurements of external radiation levels in the environs of the Susquehanna SES site ranged from 0.14 to 0.34 mrad/day. The average for all indicator locations, 0.21 $\pm$ 0.07 mrad/day, was not distinguishable from the average of the control locations, 0.20 $\pm$ 0.07, and was virtually identical, 0.21 $\pm$ 0.6, if the Allentown location was excluded from the control average. Annual levels ranged from 55 to 100 mrad/year.

Oakley[4] calculates an ionizing radiation dose equivalent of 82 mrem/year for the Wilkes-Barre area. Since Oakley's values represent averages covering wide geographical areas, the measured ambient radiation average of 77 mrad/year (77 mrem assuming a quality factor of 1) for the immediate locale of Susquehanna SES is consistent with Oakley's observations. Significant variations occur between geographical areas as a result of geological composition and altitude differences. Temporal variations result from changes in cosmic ray intensity, local human activities, and factors such as ground cover and soil moisture.

B. Fish

The primary fish samples were collected during May and September from two locations. The collected fish were divided into three classifications for analysis. These were designated predator, forage and catfish species. All samples from May were analyzed by both RMC and NUS. Catfish were not available from the control location during the May sampling effort. Additional sampling was conducted in June and October. The June sample included muskellunge from both indicator and control locations and catfish from the control location. These samples were also split and analyzed by both RMC and NUS. The October samples were from Lake Took-A-While and included catfish and panfish. A total of 24 samples were analyzed, 13 from the indicator location and 11 from the control location.

The results of gamma spectrometric analyses of fish samples collected during 1983 are presented in Table 4. As expected, naturally occurring K-40 was the major detectable activity in the edible portions of the fish and was found in all 24 samples. Cs-137 was detected in 4 of 13 samples from the indicator location, at an average activity of 15 pCi/kilogram (wet). This isotope was also detected in 1 of 11 control samples, at an activity of 11 pCi/kilogram (wet). This isotope has often been reported in fish flesh in other environmental monitoring programs at this level of activity, and was reported in two fish samples in the initial operational report for 1982 at levels of 9 and 14 pCi/kilogram (wet). Since it is present in global fallout, the occasional detection of Cs-137 in environmental media is not unusual. All other nuclides were below the detection limit. No significant differences were noted in the comparative results on the split samples.

C. Sediment

The processes by which radionuclides and stable elements are concentrated in bottom sediments are complex, involving physicochemical interaction in the environment between the various organic and inorganic materials from the watershed. These interactions can proceed by a myriad of steps in which the elements are adsorbed on or displaced from the surfaces of colloidal particles enriched with chelating organic materials. Biological action of bacteria and other benthic organisms also contribute to the concentration of certain elements and in the acceleration of the sedimentation process.

Sediment samples were collected twice during this program year. Five locations were sampled, including three indicator and two control locations. Samples collected in May were split and analyzed by both RMC and by NUS. All samples were analyzed by gamma spectrometry, and for gross alpha. A statistical summary of the analytical results including the average, fraction of detectables, and range of radionuclide concentrations are summarized in Table 22.

Results of the gamma isotopic analyses of the sediments sampled from the Susquehanna SES environment are given in Table 5.

A number of man-made and naturally occurring radioisotopes were detected in these samples. The isotope cesium-137 was detected in six of fifteen samples, ranging from 58 to 240 pCi/kg (dry). Cesium-137 was detected in 3 of 9 indicator samples ranging from 58 to 91 pCi/kg (dry). Cs-137 was detected in 3 of 6 control samples. Its range was from 70 to 240 pCi/kg (dry). Only two of the positive values were significantly different from the LLDs reported for the remainder of the analyses. Detectable activities of Co-58 and Mn-54 were reported in a single sample in May by RMC. Activities were 130 and 65 pCi/kg(dry), respectively. These values were of the same order of magnitude as the sensitivity limits reported by NUS for the sample splits.

In addition to the three man-made isotopes discussed above, a number of naturally occurring isotopes were observed in all samples. Potassium-40 was detected in all samples, ranging from 5500 to 13000 pCi/kg (dry). An assortment of daughters from the uranium and thorium chains were also detected in all of the samples. These generally ranged from 420 to 1100 pCi/kg (dry) between the different samples. The observed results were internally consistent for any given sample. Individual daughters are reported in the tabulation of NUS results. RMC data for naturally occurring isotopes in the uranium and thorium chains are reported as the long-lived parents, Ra-226 and Th-232.

The results of the analysis of sediment samples for gross alpha activity are listed in Table 6. Detectable activity was observed in 4 of 9 samples from the indicator location. The range/level of observed activity was 2900 to 8800 pCi/kg(dry). Detectable activity was observed in 4 of 6 samples from the control location. The range/level of observed activity was 3200 to 9900 pCi/kg(dry). The range of gross alpha activities reported in the 1982 operational REMP report was 6000 to 9500 pCi/kg(dry).

Due to the inhomogeneity typical of sediment samples, wide variations between samples are expected even when the samples are taken from areas that are relatively near one another.

D. Water

Three types of water were sampled during 1983. Surface water was sampled from eleven (11) locations including three control locations. Well water was sampled from eight (8) locations, including one control. Drinking water was sampled from three (3) locations; both treated and untreated samples being obtained from the first downstream drinking water plant. Samples were analyzed variously by gamma spectrometry, and for gross beta, gross alpha, iodine-131, and tritium. Results are discussed in detail below.

Gamma Emitters

The results of the gamma spectrometric analyses of water samples are presented in Table 7. There were a total of 258 analyses performed; including 115 surface water samples, 35 drinking water samples, and 108 well water samples. There was no detectable activity of fission or activation products in any of the drinking or well samples analyzed. With the exception of samples from locations 6S7 and 5S8, no gamma emitters were detected in any of the surface water samples.

During the reporting period, approximately half the samples from location 6S7 contained one or more corrosion products. Detectable Co-58 was found in 6 of 15 samples from this location, varying from 0.91 to 200 pCi/liter. In addition, the isotopes Co-60 and Mn-54 were each detected in 3 of the 15 and 7 of the 15 samples respectively from 6S7. The observed activity range of Co-60 was from 8.3 to 21 pCi/l, while Mn-54 varied from 0.94 to 130 pCi/liter. A single sample from location 5S8 contained detectable activity of Co-60. The reported level in this sample was 4.8 pCi/liter. Two samples from location 6S7 contained detectable levels of Cr-51. The observed levels at the this location were 170 and 92 pCi/l.

Three of the 15 samples from location 6S7 contained detectable activity of Fe-59. The activity levels ranged from 5.8 to 34 pCi/liter. Single samples from location 6S7 contained detectable activities of Zn-65 (4.8 pCi/l) and the fission product Nb-95 (3.2 pCi/l). None of the latter three isotopes were observed in samples from any other locations.

The presence of the observed gamma-emitting nuclides can most be likely be attributed to plant operations. The levels are generally low and in all cases are well below USNRC non-routine reporting limits.

Iodine-131

A total of 209 samples were analyzed for iodine-131. These included 132 surface waters, and 77 drinking water samples. Results of the iodine-131 analyses are contained in Table 8.

Of the 80 indicator drinking water samples analyzed, 22 had detectable activity, ranging from 0.053 to 0.35 pCi/liter. Of the 7 drinking water samples from the control location, 1 had detectable activity at a level of 0.10 pCi/liter.

Of the 78 surface water samples from indicator locations which were analyzed for I-131, 26 had detectable activity, ranging from 0.05 to 0.32 pCi/liter. Of the 54 control surface water samples analyzed, 6 had detectable activity, ranging from 0.074 to 0.45 pCi/liter.

The presence of this isotope in the control location samples, and the general distribution of the observed activities indicates that the presence of this isotope is probably not plant related. Alternate sources of this contamination could be medical uses in the area.

Gross Beta

A total of 256 samples were analyzed for gross beta activity. These included 115 of surface waters, 105 well waters, and 36 drinking water samples. Results of the gross beta analyses are contained in Table 9. Of the 68 indicator surface water samples analyzed, 57 had detectable gross beta activity, ranging from 1.3 to 79 pCi/liter. Of the 47 control surface water samples analyzed, 30 had detectable gross beta activity, ranging from 1.2 to 26 pCi/liter.

Of the 92 indicator well water samples analyzed, 44 had detectable gross beta activity, ranging from 0.58 to 19 pCi/liter. Of the 13 control well water samples analyzed, 6 had detectable gross beta activity, ranging from 1.4 to 3.4 pCi/liter.

Of the 23 indicator drinking water samples analyzed, 22 had detectable gross beta activity, ranging from 0.38 to 21 pCi/liter. Of the 13 control drinking water samples analyzed, 8 had detectable gross beta activity, ranging from 1.6 to 3.2 pCi/liter.

Gross Alpha

A total of 62 samples were analyzed for gross alpha activity. These included 35 quarterly well waters, 4 quarterly composite drinking water samples, and 23 monthly drinking water samples. Results of the gross alpha analyses are contained in Table 10.

Of the 28 indicator well water samples analyzed from the routine program, 4 had detectable gross alpha activity, ranging from 1.0 to 2.5 pCi/liter. Of the 4 control well water samples analyzed, 2 had detectable gross alpha activity, ranging from 0.94 to 1.4 pCi/liter. Three special well water samples were sampled in January. One of these samples had detectable gross alpha activity of 3.1 pCi/liter.

Of the 8 treated drinking water samples analyzed, 6 had detectable gross alpha activity, ranging from 1.4 to 24 pCi/liter. Of the 8 raw drinking water samples analyzed, 2 had detectable gross alpha activity, ranging from 1.9 to 25 pCi/liter. The samples with activities of 24 and 25 pCi/liter had high total solids content. None of the quarterly composite drinking water samples had detectable gross alpha activity.

Tritium

The water samples from each location were also composited quarterly for tritium analysis. A total of 91 samples were analyzed for tritium activity. These included 35 surface waters, 32 well waters, and 24 drinking water samples. Results of the tritium analyses are contained in Table 11. Of the 21 indicator surface water samples analyzed, 4 had detectable tritium activity, ranging from 100 to 730 pCi/liter. Of the 14 control surface water samples analyzed, 1 had detectable tritium activity at 210 pCi/liter. Of the 28 indicator well water samples analyzed, 8 had detectable tritium activity, ranging from 72 to 400 pCi/liter. Of the 4 control well water samples analyzed, 1 had detectable tritium activity at 210 pCi/liter.

Of the 20 indicator drinking water samples analyzed, 3 had detectable tritium activity, ranging from 99 to 270 pCi/liter. Of the 4 control drinking water samples analyzed, 2 had detectable tritium, ranging from 76 to 250 pCi/liter.

Except for a single value (730 pCi/liter in the first quarter sample from the plant discharge, 6S7), all tritium activities which were detected were typical of existing environmental levels.

E. Air Particulates/Air Iodine-131/Precipitation

Air Particulate

Air filters were collected weekly from 11 locations. Each weekly filter was analyzed for gross beta activity. Quarterly composites were analyzed for gamma emitting radionuclides by gamma spectrometry, for gross alpha activity.

Results of gross beta analyses on air particulate filters are given in Table 12. The mean gross beta activity for all stations was 14 E-03 pCi/m^3 and the range of gross beta activity was 3.0 to 33 E-03 pCi/m^3. Figure 4 illustrates the variation of beta activity in airborne particulates over the program year. Figure 5 shows the data from the current reporting period in the context of reported measurements for the program over the period 1973 through 1983.

Air filters from each location were composited quarterly and then analyzed by gamma spectrometry. A total of 44 composited samples were analyzed. The gamma spectrometry data are presented in Table 13. Cosmogenic beryllium-7 was detected in all of the samples. The range of Be-7 activity was 30 to 110 E-03 pCi/m^3. No differences were noted between indicator and control locations. No other gamma-emitting isotopes were detected in any of the samples analyzed.

Results of gross alpha analyses on air particulate filters are given in Tables 14. The mean gross alpha activity for all stations was 5.1 $\pm$ 3.3 E-03 pCi/m^3 and the range of gross alpha activity was 2.1 to 8.0 E-03 pCi/m^3. The average activity in the sample from the indicator locations was 5.3 $\pm$ 3.4 E-03 pCi/m^3. The average activity in the sample from the control locations was 4.6 $\pm$ 2.5 E-03 pCi/m^3.

Air Iodine

Results of airborne iodine-131 analyses on charcoal cartridges are presented in Table 15. I-131 was not detected in any of the samples.

Precipitation

Precipitation samples were collected monthly from ten locations, nine indicators and one controls. Samples were composited quarterly for analysis by gamma spectrometry and for tritium.

The results of the gamma spectrometry analyses are shown in Table 16. Cosmogenic beryllium-7 was detected in 11 of 34 samples. The range of Be-7 activity was 14 to 35 pCi/liter. No other gamma-emitting istopes were detected in any of the samples. LLDs for Be-7 in samples for which no detectable activities were measured also fell within this range.

Results of the analyses for tritium are contained in Table 11. Tritium was detected in 4 of 27 analyses of samples from indicator locations and in 2 of 7 analyses of samples from the control locations. Values of the activity ranged from 130 to 290 pCi/liter for the indicator samples; and from 120 to 190 pCi/liter for the control location. These values are typical for environmental samples.

F. Milk/Pasture Grass

Milk

Monthly and semi-monthly milk samples were analyzed by gamma spectrometry. The results are shown in Table 17. A total of 136 samples were analyzed, 114 from indicator locations and 22 from the control location.

As expected, naturally occurring K-40 was the major detectable activity in the milk samples. Detectable levels of cesium-137 were found in 34 of 114 samples from indicator locations, ranging from 1.2 to 3.1 pCi/liter. Detectable levels of cesium-137 were found in 7 of 22 samples from indicator locations, ranging from 1.1 to 3.3 pCi/liter. Since Cs-137 is present in global fallout, the occasional detection of this isotope in environmental media is not unusual. These levels are very similar to previously reported values for the Susquehanna SES REMP.

The results of iodine-131 analyses of milk samples are presented in Table 17. A total of 136 analyses were performed, 114 from indicator locations and 22 from the control location. No I-131 was detected in any of the milk samples.

Pasture Grass

A total of 16 pasture grass samples were collected for analysis during this program year. Samples were collected monthly when available. All samples were analyzed by gamma spectrometry. Results of gamma spectrometric analyses of these samples are contained in Table 19.

Cs-137 was detected in 5 of 16 samples at an average activity of 17 pCi/kilogram (dry). Since it is present in global fallout, the occasional detection of Cs-137 in environmental media is not unusual. No other man-made nuclides were detected in any of the samples; nor were any members of the uranium or thorium decay chains detected in any of the samples.

Cosmogenic beryllium-7, which exists due to its deposition as stratospheric fallout, was found in 15 of the samples. Potassium-40, a naturally occurring isotope, was found in all the samples. Table 22 contains the summarized average, fraction of detectables, and range of radionuclide concentrations. The observed values for both Be-7 and K-40 were within the expected range of normal distribution.

G. Food Products

A total of 62 fruit, vegetable and food product samples were collected for analysis during this program year. Samples were collected as available during the harvest season. All samples were analyzed by gamma spectrometry.

Fruits, Vegetables and Honey

A total of 47 edible vegetation samples were collected from various gardens over the period June through October. These samples consisted of lettuce (9 samples); spinach (5 samples); cabbage, tomatoes, Swiss chard white, Swiss chard red (4 samples each); corn, endive and potatoes (3 samples each); beans(2 samples); and, peppers and strawberries (1 sample each). In addition three samples of apples and one sample of honey were collected in early 1984. Data obtained from the analysis of these samples are included in this report, because the samples are products representative of the 1983 growing season. Results of gamma spectrometric analyses of vegetation samples are contained in Table 20.

Detectable activity of cesium-137 was detected in 12 of 47 edible vegetation samples at an average activity of 18 pCi/kilogram (wet). Since it is present in global fallout, the occasional detection of Cs-137 in environmental media is not unusual. No other man-made nuclides were detected in any of the 47 samples of edible vegetation analyzed. Naturally occurring members of the uranium and thorium decay chains were not detected in any of the samples.

Cosmogenic beryllium-7, which exists due to its deposition as stratospheric fallout, was found in 22 of the 47 samples. Potassium-40, a naturally occurring isotope, was found in all the samples. Table 22 contains the summarized average, fraction of detectables, and range of radionuclide concentrations. Both Be-7 and K-40 were found at their expected ranges of activity.

The single sample of honey contained 54 $\pm$ 14 pCi/Kg of cesium-137. This data is consistent with the data obtained from prior years. No other man-made gamma emitters were detected in this sample. The data obtained from its analysis are included in Table 20.

Game, Poultry and Eggs

In addition to the samples discussed above, a total of 13 non-vegetable food product samples were collected for analysis during this program year. These included 8 squirrel samples, 3 deer samples, and one sample each of poultry and eggs. Squirrels were collected in October, deer in November and December, and poultry and eggs were collected in December. All samples were analyzed by gamma spectrometry. Results of gamma spectrometric analyses of of these non-vegetable, food product samples are contained in Table 21.

As expected the samples of squirrel meat contained high levels of Cs-137 relative to all other types of food product samples. These elevated activities have been reported previously in the annual reports on the Susquehanna SES REMP and in other sources.[18] Cs-137 was detected in all squirrel meat samples at an average activity of 1500 pCi/kilogram (wet). This is consistent with previously reported values. Since it is present in global fallout, the occasional detection of Cs-137 in environmental media is not unusual. The comparatively high levels in squirrel meat apparently result from high concentration factors in the components of the squirrel's diet. Detectable levels of cesium-137 were found in all of the deer samples, ranging from 15 to 39 pCi/kg(wet). No other man-made nuclides were detected in any of the samples of food product analyzed. Naturally occurring members of the uranium and thorium decay chains were not detected in any of the samples.

Potassium-40, a naturally occurring isotope, was found in all the samples at its expected ranges of activity. Table 22 contains the summarized average, fraction of detectables, and range of radionuclide concentrations.

DEVIATIONS FROM THE PROGRAM

V. DEVIATIONS FROM THE PROGRAM

Month	Medium	Deviation
January	Surface Water	Sample from station 6S5 lost in shipment.
	Well Water	Sample from station 3S5 not collected from January through May since pump was turned off for winter.
	Air Particulates and Air Iodine	Samples from all air stations except 7H1 were lost in shipment.
February	Surface Water	Samples from station 12G2 not collected due to icing conditions.
March	Milk	Samples from station 8D1 were not collected during the first quarter. Pasture grass was substituted.
April	Surface Water	Sample from station 6S7 was not collected during April. Sample was collected in May after a two month period instead of the required one month period.
	Well Water	No sample was collected from 4S2 because the outside spigot had been removed.
May	Surface Water	No sample was collected from 12G2 due to high river level.
	Air Iodine	Sample from station 12G1 was lost in shipment.

V. DEVIATIONS FROM THE PROGRAM (continued)

Month	Medium	Deviation
June	Milk	Duration between samples exceeded defined specifications for this frequency.
June through December	Water and Milk	Sensitivities for Ba-140, La-140, and Fe-59 were not met in many samples analyzed during these months due to delays in counting and analysis. Missed sensitivities are footnoted in the individual data tables.
August	Milk	Duration between samples exceeded defined specifications for this frequency.
September	Air Particulates and Air Iodine	Samples from 7H1 were collected on 09/22/83 after a two week period due to sample collector's error.
	Food Products	The apples and honey collected from stations 7B2, 12B1, and 2H2 were samples from the 1983 growing season. Due to a sample collection error, these samples were not picked up until the first quarter of 1984. Station 2H2 was substitued for Station 2H1 because 2H1 was closed for the season.

V. DEVIATIONS FROM THE PROGRAM (continued)

Month	Medium	Deviation
September	Air Particulates	Third Quarter gross alpha composite sample from 7H1 was destroyed in analysis.
	Milk	Samples from stations 10G1 and 12D2 were not analyzed for I-131 due to laboratory analyst error. Sample was destroyed in analysis.
	Milk	Duration between samples exceeded defined specifications for this frequency.
October	Air Particluates and Air Iodine	Samples were collected from 7H1 on 10/22/83 after a 2 week period due to sample collector's error.
	Precipitation	Sample from station 7G1 was lost in shipment.
	Surface Water	Sample from station 1D5 was not analyzed for I-131. The sample was destroyed in analysis.
	Milk	Sampling frequency was increased to obtain the correct number of samples for program.

V. DEVIATIONS FROM THE PROGRAM (continued)

Month	Medium	Deviation
November	Milk	Sample from station 5E1 was not analyzed for I-131, due to laboratory analyst's error.
	Well Water	Sample from station 3S5 was not collected. The well had been turned off for the winter.
December	Surface Water	Samples from stations 12G2 and 1D5 were not collected due to flooding conditions of river.
	Well Water	Sample from station 3S5 was not collected. The well had been turned off for the winter.
	Precipitation	Samples were not collected from the precipitation stations due to insufficient volume and the changeover from rain collectors to heated snow collectors. Rain water from December 1983 will be composited into the first quarter sample of 1984.

PROGRAM CHANGES

VI. PROGRAM CHANGES

- Well Water station 2S5 is no longer sampled. Sample collector no longer has access to the premises.

- Goat milk station 7C1 is no longer sampled. Owner disposed of goats.

- Automatic water samplers were installed at stations 6S7, 6S6 and 12H2 RAW. Sampling was initiated at 12H2 RAW for the third quarter 1983, at 6S7 for the first quarter 1983, and at 6S6 for the third quarter 1983.

- Heated snow collectors were installed during mid-December, 1983 at stations 11S2, 9B1 5S4, 12E1, and 7G1. Snow samples will be collected from these stations during 1984.

- Several new precipitation sampling stations were added to the program: 12E1, 9B1, 2S2, 3D1, 15S4, and 7G1.

- TLD location 8H1 was dropped from the program during 1983. This was an TLD location at the RMC offices in Philadelphia.

- The following surface water stations were dropped from the program: 3G5, 3G1, and 3G2. This was due to scheduled discontinuation of a special study.

LAND USE CENSUS

VII. LAND USE CENSUS

A land use survey was performed in the environs of the SSES during 1983. The purpose of this survey was to identify the potential indicator milk sampling locations as well as the nearest vegetable garden and residence in each of the sixteen standard sampling sectors around the plant. The outer bound of the survey for identifying the "nearest" or potential indicator locations was 5 miles. The vegetable garden and residence survey was conducted from August 3, 1983 to October 17, 1983. The milk survey was conducted during this same time period. The original milk survey report was lost in shipment so a reconstruction of the survey was conducted, by PP&L, NUS and IA personnel. The reconstruction of the report was based on the 1982 survey report, notes from the 1983 survey, and information from the sample collector. Table 28 identifies the nearest garden and residence in each sector for which one could be identified within the 5 mile radius. Table 29 identifies the nearest potential indicator milk sampling location in each sector.

CONCLUSIONS

VIII. CONCLUSIONS

Results of the 1983 Radiological Environmental Monitoring Program for the Susquehanna SES Nuclear Station have been presented. Generally the results were as expected for normal environmental samples. Naturally occurring activity was observed in the usual sample media at the expected magnitude. Several man-made isotopes, in particular Cs-137, were also observed in a variety of sample types. These were also generally present at the anticipated concentrations and are attributable to long term fallout from atmospheric nuclear weapons tests.

A recurring detection of low levels of I-131 in surface water samples was noted. The absence of recent atmospheric testing rules out fallout as a source because of the short half-life of this isotope. However the pattern of detection is such that plant operations are not implicated.

Some water samples in the immediate vicinity of the plant discharge contained low activities of a number of corrosion products and one quarterly composite contained levels of tritium higher than expected in environmental samples. These are probably attributable to plant operations. However, observed activities were at very low concentrations and were of no significant dose consequence.

Based on the evidence of the environmental monitoring program the station appears to be operating within regulatory limits without impact on the health or safety parameters of the local environrons.

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Table 1
(Page 1 of 4)

Annual Analytical Schedule for the
Susquehanna Steam Electric Station (PP&L)
Radiological Environmental Monitoring Program - 1983

Media(1)	No. of Locations	Sample Freq.(2)	Analysis Required	Anal. Freq.(3)
Airborne Particulates AP	11	W	BAO -Gross Beta(4) AAO -Gross Alpha GPO -Gamma Spec	W 1 QC 1 QC 1
Airborne Iodine AI	11	W	IAO -I-131	W 1
Sediment SE	5	SA	G10 -Gamma spec A10 -Gross Alpha	SA 1 SA 1
Fish F0 - F9 FA - FV	2	SA	GZO -Gamma Spec (on edible portion)	SA 1
Surface Water SW	11	W or M	BWO -Gross Beta GWO -Gamma Spec IXO -I-131 HNO -Tritium	M or MC 1 M or MC 1 W or M 1 QC 1

Note 1: Stations 6S6 and 6S7 are sampled weekly and analyzed for IXO on a weekly basis. Individual composites of the 6S6 and 6S7 weekly samples are made on a monthly basis (MC) and analyzed for BWO, and GWO. Individual quarterly composites are made of the monthly composites and analyzed for HNO.

Note: see footnote at end of table.

Table 1
(Page 2 of 4)

Annual Analytical Schedule for the
Susquehanna Steam Electric Station (PP&L)
Radiological Environmental Monitoring Program - 1983

Media(1)	No. of Locations	Sample Freq.(2)	Analysis Required	Anal. Freq.(3)
Well Water GW	8	M	BWO -Gross Beta	M 1
			GWO -Gamma Spec	M 1
			AWO -Gross Alpha	QC 1
			HNO -Tritium	QC 1
Drinking Water PW	3	M or W	BWO -Gross Beta	M or MC
			GWO -Gamma Spec	M or MC
			IXO -I-131	M or W
			AWO -Gross Alpha	MC or QC
			HNO -Tritium	MC or QC

Note 2: Station 12F3 is sampled monthly and analyzed for BWO, GWO, and IXO on a monthly basis. Station 12F3 is analyzed for AWO, and HNO on a quarterly basis from a composite of the monthly samples (QC). Station 12H2 RAW and 12H2 TREATED are sampled weekly and analyzed for IXO on a weekly basis. Individual composites of the 12H2 RAW and 12H2 TREATED weekly samples are made on a monthly basis (MC) and analyzed for BWO, GWO, AWO and HNO.

Media(1)	No. of Locations	Sample Freq.(2)	Analysis Required	Anal. Freq.(3)
Rain Water PR	10	M	GWO -Gamma Spec	QC 1
			HNO -Tritium	QC 1
Milk MI	8	M or SM(5)	GMO -Gamma Spec	SM or M
			INO -I-131	SM or M

Note: See footnote at end of table.

Table 1
(Page 3 of 4)

Annual Analytical Schedule for the
Susquehanna Steam Electric Station (PP&L)
Radiological Environmental Monitoring Program - 1983

Media(1)	No. of Locations	Sample Freq.(2)	Analysis Required	Anal. Freq.(3)
Goat Milk(6) MI	1	Q	INO -I-131	Q 1
Food Products FR, VE Various fruits and vegetables	11	A	GSO -Gamma Spec	A 1
Game GA	Approx. 6	A	GSO -Gamma Spec	A 1
Meat, Poultry, and Eggs ME, PO , EG	2	A	GSO -Gamma Spec	A 1
Pasture Grass(7) VL	1	M	GDO -Gamma Spec	M 1
Soil (8) SO	14	A	GDO -Gamma Spec	A 1
Direct Radiation TQ	66	Q	DQ -TLD	Q 1

Note: see footnote at end of table.

Table 1
(Page 4 of 4)

Annual Analytical Schedule for the
Susquehanna Steam Electric Station (PP&L)
Radiological Environmental Monitoring Program - 1983

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1. Media codes should be as specific as possible for fish, fruits, and vegetables.

2. W = weekly, M = monthly, SM = semi- monthly, Q = quarterly QC = quarterly composite, SA semi-annual, A = annual, WC = weekly composite, MC = monthly composite.

3. Codes are the same as for sample frequency. Number to the right of the code indicates the number of anaylses to be performed.

4. If the gross beta activity is greater than 10(ten) times the yearly mean of the control sample, gamma analysis should be performed on the individual filter. Perform if the gross beta analysis is greater than or equal to 24 hours following filter change.

5. Four samples will be analyzed semi-monthly from April through October.

6. Goat milk will be analyzed quarterly for I-131 only.

7. Pasture grass will be sampled during the quarters goat milk is not available.

8. Soil will be sampled during the summer of 1984.

Table 2
(Page 1 of 6)

Sample Locations and Media for the SSES Radiological Environmental Monitoring Program 1983

Location Code	Description*	Sample Types
IND**	0.9-1.4 mile ESE, At or below Discharge Structure	FI
1S2	0.2 mile N, Security Fence	TQ
2S2	0.9 mile NNE, Energy Information Center	AP,AI,TQ,PR
2S3	0.2 mile NNE, Security Fence	TQ
2S6	0.9 mile NNE, Energy Information Center	GW
3S3	0.5 mile NE, Recreational Area	TQ
3S4	0.3 mile NE, Security Fence	TQ
3S5	0.9 mile NE, Riverlands Security Office	GW
4S1	1.0 mile ENE, Susquehanna River Flood Plain	TQ
4S2	0.5 mile ENE, Site - Peach Stand	GW
4S3	0.2 mile ENE, Security Fence	TQ
4S4	0.5 mile ENE, Training Center	GW
5S1	0.8 mile E, North of Biological Consultants	TQ
5S4	0.8 mile E, West of Biological Consultants	AP,AI,TQ,PR
5S7	0.2 mile E, Security Fence	TQ
5S8	0.8 mile E, Area under power line	SW
6S4	0.2 mile ESE, Security Fence	TQ
6S5	0.9 mile ESE, Outfall Area	SW
6S6	River water intake line	SW
6S7	Cooling tower blowdown discharge line	SW
7S1	0.2 mile SE on 230 KV tower	TQ
7S3	0.2 mile SE, Security Fence	TQ
7S5	0.4 mile SE, Southeast Garden	FR,VE
8S2	0.2 mile SSE, Security Fence	TQ
9S1	0.3 mile S, Security Fence	TQ
10S1	0.4 mile SSW, Security Fence	TQ

Note: See footnote at end of table.

Table 2
(Page 2 of 6)

Sample Locations and Media for the SSES
Radiological Environmental Monitoring Program 1983

Location Code	Description*	Sample Types
11S2	0.4 mile SW, Golomb House	AP,AI,TQ,PR
11S3	0.3 mile SW, Security Fence	TQ
11S5	0.5 mile SW, EOF Building	GW
12S3	0.4 mile WSW, Security Fence	TQ
12S4	0.5 mile WSW, EOF Garden	FR,VE
13S2	0.4 mile W, Security Fence	TQ
14S5	0.5 mile WNW, Site Boundary	TQ
15S3	0.3 mile NW, Security Fence	TQ
15S4	0.6 mile NW, Transmission Corridor	AP,AI,TQ,PR
16S1	0.3 mile NNW, Security Fence	TQ
LAKE-TOOK-A-WHILE	ENE, E On site	SW
1A***	0.3-1.0 mile N, Sybert's Hill Area	GA
1A1	0.6 mile N, Thomas Residence	TQ
2A***	0.4-1.0 mile NNE, Sybert's Hill Area	GA
6A3	0.6 mile ESE, State Police	TQ
7A1	0.4 mile SE, Kline Residence	TQ
11A2	0.6 mile SW, Shortz Residence	TQ
15A***	0.3-1.0 mile NW, Sybert's Hill Area	GA
15A1	0.9 mile NW, Serafin Farm	PG
15A3	0.9 mile NW, Serafin Farm	TQ
15A4	0.9 mile NW, Serafin Farm	GW
16A***	0.3-1.0 mile NNW, Sybert's Hill Area	GA
16A2	0.8 mile NNW, Rysinski Farm	TQ
1B***	1.0-1.3 miles N, Sybert's Hill Area	GA

Note: See footnote at end of table.

Table 2
(Page 3 of 6)

Sample Locations and Media for the SSES
Radiological Environmental Monitoring Program 1983

Location Code	Description*	Sample Types
2B***	1.6 miles NNE, Gould Island	SE
2B3	1.3 miles NNE, Luzerne Outerwear	TQ
7B***	1.2 miles SE, Bell Bend	SE
7B2	1.5 miles SE, Heller's Orchard	FR,VE
7B3	1.7 miles SE, Council Cup	TQ
8B2	1.4 miles SSE, Lawall Residence	TQ
9B1	1.3 miles S, Transmission Line East of Route 11	AP,AI,TQ,PR
10B2	2.0 miles SSW, Algatt Residence	TQ
10B3	1.7 miles SSW, Car-Mar	TQ
12B1	1.3 miles WSW, Kisner Farm	EG,FR,PO
12B2	1.7 miles WSW, Shultz Farm	MI
12B3	2.0 miles WSW, Young Farm	MI
12B4	1.7 miles WSW, Shultz Farm	TQ
16B***	1.0-1.3 miles NNW, Sybert's Hill Area	GA
16B1	1.6 miles NNW, Walton Power Line	TQ
6C1	2.7 miles ESE, Moyer Farm	MI
11C***	2.6 miles SW, Hess Island	SE
1D2	4.0 miles N, Near Mocanaqua Substation	AP,AI,TQ,PR
1D3	3.9 miles N, Near Mocanaqua Substation	SW
1D5	3.9 miles N, Shickshinny Sewage Treatment Facility	SW
3D1	3.4 miles NE, Pond Hill	AP,AI,TQ,PR
8D1	3.2 miles SSE, Poltrock Farm	MI,PG
8D2	4.0 miles SSE, Mowry Residence	TQ
9D1	3.6 miles S, Smith Farm	TQ
10D1	3.0 miles SSW, Ross Ryman Farm	MI
10D2	3.0 miles SSW, Ross Ryman Farm	TQ

Note: See footnote at end of table.

Sample Locations and Media for the SSES
Radiological Environmental Monitoring Program 1983

Location Code	Description*	Sample Types
11D1	3.3 miles SW, Zehner Farm	FR,VE
12D2	3.7 miles WSW, Dogastin Farm	MI
12D3	3.7 miles WSW, Dogastin Residence	TQ
1E1	4.5 miles N, Lane Residence	TQ
4E1	4.8 miles ENE, Pole #46422 N35-197	TQ
5E1	4.5 miles E, Bloss Farm	MI
5E2	4.5 miles E, Bloss Farm	TQ
6E1	4.7 miles ESE, St. James Church	TQ
7E1	4.2 miles SE, Harwood Trans. Line Pole #2	TQ
11E1	4.7 miles SW, Jacobsen Residence	TQ
12E1	4.7 miles WSW, Berwick Hospital	AP,AI,TQ,PR
12E4	4.7 miles WSW, Berwick Hospital	GW
13E1	4.5 miles W, Glen Brook Reservoir	SW
13E3	5.0 miles W, Dent Farm	MI
13E4	4.1 miles W, Kessler Farm	TQ
14E1	4.1 miles WNW, Knouse Farm	TQ
2F***	6.4 miles NNE, Between Shickshinny and former State Hospital	SE
2F1	5.9 miles NNE, St. Adalberts Cemetery	TQ
3F1	9.1 miles NE, Valania Residence	TQ
7F1	9.0 miles SE, Conyngham School	TQ
12F***	6.9 miles WSW, Old Berwick Test Track	SE
12F1	5.3 miles WSW, Berwick Bridge	SW
12F2	5.2 miles WSW, Berwick Substation	TQ
12F3	5.2 miles WSW, Berwick Water Co.	GW,PW

Note: See footnote at end of table.

Table 2
(Page 5 of 6)

Sample Locations and Media for the SSES
Radiological Environmental Monitoring Program 1983

Location Code	Description*	Sample Types
15F1	5.4 miles NW, Zawatski Farm	TQ
16F1	7.8 miles NNW, Hidlay Residence	TQ
3G3	16 miles NE, WB Horton St. Substation	TQ
3G4	17 miles NE, WB Service Center	TQ
4G1	14 miles ENE, Mountain Top - Ind. Park	TQ
7G1	14 miles SE, Hazelton Chem Lab .	AP,AI,TQ,PR
10G1	14 miles SSW, Davis Farm	MI
12G1	15 miles WSW, Bloomsburg, PA	AP,AI,TQ,PR
12G2	17 miles WSW, between Bloomsburg and Berwick, PA	SW
12G4	10 miles WSW, Kinery Residence	TQ
2H***	30 miles NNE, Near Falls, PA	FI
2H1	Greater than 20 miles NNE	FR,VE
2H2	Greater than 20 miles NNE	FR,VE
7H1	47 miles SE, PP&L roof, Allentown.	AP,AI,TQ
12H1	26 miles WSW, Merck Co.	SW
12H2****	26 miles WSW, Danville Water Company	PW
12H2RAW	26 miles WSW, Danville Water Company	PW
12H2TREATED	26 miles WSW, Danville Water Company	PW

* All distances measured from vent.

** No actual location is indicated since fish are sampled over an area which extends through 3 sectors (5,6 and 7) near the outfall area.

*** Station code is omitted because no permanent locations exist; samples are taken based on availability.

**** During the first six months of 1983, station 12H2 was not designated as either treated or raw.

Sample Locations and Media for the SSES Radiological Environmental Monitoring Program 1983

Location Codes:

The location codes are based on direction and distance from the site. The first two numbers represent each of the 16 angular sectors of 22-1/2 degrees centered about the reactor site. Sector one is divided evenly by the north axis and other sectors are numbered in a clockwise direction; i.e., 2=NNE, 3=NE, 4=ENE, etc. The next digit is a letter which represents the radial distance from the station:

S	=	Site(1) location	E	=	4-5 miles off-site
A	=	0-1 miles off-site	F	=	5-10 miles off-site
B	=	1-2 miles off-site	G	=	10-20 miles off-site
C	=	2-3 miles off-site	H	=	20 miles off-site
D	=	3-4 miles off-site			

The last number is the station numerical designation within each sector and zone; e.g., 1, 2, 3, ...

Sample Type Codes

AP	=	Air Particulate	PR	=	Rain Water
AI	=	Air Iodine	MI	=	Milks
TQ	=	TLD	SE	=	Sediment
SW	=	Surface Water	FI	=	Fish
GW	=	Ground Water	FR	=	Fruits
PW	=	Potable Water	VE	=	Vegetables
EG	=	Eggs	GA	=	Game
PO	=	Poultry			

(1) Site is defined as that area within PP&L's property boundary.

Table 3
(Page 1 of 5)

Direct Radiation - Thermoluminscent Dosimetry[1] Results
SSES REMP 1983

(All results are in mrad/std. mo, mrad/day, or mR/day ± 2s)

Station	Quarter 1[2] a mrad/std. mo	Quarter 1[2] b mrad/day	Quarter 2[2] a mrad/std. mo	Quarter 2[2] b mrad/day	Quarter 3[3] mR/day	Quarter 4[3] mR/day	Average[4] mrad/day
1S2	5.50 ± 1.30	0.18 ± 0.04	7.31 ± 0.69	0.24 ± 0.02	0.24 ± 0.03	0.30 ± 0.02	0.23 ± 0.09
1A1	4.97 ± 0.50	0.16 ± 0.02	6.65 ± 0.77	0.22 ± 0.03	0.26 ± 0.02	0.36 ± .15	0.24 ± 0.15
1D2	5.76 ± 0.65	0.19 ± 0.02	6.89 ± 1.13	0.23 ± 0.04	0.24 ± 0.03	0.19 ± 0.02	0.21 ± 0.05
1E1	5.57 ± 0.09	0.18 ± 0.01	6.14 ± 0.61	0.20 ± 0.02	0.20 ± 0.02	0.23 ± 0.02	0.20 ± 0.03
2S3	5.79 ± 0.59	0.19 ± 0.02	5.61 ± 1.01	0.18 ± 0.03	0.24 ± 0.03	0.23 ± 0.02	0.20 ± 0.05
2S2	5.27 ± 1.09	0.17 ± 0.04	5.58 ± 1.33	0.18 ± 0.04	0.22 ± 0.02	0.22 ± 0.03	0.19 ± 0.04
2B3	5.47 ± 0.60	0.18 ± 0.02	6.23 ± 1.10	0.20 ± 0.04	0.21 ± 0.04	0.24 ± 0.03	0.20 ± 0.04
2F1	5.62 ± 0.31	0.18 ± 0.01	5.64 ± 0.54	0.19 ± 0.02	0.23 ± 0.02	0.24 ± 0.02	0.20 ± 0.05
3S4	5.06 ± 0.71	0.17 ± 0.02	6.40 ± 0.11	0.21 ± 0.01	0.22 ± 0.02	0.23 ± 0.03	0.20 ± 0.04
3S3	5.65 ± 0.20	0.19 ± 0.01	5.58 ± 0.35	0.18 ± 0.01	0.21 ± 0.02	0.22 ± 0.04	0.20 ± 0.03
3D1	6.88 ± 0.25	0.23 ± 0.01	6.76 ± 1.40	0.22 ± 0.05	0.29 ± 0.02	0.28 ± 0.03	0.25 ± 0.06
3F1	5.05 ± 0.51	0.17 ± 0.02	6.40 ± 0.62	0.21 ± 0.02	0.22 ± 0.03	0.28 ± 0.03	0.21 ± 0.08
3G3	6.36 ± 0.53	0.21 ± 0.02	6.62 ± 0.34	0.22 ± 0.01	0.26 ± 0.03	0.26 ± 0.03	0.23 ± 0.04
3G4	4.99 ± 0.15	0.16 ± 0.01	6.36 ± 0.42	0.21 ± 0.01	0.24 ± 0.03	0.24 ± 0.02	0.21 ± 0.07
4S3	5.78 ± 1.29	0.19 ± 0.04	6.83 ± 1.33	0.22 ± 0.04	0.25 ± 0.02	0.27 ± 0.03	0.23 ± 0.06

Note: See footnote at end of table.

Table 3
(Page 2 of 5)

Direct Radiation - Thermoluminscent Dosimetry[1] Results
SSES REMP 1983

(All results are in mrad/std. mo, mrad/day, or mR/day ± 2s)

Station	Quarter 1[2] a mrad/std. mo	Quarter 1[2] b mrad/day	Quarter 2[2] a mrad/std. mo	Quarter 2[2] b mrad/day	Quarter 3[3] mR/day	Quarter 4[3] mR/day	Average[4] mrad/day
4S1	4.53 ± 1.07	0.15 ± 0.04	5.70 ± 1.10	0.19 ± 0.04	0.21 ± 0.02	0.24 ± 0.04	0.19 ± 0.07
4E1	6.01 ± 0.62	0.20 ± 0.02	5.65 ± 1.11	0.19 ± 0.04	0.25 ± 0.02	0.27 ± 0.02	0.22 ± 0.06
4G1	5.56 ± 0.31	0.18 ± 0.01	6.58 ± 0.38	0.22 ± 0.01	0.22 ± 0.03	0.23 ± 0.04	0.21 ± 0.04
5S7	5.94 ± 0.50	0.20 ± 0.02	5.97 ± 0.75	0.20 ± 0.02	0.23 ± 0.04	0.24 ± 0.03	0.21 ± 0.03
5S1	4.51 ± 0.93	0.15 ± 0.03	5.35 ± 0.57	0.18 ± 0.02	0.21 ± 0.02	0.21 ± 0.02	0.18 ± 0.05
5S4	5.75 ± 0.50	0.19 ± 0.02	5.08 ± 0.83	0.17 ± 0.03	0.22 ± 0.03	0.24 ± 0.03	0.20 ± 0.05
5E2	6.41 ± 1.18	0.21 ± 0.04	6.13 ± 1.35	0.20 ± 0.04	0.24 ± 0.02	0.30 ± 0.03	0.23 ± 0.08
6S4	7.00 ± 0.92	0.23 ± 0.03	7.12 ± 1.29	0.23 ± 0.04	0.28 ± 0.03	0.30 ± 0.04	0.25 ± 0.06
6A3	6.60 ± 0.76	0.22 ± 0.03	6.47 ± 0.13	0.21 ± 0.01	0.24 ± 0.03	0.27 ± 0.03	0.23 ± 0.04
6E1	6.48 ± 0.81	0.21 ± 0.03	6.82 ± 0.83	0.22 ± 0.03	0.27 ± 0.03	0.33 ± 0.04	0.25 ± 0.10
7S3	5.74 ± 1.08	0.19 ± 0.04	6.00 ± 1.53	0.20 ± 0.05	0.24 ± 0.02	0.24 ± 0.02	0.21 ± 0.04
7S1	5.86 ± 0.90	0.19 ± 0.03	5.60 ± 0.60	0.18 ± 0.02	0.21 ± 0.02	0.24 ± 0.04	0.20 ± 0.04
7A1	6.00 ± 0.16	0.20 ± 0.01	5.33 ± 0.66	0.18 ± 0.02	0.24 ± 0.02	0.27 ± 0.02	0.22 ± 0.07
7B3	5.85 ± 0.20	0.19 ± 0.01	5.09 ± 1.55	0.17 ± 0.05	0.24 ± 0.02	0.25 ± 0.02	0.21 ± 0.06
7E1	6.05 ± 0.52	0.20 ± 0.02	5.74 ± 0.71	0.19 ± 0.02	0.25 ± 0.02	0.25 ± 0.03	0.22 ± 0.05

Note: See footnote at end of table.

Table 3
(Page 3 of 5)

Direct Radiation - Thermoluminscent Dosimetry(1) Results
SSES REMP 1983

(All results are in mrad/std. mo, mrad/day, or mR/day ± 2s)

Station	Quarter 1(2) a mrad/std. mo	Quarter 1(2) b mrad/day	Quarter 2(2) a mrad/std. mo	Quarter 2(2) b mrad/day	Quarter 3(3) mR/day	Quarter 4(3) mR/day	Average(4) mrad/day
7F1	6.13 ± 0.64	0.20 ± 0.02	4.69 ± 1.70	0.15 ± 0.06	NS(5)	0.26 ± 0.02	0.20 ± 0.10
7G1	6.03 ± 0.50	0.20 ± 0.02	6.56 ± 1.53	0.20 ± 0.05	0.23 ± 0.02	0.22 ± 0.03	0.21 ± 0.02
8S2	6.23 ± 0.61	0.20 ± 0.02	5.65 ± 0.79	0.19 ± 0.03	0.22 ± 0.04	0.24 ± 0.03	0.21 ± 0.03
8B1	6.00 ± 0.63	0.20 ± 0.02	5.47 ± 0.69	0.18 ± 0.02	0.25 ± 0.03	0.25 ± 0.03	0.21 ± 0.06
8D2	5.46 ± 0.31	0.18 ± 0.01	5.89 ± 0.86	0.19 ± 0.03	0.24 ± 0.02	0.23 ± 0.02	0.20 ± 0.05
9S1	5.06 ± 0.94	0.17 ± 0.03	4.86 ± 1.01	0.16 ± 0.03	0.20 ± 0.03	0.22 ± 0.02	0.18 ± 0.04
9B1	5.39 ± 0.52	0.18 ± 0.02	5.52 ± 1.19	0.18 ± 0.04	0.21 ± 0.02	0.22 ± 0.03	0.19 ± 0.03
9D1	5.86 ± 0.71	0.19 ± 0.02	6.18 ± 0.50	0.20 ± 0.02	0.24 ± 0.02	0.23 ± 0.02	0.21 ± 0.04
10S1	5.44 ± 0.38	0.18 ± 0.01	5.69 ± 1.03	0.19 ± 0.03	0.21 ± 0.03	0.24 ± 0.03	0.20 ± 0.04
10B2	5.17 ± 0.31	0.17 ± 0.01	4.40 ± 1.08	0.14 ± 0.04	0.19 ± 0.02	0.19 ± 0.02	0.17 ± 0.04
10B3	4.95 ± 0.65	0.16 ± 0.02	4.50 ± 1.13	0.15 ± 0.04	0.21 ± 0.02	0.19 ± 0.02	0.17 ± 0.05
10D2	5.90 ± 0.27	0.19 ± 0.01	5.88 ± 0.90	0.19 ± 0.03	0.23 ± 0.03	0.23 ± 0.03	0.20 ± 0.03
11S3	8.15 ± 1.36	0.27 ± 0.04	7.73 ± 0.94	0.25 ± 0.03	0.29 ± 0.03	0.32 ± 0.03	0.28 ± 0.05
11S2	5.23 ± 0.21	0.17 ± 0.01	4.65 ± 0.30	0.15 ± 0.01	0.19 ± 0.03	0.20 ± 0.03	0.17 ± 0.04
11A2	5.14 ± 0.19	0.17 ± 0.01	4.88 ± 0.57	0.16 ± 0.02	0.21 ± 0.03	0.21 ± 0.03	0.18 ± 0.04
11E1	5.25 ± 0.43	0.17 ± 0.01	4.93 ± 0.89	0.16 ± 0.03	0.19 ± 0.03	0.21 ± 0.02	0.18 ± 0.03

Note: See footnote at end of table.

Table 3
(Page 4 of 5)

Direct Radiation - Thermoluminscent Dosimetry[1] Results
SSES REMP 1983

(All results are in mrad/std. mo, mrad/day, or mR/day ± 2s)

Station	Quarter 1[2] a mrad/std. mo	Quarter 1[2] b mrad/day	Quarter 2[2] a mrad/std. mo	Quarter 2[2] b mrad/day	Quarter 3[3] mR/day	Quarter 4[3] mR/day	Average[4] mrad/day
12S3	7.06 ± 0.23	0.23 ± 0.01	6.41 ± 0.30	0.21 ± 0.01	0.25 ± 0.03	0.26 ± 0.04	0.23 ± 0.03
12B4	5.73 ± 0.39	0.19 ± 0.01	4.75 ± 1.02	0.16 ± 0.03	0.23 ± 0.02	0.23 ± 0.02	0.20 ± 0.06
12D3	6.39 ± 0.29	0.21 ± 0.01	6.40 ± 0.52	0.21 ± 0.02	0.24 ± 0.02	0.26 ± 0.02	0.22 ± 0.04
12E1	5.83 ± 0.45	0.19 ± 0.01	5.55 ± 0.79	0.18 ± 0.03	0.21 ± 0.03	0.24 ± 0.03	0.20 ± 0.04
12F2	6.45 ± 0.83	0.21 ± 0.03	5.75 ± 0.91	0.19 ± 0.03	0.23 ± 0.03	0.27 ± 0.03	0.22 ± 0.06
12G1	4.65 ± 0.35	0.15 ± 0.01	4.62 ± 0.51	0.15 ± 0.02	0.17 ± 0.03	0.21 ± 0.03	0.17 ± 0.05
12G4	6.37 ± 0.63	0.21 ± 0.02	6.09 ± 1.03	0.20 ± 0.03	0.25 ± 0.02	0.28 ± 0.03	0.23 ± 0.06
13S2	7.02 ± 0.87	0.23 ± 0.03	5.80 ± 1.62	0.19 ± 0.05	0.26 ± 0.02	0.27 ± 0.04	0.23 ± 0.06
13E4	5.92 ± 1.15	0.19 ± 0.04	5.62 ± 1.14	0.18 ± 0.04	0.23 ± 0.02	0.27 ± 0.04	0.21 ± 0.07
14S5	6.74 ± 0.34	0.22 ± 0.01	6.66 ± 0.43	0.22 ± 0.01	0.26 ± 0.02	0.28 ± 0.03	0.24 ± 0.05
14E1	6.12 ± 0.75	0.20 ± 0.02	5.57 ± 1.40	0.18 ± 0.05	0.24 ± 0.02	0.26 ± 0.03	0.21 ± 0.06
15S3	6.70 ± 0.76	0.22 ± 0.03	6.50 ± 0.38	0.21 ± 0.01	0.24 ± 0.02	0.26 ± 0.02	0.23 ± 0.03
15S4	4.89 ± 0.37	0.16 ± 0.01	4.81 ± 0.74	0.16 ± 0.02	0.19 ± 0.03	0.23 ± 0.02	0.18 ± 0.06
15A3	6.39 ± 0.65	0.21 ± 0.02	5.81 ± 0.90	0.19 ± 0.03	0.23 ± 0.02	0.26 ± 0.02	0.22 ± 0.05

Note: See footnote at end of table.

Table 3
(Page 5 of 5)

Direct Radiation - Thermoluminscent Dosimetry[1] Results
SSES REMP 1983

(All results are in mrad/std. mo, mrad/day, or mR/day ± 2s)

Station	Quarter 1[2] a mrad/std. mo	Quarter 1[2] b mrad/day	Quarter 2[2] a mrad/std. mo	Quarter 2[2] b mrad/day	Quarter 3[3] mR/day	Quarter 4[3] mR/day	Average[4] mrad/day
15F1	7.31 ± 0.94	0.24 ± 0.03	5.89 ± 1.32	0.19 ± 0.04	NS[5]	0.33 ± 0.03	0.25 ± 0.13
16S1	6.16 ± 0.89	0.20 ± 0.03	6.03 ± 0.41	0.20 ± 0.01	0.24 ± 0.02	0.27 ± 0.03	0.22 ± 0.06
16A2	5.37 ± 0.58	0.18 ± 0.02	5.16 ± 0.25	0.17 ± 0.01	0.21 ± 0.02	0.22 ± 0.02	0.19 ± 0.04
16B1	5.30 ± 0.54	0.17 ± 0.02	4.94 ± 0.39	0.16 ± 0.01	0.22 ± 0.02	0.20 ± 0.02	0.19 ± 0.04
16F1	5.67 ± 1.08	0.19 ± 0.04	4.94 ± 0.25	0.16 ± 0.01	0.25 ± 0.02	0.25 ± 0.02	0.18 ± 0.04
7H1	4.42 ± 0.60	0.15 ± 0.02	4.55 ± 1.01	0.15 ± 0.03	0.15 ± 0.02	0.18 ± 0.02	0.15 ± 0.02
Average[4]	5.78 ± 1.52	0.19 ± 0.05	5.78 ± 1.52	0.19 ± 0.05	0.23 ± 0.05	0.25 ± 0.07	0.21 ± 0.07

(1) Errors for individual measurements are two standard deviations of the average of four readings per dosimeter.
(2) Samples collected and analyzed by Radiation Management Corporation.
(3) Samples collected and analyzed by NUS.
(4) Errors of row and column averages are two standard deviations calculated from the same row or column data used to generate the average.
(5) NS = No Sample. TLD vandalized in field.

Table 4

Gamma Spectrometry of Fish
SSES REMP 1983

(Results in pCi/kg (wet) ± 2s)

Month	Sample Type	Station	Collection Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
May (2)	Sucker/Redhorse	IND	05/19/83	LT 300(1)	LT 14	LT 15	LT 11	LT 11	LT 40	3200 ± 400	LT 90	LT 11	LT 20	LT 30	LT 30
	Bass and Walleye	IND	05/19/83	LT 400	LT 16	LT 12	LT 11	15 ± 8	LT 40	3600 ± 400	LT 60	LT 13	LT 20	LT 30	LT 30
	Channel Catfish	IND	05/27/83	LT 300	LT 14	LT 12	LT 10	18 ± 8	LT 40	2900 ± 300	LT 80	LT 12	LT 20	LT 30	LT 30
	Sucker/Redhorse	2H	05/31/83	LT 400	LT 20	LT 16	LT 15	LT 17	LT 50	3500 ± 400	LT 70	LT 16	LT 30	LT 40	LT 40
	Bass and Walleye	2H	05/31/83	LT 170	LT 11	LT 10	LT 8	11 ± 5	LT 30	3300 ± 400	LT 40	LT 9	LT 14	LT 20	LT 18
June (2)	Muskellunge	2H	06/01/83	LT 300	LT 15	LT 17	LT 10	LT 13	LT 40	3400 ± 400	LT 50	LT 12	LT 20	LT 30	LT 30
	Channel Catfish	2H	06/01/83	LT 300	LT 18	LT 20	LT 14	LT 15	LT 50	2800 ± 300	LT 80	LT 16	LT 30	LT 40	LT 40
	Muskellunge	IND	06/14/83	LT 90	LT 9	LT 11	LT 8	17 ± 7	LT 30	3600 ± 400	LT 20	LT 9	LT 12	LT 30	LT 18
May (3)	Predator Fish	IND	05/19/83	LT 600	LT 40	LT 40	LT 20	LT 30	LT 160	3600 ± 500	LT 300	LT 30	LT 40	LT 70	LT 50
	Forage Species	IND	05/19/83	LT 800	LT 60	LT 40	LT 30	LT 40	LT 190	2700 ± 400	LT 500	LT 40	LT 50	LT 100	LT 90
	Catfish	IND	05/27/83	LT 500	LT 40	LT 30	LT 20	LT 30	LT 140	3100 ± 500	LT 300	LT 30	LT 30	LT 70	LT 70
	Predator Fish	2H	05/31/83	LT 400	LT 30	LT 20	LT 18	LT 20	LT 100	2800 ± 300	LT 200	LT 20	LT 30	LT 60	LT 50
	Forage Species	2H	05/31/83	LT 300	LT 40	LT 30	LT 20	LT 30	LT 150	2700 ± 500	LT 150	LT 30	LT 30	LT 90	LT 60
June (3)	Catfish	2H	06/01/83	LT 300	LT 40	LT 30	LT 20	LT 30	LT 100	2400 ± 400	LT 140	LT 30	LT 30	LT 80	LT 50
	Muskellunge	2H	06/01/83	LT 4000	LT 50	LT 30	LT 20	LT 20	LT 180	3100 ± 500	LT 3000	LT 30	LT 50	LT 70	LT 90
	Muskellunge	IND	06/14/83	LT 2000	LT 50	LT 40	LT 20	LT 20	LT 200	3000 ± 500	LT 1200	LT 30	LT 50	LT 100	LT 110
September (3)	Predator Fish	IND	09/15/83	LT 150	LT 10	LT 9	LT 6	9.2 ± 3.4	LT 30	3400 ± 400	LT 80	LT 7	LT 15	LT 20	LT 18
	Forage Species	IND	09/15/83	LT 200	LT 14	LT 12	LT 8	LT 9	LT 50	3600 ± 400	LT 11	LT 11	LT 20	LT 30	LT 20
	Predator Fish	2H	09/22/83	LT 150	LT 12	LT 11	LT 7	LT 10	LT 40	3100 ± 400	LT 80	LT 9	LT 18	LT 30	LT 20
	Catfish	IND	09/28/83	LT 100	LT 11	LT 11	LT 7	LT 9	LT 40	3500 ± 400	LT 40	LT 9	LT 15	LT 30	LT 18
	Forage Species	2H	09/22/83	LT 150	LT 10	LT 9	LT 7	LT 8	LT 30	3400 ± 400	LT 70	LT 8	LT 11	LT 20	LT 19
	Catfish	2H	09/23/83	LT 140	LT 11	LT 10	LT 7.	LT 6	LT 40	3200 ± 400	LT 80	LT 8	LT 15	LT 20	LT 19
October (3)	Catfish	Lake T-A-W	10/07/83	LT 50	LT 8	LT 8	LT 6	LT 7	LT 20	3100 ± 400	LT 20	LT 7	LT 10	LT 20	LT 14
	Panfish	Lake T-A-W	10/07/83	LT 70	LT 11	LT 13	LT 9	LT 10	LT 30	3200 ± 400	LT 30	LT 16	LT 14	LT 30	LT 30

(1) LT = Less Than
(2) Samples collected and analyzed by Radiation Management Corporation.
(3) Samples collected and analyzed by NUS.

Table 5 (1)
(Page 1 of 3)

Gamma Spectrometry of Sediment
SSES REMP 1983

(Results in pCi/kg (dry) ± 2s)

Collection Date: May 26, 1983

	Station				
	11C	2F	12F	7B	2B
Ac-228:	ND (2)	ND	ND	ND	ND
Ba-140:	LT 1000 (3)	LT 1200	LT 1100	LT 800	LT 1000
Bi-212:	ND	ND	ND	ND	ND
Bi-214:	ND	ND	ND	ND	ND
Co-58:	LT 40	LT 50	130 ± 40	LT 30	LT 40
Co-60:	LT 40	LT 40	LT 30	LT 30	LT 30
Cs-134:	LT 40	LT 50	LT 40	LT 30	LT 30
Cs-137:	64 ± 27	240 ± 40	91 ± 24	58 ± 19	70 ± 24
Fe-59:	LT 110	LT 140	LT 110	LT 90	LT 100
K-40:	7700 ± 800	11000 ± 2000	8800 ± 900	8300 ± 900	8100 ± 900
La-140:	LT 300	LT 400	LT 300	LT 200	LT 200
Mn-54:	LT 40	LT 40	65 ± 28	LT 30	LT 40
Nb-95:	LT 70	LT 80	LT 70	LT 50	LT 70
Pb-212:	ND	ND	ND	ND	ND
Pb-214:	ND	ND	ND	ND	ND
Ra-226:	680 ± 70	770 ± 80	690 ± 70	530 ± 60	530 ± 60
Th-232:	720 ± 100	1100 ± 200	880 ± 90	680 ± 80	680 ± 80
Tl-208:	ND	ND	ND	ND	ND
Zn-65:	LT 90	LT 120	LT 80	LT 80	LT 80
Zr-95:	LT 80	LT 100	LT 90	LT 60	LT 80

Note: See footnotes at end of table.

Table 5 (4)
(Page 2 of 3)

Gamma Spectrometry of Sediment
SSES REMP 1983

(Results in pCi/kg (dry) ± 2s)

Collection Date: May 26, 1983

	Station				
	11C	2F	12F	7B	2B
Ac-228:	770 ± 220	1100 ± 200	900 ± 180	770 ± 200	860 ± 210
Ba-140:	LT 2000	LT 1800	LT 1200	LT 1600	LT 1500
Bi-212:	ND	1100 ± 600	ND	990 ± 610	ND
Bi-214:	790 ± 140	970 ± 150	820 ± 120	680 ± 130	740 ± 140
Co-58:	LT 140	LT 120	LT 120	LT 110	LT 110
Co-60:	LT 100	LT 90	LT 80	LT 80	LT 80
Cs-134:	LT 100	LT 100	LT 90	LT 90	LT 110
Cs-137:	LT 100	190 ± 60	LT 90	LT 100	LT 90
Fe-59:	LT 300	LT 300	LT 300	LT 300	LT 300
K-40:	6300 ± 1000	13000 ± 2000	6400 ± 800	8500 ± 1300	8700 ± 1300
La-140:	LT 1000	LT 1200	LT 700	LT 800	LT 1000
Mn-54:	LT 100	LT 90	LT 80	LT 80	LT 100
Nb-95:	LT 140	LT 130	LT 100	LT 110	LT 140
Pb-212:	630 ± 110	780 ± 90	670 ± 100	540 ± 80	470 ± 70
Pb-214:	730 ± 130	1100 ± 200	770 ± 110	840 ± 140	850 ± 130
Ra-226:	760 ± 140	1000 ± 200	790 ± 120	760 ± 140	790 ± 140
Tl-208:	780 ± 170	1100 ± 200	930 ± 150	880 ± 170	800 ± 170
Zn-65:	LT 300	LT 300	LT 200	LT 300	LT 300
Zr-95:	LT 200	LT 200	LT 190	LT 190	LT 200

Note: See footnote at end of table.

Table 5 [4]
(Page 3 of 3)

Gamma Spectrometry of Sediment
SSES REMP 1983

(Results in pCi/kg (dry) ± 2s)

Collection Date: September 29, 1983

	Station				
	11C	2F	12F	7B	2B
Ac-228:	740 ± 190	870 ± 200	590 ± 200	550 ± 240	610 ± 220
Ba-140:	LT 3000	LT 2000	LT 1900	LT 2000	LT 2000
Bi-212:	ND	ND	ND	ND	ND
Bi-214:	600 ± 130	620 ± 120	540 ± 120	450 ± 130	510 ± 140
Co-58:	LT 130	LT 130	LT 120	LT 130	LT 120
Co-60:	LT 100	LT 90	LT 80	LT 50	LT 120
Cs-134:	LT 110	LT 110	LT 100	LT 110	LT 120
Cs-137:	LT 100	LT 100	LT 90	LT 90	LT 110
Fe-59:	LT 300	LT 300	LT 300	LT 400	LT 300
K-40:	8600 ± 1100	8800 ± 1100	8200 ± 1200	5500 ± 1200	6900 ± 1300
La-140:	LT 1500	LT 1400	LT 1100	LT 1300	LT 1700
Mn-54:	LT 100	LT 90	LT 90	LT 110	LT 110
Nb-95:	LT 140	LT 130	LT 120	LT 160	LT 150
Pb-212:	430 ± 110	460 ± 110	490 ± 120	420 ± 120	530 ± 140
Pb-214:	590 ± 130	780 ± 140	620 ± 110	430 ± 110	480 ± 120
Ra-226:	600 ± 130	700 ± 130	580 ± 110	440 ± 120	500 ± 130
Tl-208:	710 ± 160	720 ± 170	610 ± 150	540 ± 180	630 ± 190
Zn-65:	LT 300	LT 200	LT 300	LT 300	LT 300
Zr-95:	LT 300	LT 200	LT 200	LT 300	LT 300

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) ND = Not detected
(3) LT = Less Than
(4) Samples collected and analyzed by NUS.

Table 6

Gross Alpha in Sediment
SSES REMP 1983

(Results in Units of pCi/kg (dry) $\pm$ 2s)

Month	Station	Collection Date	Gross Alpha Activity
May[2]	2B	05/26/83	3200 $\pm$ 2900
	7B	05/26/83	2900 $\pm$ 2900
	11C	05/26/83	LT 4000[1]
	2F	05/26/83	4400 $\pm$ 3100
	12F	05/26/83	LT 4000
May[3]	2B	05/26/83	5400 $\pm$ 3700
	7B	05/26/83	6800 $\pm$ 3900
	11C	05/26/83	8800 $\pm$ 4200
	2F	05/26/83	9900 $\pm$ 4300
	12F	05/26/83	5500 $\pm$ 3700
September[3]	2B	09/29/83	LT 3000
	7B	09/29/83	LT 3000
	11C	09/29/83	LT 3000
	2F	09/29/83	LT 3000
	12F	09/29/83	LT 3000

(1) LT = Less Than
(2) Samples collected and analyzed by Radiation Management Corporation.
(3) Samples collected and analyzed by NUS.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
Jan.[1]	SW[2]	5S8	01/04 to 01/25/83	LT 7[3]	LT 0.6	LT 0.6	LT 0.5	LT 0.5	LT 1.4	LT 2	LT 0.6	LT 0.7	LT 1.2	LT 1.1	
		6S5	NS[4]	-	-	-	-	-	-	-	-	-	-	-	
		6S7	01/03 to 02/03/83	LT 100[5]	35 ± 4	LT 1.2	LT 1.5	LT 0.9	LT 3	LT 20[5]	26 ± 3	LT 2	LT 1.8	LT 2	
		1D3	01/07/83	LT 6	LT 0.8	LT 0.8	LT 0.7	LT 0.8	LT 1.5	LT 1.4	LT 0.7	LT 0.9	LT 1.5	LT 1.4	
		13E1	01/05/83	LT 8	LT 0.6	LT 0.6	LT 0.5	LT 0.5	LT 1.5	LT 2	LT 0.6	LT 0.8	LT 1.1	LT 1.1	
		12F1	01/05/83	LT 5	LT 0.5	LT 0.5	LT 0.5	LT 0.6	LT 1.2	LT 1.5	LT 0.5	LT 0.6	LT 1.1	LT 0.9	
		12G2	01/05/83	LT 6	LT 0.6	ND[6]	LT 0.6	LT 0.6	LT 1.4	LT 1.6	LT 0.5	LT 0.8	LT 1.4	LT 1.1	
		12H1	01/03 to 02/02/83	LT 60	LT 0.9	LT 0.8	LT 0.6	LT 0.6	LT 3	LT 20[5]	LT 0.6	LT 1.9	LT 1.7	LT 1.7	
	GW[7]	Orangeville	01/13/84	LT 13	LT 0.8	LT 0.8	LT 0.6	LT 0.7	LT 1.9	LT 3	LT 0.7	LT 1.1	LT 1.3	LT 1.6	
		Muncy Valley	01/13/83	LT 11	LT 0.8	LT 1.0	LT 0.5	LT 0.6	LT 1.9	LT 3	LT 0.6	LT 1.0	LT 1.4	LT 1.5	
		Lee Mount.	01/13/83	LT 11	LT 0.7	LT 0.8	LT 0.5	LT 0.6	LT 1.5	LT 4	LT 0.6	LT 1.0	LT 1.3	LT 1.3	
		2S6	01/06/83	LT 9	LT 0.7	LT 1.1	LT 0.6	LT 0.7	LT 1.4	LT 2	LT 0.6	LT 0.9	LT 1.3	LT 1.3	
		2S5	01/06/83	LT 7	LT 0.6	LT 0.7	LT 0.6	LT 0.6	LT 1.5	LT 2	LT 0.6	LT 0.8	LT 1.5	LT 1.1	
		4S2	01/06/83	LT 7	LT 0.7	LT 0.7	LT 0.5	LT 0.6	LT 1.4	LT 2	LT 0.5	LT 0.8	LT 1.2	LT 1.1	
		4S4	01/06/83	LT 8	LT 0.7	LT 0.7	LT 0.6	LT 0.6	LT 1.4	LT 3	LT 0.6	LT 0.8	LT 1.3	LT 1.2	
		11S5	01/06/83	LT 12	LT 0.8	LT 0.8	LT 0.5	LT 0.6	LT 1.7	LT 4	LT 0.6	LT 1.1	LT 1.5	LT 1.2	
		15A4	01/08/83	LT 8	LT 0.8	LT 1.0	LT 0.6	LT 0.7	LT 1.6	LT 2	LT 0.7	LT 0.9	LT 1.4	LT 1.4	
		12E4	01/06/83	LT 7	LT 0.7	LT 1.0	LT 0.6	LT 0.7	LT 1.5	LT 2	LT 0.6	LT 0.9	LT 1.4	LT 1.4	
		12F3	01/05/83	LT 6	LT 0.6	LT 0.7	LT 0.6	LT 0.6	LT 1.4	LT 2	LT 0.6	LT 0.8	LT 1.5	LT 1.2	
		3S5	NS	-	-	-	-	-	-	-	-	-	-	-	
	PW[8]	12F3	01/05/83	LT 7	LT 0.6	LT 0.6	LT 0.5	LT 0.5	LT 1.3	LT 1.9	LT 0.5	LT 0.7	LT 1.3	LT 1.1	
		12H2	01/03 to 02/02/83	LT 110[5]	LT 1.8	LT 1.1	LT 0.9	LT 1.0	LT 4	LT 30[5]	LT 1.1	LT 3	LT 2	LT 3	

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
Feb.[1]	SW	5S8	02/01 to 02/22/83	LT 60	LT 1.3	LT 0.8	LT 0.8	LT 0.8	LT 3	LT 13	LT 0.9	LT 2	LT 1.9	LT 2	
		6S5	02/01 to 02/22/83	LT 80[5]	LT 1.6	LT 1.1	LT 0.9	LT 0.9	LT 4	LT 18[5]	LT 1.1	LT 3	LT 2	LT 3	
		6S7	02/03 to 03/11/83	LT 30	120 + 20	8.3 + 0.9	LT 1.4	LT 1.1	13 + 2	LT 4	70 + 7	LT 1.6	LT 2	LT 2	
		1D3	02/03/83	LT 100[5]	LT 1.7	LT 1.1	LT 0.9	LT 1.0	LT 4	LT 20[5]	LT 1.1	LT 3	LT 3	LT 3	
		13E1	02/03/83	LT 50	LT 0.9	LT 0.6	LT 0.5	LT 0.5	LT 3	LT 16[5]	LT 0.5	LT 1.5	LT 1.2	LT 1.6	
		12F1	02/03/83	LT 60	LT 0.9	LT 0.7	LT 0.5	LT 0.5	LT 3	LT 18[5]	LT 0.6	LT 1.6	LT 1.3	LT 1.6	
		12G2	NS	-	-	-	-	-	-	-	-	-	-	-	
		12H1	02/02 to 03/07/83	LT 30	LT 0.9	LT 1.1	LT 0.6	LT 0.7	LT 3	LT 8	LT 0.8	LT 1.5	LT 1.5	LT 1.8	
	GW	2S6	02/02/83	LT 100[5]	LT 1.4	LT 0.9	LT 0.8	LT 0.9	LT 3	LT 19[5]	LT 0.9	LT 3	LT 2	LT 3	
		2S5	02/02/83	LT 60	LT 1.0	LT 0.8	LT 0.6	LT 0.6	LT 3	LT 20[5]	LT 0.7	LT 1.8	LT 1.7	LT 1.8	
		4S2	02/02/83	LT 110[5]	LT 1.8	LT 1.2	LT 0.9	LT 1.0	LT 5	LT 30[5]	LT 1.1	LT 3	LT 2	LT 3	
		4S4	02/02/83	LT 60	LT 0.8	LT 0.6	LT 0.5	LT 0.6	LT 3	LT 18[5]	LT 0.6	LT 1.8	LT 1.2	LT 1.7	
		11S5	02/02/83	LT 70	LT 1.1	LT 0.8	LT 0.6	LT 0.6	LT 3	LT 30[5]	LT 0.6	LT 2	LT 1.6	LT 1.9	
		15A4	02/04/83	LT 110[5]	LT 1.8	LT 1.1	LT 0.9	LT 1.0	LT 4	LT 30[5]	LT 1.1	LT 3	LT 3	LT 3	
		12E4	02/02/83	LT 70[5]	LT 1.0	LT 0.8	LT 0.6	LT 0.6	LT 3	LT 20[5]	LT 0.6	LT 1.9	LT 1.6	LT 1.9	
		12F3	02/03/83	LT 70[5]	LT 1.1	LT 1.1	LT 0.6	LT 0.7	LT 3	LT 20[5]	LT 0.8	LT 2	LT 1.6	LT 2	
		3S5	NS	-	-	-	-	-	-	-	-	-	-	-	
	PW	12F3	02/03/83	LT 100[5]	LT 1.4	LT 0.9	LT 0.8	LT 0.9	LT 4	LT 19[5]	LT 0.9	LT 3	LT 1.9	LT 3	
		12H2	02/02 to 03/07/83	LT 40	LT 1.2	LT 0.8	LT 0.8	LT 0.8	LT 3	LT 8	LT 0.8	LT 1.9	LT 1.7	LT 2	
March[1]	SW	5S8	03/02 to 03/28/83	LT 20	LT 1.3	LT 1.0	LT 0.9	LT 0.9	LT 3	LT 5	LT 1.0	LT 1.6	LT 2	LT 2	
		6S5	03/02 to 03/28/83	LT 13	LT 0.6	LT 0.7	LT 0.5	LT 0.6	LT 1.6	LT 4	LT 0.5	LT 0.9	LT 1.2	LT 1.2	
		6S7	03/11 to 04/08/83	LT 60	200 ± 20	21 ± 2	LT 1.9	LT 1.6	34 ± 4	LT 7	130 ± 20	3.2 ± 1.7	4.8 ± 1.8	LT 4	Cr-510 170 ± 20
		1D3	03/09/83	LT 20	LT 0.7	LT 0.6	LT 0.5	LT 0.5	LT 1.9	LT 6	LT 0.5	LT 1.1	LT 1.4	LT 1.3	
		13E1	03/09/83	LT 30	LT 0.9	LT 1.0	LT 0.6	LT 0.7	LT 2	LT 8	LT 0.7	LT 1.4	LT 1.4	LT 1.7	
		12F1	03/11/83	LT 19	LT 0.8	LT 0.8	LT 0.6	LT 0.6	LT 2	LT 6	LT 0.6	LT 1.2	LT 1.5	LT 1.4	
		12G2	03/07/83	LT 30	LT 0.8	LT 0.6	LT 0.5	LT 0.5	LT 2	LT 7	LT 0.6	LT 1.1	LT 1.2	LT 1.3	
		12H1	03/07 to 04/07/83	LT 40	LT 1.4	LT 1.0	LT 0.9	LT 0.9	LT 3	LT 10	LT 1.1	LT 1.9	LT 2	LT 2	

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
March(1) (cont)	GW	2S6	03/09/83	LT 20	LT 0.8	LT 0.6	LT 0.5	LT 0.5	LT 2	LT 7	LT 0.5	LT 1.1	LT 1.4	LT 1.3	
		2S5	03/09/83	LT 40	LT 1.4	LT 1.1	LT 0.9	LT 0.9	LT 3	LT 10	LT 1.1	LT 1.9	LT 2	LT 2	
		4S2	03/09/83	LT 30	LT 0.9	LT 1.0	LT 0.6	LT 0.7	LT 2	LT 8	LT 0.7	LT 1.4	LT 1.5	LT 1.6	
		4S4	03/09/83	LT 30	LT 0.8	LT 0.8	LT 0.6	LT 0.6	LT 2	LT 8	LT 0.6	LT 1.3	LT 1.5	LT 1.4	
		11S5	03/09/83	LT 40	LT 1.1	LT 0.8	LT 0.8	LT 0.8	LT 3	LT 8	LT 0.9	LT 1.8	LT 1.7	LT 2.1	
		15A4	03/11/83	LT 40	LT 1.4	LT 1.0	LT 0.8	LT 0.9	LT 3	LT 10	LT 1.0	LT 2	LT 2	LT 2	
		12E4	03/09/83	LT 30	LT 0.8	LT 0.6	LT 0.5	LT 0.6	LT 2	LT 8	LT 0.5	LT 1.2	LT 1.2	LT 1.5	
		12F3	03/09/83	LT 40	LT 1.0	LT 1.1	LT 0.6	LT 0.7	LT 3	LT 9	LT 0.8	LT 1.7	LT 1.6	LT 2	
		3S5	NS(4)	-	-	-	-	-	-	-	-	-	-	-	
	PW	12F3	03/09/83	LT 20	LT 0.8	LT 0.8	ND	LT 0.6	LT 2	LT 7	LT 0.7	LT 1.3	LT 1.6	LT 1.6	
		12H2	03/07 to 04/07/83	LT 30	LT 0.8	LT 0.6	LT 0.5	LT 0.6	LT 2	LT 9	LT 0.5	LT 1.2	LT 1.3	LT 1.4	
April(1)	SW	5S8	04/08 to 04/25/83	LT 20	LT 1.1	LT 0.8	LT 0.8	LT 0.9	LT 2	LT 5	LT 0.8	LT 1.5	LT 1.8	LT 2	
		6S5	04/08 to 04/25/83	LT 30	LT 1.3	LT 1.0	LT 0.8	LT 0.9	LT 3	LT 6	LT 1.1	LT 1.6	LT 2	LT 2	
		6S7	(9)	-	-	-	-	-	-	-	-	-	-	-	
		1D3	04/07/83	LT 30	LT 1.2	LT 0.8	LT 0.7	LT 0.9	LT 3	LT 6	LT 0.8	LT 1.6	LT 1.8	LT 2	
		1D3(11)	04/07/83	LT 40	LT 0.9	LT 0.7	LT 0.6	LT 0.6	LT 3	LT 10	LT 0.7	LT 1.4	LT 1.6	LT 1.6	
		13E1	04/07/83	LT 30	LT 1.4	LT 1.0	LT 0.9	LT 0.9	LT 3	LT 8	LT 1.1	LT 1.8	LT 2	LT 2	
		12F1	04/07/83	LT 40	LT 1.4	LT 1.1	LT 0.9	LT 1.0	LT 3	LT 8	LT 1.0	LT 1.9	LT 2	LT 3	
		12G2	04/07/83	LT 20	LT 0.8	LT 0.8	LT 0.6	LT 0.6	LT 2	LT 7	LT 0.6	LT 1.4	LT 1.6	LT 1.4	
		12H1	04/07 to 05/05/83	LT 10	LT 0.7	LT 0.8	LT 0.6	LT 0.6	LT 1.7	LT 3	LT 0.6	LT 1.0	LT 1.5	LT 1.4	
	GW	3S5	NS	-	-	-	-	-	-	-	-	-	-	-	
		2S6	04/07/83	LT 50	LT 1.2	LT 0.8	LT 0.8	LT 0.8	LT 3	LT 11	LT 0.9	LT 1.9	LT 1.7	LT 3	
		2S5	04/07/83	LT 40	LT 1.0	LT 1.1	LT 0.7	LT 0.7	LT 2	LT 11	LT 0.7	LT 1.8	LT 1.7	LT 1.9	
		4S2	NS	-	-	-	-	-	-	-	-	-	-	-	
		4S4	04/07/83	LT 50	LT 1.4	LT 1.1	LT 0.9	LT 0.9	LT 4	LT 12	LT 1.1	LT 2	LT 2	LT 3	
		11S5	04/07/83	LT 30	LT 0.8	LT 0.6	LT 0.5	LT 0.5	LT 1.9	LT 9	LT 0.5	LT 1.3	LT 1.3	LT 1.4	
		11S5(11)	04/07/83	LT 30	LT 0.8	LT 0.6	LT 0.5	LT 0.5	LT 2	LT 9	LT 0.5	LT 1.4	LT 1.3	LT 1.5	
		15A4	04/08/83	LT 30	LT 0.9	LT 0.8	LT 0.6	LT 0.6	LT 2	LT 10	LT 0.6	LT 1.4	LT 1.6	LT 1.6	
		12E4	04/07/83	LT 50	LT 1.2	LT 0.8	LT 0.8	LT 0.9	LT 3	LT 11	LT 0.9	LT 2	LT 1.8	LT 2	
		12F3	04/07/83	LT 60	LT 1.5	LT 1.1	LT 0.9	LT 0.9	LT 4	LT 13	LT 1.0	LT 2	LT 2	LT 3	
	PW	12F3	04/07/83	LT 30	LT 0.8	LT 0.6	LT 0.5	LT 0.5	LT 1.9	LT 7	LT 0.6	LT 1.2	LT 1.5	LT 1.4	
		12H2	04/07 to 05/05/83	LT 18	LT 1.2	LT 1.1	LT 0.8	LT 1.0	LT 3	LT 4	LT 1.0	LT 1.5	LT 2	LT 2	

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
May[1]	SW	5S8	05/06 to 05/31/83	LT 10	LT 0.7	LT 1.0	LT 0.6	LT 0.7	LT 1.9	LT 3	LT 0.7	LT 1.0	LT 1.5	LT 1.5	
		6S5	05/06 to 05/31/83	LT 12	LT 1.0	LT 0.7	LT 0.7	LT 0.8	LT 1.9	LT 3	LT 0.8	LT 1.1	LT 1.7	LT 1.7	
		6S7	04/08 to 06/05/83	LT 40	45 ± 5	9.2 ± 1.2	LT 1.3	LT 1.1	5.8 ± 2.2	LT 7	37 ± 4	LT 1.9	LT 3	LT 2	
		1D3	05/06/83	LT 14	LT 1.0	LT 0.7	LT 0.8	LT 0.8	LT 2	LT 3	LT 0.8	LT 1.2	LT 1.7	LT 1.7	
		13E1	05/05/83	LT 16	LT 1.2	LT 1.1	LT 0.9	LT 0.9	LT 3	LT 4	LT 1.0	LT 1.4	LT 2	LT 2	
		12F1	05/05/83	LT 10	LT 0.7	LT 0.6	LT 0.5	LT 0.5	LT 1.6	LT 3	LT 0.5	LT 0.8	LT 1.2	LT 1.1	
		12G2	NS	-	-	-	-	-	-	-	-	-	-	-	
		12H1	05/05 to 06/14/83	LT 12	LT 0.9	LT 0.8	LT 0.8	LT 0.9	LT 2	LT 2	LT 0.8	LT 1.2	LT 1.7	LT 1.8	
	GW	2S6	05/04/83	LT 11	LT 0.6	LT 0.7	LT 0.5	LT 0.6	LT 1.6	LT 3	LT 0.5	LT 0.9	LT 1.2	LT 1.2	
		2S5	NS	-	-	-	-	-	-	-	-	-	-	-	
		4S2	05/04/83	LT 14	LT 0.8	LT 1.1	LT 0.7	LT 0.7	LT 1.7	LT 3	LT 0.7	LT 1.2	LT 1.5	LT 1.5	
		4S4	05/04/83	LT 14	LT 0.9	LT 1.0	LT 0.7	LT 0.7	LT 1.9	LT 4	LT 0.7	LT 1.1	LT 1.4	LT 1.6	
		11S5	05/04/83	LT 12	LT 0.7	LT 0.8	LT 0.6	LT 0.6	LT 1.8	LT 4	LT 0.6	LT 1.0	LT 1.5	LT 1.2	
		15A4	05/06/83	LT 17	LT 1.0	LT 0.8	LT 0.7	LT 0.8	LT 2	LT 4	LT 0.9	LT 1.3	LT 1.7	LT 1.9	
		12E4	05/04/83	LT 20	LT 1.2	LT 1.0	LT 0.8	LT 0.9	LT 3	LT 5	LT 1.1	LT 1.6	LT 2	LT 2	
		12F3	05/04/83	LT 15	LT 0.7	LT 0.6	LT 0.5	LT 0.6	LT 1.6	LT 4	LT 0.5	LT 1.0	LT 1.3	LT 1.3	
		3S5	NS	-	-	-	-	-	-	-	-	-	-	-	
	PW	12F3	05/04/83	LT 16	LT 1.0	LT 0.8	LT 0.8	LT 0.8	LT 2	LT 3	LT 0.8	LT 1.3	LT 1.7	LT 1.7	
		12H2	05/05 to 06/14/83	LT 13	LT 1.0	LT 0.8	LT 0.8	LT 0.9	LT 2	LT 3	LT 0.8	LT 1.2	LT 1.6	LT 1.8	
June[1]	SW	5S8	06/08 to 06/27/83	LT 17	LT 0.7	LT 0.7	LT 0.5	LT 0.6	LT 1.7	LT 4	LT 0.5	LT 1.0	LT 1.2	LT 1.3	
		6S5	06/08 to 06/27/83	LT 14	LT 1.1	0.88 ± 0.52	LT 0.8	LT 0.9	LT 2	LT 3	LT 0.9	LT 1.3	LT 1.9	LT 1.9	
		6S7	06/05 to 07/06/83	LT 8	0.91 ± 0.57	LT 0.7	LT 0.6	LT 0.6	LT 1.4	LT 2	0.94 ± 0.38	LT 0.8	LT 1.2	LT 1.2	
		1D3	06/14/83	LT 6	LT 0.6	LT 0.7	LT 0.6	LT 0.6	LT 1.5	LT 1.9	LT 0.6	LT 0.8	LT 1.5	LT 1.2	
		13E1	06/14/83	LT 9	LT 0.9	LT 0.8	LT 0.8	LT 0.9	LT 1.7	LT 1.9	LT 0.8	LT 1.1	LT 1.7	LT 1.6	
		12F1	06/15/83	LT 6	LT 0.6	LT 0.7	LT 0.5	LT 0.6	LT 1.2	LT 1.5	LT 0.6	LT 0.7	LT 1.2	LT 1.1	
		12G2	06/14/83	LT 8	LT 0.6	LT 0.7	LT 0.6	LT 0.6	LT 1.7	LT 2	LT 0.6	LT 0.8	LT 1.5	LT 1.2	
		12H1	06/14 to 07/15/83	LT 7	LT 0.7	LT 1.0	LT 0.7	LT 0.7	LT 1.6	LT 1.5	LT 0.7	LT 0.9	LT 1.6	LT 1.4	

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
June[1] (cont)	GW	2S6	06/15/83	LT 8	LT 0.7	LT 0.6	LT 0.5	LT 0.6	LT 1.5	LT 2	LT 0.6	LT 0.8	LT 1.3	LT 1.2	
		3S5	06/15/83	LT 11	LT 0.8	LT 1.1	LT 0.6	LT 0.7	LT 1.7	LT 3	LT 0.7	LT 1.1	LT 1.6	LT 1.4	
		4S2	06/15/83	LT 17	LT 0.7	LT 0.7	LT 0.5	LT 0.6	LT 1.8	LT 5	LT 0.6	LT 1.0	LT 1.4	LT 1.3	
		4S4	06/15/83	LT 11	LT 0.7	LT 0.7	LT 0.5	LT 0.6	LT 1.6	LT 3	LT 0.5	LT 0.9	LT 1.4	LT 1.2	
		11S5	06/15/83	LT 10	LT 0.8	LT 1.1	LT 0.6	LT 0.7	LT 1.7	LT 3	LT 0.7	LT 1.0	LT 1.5	LT 1.5	
		15A4	06/15/83	LT 13	LT 1.0	LT 0.8	LT 0.8	LT 0.9	LT 2	LT 3	LT 0.8	LT 1.3	LT 1.8	LT 1.8	
		12E4	06/14/83	LT 9	LT 0.8	LT 0.7	LT 0.6	LT 0.6	LT 1.6	LT 3	LT 0.6	LT 1.0	LT 1.5	LT 1.2	
		12F3	06/14/83	LT 14	LT 0.9	LT 1.1	LT 0.7	LT 0.7	LT 2	LT 4	LT 0.7	LT 1.2	LT 1.5	LT 1.6	
		2S5	06/21/83	LT 9	LT 0.7	LT 1.1	LT 0.6	LT 0.7	LT 1.5	LT 1.9	LT 0.7	LT 1.0	LT 1.5	LT 1.4	
	PW	12F3	06/14/83	LT 8	LT 0.7	LT 0.8	LT 0.6	LT 0.6	LT 1.7	LT 3	LT 0.6	LT 1.0	LT 1.6	LT 1.3	
		12H2	06/14 to 07/15/83	LT 5	LT 0.5	LT 0.6	LT 0.5	LT 0.6	LT 1.2	LT 1.3	LT 0.5	LT 0.6	LT 1.2	LT 1.0	
June[10]	SW	5S8	06/08 to 06/27/83	LT 7	LT 0.8	LT 1.4	LT 4	LT 0.8	LT 3	LT 11	LT 0.7	LT 0.8	LT 2	LT 1.4	
		6S5	06/08 to 06/27/83	LT 40	LT 7	LT 4	LT 3	LT 4	LT 20	LT 50[5]	LT 4	LT 7	LT 10	LT 13	
		1D3	06/14/83	LT 30	LT 9	LT 5	LT 4	LT 4	LT 30	LT 40[5]	LT 4	LT 10	LT 10	LT 17	
		13E1	06/14/83	LT 20	LT 2	LT 2	LT 1.9	LT 2	LT 5	LT 9	LT 2	LT 2	LT 5	LT 5	
		12F1	06/14/83	LT 19	LT 6	LT 6	LT 5	LT 5	LT 12	LT 11	LT 6	LT 6	LT 11	LT 11	
		12G2	06/14/83	LT 20	LT 5	LT 6	LT 4	LT 4	LT 11	LT 10	LT 6	LT 5	LT 12	LT 9	
		12H1	05/05 to 06/14/83	LT 15	LT 3	LT 4	LT 3	LT 3	LT 7	LT 10	LT 3	LT 3	LT 7	LT 5	
		6S7	04/08 to 06/05/83	LT 60	28 ± 12	LT 9	LT 7	LT 7	LT 40[5]	LT 60[5]	41 ± 7	LT 14	LT 14	LT 20	
		1D5	06/15/83	LT 60	LT 9	LT 5	LT 4	LT 4	LT 30	LT 60[5]	LT 4	LT 10	LT 10	LT 17	K-400 LT 40
		6S7	06/05 to 07/06/83	LT 20	LT 5	LT 3	LT 2	LT 2	LT 13	LT 20[5]	LT 3	LT 4	LT 6	LT 8	
	GW	2S6	06/15/83	LT 20	LT 3	LT 2	LT 2	LT 2	LT 6	LT 10	LT 2	LT 3	LT 5	LT 5	
		3S5	06/15/83	LT 19	LT 9	LT 5	LT 4	LT 4	LT 30	LT 19[5]	LT 4	LT 10	LT 10	LT 17	
		4S2	06/15/83	LT 12	LT 9	LT 5	LT 4	LT 4	LT 30	LT 12	LT 4	LT 10	LT 10	LT 17	K-400 LT 40
		4S4	06/15/83	LT 20	LT 9	LT 5	LT 4	LT 4	LT 30	LT 20[5]	LT 4	LT 10	LT 10	LT 17	
		11S5	06/15/83	LT 14	LT 9	LT 5	LT 4	LT 4	LT 30	LT 14	LT 4	LT 10	LT 10	LT 17	
		15A4	06/15/83	LT 18	LT 2	LT 2	LT 2	LT 2	LT 5	LT 10	LT 2	LT 3	LT 4	LT 4	
		12E4	06/14/83	LT 19	LT 3	LT 3	LT 3	LT 2	LT 6	LT 11	LT 2	LT 3	LT 5	LT 5	
		12F3	06/14/83	LT 30	LT 11	LT 5	LT 4	LT 4	LT 4	LT 30[5]	LT 5	LT 13	LT 11	LT 20	

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
June[10] (cont)	PW	12F3	06/14/83	LT 30	LT 9	LT 4	LT 3	LT 3	LT 30	LT 30[5]	LT 4	LT 8	LT 10	LT 17	
		12H2 RAW	05/05 to 06/14/83	LT 30	LT 9	LT 5	LT 4	LT 4	LT 30	LT 30[5]	LT 4	LT 10	LT 10	LT 17	
		12H2 RAW	06/14 to 06/27/83	LT 20	LT 7	LT 4	LT 3	LT 4	LT 20	LT 20[5]	LT 4	LT 7	LT 10	LT 13	
		12H2 TREATED	06/14/83	LT 30	LT 9	LT 5	LT 4	LT 4	LT 30	LT 30[5]	LT 4	LT 10	LT 10	LT 17	
		12H2 TREATED	06/14 to 07/05/83	LT 4E05[5]	LT 10	LT 1.6	LT 1.4	LT 1.3	LT 80[5]	LT 3E05[5]	LT 2	LT 12	LT 5	LT 20	
July[10]	SW	5S8	07/05 to 07/25/83	LT 11	LT 9	LT 6	LT 5	LT 5	LT 20	LT 11	LT 6	LT 8	LT 14	LT 14	K-400 LT 130
		6S5	07/05 to 07/25/83	LT 10	LT 9	LT 6	LT 5	LT 5	LT 20	LT 10	LT 6	LT 8	LT 14	LT 14	K-400 LT 130
		6S6	NS	-	-	-	-	-	-	-	-	-	-	-	
		1D3	07/15/83	LT 9	LT 4	LT 3	LT 2	LT 2	LT 12	LT 9	LT 3	LT 4	LT 6	LT 7	
		13E1	07/15/83	LT 8	LT 4	LT 3	LT 2	LT 2	LT 12	LT 8	LT 3	LT 4	LT 6	LT 7	
		12F1	07/17/83	LT 7	LT 4	LT 3	LT 2	LT 2	LT 11	LT 7	LT 3	LT 4	LT 6	LT 7	
		12G2	07/15/83	LT 9	LT 4	LT 3	LT 2	LT 2	LT 12	LT 9	LT 3	LT 4	LT 6	LT 7	
		12H1	06/14 to 07/15/83	LT 9	LT 4	LT 3	LT 2	LT 2	LT 12	LT 9	LT 3	LT 4	LT 6	LT 7	
		6S7	07/06 to 08/04/83	LT 130[5]	LT 5	LT 3	LT 3	LT 3	LT 12	LT 70[5]	LT 3	LT 4	LT 6	LT 8	K-400 LT 30
		1D5	07/15/83	LT 6E05[5]	LT 40	LT 7	LT 7	LT 6	LT 200	LT 3E05[5]	LT 9	LT 40	LT 20	LT 80	
	GW	2S6	07/15/83	LT 13	LT 13	LT 8	LT 7	LT 8	LT 40[5]	LT 13	LT 9	LT 14	LT 18	LT 20	K-400 LT 100
		3S5	07/15/83	LT 10	LT 13	LT 8	LT 7	LT 8	LT 40[5]	LT 10	LT 9	LT 14	LT 18	LT 20	K-400 LT 100
		4S2	07/15/83	LT 9	LT 4	LT 3	LT 2	LT 2	LT 12	LT 9	LT 3	LT 4	LT 6	LT 7	
		4S4	07/15/83	LT 13	LT 6	LT 4	LT 3	LT 4	LT 17	LT 13	LT 4	LT 6	LT 9	LT 10	
		11S5	07/15/83	LT 10	LT 13	LT 8	LT 7	LT 8	LT 40[5]	LT 10	LT 9	LT 14	LT 18	LT 20	K-400 LT 100
		15A4	07/16/83	LT 11	LT 4	LT 3	LT 2	LT 2	LT 11	LT 11	LT 3	LT 4	LT 6	LT 7	
		12E4	07/15/83	LT 11	LT 13	LT 8	LT 7	LT 8	LT 40[5]	LT 11	LT 9	LT 14	LT 18	LT 20	K-400 LT 100
		12F3	07/15/83	LT 9	LT 4	LT 3	LT 2	LT 2	LT 12	LT 9	LT 3	LT 4	LT 6	LT 7	
	PW	12F3	07/15/83	LT 11	LT 6	LT 4	LT 3	LT 4	LT 17	LT 11	LT 4	LT 6	LT 9	LT 10	
		12H2 RAW	06/27 to 07/15/83	LT 11	LT 13	LT 8	LT 7	LT 8	LT 40[5]	LT 11	LT 9	LT 14	LT 18	LT 20	K-400 LT 100
		12H2 TREATED	07/05 to 08/01/83	LT 9000[5]	LT 7	LT 2	LT 2	LT 1.9	LT 30	LT 5000[5]	LT 2	LT 8	LT 6	LT 14	

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l $\pm$ 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
Aug.(10)	SW	5S8	08/01 to 08/29/83	LT 30	LT 4	4.8 ± 1.3	LT 2	LT 2	LT 10	LT 15	LT 3	LT 4	LT 6	LT 6	
		6S5	08/01 to 08/29/83	LT 30(5)	LT 5	LT 4	LT 3	LT 3	LT 15	LT 15(5)	LT 4	LT 5	LT 8	LT 9	
		6S6	07/16 to 08/16/83	LT 80	LT 4	LT 2	LT 2	LT 3	LT 10	LT 40	LT 3	LT 4	LT 6	LT 6	K-40θ LT 20
		1D3	08/22/83	LT 50	LT 4	LT 2	LT 2	LT 2	LT 9	LT 30(5)	LT 3	LT 3	LT 6	LT 6	K-40θ LT 20
		13E1	08/22/83	LT 50	LT 4	LT 2	LT 2	LT 2	LT 9	LT 30(5)	LT 3	LT 3	LT 6	LT 6	K-40θ LT 20
		12F1	08/22/83	LT 50	LT 4	LT 2	LT 2	LT 2	LT 9	LT 30(5)	LT 3	LT 3	LT 6	LT 6	K-40θ LT 20
		12G2	08/22/83	LT 50	LT 4	LT 2	LT 2	LT 2	LT 9	LT 30(5)	LT 3	LT 3	LT 6	LT 6	K-40θ LT 20
		12H1	07/15 to 08/22/83	LT 50	LT 4	LT 2	LT 2	LT 2	LT 9	LT 30(5)	LT 3	LT 3	LT 6	LT 6	K-40θ LT 20
		6S7	08/04 to 09/07/83	LT 19	LT 10	LT 6	LT 6	LT 6	LT 17	LT 9	7.2 ± 0.9	LT 7	LT 14	LT 15	Cr-51θ 92 ± 20
		1D5	08/22/83	LT 3E04(5)	LT 13	LT 4	LT 3	LT 3	LT 60	LT 18E03(5)	LT 4	LT 15	LT 10	LT 20	
	GW	2S6	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40θ LT 12
		3S5	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40θ LT 12
		4S2	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40θ LT 12
		4S4	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40θ LT 12
		11S5	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40θ LT 12
		15A4	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40θ LT 12
		12E4	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40θ LT 12
		12F3	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40θ LT 12

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l $\pm$ 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
Aug.[10] (cont)	PW	12F3	08/22/83	LT 30	LT 1.6	LT 1.3	LT 1.1	LT 1.1	LT 4	LT 15	LT 1.2	LT 1.7	LT 3	LT 3	K-40Ø LT 12
		12H2 RAW	07/15 to 08/16/83	LT 80[5]	LT 4	LT 2	LT 2	LT 3	LT 10	LT 40[5]	LT 3	LT 4	LT 6	LT 6	K-40Ø LT 20
		12H2 TREATED	08/01 to 09/05/83	LT 1700[5]	LT 6	LT 3	LT 3	LT 3	LT 20	LT 1100[5]	LT 3	LT 7	LT 6	LT 12	
Sept.[10]	SW	5S8	09/06 to 09/26/83	LT 600[5]	LT 5	LT 3	LT 2	LT 2	LT 18	LT 400[5]	LT 3	LT 6	LT 7	LT 10	
		6S5	09/06 to 09/26/83	LT 200[5]	LT 4	LT 2	LT 1.9	LT 2	LT 11	LT 120[5]	LT 2	LT 4	LT 5	LT 7	
		6S6	08/16 to 10/07/83	LT 400[5]	LT 5	LT 3	LT 3	LT 3	LT 18	LT 200[5]	LT 3	LT 6	LT 7	LT 10	Cr-51Ø LT 120
		1D3	09/20/83	LT 60	LT 3	LT 2	LT 2	LT 2	LT 7	LT 30[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 40
		13E1	09/20/83	LT 60	LT 3	LT 2	LT 2	LT 2	LT 7	LT 40[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 40
		12F1	09/19/83	LT 60	LT 3	LT 2	LT 2	LT 2	LT 8	LT 40[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 40
		12G2	09/19/83	LT 60	LT 3	LT 2	LT 2	LT 2	LT 8	LT 40[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 40
		12H1	08/22 to 09/19/83	LT 200[5]	LT 13	LT 10	LT 9	LT 9	LT 40[5]	LT 140[5]	LT 10	LT 14	LT 20	LT 20	Cr-51Ø LT 190
		6S7	09/07 to 10/04/83	LT 4000[5]	LT 9	LT 4	LT 3	LT 3	LT 40[5]	LT 2000[5]	LT 4	LT 10	LT 9	LT 17	
		1D5	09/21/83	LT 70[5]	LT 3	LT 2	LT 2	LT 1.8	LT 7	LT 40[5]	LT 2	LT 3	LT 5	LT 5	

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
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(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
Sept.[10] (cont)	GW	2S6	09/20/83	LT 60	LT 3	LT 2	LT 2	LT 2	LT 7	LT 30[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 40
		3S5	09/20/83	LT 60	LT 3	LT 2	LT 2	LT 2	LT 7	LT 30[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 40
		4S2	09/20/83	LT 80[5]	LT 3	LT 2	LT 2	LT 1.8	LT 7	LT 40[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 50
		4S4	09/20/83	LT 100[5]	LT 4	LT 3	LT 3	LT 3	LT 11	LT 60[5]	LT 3	LT 4	LT 6	LT 8	Cr-51Ø LT 70
		11S5	09/20/83	LT 110[5]	LT 3	LT 2	LT 2	LT 2	LT 8	LT 60[5]	LT 2	LT 3	LT 5	LT 6	Cr-51Ø LT 60
		15A4	09/21/83	LT 180[5]	LT 3	LT 1.6	LT 1.5	LT 1.5	LT 9	LT 100[5]	LT 1.7	LT 3	LT 4	LT 5	
		12E4	09/20/83	LT 80[5]	LT 3	LT 2	LT 2	LT 1.8	LT 7	LT 40[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 50
		12F3	09/19/83	LT 80[5]	LT 3	LT 2	LT 2	LT 1.8	LT 7	LT 40[5]	LT 2	LT 3	LT 5	LT 5	Cr-51Ø LT 60
	PW	12F3	09/19/83	LT 2000[5]	LT 6	LT 3	LT 3	LT 3	LT 30	LT 1300[5]	LT 3	LT 8	LT 7	LT 14	
		12H2 RAW	08/16 to 09/19/83	LT 90[5]	LT 3	LT 2	LT 1.9	LT 1.8	LT 8	LT 50[5]	LT 2	LT 3	LT 4	LT 5	Cr-51Ø LT 50
		12H2 TREATED	09/05 to 10/03/83	LT 4E04[5]	LT 30	LT 9	LT 7	LT 6	LT 120	LT 2E04[5]	LT 10	LT 30	LT 20	LT 50	
Oct.[10]	SW	5S8	10/04 to 10/25/83	LT 120[5]	LT 4	LT 3	LT 2	LT 2	LT 11	LT 70[5]	LT 3	LT 4	LT 6	LT 7	
		6S5	10/04 to 10/25/83	LT 120[5]	LT 4	LT 3	LT 2	LT 2	LT 11	LT 70[5]	LT 3	LT 4	LT 6	LT 7	
		6S6	10/07 to 10/17/83	LT 900[5]	LT 4	LT 2	LT 2	LT 2	LT 16	LT 500[5]	LT 2	LT 4	LT 4	LT 8	
		6S6	10/17 to 10/31/83	LT 2000[5]	LT 8	LT 3	LT 3	LT 3	LT 30	LT 1200[5]	LT 3	LT 9	LT 9	LT 15	
		1D3	10/19/83	LT 600[5]	LT 6	LT 3	LT 3	LT 3	LT 18	LT 300[5]	LT 3	LT 6	LT 7	LT 10	
		13E1	10/18/83	LT 600[5]	LT 6	LT 3	LT 3	LT 3	LT 18	LT 300[5]	LT 3	LT 6	LT 7	LT 10	
		12F1	10/18/83	LT 1600[5]	LT 5	LT 3	LT 2	LT 1.9	LT 19	LT 800[5]	LT 2	LT 6	LT 6	LT 10	
		12G2	10/18/83	LT 1900[5]	LT 6	LT 3	LT 3	LT 2	LT 20	LT 900[5]	LT 3	LT 7	LT 7	LT 12	
		12H1	09/19 to 10/17/83	LT 1400[5]	LT 6	LT 1.9	LT 2	LT 2	LT 19	LT 900[5]	LT 2	LT 5	LT 6	LT 10	
		6S7	10/04 to 10/17/83	LT 2000[5]	LT 8	LT 4	LT 3	LT 3	LT 3	LT 1200[5]	LT 4	LT 9	LT 9	LT 15	
		6S7	10/17 to 11/01/83	LT 700[5]	LT 3	LT 1.6	LT 1.4	LT 1.3	LT 11	LT 400[5]	LT 1.6	LT 3	LT 4	LT 6	
		1D5	10/19/83	LT 600[5]	LT 6	LT 3	LT 3	LT 3	LT 18	LT 300[5]	LT 3	LT 6	LT 7	LT 10	

Note: See footnotes at end of table.

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Gamma Spectrometry of Water
(Surface, Well, and Drinking)
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(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
Oct.(10) (cont)	GW	2S6	10/18/83	LT 90 (5)	LT 3	LT 1.9	LT 1.5	LT 1.6	LT 8	LT 50 (5)	LT 1.7	LT 3	LT 4	LT 5	
		3S5	10/18/83	LT 600 (5)	LT 5	LT 3	LT 3	LT 2	LT 16	LT 300 (5)	LT 3	LT 7	LT 6	LT 10	
		4S2	10/18/83	LT 600 (5)	LT 5	LT 3	LT 3	LT 2	LT 16	LT 300 (5)	LT 3	LT 7	LT 6	LT 10	
		4S4	10/18/83	LT 600 (5)	LT 5	LT 3	LT 3	LT 2	LT 16	LT 300 (5)	LT 3	LT 6	LT 6	LT 10	
		11S5	10/18/83	LT 600 (5)	LT 5	LT 3	LT 3	LT 2	LT 16	LT 300 (5)	LT 3	LT 6	LT 6	LT 10	
		15A4	10/18/83	LT 90 (5)	LT 3	LT 1.9	LT 1.5	LT 1.6	LT 8	LT 50 (5)	LT 1.7	LT 3	LT 4	LT 5	
		12E4	10/17/83	LT 700 (5)	LT 5	LT 3	LT 3	LT 2	LT 17	LT 300 (5)	LT 3	LT 6	LT 6	LT 10	
		12F3	10/18/83	LT 600 (5)	LT 5	LT 3	LT 3	LT 2	LT 16	LT 300 (5)	LT 3	LT 6	LT 6	LT 10	
	PW	12F3	10/18/83	LT 600 (5)	LT 6	LT 3	LT 3	LT 3	LT 18	LT 400 (5)	LT 3	LT 6	LT 7	LT 10	
		12H2 RAW	09/19 to 10/17/83	LT 700 (5)	LT 6	LT 3	LT 3	LT 3	LT 18	LT 400 (5)	LT 3	LT 6	LT 7	LT 10	
		12H2 TREATED	10/03 to 10/31/83	LT 2E04 (5)	LT 30 (5)	LT 9	LT 7	LT 7	LT 130 (5)	LT 15E03 (5)	LT 10	LT 30 (5)	LT 20	LT 50 (5)	
		12H2 RAW	10/17 to 10/31/83	LT 12E03 (5)	LT 13	LT 5	LT 4	LT 4	LT 60 (5)	LT 7E03 (5)	LT 5	LT 15	LT 12	LT 30	
Nov.(10)	SW	5S8	11/01 to 11/28/83	LT 170 (5)	LT 3	LT 1.6	LT 1.3	LT 1.3	LT 7	LT 90 (5)	LT 1.5	LT 3	LT 4	LT 5	
		6S5	11/01 to 11/28/83	LT 170 (5)	LT 3	LT 1.6	LT 1.3	LT 1.3	LT 7	LT 90 (5)	LT 1.5	LT 3	LT 4	LT 5	
		6S6	10/31 to 11/28/83	LT 400 (5)	LT 5	LT 3	LT 2	LT 2	LT 16	LT 200 (5)	LT 2	LT 4	LT 6	LT 8	
		1D3	11/14/83	LT 140 (5)	LT 4	LT 3	LT 3	LT 2	LT 11	LT 80 (5)	LT 3	LT 4	LT 6	LT 8	
		13E1	11/15/83	LT 200 (5)	LT 6	LT 3	LT 3	LT 3	LT 17	LT 120 (5)	LT 3	LT 6	LT 8	LT 11	
		12F1	11/15/83	LT 120 (5)	LT 4	LT 2	LT 2	LT 2	LT 11	LT 60 (5)	LT 2	LT 4	LT 6	LT 7	
		12G2	11/16/83	LT 120 (5)	LT 4	LT 2	LT 2	LT 2	LT 10	LT 60 (5)	LT 2	LT 4	LT 6	LT 7	
		12H1	10/17 to 11/14/83	LT 400 (5)	LT 5	LT 3	LT 3	LT 2	LT 13	LT 200 (5)	LT 3	LT 5	LT 7	LT 10	Cr-51@ LT 130
		6S7	11/01 to 12/01/83	LT 140 (5)	LT 3	LT 1.6	LT 1.3	LT 1.3	LT 7	LT 80 (5)	LT 1.5	LT 3	LT 4	LT 5	
		1D5	11/14/83	LT 500 (5)	LT 6	LT 4	LT 3	LT 3	LT 20	LT 300 (5)	LT 4	LT 7	LT 9	LT 12	
	GW	2S6	11/14/83	LT 130 (5)	LT 4	LT 2	LT 2	LT 2	LT 11	LT 70 (5)	LT 2	LT 4	LT 6	LT 7	
		3S5	NS	-	-	-	-	-	-	-	-	-	-	-	
		4S2	11/14/83	LT 200 (5)	LT 6	LT 3	LT 3	LT 3	LT 17	LT 130 (5)	LT 4	LT 7	LT 8	LT 11	
		4S4	11/14/83	LT 200 (5)	LT 6	LT 3	LT 3	LT 3	LT 17	LT 130 (5)	LT 4	LT 7	LT 8	LT 11	
		11S5	11/14/83	LT 130 (5)	LT 4	LT 2	LT 2	LT 2	LT 11	LT 70 (5)	LT 2	LT 4	LT 6	LT 7	
		15A4	11/16/83	LT 120 (5)	LT 4	LT 2	LT 2	LT 2	LT 10	LT 60 (5)	LT 2	LT 4	LT 6	LT 7	
		12E4	11/14/83	LT 130 (5)	LT 4	LT 2	LT 2	LT 2	LT 11	LT 70 (5)	LT 2	LT 4	LT 6	LT 7	
		12F3	11/15/83	LT 120 (5)	LT 4	LT 2	LT 2	LT 2	LT 11	LT 60 (5)	LT 2	LT 4	LT 6	LT 7	

Note: See footnotes at end of table.

Table 7
(Page 11 of 11)

Gamma Spectrometry of Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Other
Nov.(10)	PW	12F3	11/15/83	LT 500(5)	LT 6	LT 4	LT 3	LT 3	LT 20	LT 300(5)	LT 4	LT 7	LT 9	LT 13	
(cont)		12H2 RAW	10/31 to 11/29/83	LT 160(5)	LT 3	LT 1.6	LT 1.3	LT 1.3	LT 7	LT 90(5)	LT 1.5	LT 3	LT 4	LT 5	
		12H2 TREATED	10/31 to 11/29/83	LT 160(5)	LT 3	LT 1.6	LT 1.3	LT 1.3	LT 7	LT 90(5)	LT 1.5	LT 3	LT 4	LT 5	
Dec.(10)	SW	5S8	12/05 to 12/19/83	LT 130(5)	LT 4	LT 3	LT 2	LT 2	LT 12	LT 80(5)	LT 2	LT 3	LT 6	LT 7	
		6S5	12/05 to 12/19/83	LT 130(5)	LT 4	LT 3	LT 2	LT 2	LT 12	LT 80(5)	LT 2	LT 3	LT 6	LT 7	
		6S6	11/28/83-01/02/84	LT 16	LT 2	LT 2	LT 1.8	LT 1.8	LT 5	LT 8	LT 2	LT 2	LT 4	LT 4	
		1D3	12/14/83	LT 70(5)	LT 5	LT 4	LT 3	LT 3	LT 12	LT 40(5)	LT 3	LT 4	LT 8	LT 9	
		13E1	12/13/83	LT 30	LT 2	LT 2	LT 1.9	LT 1.9	LT 6	LT 16(5)	LT 1.9	LT 2	LT 4	LT 4	
		12F1	12/13/83	LT 80(5)	LT 5	LT 4	LT 3	LT 3	LT 12	LT 40(5)	LT 3	LT 5	LT 8	LT 9	
		12G2	NS	-	-	-	-	-	-	-	-	-	-	-	
		12H1	11/14 to 12/12/83	LT 30	LT 2	LT 2	LT 1.9	LT 1.9	LT 6	LT 17(5)	LT 1.9	LT 3	LT 4	LT 4	
		6S7	11/28/83-01/02/84	LT 16	LT 2	LT 1.9	LT 1.8	LT 1.8	LT 5	LT 8	LT 2	LT 2	LT 4	LT 4	
		1D5	NS	-	-	-	-	-	-	-	-	-	-	-	
		LAKE T-A-W	12/09/83	LT 50	LT 1.6	LT 1.2	LT 1.1	LT 1.0	LT 4	LT 30(5)	LT 1.1	LT 1.7	LT 2	LT 3	
	GW	2S6	12/14/83	LT 30	LT 3	LT 2	LT 2	LT 2	LT 6	LT 17(5)	LT 2	LT 3	LT 4	LT 4	
		3S5	NS	-	-	-	-	-	-	-	-	-	-	-	
		4S2	12/13/83	LT 30(5)	LT 2	LT 2	LT 1.9	LT 1.9	LT 6	LT 16(5)	LT 1.9	LT 2	LT 4	LT 4	
		4S4	12/13/83	LT 180(5)	LT 4	LT 3	LT 2	LT 2	LT 13	LT 100(5)	LT 2	LT 4	LT 6	LT 7	
		11S5	12/14/83	LT 170(5)	LT 4	LT 3	LT 2	LT 2	LT 12	LT 100(5)	LT 2	LT 4	LT 6	LT 7	
		15A4	12/15/83	LT 160(5)	LT 4	LT 3	LT 2	LT 2	LT 12	LT 90(5)	LT 2	LT 4	LT 6	LT 7	
		12E4	12/14/83	LT 170(5)	LT 4	LT 3	LT 2	LT 2	LT 12	LT 100(5)	LT 2	LT 4	LT 6	LT 7	
		12F3	12/13/83	LT 180(5)	LT 4	LT 3	LT 2	LT 2	LT 13	LT 100(5)	LT 2	LT 4	LT 6	LT 7	
	PW	12F3	12/13/83	LT 200(5)	LT 6	LT 3	LT 3	LT 3	LT 16	LT 110(5)	LT 3	LT 6	LT 9	LT 10	
		12H2 RAW	11/29/83-01/02/84	LT 16	LT 2	LT 1.9	LT 1.8	LT 1.8	LT 5	LT 8	LT 2	LT 2	LT 4	LT 4	
		12H2 TREATED	11/29/83-01/02/84	LT 16	LT 2	LT 1.9	LT 1.8	LT 1.8	LT 5	LT 8	LT 2	LT 2	LT 4	LT 4	

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) SW = Surface Water
(3) LT = Less Than
(4) NS = No Sample
(5) Lower sensitivity due to delay in counting.
(6) ND = Not Detected
(7) GW = Ground Water
(8) PW = Drinking Water
(9) Sample was collected in May, after a two month period.
(10) Samples collected and analyzed by NUS.
(11) Duplicate sample and analysis.

Table 8
(Page 1 of 8)

Iodine-131 in Water (Surface and Drinking)
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Water Type	Station	Collection Date (period)	I-131 Activity
January[1]	Surface	5S8	01/04/83 to 01/25/83	LT.0.3[2]
		6S5	NS(3)	--
		1D3	01/07/83	LT 0.3
		13E1	01/05/83	LT 0.13
		12F1	01/05/83	LT 0.11
		12G2	01/05/83	LT 0.12
		12H1	01/03/83 to 02/02/83	LT 0.19
		1D5	01/06/83	LT 0.3
		6S7	(4)	--
	Drinking	12H2	01/03/83 to 01/10/83	LT 0.7
		12H2	01/10/83 to 01/17/83	LT 0.3
		12H2	01/17/83 to 01/24/83	LT 0.3
		12H2	01/24/83 to 01/31/83	LT 0.2
February[1]	Surface	6S7	02/03/83 to 03/11/83	LT 0.10
		5S8	02/01/83 to 02/22/83	LT 0.12
		6S5	02/01/83 to 02/22/83	LT 0.11
		1D3	02/03/83	LT 0.14
		13E1	02/03/83	LT 0.17
		12F1	02/03/83	LT 0.16
		12G2	NS	--
		12H1	02/02/83 to 03/07/83	LT 0.14
		1D5	02/03/83	LT 0.2
	Drinking	12H2	01/31/83 to 02/07/83	LT 0.17
		12H2	02/07/83 to 02/14/83	LT 0.8
		12H2	02/14/83 to 02/21/83	LT 0.15
		12H2	02/21/83 to 02/28/83	LT 0.11

Note: See footnote at end of table.

Table 8
(Page 2 of 8)

Iodine-131 in Water (Surface and Drinking)
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Water Type	Station	Collection Date (period)	I-131 Activity
March[1]	Surface	6S7	03/11/83 to 04/08/83	LT 0.10
		5S8	03/02/83 to 03/28/83	LT 0.09
		6S5	03/02/83 to 03/28/83	LT 0.09
		1D3	03/09/83	LT 0.12
		13E1	03/09/83	LT 0.09
		12F1	03/11/83	LT 0.11
		12G2	03/07/83	LT 0.14
		12H1	03/07/83 to 04/07/83	LT 0.10
		1D5	03/09/83	LT 0.13
	Drinking	12H2	02/28/83 to 03/07/83	LT 0.09
		12H2	03/07/83 to 03/14/83	LT 0.11
		12H2	03/14/83 to 03/21/83	LT 0.09
		12H2	03/21/83 to 03/28/83	LT 0.09
April[1]	Surface	6S7	(5)	--
		5S8	04/08/83 to 04/25/83	LT 0.10
		6S5	04/08/83 to 04/25/83	0.34 ± 0.06
		1D3	04/07/83	LT 0.10
		13E1	04/07/83	LT 0.08
		12F1	04/07/83	LT 0.10
		12G2	04/07/83	LT 0.12
		12H1	04/07/83 to 05/05/83	LT 0.16
		1D5	04/08/83	LT 0.11
	Drinking	12H2	03/28/83 to 04/04/83	LT 0.09
		12H2	04/04/83 to 04/11/83	LT 0.09
		12H2	04/11/83 to 04/18/83	LT 0.12
		12H2	04/18/83 to 04/25/83	LT 0.10
		12H2	04/18/83 to 04/25/83	0.13 ± 0.04[6]

Note: See footnote at end of table.

Table 8
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Iodine-131 in Water (Surface and Drinking)
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Water Type	Station	Collection Date (period)	I-131 Activity
May(1)	Surface	6S7	04/08/83 to 06/05/83	LT 0.3
		5S8	05/06/83 to 05/31/83	LT 0.2
		6S5	05/06/83 to 05/31/83	LT 0.11
		1D3	05/06/83	0.21 ± 0.05
		13E1	05/05/83	LT 0.14
		12F1	05/05/83	LT 0.18
		12G2	NS	--
		12H1	05/05/83 to 06/14/83	LT 0.12
		1D5	05/05/83	LT 0.17
	Drinking	12H2	04/25/83 to 05/02/83	LT 0.11(6)
		12H2	04/25/83 to 05/02/83	LT 0.16(6)
		12H2	05/02/83 to 05/09/83	LT 0.12
		12H2	05/09/83 to 05/16/83	LT 0.11
		12H2	05/16/83 to 05/23/83	LT 0.12
		12H2	05/23/83 to 05/30/83	0.14 ± 0.05
June(1)	Surface	5S8	06/08/83 to 06/27/83	LT 0.09
		6S5	06/08/83 to 06/27/83	LT 0.08
		1D3	06/14/83	LT 0.08
		13E1	06/14/83	LT 0.09
		12F1	06/15/83	LT 0.09
		12G2	06/14/83	0.17 ± 0.04
		1D5	06/15/83	LT 0.08
	Drinking	12H2	05/30/83 to 06/06/83	LT 0.13
		12H2	06/06/83 to 06/14/83	LT 0.13
		12H2	06/14/83 to 06/21/83	LT 0.09
		12H2	06/21/83 to 06/27/83	LT 0.09

Note: See footnote at end of table.

Table 8
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Iodine-131 in Water (Surface and Drinking)
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Water Type	Station	Collection Date (period)	I-131 Activity
June(7)	Surface	6S7	04/08/83 to 06/05/83	LT 0.7
		6S7	06/05/83 to 07/06/83	LT 0.4
		5S8	06/08/83 to 06/27/83	LT 0.05
		6S5	06/08/83 to 06/27/83	LT 0.06
		1D3	06/14/83	LT 0.13
		13E1	06/14/83	LT 0.07
		12F1	06/14/83	LT 0.06
		12G2	06/14/83	LT 0.15
		12H1	05/05/83 to 06/14/83	LT 0.07
	Drinking	12F3	06/14/83	LT 0.06
		12H2 RAW	05/05/83 to 06/14/83	LT 0.05
		12H2 TREATED	06/14/83	LT 0.05
		12H2 TREATED	06/14/83 to 06/21/83	0.35 ± 0.32
		12H2 TREATED	06/21/83 to 06/27/83	LT 0.04
		12H2 TREATED	06/27/83 to 07/05/83	0.080 ± 0.054
July (7)	Surface	6S7	07/06/83 to 08/04/83	0.16 ± 0.10
		5S8	07/05/83 to 07/25/83	0.10 ± 0.05
		6S5	07/05/83 to 07/25/83	LT 0.09
		1D3	07/15/83	LT 0.08
		13E1	07/15/83	LT 0.07
		12F1	07/17/83	0.26 ± 0.10
		12G2	07/15/83	LT 0.15
		12H1	06/14/83 to 07/15/83	LT 0.07
		1D5	07/15/83	LT 0.10
	Drinking	12F3	07/15/83	LT 0.07
		12H2 RAW	06/27/83 to 07/15/83	LT 0.11
		12H2 TREATED	07/05/83 to 07/11/83	LT 0.14
		12H2 TREATED	07/11/83 to 07/19/83	0.06 ± 0.03
		12H2 TREATED	07/19/83 to 07/26/83	LT 0.07
		12H2 TREATED	07/26/83 to 08/01/83	0.055 ± 0.016

Note: See footnote at end of table.

Table 8
(Page 5 of 8)

Iodine-131 in Water (Surface and Drinking)
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Water Type	Station	Collection Date (period)	I-131 Activity
August (7)	Surface	6S6	07/16/83 to 08/16/83	0.083 ± 0.039
		5S8	08/01/83 to 08/29/83	0.45 ± 0.13
		6S7	08/04/83 to 09/07/83	LT 0.2
		6S5	08/01/83 to 08/29/83	LT 0.2
		1D3	08/22/83	LT 0.08
		13E1	08/22/83	LT 0.04
		12F1	08/22/83	0.20 ± 0.03
		12G2	08/22/83	0.28 ± 0.04
		12H1	07/15/83 to 08/22/83	0.060 ± 0.049
		1D5	08/22/83	LT 0.14
	Drinking	12F3	08/22/83	LT 0.12
		12H2 RAW	07/15/83 to 08/16/83	0.065 ± 0.062
		12H2 TREATED	08/01/83 to 08/08/83	0.13 ± 0.11
		12H2 TREATED	08/08/83 to 08/15/83	LT 0.2
		12H2 TREATED	08/15/83 to 08/22/83	0.29 ± 0.14
		12H2 TREATED	08/22/83 to 08/29/83	LT 0.18
September (7)	Surface	6S6	08/16/83 to 10/07/83	LT 0.07
		6S7	09/07/83 to 10/04/83	0.15 ± 0.10
		5S8	09/06/83 to 09/26/83	LT 0.1
		6S5	09/06/83 to 09/26/83	LT 0.1
		1D3	09/20/83	0.16 ± 0.08
		13E1	09/20/83	LT 0.11
		12F1	09/19/83	0.22 ± 0.08
		12G2	09/19/83	LT 0.11
		12H1	08/22/83 to 09/19/83	LT 0.11
		1D5	(8)	--
	Drinking	12F3	09/19/83	LT 0.13
		12H2 RAW	08/16/83 to 09/19/83	LT 0.11
		12H2 TREATED	08/29/83 to 09/05/83	0.20 ± 0.13
		12H2 TREATED	09/05/83 to 09/12/83	LT 0.1
		12H2 TREATED	09/12/83 to 09/19/83	0.13 ± 0.08
		12H2 TREATED	09/19/83 to 09/26/83	LT 0.1

Note: See footnote at end of table.

Table 8
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Iodine-131 in Water (Surface and Drinking)
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Water Type	Station	Collection Date (period)	I-131 Activity
October[7]	Surface	6S6	10/07/83 to 10/17/83	0.10 ± 0.03
		6S7	10/04/83 to 10/17/83	0.18 ± 0.04
		6S6[9]	10/17/83 to 10/25/83	LT 0.1
		6S7[10]	10/17/83 to 10/25/83	0.13 ± 0.06
		6S6	10/25/83 to 10/31/83	0.05 ± 0.03
		6S7	10/25/83 to 11/01/83	0.32 ± 0.03
		6S7[11]	10/25/83 to 11/01/83	0.26 ± 0.03
		5S8	10/04/83 to 10/25/83	0.15 ± 0.05
		6S5	10/04/83 to 10/25/83	0.23 ± 0.05
		1D3	10/19/83	LT 0.2
		13E1	10/18/83	LT 0.09
		12F1	10/18/83	LT 0.10
		12G2	10/18/83	LT 0.08
		12H1	09/19/83 to 10/17/83	LT 0.08
		1D5	(8)	--
	Drinking	12F3	10/18/83	0.10 ± 0.10
		12H2 RAW	09/19/83 to 10/17/83	0.15 ± 0.11
		12H2 TREATED	09/26/83 to 10/03/83	LT 0.1
		12H2 TREATED	10/03/83 to 10/10/83	LT 0.1
		12H2 TREATED	10/10/83 to 10/17/83	LT 0.08
		12H2 RAW (12)	10/17/83 to 10/24/83	0.098 ± 0.059
		12H2 TREATED	10/17/83 to 10/24/83	0.11 ± 0.06
		12H2 TREATED	10/24/83 to 10/31/83	LT 0.05
		12H2 RAW	10/24/83 to 10/31/83	0.079 ± 0.034
November[7]	Surface	6S6	10/31/83 to 11/07/83	LT 0.06
		6S7	11/01/83 to 11/07/83	0.13 ± 0.05
		6S6	11/07/83 to 11/14/83	0.13 ± 0.03
		6S7	11/07/83 to 11/14/83	0.08 ± 0.03
		6S6	11/14/83 to 11/21/83	0.12 ± 0.06
		6S7	11/14/83 to 11/21/83	0.15 ± 0.07
		6S6	11/21/83 to 11/28/83	LT 0.07
		6S7	11/21/83 to 11/28/83	0.13 ± 0.07
		5S8	11/01/83 to 11/28/83	LT 0.07
		6S5	11/01/83 to 11/28/83	0.07 ± 0.06
		1D3	11/14/83	LT 0.05
		13E1	11/15/83	0.074 ± 0.054

Note: See footnote at end of table.

Table 8
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Iodine-131 in Water (Surface and Drinking)
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Water Type	Station	Collection Date (period)	I-131 Activity
November (cont.) (7)	Surface	12F1	11/15/83	LT 0.08
		12G2	11/16/83	LT 0.07
		12H1	10/17/83 to 11/14/83	LT 0.05
		1D5	11/14/83	LT 0.08
	Drinking	12F3	11/15/83	LT 0.09
		12H2 RAW	10/31/83 to 11/07/83	0.076 ± 0.040
		12H2 TREATED	10/31/83 to 11/07/83	0.072 ± 0.037
		12H2 RAW	11/07/83 to 11/14/83	LT 0.04
		12H2 TREATED	11/07/83 to 11/14/83	0.053 ± 0.030
		12H2 RAW	11/14/83 to 11/21/83	LT 0.02
		12H2 TREATED	11/14/83 to 11/21/83	LT 0.10
		12H2 RAW	11/21/83 to 11/29/83	0.17 ± 0.06
		12H2 TREATED	11/21/83 to 11/29/83	0.092 ± 0.050
December(7)	Surface	6S6	11/28/83 to 12/05/83	LT 0.12
		6S7	11/28/83 to 12/01/83	LT 0.16
		6S7	12/01/83 to 12/05/83	LT 0.10
		6S6	12/05/83 to 12/12/83	LT 0.11
		6S7	12/05/83 to 12/12/83	LT 0.13
		6S6	12/12/83 to 12/19/83	LT 0.09
		6S7	12/12/83 to 12/19/83	LT 0.08
		6S6	12/19/83 to 12/26/83	LT 0.09
		6S6	12/19/83 to 12/26/83	LT 0.08
		6S7	12/19/83 to 12/26/83	LT 0.10
		6S6	12/26/83 to 01/02/83	0.21 ± 0.04
		6S7	12/26/83 to 01/02/83	LT 0.06
		5S8	12/05/83 to 12/19/83	LT 0.10
		6S5	12/05/83 to 12/19/83	LT 0.11
		1D3	12/14/83	LT 0.08
		13E1	12/13/83	LT 0.13
		12F1	12/13/83	LT 0.13
		12G2	NS	--
		12H1	11/14/83 to 12/12/83	LT 0.10
		1D5	NS	--

Note: See footnote at end of table.

Table 8
(Page 8 of 8)

Iodine-131 in Water (Surface and Drinking)
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Water Type	Station	Collection Date (period)	I-131 Activity
December (7)	Surface	LAKE T-A-W(13)	12/09/83	0.15 ± 0.07
	Drinking	12F3	12/13/83	LT 0.09
		12H2 RAW	11/29/83 to 12/05/83	LT 0.11
		12H2 TREATED	11/29/83 to 12/05/83	LT 0.11
		12H2 RAW	12/05/83 to 12/12/83	0.17 ± 0.06
		12H2 TREATED	12/05/83 to 12/12/83	0.10 ± 0.09
		12H2 RAW	12/12/83 to 12/19/83	LT 0.08
		12H2 TREATED	12/12/83 to 12/19/83	LT 0.08
		12H2 RAW	12/19/83 to 12/26/83	LT 0.09
		12H2 TREATED	12/19/83 to 12/26/83	LT 0.09
		12H2 RAW	12/26/83 to 01/02/84	LT 0.08
		12H2 TREATED	12/26/83 to 01/02/84	0.22 ± 0.04

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) LT = Less Than
(3) NS = No sample
(4) No data reported.
(5) Sample was collected in May after a 2 month period.
(6) Composite sampler
(7) Samples collected and analyzed by NUS.
(8) Sample destroyed in analysis.
(9) Beginning of weekly collection from 6S6.
(10) Beginning of weekly collection from 6S7.
(11) Duplicate sample and analysis.
(12) Beginning of weekly collection from 12H2 RAW.
(13) Supplementary water samples taken during 1983.

Table 9
(Page 1 of 12)

Gross Beta in Water
(Surface, Well, and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
January(1)	Surface	5S8	01/04/83 to 01/25/83	LT 1.9(2)
		6S5	NS(3)	--
		6S7	01/03/83 to 02/03/83	20 ± 2
		1D3	01/07/83	2.2 ± 1.0
		13E1	01/05/83	LT 1.4
		12F1	01/05/83	2.2 ± 1.0
		12G2	01/05/83	3.0 ± 1.1
		12H1	01/03/83 to 02/02/83	LT 2
	Well	Muncy VLY	01/13/83	1.5 ± 0.6
		Orangeville	01/13/83	1.1 ± 0.6
		Lee Mount	01/13/83	0.58 ± 0.53
		2S6	01/06/83	5.4 ± 1.3
		3S5	NS	--
		4S2	01/06/83	1.7 ± 1.0
		4S4	01/06/83	2.5 ± 1.1
		11S5	01/06/83	1.6 ± 1.0
		15A4	01/08/83	4.9 ± 1.2
		12E4	01/06/83	1.3 ± 1.0
		12F3	01/05/83	2.2 ± 1.1
		2S5	01/06/83	1.9 ± 1.0
	Drinking	12F3	01/05/83	3.2 ± 1.1
		12H2	01/03/83 to 02/02/83	1.5 ± 0.8

Note: See footnotes at end of table.

Table 9
(Page 2 of 12)

Gross Beta in Water
(Surface, Well and Drinking)

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
February[1]	Surface	5S8	02/01/83 to 02/22/83	1.6 ± 1.2
		6S5	02/01/83 to 02/22/83	LT 1.8
		6S7	02/03/83 to 03/11/83	49 ± 5
		1D3	02/03/83	5.2 ± 1.7
		13E1	02/03/83	1.8 ± 1.5
		12F1	02/03/83	2.1 ± 1.5
		12G2	NS	-
		12H1	02/02/82 to 03/07/83	1.5 ± 1.2
	Well	2S6	02/02/83	LT 2
		3S5	NS	-
		4S2	02/02/83	1.9 ± 1.5
		4S4	02/02/83	LT 2
		11S5	02/02/83	LT 2
		15A4	02/04/83	5.7 ± 1.7
		12E4	02/02/83	LT 2
		12F3	02/03/83	LT 2
		2S5	02/02/83	3.2 ± 1.6
	Drinking	12F3	02/03/83	1.8 ± 1.5
		12H2	02/02/83 to 03/07/83	3.2 ± 1.3
March[1]	Surface	5S8	03/02/83 to 03/28/83	2.7 ± 1.2
		6S5	03/02/83 to 03/28/83	1.3 ± 1.1
		6S7	03/11/83 to 04/08/83	79 ± 8
		1D3	03/09/83	LT 1.9
		13E1	03/09/83	LT 1.9
		12F1	03/11/83	LT 1.9
		12G2	03/07/83	LT 1.9
		12H1	03/07/83 to 04/07/83	2.8 ± 1.3

Note: See footnotes at end of table.

Table 9
(Page 3 of 12)

Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
March (cont.)	Well	2S6	03/09/83	LT 1.8
		3S5	NS	-
		4S2	03/09/83	LT 1.9
		4S4	03/09/83	LT 1.8
		11S5	03/09/83	LT 1.9
		15A4	03/11/83	3.5 ± 1.3
		12E4	03/09/83	LT 1.8
		12F3	03/09/83	LT 1.9
		2S5	03/09/83	2.1 ± 1.3
	Drinking	12F3	03/09/83	LT 1.9
		12H2	03/07/83 to 04/07/83	1.2 ± 0.7
April(1)	Surface	5S8	04/08/83 to 04/25/83	2.8 ± 1.2
		6S5	04/08/83 to 04/25/83	1.4 ± 1.1
		6S7	(4)	-
		1D3	04/07/83	2.3 ± 1.3
		1D3(5)	04/07/83	3.1 ± 1.3
		13E1	04/07/83	1.2 ± 1.2
		12F1	04/07/83	1.7 ± 1.3
		12G2	04/07/83	2.1 ± 1.3
		12H1	04/07/83 to 05/05/83	LT 2

Note: See footnotes at end of table.

Table 9
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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
April (cont.)	Well	2S6	04/07/83	LT 1.9
		3S5	NS	-
		4S2	NS	-
		4S4	04/07/83	LT 1.9
		11S5	04/07/83	LT 1.9
		11S5(5)	04/07/83	LT 1.9
		15A4	04/08/83	4.7 ± 1.4
		12E4	04/07/83	LT 1.9
		12F3	04/07/83	1.4 ± 1.2
		2S5	04/07/83	LT 1.9
	Drinking	12F3	04/07/83	1.7 ± 1.3
		12H2	04/07/83 to 05/05/83	1.1 ± 0.7
May(1)	Surface	5S8	05/06/83 to 05/31/83	LT 2
		6S5	05/06/83 to 05/31/83	1.6 ± 1.1
		6S7	04/08/83 to 06/05/83	39 ± 4
		1D3	05/06/83	2.9 ± 1.4
		13E1	05/05/83	LT 2
		12F1	05/05/83	2.3 ± 1.2
		12G2	NS	-
		12H1	05/05/83 to 06/14/83	2.2 ± 1.1
	Well	2S6	05/04/83	LT 2
		3S5	NS	-
		4S2	05/04/83	2.0 ± 1.4
		4S4	05/04/83	LT 2
		11S5	05/04/83	LT 2
		15A4	05/06/83	3.0 ± 1.4
		12E4	05/04/83	LT 2
		12F3	05/04/83	LT 2
		2S5	NS	-

Note: See footnotes at end of table.

Table 9
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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
May (cont.)	Drinking	12F3	05/04/83	LT 2
		12H2	05/05/83 to 06/14/83	1.7 ± 0.6
June(1)	Surface	5S8	06/08/83 to 06/27/83	LT 1.8
		6S5	06/08/83 to 06/27/83	1.7 ± 1.2
		6S7	06/05/83 to 07/06/83	6.4 ± 1.4
		1D3	06/14/83	2.3 ± 1.1
		13E1	06/14/83	1.6 ± 1.0
		12F1	06/15/83	3.4 ± 1.1
		12G2	06/14/83	2.2 ± 1.1
		12H1	06/14/83 to 07/15/83	2.9 ± 1.2
	Well	2S6	06/15/83	1.2 ± 1.0
		3S5	06/15/83	1.7 ± 1.0
		4S2	06/15/83	LT 1.5
		4S4	06/15/83	LT 1.5
		11S5	06/15/83	1.2 ± 1.0
		15A4	06/15/83	6.0 ± 1.3
		12E4	06/14/83	1.9 ± 1.0
		12F3	06/14/83	2.3 ± 1.3
		2S5	06/21/83	LT 1.8
	Drinking	12F3	06/14/83	1.6 ± 1.0
		12H2	06/14/83 to 07/15/83	2.3 ± 0.6

Note: See footnotes at end of table.

Table 9
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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP·1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
June[6]	Surface	5S8	06/08/83 to 06/27/83	LT 2
		6S5	06/08/83 to 06/27/83	LT 2
		6S7	04/08/83 to 06/05/83	28 ± 4
		6S7	06/05/83 to 07/06/83	5.2 ± 3.4
		1D3	06/14/83	4.3 ± 1.5
		13E1	06/14/83	LT 2
		12F1	06/14/83	LT 2
		12G2	06/14/83	LT 5
		12H1	05/05/83 to 06/14/83	LT 2
		1D5	06/15/83	8.9 ± 2.7
	Well	2S6	06/15/83	LT 2
		3S5	06/15/83	LT 2
		4S2	06/15/83	3.9 ± 1.5
		4S4	06/15/83	4.0 ± 1.5
		11S5	06/15/83	LT 2
		15A4	06/15/83	6.0 ± 1.5
		12E4	06/14/83	LT 2
		12F3	06/14/83	LT 2
	Drinking	12F3	06/14/83	2.0 ± 1.4
		12H2 RAW	05/05/83 to 06/14/83	2.8 ± 1.5
		12H2 TREATED	06/14/83	1.7 ± 1.5
		12H2 RAW	06/14/83 to 06/27/83	21 ± 3
		12H2 TREATED	06/14/83 to 07/05/83	LT 2

Note: See footnotes at end of table.

Table 9
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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
July (6)	Surface	5S8	07/05/83 to 07/25/83	2.1 ± 1.7
		6S5	07/05/83 to 07/25/83	LT 3
		1D3	07/15/83	3.6 ± 1.4
		13E1	07/15/83	LT 2
		12F1	07/17/83	1.9 ± 1.3
		12G2	07/15/83	3.5 ± 1.4
		12H1	06/14/83 to 07/15/83	3.0 ± 1.4
		6S7	07/06/83 to 08/04/83	4.5 ± 1.8
		1D5	07/15/83	11 ± 4
	Well	2S6	07/15/83	19 ± 3
		3S5	07/15/83	4.2 ± 1.6
		4S2	07/15/83	4.0 ± 2.4
		4S4	07/15/83	5.6 ± 1.5
		11S5	07/15/83	LT 2
		15A4	07/16/83	3.9 ± 1.4
		12E4	07/15/83	LT 1.8
		12F3	07/15/83	3.2 ± 2.5
	Drinking	12F3	07/15/83	1.6 ± 1.4
		12H2 RAW	06/27/83 to 07/15/83	3.6 ± 2.5
		12H2 TREATED	07/05/83 to 08/01/83	8.1 ± 4.9

Note: See footnotes at end of table.

Table 9
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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
August (6)	Surface	5S8	08/01/83 to 08/29/83	3.6 ± 1.8
		6S5	08/01/83 to 08/29/83	2.1 ± 1.4
		6S6	07/16/83 to 08/16/83	2.7 ± 1.7
		1D3	08/22/83	LT 3
		13E1	08/22/83	LT 3
		12F1	08/22/83	4.7 ± 1.5
		12G2	08/22/83	3.1 ± 1.8
		12H1	07/15/83 to 08/22/83	3.8 ± 2.1
		6S7	08/04/83 to 09/07/83	9.0 ± 1.8
		1D5	08/22/83	8.4 ± 1.5
	Well	2S6	08/22/83	LT 2
		3S5	08/22/83	5.4 ± 1.8
		4S2	08/22/83	LT 2
		4S4	08/22/83	LT 2
		11S5	08/22/83	LT 2
		15A4	08/22/83	4.4 ± 1.2
		12E4	08/22/83	LT 1.9
		12F3	08/22/83	3.4 ± 1.3
	Drinking	12F3	08/22/83	LT 2
		12H2 RAW	07/15/83 to 08/16/83	3.1 ± 2.0
		12H2 TREATED	08/01/83 to 09/05/83	2.7 ± 2.5

Note: See footnotes at end of table.

Table 9
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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
September[6]	Surface	5S8	09/06/83 to 09/26/83	2.4 ± 1.5
		6S5	09/06/83 to 09/26/83	1.5 ± 1.4
		6S6	08/16/83 to 10/07/83	LT 4
		1D3	09/20/83	1.5 ± 1.4
		13E1	09/20/83	LT 2
		12F1	09/19/83	LT 2
		12G2	09/19/83	2.0 ± 1.7
		12H1	08/22/83 to 09/19/83	4.4 ± 1.8
		6S7	09/07/83 to 10/04/83	8.8 ± 3.1
		1D5	09/21/83	9.8 ± 1.7
	Well	2S6	09/20/83	LT 2
		3S5	09/20/83	LT 2
		4S2	09/20/83	LT 2
		4S4	09/20/83	1.7 ± 1.4
		11S5	09/20/83	LT 2
		15A4	09/21/83	5.9 ± 1.5
		12E4	09/20/83	LT 2
		12F3	09/19/83	LT 2
	Drinking	12F3	09/19/83	2.3 ± 1.5
		12H2 RAW	08/16/83 to 09/19/83	19 ± 7
		12H2 TREATED	09/05/83 to 10/03/83	7.9 ± 6.6

Note: See footnotes at end of table.

Table 9
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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
October (6)	Surface	5S8	10/04/83 to 10/25/83	1.8 ± 1.5
		6S5	10/04/83 to 10/25/83	3.6 ± 1.4
		6S6	10/07/83 to 10/17/83	3.7 ± 1.7
		6S6	10/17/83 to 10/31/83	2.4 ± 2.1
		1D3	10/19/83	LT 2
		13E1	10/18/83	LT 2
		12F1	10/18/83	4.3 ± 1.4
		12G2	10/18/83	4.3 ± 1.4
		12HI	09/19/83 to 10/17/83	3.2 ± 1.4
		6S7	10/04/83 to 10/17/83	9.6 ± 3.4
		6S7	10/17/83 to 11/01/83	4.6 ± 1.9
		1D5	10/19/83	12 ± 2
	Well	2S6	10/18/83	LT 2
		3S5	10/18/83	1.9 ± 1.4
		4S2	10/18/83	1.6 ± 1.4
		4S4	10/18/83	2.2 ± 1.3
		11S5	10/18/83	2.0 ± 1.4
		15A4	10/18/83	8.3 ± 1.6
		12E4	10/17/83	LT 2
		12F3	10/18/83	2.0 ± 1.3
	Drinking	12F3	10/18/83	LT 2
		12H2 RAW	09/19/83 to 10/17/83	13 ± 4
		12H2 TREATED	10/03/83 to 10/31/83	2.9 ± 1.5
		12H2 RAW	10/17/83 to 10/31/83	4.2 ± 1.5

Note: See footnotes at end of table.

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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
November(6)	Surface	5S8	11/01/83 to 11/28/83	3.4 ± 1.5
		6S5	11/01/83 to 11/28/83	1.9 ± 1.4
		6S6	10/31/83 to 11/28/83	3.3 ± 1.8
		1D3	11/14/83	12 ± 2
		13E1	11/15/83	1.5 ± 1.4
		12F1	11/15/83	2.4 ± 1.5
		12G2	11/16/83	5.0 ± 2.4
		12H1	10/17/83 to 11/14/83	3.0 ± 2.8
		6S7	11/01/83 to 12/01/83	4.5 ± 2.2
		1D5	11/14/83	11 ± 2
	Well	2S6	11/14/83	LT 2
		3S5	NS	--
		4S2	11/14/83	2.0 ± 1.5
		4S4	11/14/83	2.7 ± 1.5
		11S5	11/14/83	LT 2
		15A4	11/16/83	4.8 ± 1.5
		12E4	11/14/83	LT 2
		12F3	11/15/83	LT 2
	Drinking	12F3	11/15/83	LT 4
		12H2 RAW	10/31/83 to 11/29/83	0.38 ± 0.30
		12H2 TREATED	10/31/83 to 11/29/83	7.7 ± 4.1

Note: See footnotes at end of table.

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Gross Beta in Water
(Surface, Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Water Type	Station	Collection Period	Gross Beta Activity
December(6)	Surface	5S8	12/05/83 to 12/19/83	5.8 ± 1.4
		6S5	12/05/83 to 12/19/83	4.5 ± 1.3
		6S6	11/28/83 to 01/02/83	5.1 ± 2.0
		1D3	12/14/83	26 ± 3
		13E1	12/13/83	4.6 ± 1.7
		12F1	12/13/83	8.9 ± 2.5
		12G2	NS	--
		12H1	11/14/83 to 12/12/83	4.0 ± 1.7
		6S7	12/01/83 to 01/02/84	4.3 ± 2.3
		1D5	NS	--
		LAKE T-A-W	12/09/83	6.3 ± 1.8
	Well	2S6	12/14/83	LT 2
		3S5	NS	--
		4S2	12/13/83	LT 2
		4S4	12/13/83	LT 2
		11S5	12/14/83	LT 2
		15A4	12/15/83	7.7 ± 1.6
		12E4	12/14/83	LT 2
		12F3	12/13/83	LT 2
	Drinking	12F3	12/13/83	2.3 ± 1.5
		12H2 RAW	11/29/83 to 01/02/84	3.7 ± 3.6
		12H2 TREATED	11/29/83 to 01/02/84	5.5 ± 2.5

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) LT = Less Than
(3) NS = No sample
(4) Sample was collected in May, after two month period
(5) Duplicate analysis
(6) Samples collected and analyzed by NUS

Table 10
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Gross Alpha in Water
(Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	Gross Alpha Activity
Quarter 1[1]	Well	2S6	01/06/83 to 03/09/83	LT 0.9[2]
		3S5	NS[3]	--
		4S2	01/06/83 to 03/09/83	LT 1.9
		4S4	01/06/83 to 03/09/83	LT 2
		11S5	01/06/83 to 03/09/83	2.1 ± 1.1
		15A4	01/08/83 to 03/11/83	LT 0.8
		12E4	01/06/83 to 03/09/83	LT 0.8
		12F3	01/05/83 to 03/09/83	LT 1.6
		2S5	01/06/83 to 03/09/83	LT 1.2
	Drinking	12F3	01/05/83 to 03/09/83	LT 1.4
January[1]	Well	Muncy Vly	01/13/83	3.1 ± 1.1
		Orangeville	01/13/83	LT 1.0
		Lee Mount.	01/13/83	LT 1.0
	Drinking	12H2	01/03/83 to 02/02/83	LT 0.7
February[1]	Drinking	12H2	02/02/83 to 03/07/83	LT 0.7
March[1]	Drinking	12H2	03/07/83 to 04/07/83	LT 0.9

Note: See footnotes at end of table.

Table 10
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Gross Alpha in Water
(Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	Gross Alpha Activity
Quarter 2[1]	Well	2S6	04/07/83 to 06/15/83	LT 1.5
		3S5	06/15/83	LT 1.5
		4S2	05/04/83 to 06/15/83	LT 1.3
		4S4	04/07/83 to 06/15/83	1.6 ± 1.2
		11S5	04/07/83 to 06/15/83	LT 1.1
		15A4	04/08/83 to 06/15/83	LT 1.3
		12E4	04/07/83 to 06/14/83	LT 1.0
		12F3	04/07/83 to 06/14/83	0.94 ± 0.74
		2S5	04/07/83 to 06/21/83	LT 0.8
	Drinking	12F3	04/07/83 to 06/14/83	LT 0.8
April[1]	Drinking	12H2	04/07/83 to 05/05/83	LT 1.0
May[1]	Drinking	12H2	05/05/83 to 06/14/83	LT 1.6
June[1]	Drinking	12H2	06/14/83 to 07/15/83	LT 1.0
June[4]	Drinking	12F3	06/14/83	LT 3
		12H2 RAW	05/05/83 to 06/14/83	LT 4
		12H2 TREATED	06/14/83	LT 4
		12H2 RAW	06/14/83 to 06/27/83	LT 2
		12H2 TREATED	06/14/83 to 07/05/83	2.2 ± 1.7

Note: See footnotes at end of table.

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Gross Alpha in Water
(Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	Gross Alpha Activity
Quarter 3 (4)	Well	2S6	07/15/83 to 09/20/83	LT 1.6
		3S5	07/15/83 to 09/20/83	LT 1.6
		4S2	07/15/83 to 09/20/83	LT 2
		4S4	07/15/83 to 09/20/83	LT 4
		11S5	07/15/83 to 09/20/83	2.5 ± 2.0
		15A4	07/16/83 to 09/21/83	LT 1.6
		12E4	07/15/83 to 09/20/83	LT 1.8
		12F3	07/15/83 to 09/19/83	LT 3
	Drinking	12F3	07/15/83 to 09/19/83	LT 7
July (4)	Drinking	12H2 RAW	06/27/83 to 07/15/83	LT 4
		12H2 TREATED	07/05/83 to 08/01/83	8.4 ± 7.0
August (4)	Drinking	12H2 RAW	07/15/83 to 08/16/83	LT 4
		12H2 TREATED	08/01/83 to 09/05/83	24 ± 20
September (4)	Drinking	12H2 RAW	08/16/83 to 09/19/83	25 ± 18
		12H2 TREATED	09/05/83 to 10/03/83	LT 4

Note: See footnotes at end of table.

Table 10
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Gross Alpha in Water
(Well and Drinking)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	Gross Alpha Activity
Quarter 4	Well	2S6	10/18/83 to 12/14/83	LT 1.1
		3S5	NS	--
		4S2	10/18/83 to 12/13/83	LT 1.9
		4S4	10/18/83 to 12/13/83	LT 1.4
		11S5	10/18/83 to 12/14/83	LT 2
		15A4	10/18/83 to 12/15/83	1.0 ± 0.9
		12E4	10/17/83 to 12/14/83	LT 1.1
		12F3	10/18/83 to 12/13/83	1.4 ± 1.4
	Drinking	12F3	10/18/83 to 12/13/83	LT 4
October (4)	Drinking	12H2 RAW	10/17/83 to 10/31/83	1.9 ± 0.8
		12H2 TREATED	10/03/83 to 10/31/83	1.4 ± 0.9
November (4)	Drinking	12H2 RAW	10/31/83 to 11/29/83	LT 0.9
		12H2 TREATED	10/31/83 to 11/29/83	10 ± 7
December (4)	Drinking	12H2 RAW	11/29/83 to 01/02/84	LT 6
		12H2 TREATED	11/29/83 to 01/02/84	7.7 ± 7.0

(1) Samples collected and analyzed by Radiation Management Corporation
(2) LT = Less Than
(3) NS = No sample
(4) Samples collected and analyzed by NUS

Table 11
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Tritium in Water
(Surface, Well, Drinking, and Precipitation)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	H-3 Activity
Quarter 1[1]	Surface	6S7	01/03/83 to 04/08/83	730 ± 80[2]
		5S8	01/04/83 to 03/28/83	LT 120
		6S5	02/01/83 to 03/28/83	LT 120
		1D3	01/07/83 to 03/09/83	LT 120
		13E1	01/05/83 to 03/09/83	LT 120
		12F1	01/05/83 to 03/11/83	LT 120
		12G2	01/05/83 to 03/07/83	LT 120
		12H1	01/03/83 to 04/07/83	LT 120
	Well	2S6	01/06/83 to 03/09/83	LT 120
		3S5	NS[3]	--
		4S2	01/06/83 to 03/09/83	LT 120
		4S4	01/06/83 to 03/09/83	LT 120
		11S5	01/06/83 to 03/09/83	LT 120
		15A4	01/08/83 to 03/11/83	LT 120
		12E4	01/06/83 to 03/09/83	LT 120
		12F3	01/05/83 to 03/09/83	LT 120
		2S5	01/06/83 to 03/09/83	LT 120
	Drinking	12F3	01/05/83 to 03/09/83	LT 120
	Precipitation	5S4	01/06/83 to 04/07/83	LT 200
		11S2	01/06/83 to 04/07/83	LT 200
		1D2	01/06/83 to 04/07/83	LT 200
		12G1	01/06/83 to 04/07/83	LT 200
January[1]	Drinking	12H2	01/03/83 to 02/02/83	LT 110
February[1]	Drinking	12H2	02/02/83 to 03/07/83	LT 120
March[1]	Drinking	12H2	03/07/83 to 04/07/83	LT 120

Note: See footnote at end of table.

Table 11
(Page 2 of 5)

Tritium in Water
(Surface, Well, Drinking, and Precipitation)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	H-3 Activity
Quarter 2[1]	Surface	6S7	04/08/83 to 06/05/83	LT 1400[4]
		5S8	04/08/83 to 06/27/83	210 ± 70
		6S5	04/08/83 to 06/27/83	260 ± 70
		1D3	04/07/83 to 06/14/83	LT 120
		13E1	04/07/83 to 06/14/83	LT 120
		12F1	04/07/83 to 06/15/83	LT 120
		12G2	04/07/83 to 06/14/83	100 ± 70
		12H1	NS	--
	Well	2S6	04/07/83 to 06/15/83	LT 120
		3S5	06/15/83	LT 120
		4S2	05/04/83 to 06/15/83	88 ± 71
		4S4	04/07/83 to 06/15/83	160 ± 70
		11S5	04/07/83 to 06/15/83	220 ± 70
		15A4	04/08/83 to 06/15/83	180 ± 70
		12E4	04/07/83 to 06/14/83	200 ± 70
		12F3	04/07/83 to 06/14/83	210 ± 70
		2S5	04/07/83 to 06/21/83	72 ± 71
	Drinking	12F3	04/07/83 to 06/14/83	76 ± 71
	Precipitation	12E1	04/17/83 to 06/27/83	LT 160
		5S4	04/07/83 to 06/27/83	LT 160
		11S2	04/07/83 to 06/27/83	130 ± 100
		1D2	04/07/83 to 06/27/83	LT 160
		12G1	04/07/83 to 06/27/83	120 ± 100
		9B1	04/17/83 to 06/27/83	LT 160
		2S2	04/17/83 to 06/27/83	LT 160
		3D1	04/17/83 to 06/27/83	LT 160
		15S4	04/17/83 to 06/27/83	LT 160
		7G1	04/17/83 to 06/27/83	190 ± 100
April[1]	Drinking	12H2	04/07/83 to 05/05/83	LT 120
May[1]	Drinking	12H2	05/05/83 to 06/14/83	LT 120

Note: See footnote at end of table.

Table 11
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Tritium in Water
(Surface, Well, Drinking, and Precipitation)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	H-3 Activity
Quarter 3[5]	Surface	6S6	07/16/83 to 10/07/83	LT 1400[6]
		5S8	07/05/83 to 09/26/83	LT 1400[6]
		6S5	07/05/83 to 09/26/83	LT 1400
		1D3	07/15/83 to 09/20/83	LT 1400
		13E1	07/15/83 to 09/20/83	LT 1400
		12F1	07/17/83 to 09/19/83	LT 1400
		12G2	07/15/83 to 09/19/83	LT 1400
		12H1	06/14/83 to 09/19/83	LT 1400
		1D5	07/15/83 to 09/21/83	LT 1200
		6S7	07/06/83 to 10/04/83	LT 1400
	Well	2S6	07/15/83 to 09/20/83	LT 1200
		3S5	07/15/83 to 09/20/83	LT 1200
		4S2	07/15/83 to 09/20/83	LT 1200
		4S4	07/15/83 to 09/20/83	LT 1200
		11S5	07/15/83 to 09/20/83	LT 1200
		15A4	07/16/83 to 09/21/83	LT 1200
		12E4	07/15/83 to 09/20/83	LT 1200
		12F3	07/15/83 to 09/19/83	LT 1200
	Drinking	12F3	07/15/83 to 09/19/83	LT 1200
	Precipitation	12E1	06/27/83 to 09/19/83	LT 1200
		5S4	06/27/83 to 09/20/83	LT 1200
		11S2	06/27/83 to 09/20/83	LT 1200
		1D2	06/27/83 to 09/20/83	LT 1200
		12G1	06/27/83 to 09/19/83	LT 1200
		9B1	06/27/83 to 09/20/83	LT 1200
		2S2	06/27/83 to 09/20/83	LT 1200
		3D1	06/27/83 to 09/20/83	LT 1200
		15S4	06/27/83 to 09/22/83	LT 1400
		7G1	06/27/83 to 09/22/83	LT 1200

Note: See footnote at end of table.

Table 11
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Tritium in Water
(Surface, Well, Drinking, and Precipitation)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	H-3 Activity
June (5)	Drinking	12H2 RAW	06/14/83 to 06/27/83	LT 300
		12H2 TREATED	06/14/83 to 07/05/83	LT 160
July (5)	Drinking	12H2 RAW	06/27/83 to 07/15/83	LT 130
		12H2 TREATED	07/05/83 to 08/01/83	LT 1400
August (5)	Drinking	12H2 RAW	07/15/83 to 08/16/83	270 ± 80 (7)
		12H2 TREATED	08/01/83 to 09/05/83	LT 1400
September (5)	Drinking	12H2 RAW	08/16/83 to 09/19/83	99 ± 71
		12H2 TREATED	09/05/83 to 10/03/83	LT 1400
Quarter 4 (5)	Surface	6S6	10/07/83 to 01/02/84	LT 1400
		5S8	10/04/83 to 12/19/83	LT 1200
		6S5	10/04/83 to 12/19/83	LT 1200
		1D3	10/19/83 to 12/14/83	LT 1200
		13E1	10/18/83 to 12/13/83	LT 120
		12F1	10/18/83 to 12/13/83	LT 120
		12G2	10/18/83 to 11/16/83	LT 120
		12H1	09/19/83 to 12/12/83	120 ± 70
		1D5	10/19/83 to 11/14/83	LT 120
		6S7	10/04/83 to 01/02/84	LT 1400
	Well	2S6	10/18/83 to 12/14/83	LT 130
		3S5	NS	--
		4S2	10/18/83 to 12/13/83	130 ± 90
		4S4	10/18/83 to 12/13/83	LT 130
		11S5	10/18/83 to 12/14/83	LT 130
		15A4	10/18/83 to 12/15/83	400 ± 180
		12E4	10/17/83 to 12/14/83	LT 130
		12F3	10/18/83 to 12/13/83	LT 130

Note: See footnote at end of table.

Table 11
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Tritium in Water
(Surface, Well, Drinking, and Precipitation)
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month or Quarter	Water Type	Station	Collection Period	H-3 Activity
Quarter 4 (cont.) (5)	Drinking	12F3	10/18/83 to 12/13/83	250 ± 80
	Precipitation	12E1	09/19/83 to 11/14/83	LT 110
		5S4	09/20/83 to 11/15/83	260 ± 100
		11S2	09/20/83 to 11/14/83	140 ± 100
		1D2	09/20/83 to 11/14/83	LT 110
		12G1	09/19/83 to 11/14/83	LT 110
		9B1	09/20/83 to 11/14/83	290 ± 100
		2S2	09/20/83 to 11/14/83	LT 1200
		3D1	09/20/83 to 11/14/83	LT 160
		15S4	09/22/83 to 11/14/83	LT 110
		7G1	09/22/83 to 10/18/83	LT 110
October (5)	Drinking	12H2 RAW	09/19/83 to 10/17/83	LT 120
		12H2 TREATED	10/03/83 to 10/31/83	LT 130
		12H2 RAW	10/17/83 to 10/31/83	LT 130
November (5)	Drinking	12H2 RAW	10/31/83 to 11/29/83	LT 130
		12H2 TREATED	10/31/83 to 11/29/83	LT 130
December (5)	Drinking	12H2 RAW	11/29/83 to 01/02/84	LT 160
		12H2 TREATED	11/29/83 to 01/02/84	110 ± 70

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) LT = Less Than
(3) NS = No sample
(4) Sample analyzed by NUS. Insufficient sample to analyze from 06/05/83 to 07/06/83.
(5) Samples collected and analyzed by NUS.
(6) Insufficient sample to analyze from 09/06/83 to 09/26/83.
(7) Insufficient sample to analyze from 08/15/83 to 08/22/83.

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Table 12
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Gross Beta in Air Particulate Filters
SSES REMP 1983

(Results in E-03 pCi/m^3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
Jan[1]	01/02/83 to 01/09/83	16 ± 3	14 ± 3	16 ± 3	14 ± 3	13 ± 3	15 ± 3	10 ± 3	14 ± 3	11 ± 2	7.7 ± 2.2	-
	01/03/83 to 01/10/83											14 ± 4
	01/09/83 to 01/16/83	NS[2]	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	01/10/83 to 01/17/83	-	-	-	-	-	-	-	-	-	-	15 ± 3
	01/16/83 to 01/23/83	12 ± 3	15 ± 3	14 ± 3	12 ± 2	9.0 ± 2.4	13 ± 3	6.5 ± 2.1	15 ± 3	-	-	
	01/16/83 to 01/24/83									11 ± 2	10 ± 2	-
	01/17/83 to 01/24/83	-	-	-	-	-	-	-	-			15 ± 4
	01/23/83 to 01/30/83	18 ± 3	17 ± 3	16 ± 3	17 ± 3	17 ± 3	20 ± 3	12 ± 3	19 ± 3	-	-	
	01/24/83 to 01/30/83									18 ± 3	14 ± 3	-
	01/24/83 to 01/31/83	-	-	-	-	-	-	-	-			19 ± 4
Feb[1]	01/30/83 to 02/06/83	14 ± 3	11 ± 2	13 ± 2	10 ± 2	13 ± 3	9.8 ± 2.4	11 ± 3	11 ± 2	10 ± 2	6.8 ± 1.8	-
	01/31/83 to 02/07/83											15 ± 3
	02/06/83 to 02/14/83	14 ± 3	16 ± 3	16 ± 2	14 ± 2	13 ± 2	12 ± 2	9.0 ± 2.2	15 ± 2	15 ± 2	8.5 ± 1.7	
	02/07/83 to 02/14/83											16 ± 3
	02/14/83 to 02/20/83	24 ± 5	20 ± 5	21 ± 4	20 ± 4	16 ± 3	19 ± 3	15 ± 4	16 ± 3	19 ± 3	15 ± 3	
	02/14/83 to 02/22/83											25 ± 8
	02/20/83 to 02/27/83	17 ± 3	15 ± 3	15 ± 3	14 ± 2	15 ± 3	15 ± 3	12 ± 3	16 ± 3	15 ± 3	12 ± 2	
	02/22/83 to 02/28/83											16 ± 4
Mar[1]	02/27/83 to 03/06/83	15 ± 3	14 ± 3	14 ± 3	14 ± 3	15 ± 3	13 ± 2	13 ± 3	13 ± 3	13 ± 3	13 ± 2	-
	02/28/83 to 03/07/83											15 ± 4
	03/06/83 to 03/13/83	3.2 ± 2.2	4.2 ± 2.1	5.1 ± 1.9	4.7 ± 1.9	4.9 ± 2.0	3.2 ± 1.9	3.0 ± 2.0	3.8 ± 1.9	4.0 ± 1.8	3.4 ± 1.7	
	03/07/83 to 03/14/83											8.1 ± 2.7
	03/13/83 to 03/20/83	8.7 ± 2.4	9.2 ± 2.2	11 ± 2	8.6 ± 1.7	8.4 ± 1.9	9.7 ± 2.2	6.1 ± 2.0	8.5 ± 2.1	9.1 ± 2.0	5.8 ± 1.8	
	03/14/83 to 03/21/83											7.6 ± 2.8
	03/20/83 to 03/28/83	14 ± 3	12 ± 2	13 ± 2	11 ± 2	13 ± 2	13 ± 2	7.8 ± 1.8	13 ± 2	11 ± 2	8.1 ± 1.7	
	03/21/83 to 03/28/83											17 ± 3
Apr[1]	03/28/83 to 04/04/83	16 ± 3	14 ± 3	17 ± 3	15 ± 3	16 ± 3	16 ± 3	9.7 ± 2.3	15 ± 3	14 ± 2	13 ± 2	12 ± 3
	04/04/83 to 04/11/83	7.9 ± 2.3	8.1 ± 2.1	6.1 ± 1.8	7.9 ± 2.1	7.9 ± 2.0	9.0 ± 2.1	5.1 ± 2.0	8.9 ± 2.1	8.7 ± 2.0	2.0 ± 1.4	7.2 ± 2.3
	04/11/83 to 04/18/83	10 ± 3	6.6 ± 2.0	7.4 ± 1.8	7.3 ± 1.9	7.5 ± 2.0	8.9 ± 2.1	3.3 ± 1.8	7.8 ± 2.1	7.4 ± 1.9	7.1 ± 1.9	
	04/11/83 to 04/19/83											6.0 ± 2.1
	04/18/83 to 04/25/83	18 ± 3	13 ± 2	14 ± 2	13 ± 2	15 ± 3	14 ± 2	9.9 ± 2.3	14 ± 3	12 ± 2	13 ± 2	
	04/19/83 to 04/25/83											16 ± 3
	04/25/83 to 05/02/83	18 ± 3	20 ± 3	21 ± 3	18 ± 3	20 ± 3	19 ± 3	13 ± 3	20 ± 3	17 ± 3	16 ± 2	21 ± 4

Note: See footnotes at end of table.

Table 12
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Gross Beta in Air Particulate Filters
SSES REMP 1983

(Results in E-03 pCi/m^3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
May[1]	05/02/83 to 05/09/83	13 ± 3	15 ± 3	15 ± 2	13 ± 2	14 ± 2	16 ± 3	11 ± 3	14 ± 3	5.9 ± 1.7	11 ± 2	13 ± 3
	05/09/83 to 05/17/83	9.8 ± 1.4	11 ± 1	10 ± 1	9.7 ± 1.0	11 ± 1	10 ± 1	6.6 ± 1.2	12 ± 1	10 ± 1	7.5 ± 1.0	11 ± 2
	05/17/83 to 05/23/83	22 ± 4	17 ± 3	14 ± 3	13 ± 3	10 ± 2	15 ± 3	13 ± 3	13 ± 3	12 ± 3	11 ± 4	16 ± 3
	05/23/83 to 05/30/83	8.4 ± 2.4	12 ± 3	11 ± 2	7.9 ± 1.9	9.6 ± 1.8	8.6 ± 1.9	7.3 ± 2.2	11 ± 2	8.1 ± 1.8	5.2 ± 3.0	-
	05/23/83 to 05/31/83	-	-	-	-	-	-	-	-	-	-	9.5 ± 2.1
June[1]	05/30/83 to 06/05/83	12 ± 3	11 ± 3	11 ± 3	8.6 ± 2.2	12 ± 2	9.8 ± 2.3	7.5 ± 2.5	12 ± 3	8.9 ± 2.7	12 ± 4	-
	05/31/83 to 06/06/83	-	-	-	-	-	-	-	-	-	-	11 ± 3
	06/05/83 to 06/12/83	15 ± 3	17 ± 3	17 ± 2	13 ± 2	15 ± 2	15 ± 2	14 ± 2	15 ± 2	15 ± 3	16 ± 4	-
	06/06/83 to 06/12/83	-	-	-	-	-	-	-	-	-	-	17 ± 3
	06/12/83 to 06/18/83	26 ± 4	31 ± 4	30 ± 4	28 ± 3	27 ± 3	27 ± 3	22 ± 3	26 ± 4	26 ± 4	24 ± 4	33 ± 6
	06/18/83 to 06/24/83	17 ± 3	16 ± 3	14 ± 2	17 ± 3	16 ± 2	15 ± 3	13 ± 2	16 ± 3	16 ± 3	7.6 ± 2.7	17 ± 3
	06/24/83 to 06/30/83	13 ± 3	14 ± 3	15 ± 3	12 ± 3	11 ± 2	10 ± 2	9.5 ± 2.5	15 ± 3	14 ± 3	7.8 ± 2.9	15 ± 3
July[3]	06/30/83 to 07/06/83	-	-	-	-	-	-	-	-	-	-	13 ± 4
	06/30/83 to 07/07/83	15 ± 3	13 ± 3	11 ± 3	11 ± 3	13 ± 2	18 ± 3	10 ± 3	13 ± 3	-	5.6 ± 3.4	-
	06/30/83 to 07/08/83	-	-	-	-	-	-	-	-	12 ± 3	-	-
	07/06/83 to 07/14/83	-	-	-	-	-	-	-	-	-	-	11 ± 3
	07/07/83 to 07/14/83	9.8 ± 3.2	14 ± 3	11 ± 3	11 ± 3	14 ± 3	12 ± 3	6.6 ± 3.1	9.8 ± 3.0	-	9.8 ± 4	-
	07/08/83 to 07/14/83	-	-	-	-	-	-	-	-	20 ± 4	-	-
	07/14/83 to 07/21/83	-	23 ± 4	20 ± 4	-	18 ± 4	-	-	18 ± 4	-	-	19 ± 4
	07/14/83 to 07/22/83	21 ± 3	-	-	24 ± 3	-	19 ± 3	11 ± 3	-	19 ± 3	8.6 ± 3.4	-
	07/21/83 to 07/29/83	-	12 ± 3	11 ± 2	-	11 ± 3	-	-	12 ± 3	-	-	11 ± 3
	07/22/83 to 07/29/83	9.6 ± 3.5	-	-	9.7 ± 3.0	-	11 ± 3	6.4 ± 2.6	-	10 ± 3	5.8 ± 3.2	-
Aug[3]	07/29/83 to 08/04/83	12 ± 5	13 ± 4	14 ± 3	12 ± 3	16 ± 4	14 ± 4	9.9 ± 3.4	15 ± 4	12 ± 3	LT 7[4]	-
	07/29/83 to 08/05/83	-	-	-	-	-	-	-	-	-	-	7.6 ± 3.4
	08/04/83 to 08/11/83	18 ± 4	17 ± 4	18 ± 3	18 ± 3	19 ± 3	19 ± 3	17 ± 4	18 ± 3	17 ± 3	13 ± 4	-
	08/05/83 to 08/12/83	-	-	-	-	-	-	-	-	-	-	11 ± 4
	08/11/83 to 08/17/83	-	12 ± 4	11 ± 3	-	11 ± 3	-	-	8.6 ± 3.0	8.4 ± 3.0	-	-
	08/11/83 to 08/18/83	17 ± 4	-	-	8.7 ± 2.6	-	LT 4	8.4 ± 2.2	-	-	8.5 ± 3.6	-
	08/12/83 to 08/19/83	-	-	-	-	-	-	-	-	-	-	18 ± 4
	08/17/83 to 08/25/83	-	15 ± 3	17 ± 3	-	18 ± 3	-	-	19 ± 3	18 ± 3	-	-
	08/18/83 to 08/25/83	19 ± 4	-	-	18 ± 4	-	16 ± 3	12 ± 2	-	-	11 ± 5	-
	08/19/83 to 08/26/83	-	-	-	-	-	-	-	-	-	-	17 ± 3
	08/25/83 to 09/01/83	18 ± 4	19 ± 3	16 ± 3	17 ± 3	18 ± 3	16 ± 3	16 ± 4	20 ± 3	18 ± 3	17 ± 4	-
	08/26/83 to 09/02/83	-	-	-	-	-	-	-	-	-	-	19 ± 4

Note: See footnotes at end of table.

Table 12
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Gross Beta in Air Particulate Filters
SSES REMP 1983

(Results in E-03 pCi/m^3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
Sept(3)	09/01/83 to 09/08/83	20 ± 4	22 ± 3	19 ± 4	22 ± 4	22 ± 3	26 ± 3	19 ± 3	24 ± 3	20 ± 3	11 ± 4	-
	09/02/83 to 09/09/83											23 ± 4
	09/08/83 to 09/15/83	11 ± 2	16 ± 3	15 ± 3	15 ± 3	19 ± 3	17 ± 3	11 ± 2	18 ± 3	15 ± 3	7.7 ± 3.5	
	09/15/83 to 09/22/83	20 ± 4	13 ± 3	18 ± 3	19 ± 4	19 ± 3	19 ± 3	16 ± 3	21 ± 3	21 ± 3	18 ± 4	-
	09/09/83 to 09/22/83											19 ± 3
	09/22/83 to 09/30/83	17 ± 4	24 ± 4	20 ± 3	17 ± 3	23 ± 3	22 ± 3	15 ± 2	26 ± 3	18 ± 3	-	15 ± 3
	09/22/83 to 10/01/83										13 ± 5	
Oct(3)	09/30/83 to 10/08/83	17 ± 3	17 ± 3	18 ± 2	21 ± 3	20 ± 2	19 ± 3	12 ± 2	18 ± 2	18 ± 2	-	-
	10/01/83 to 10/08/83										18 ± 4	-
	09/30/83 to 10/07/83	-	-	-	-	-	-	-	-	-		20 ± 3
	10/08/83 to 10/15/83	6.5 ± 3.2	8.6 ± 3.1	6.6 ± 2.6	7.7 ± 2.3	11 ± 3	10 ± 3	5.9 ± 2.7	8.2 ± 2.5	5.4 ± 2.7	3.9 ± 3.4	
	10/07/83 to 10/22/83											9.4 ± 1.4
	10/15/83 to 10/22/83	10 ± 2	10 ± 2	13 ± 2	11 ± 2	13 ± 2	12 ± 2	7.1 ± 2.0	9.2 ± 2.3	11 ± 2	11 ± 3	
	10/22/83 to 10/29/83	5.8 ± 2.2	5.9 ± 2.3	6.8 ± 1.9	5.9 ± 1.8	7.0 ± 1.9	6.2 ± 2.1	3.4 ± 1.9	3.7 ± 2.4	5.7 ± 1.9	2.9 ± 2.7	6.7 ± 2.2
Nov(3)	10/29/83 to 11/05/83	5.5 ± 2.1	4.6 ± 2.1	4.7 ± 1.9	6.5 ± 1.7	7.8 ± 1.9	11 ± 3	5.0 ± 1.8	6.4 ± 2.3	7.8 ± 2.0	LT 4	-
	10/29/83 to 11/04/83										-	6.3 ± 3.5
	11/05/83 to 11/12/83	15 ± 3	12 ± 2	13 ± 2	14 ± 3	13 ± 2	16 ± 3	9.2 ± 2.0	11 ± 2	12 ± 2	14 ± 2	
	11/04/83 to 11/11/83											8.6 ± 3.4
	11/12/83 to 11/20/83	10 ± 2	12 ± 2	12 ± 2	25 ± 4	14 ± 2	13 ± 2	6.5 ± 1.6	11 ± 2	13 ± 2	10 ± 2	
	11/11/83 to 11/26/83											13 ± 2
	11/20/83 to 11/27/83	22 ± 3	22 ± 3	21 ± 2	21 ± 2	23 ± 2	20 ± 3	16 ± 2	20 ± 2	20 ± 2	23 ± 3	
	11/26/83 to 12/02/83											16 ± 3
Dec(3)	11/27/83 to 12/04/83	14 ± 3	12 ± 2	13 ± 2	13 ± 2	13 ± 2	17 ± 3	9.4 ± 1.9	13 ± 2	12 ± 2	14 ± 2	-
	12/02/83 to 12/09/83											11 ± 2
	12/04/83 to 12/12/83	12 ± 2	15 ± 2	14 ± 2	14 ± 2	16 ± 2	-	-	16 ± 2	13 ± 2	12 ± 2	
	12/04/83 to 12/13/83						22 ± 3	8.5 ± 1.7				-
	12/09/83 to 12/20/83	-	-	-	-	-			-	-	-	15 ± 2
	12/12/83 to 12/19/83	13 ± 2	13 ± 2	13 ± 2	15 ± 3	13 ± 2	-	-	14 ± 2	13 ± 2	14 ± 2	
	12/13/83 to 12/19/83						15 ± 2	5.7 ± 2.1				-
	12/19/83 to 12/27/83	15 ± 2	14 ± 3	14 ± 2	15 ± 3	14 ± 2	24 ± 3		15 ± 2	15 ± 2	11 ± 2	-
	12/20/83 to 12/27/83							10 ± 2				6.7 ± 2.8
	12/27/83 to 01/03/84	20 ± 3	19 ± 3	19 ± 2	21 ± 4	18 ± 3	5.1 ± 0.6	16 ± 2	21 ± 3	19 ± 3	15 ± 2	17 ± 3

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) NS = No sample
(3) Samples collected and analyzed by NUS.
(4) LT = Less Than

Table 13
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Gamma Spectrometry of Composited Air Particulate Filters
SSES REMP 1983

(Results in E-03 pCi/m3 ± 2s)

Quarter	Collection Period	Station	Be-7	Ce-144	Cs-134	Cs-137	Nb-95	Zr-95	K-40
1(1)	01/02/83	2S2	78 ± 22	LT 9(2)	LT 1.2	LT 1.3	LT 1.7	LT 3	LT 12
	to	5S4	66 ± 16	LT 5	LT 0.8	LT 1.1	LT 1.5	LT 2	LT 14
	03/28/83	11S2	70 ± 12	LT 9	LT 0.9	LT 0.9	LT 1.4	LT 1.7	12 ± 8
		15S4	61 ± 13	LT 4	LT 0.9	LT 0.9	LT 1.2	LT 1.8	LT 18
		9B1	72 ± 16	LT 9	LT 1.2	LT 1.5	LT 2	LT 3	LT 25
		1D2	77 ± 17	LT 11	LT 1.2	LT 1.6	LT 2	LT 3	LT 30
		3D1	63 ± 12	LT 9	LT 1.0	LT 0.8	LT 1.7	LT 2	LT 15
		12E1	72 ± 16	LT 8	LT 0.9	LT 1.2	LT 2	LT 2	LT 20
		7G1	46 ± 11	LT 4	LT 0.9	LT 1.0	LT 1.3	LT 1.7	LT 14
		12G1	53 ± 14	LT 7	LT 0.8	LT 1.0	LT 1.8	LT 2	LT 17
		7H1	74 ± 15	LT 11	LT 1.1	LT 1.4	LT 1.1	LT 2	LT 20
2(1)	03/28/83	2S2	110 ± 20	LT 8	LT 0.9	LT 1.0	LT 1.2	LT 2	LT 18
	to	5S4	75 ± 10	LT 4	LT 0.8	LT 0.9	LT 1.1	LT 1.4	LT 12
	06/30/83	11S2	98 ± 12	LT 7	LT 0.9	LT 1.0	LT 1.2	LT 1.7	LT 18
		15S4	95 ± 10	LT 6	LT 0.6	LT 0.8	LT 0.8	LT 1.3	LT 10
		9B1	110 ± 20	LT 6	LT 0.7	LT 0.8	LT 0.6	LT 1.6	LT 10
		1D2	70 ± 12	LT 3	LT 0.7	LT 0.7	LT 0.8	LT 1.3	LT 11
		3D1	80 ± 12	LT 8	LT 1.0	LT 1.2	LT 1.3	LT 2	LT 17
		12E1	99 ± 11	LT 6	LT 0.7	LT 0.8	LT 0.7	LT 1.0	LT 13
		7G1	84 ± 12	LT 7	LT 0.8	LT 0.9	LT 0.8	LT 1.4	LT 14
		12G1	70 ± 12	LT 8	LT 1.0	LT 1.2	LT 1.4	LT 1.7	LT 22
		7H1	100 ± 10	LT 8	LT 0.7	LT 1.2	LT 1.0	LT 1.6	ND(3)

Note: See footnotes at end of table.

Table 13
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Gamma Spectrometry of Composited Air Particulate Filters
SSES REMP 1983

(Results in E-03 pCi/m3 ± 2s)

Quarter	Collection Period	Station	Be-7	Ce-144	Cs-134	Cs-137	Nb-95	Zr-95	K-40
3(4)	06/30/83	2S2	67 ± 17	LT 5	LT 1.3	LT 1.4	LT 1.9	LT 3	ND
	to	5S4	72 ± 16	LT 4	LT 1.2	LT 0.9	LT 1.8	LT 4	ND
	09/30/83	11S2	42 ± 12	LT 4	LT 1.2	LT 0.8	LT 1.3	LT 3	ND
		15S4	73 ± 17	LT 6	LT 1.3	LT 1.0	LT 2	LT 4	ND
		9B1	63 ± 15	LT 4	LT 0.9	LT 1.3	LT 1.2	LT 3	ND
		1D2	55 ± 15	LT 4	LT 1.1	LT 0.9	LT 1.8	LT 3	ND
		3D1	45 ± 14	LT 5	LT 1.2	LT 1.3	LT 1.9	LT 4	ND
		12E1	69 ± 16	LT 6	LT 1.6	LT 1.4	LT 1.7	LT 3	ND
		7G1	77 ± 15	LT 4	LT 1.1	LT 1.2	LT 1.7	LT 3	ND
		12G1(5)	42 ± 14	LT 5	LT 1.6	LT 1.3	LT 3	LT 5	ND
		7H1	56 ± 17	LT 4	LT 1.2	LT 1.4	LT 3	LT 3	ND
4(4)	09/30/83	2S2	34 ± 12	LT 5	LT 1.1	LT 1.1	LT 1.3	LT 4	ND
	to	5S4	52 ± 12	LT 4	LT 1.1	LT 1.4	LT 1.8	LT 3	ND
	01/03/84	11S2	45 ± 11	LT 4	LT 1.2	LT 1.0	LT 1.1	LT 2	ND
		15S4	42 ± 13	LT 4	LT 1.3	LT 1.3	LT 2	LT 4	ND
		9B1	43 ± 11	LT 4	LT 0.9	LT 1.1	LT 1.8	LT 2	ND
		1D2	45 ± 14	LT 6	LT 1.7	LT 1.5	LT 1.1	LT 2	ND
		3D1	30 ± 11	LT 5	LT 1.3	LT 1.5	LT 1.7	LT 3	ND
		12E1	53 ± 14	LT 4	LT 1.3	LT 1.0	LT 1.4	LT 2	ND
		7G1	48 ± 12	LT 4	LT 1.1	LT 1.1	LT 1.8	LT 2	ND
		12G1(6)	41 ± 12	LT 4	LT 1.1	LT 1.0	LT 1.5	LT 3	ND
		7H1	42 ± 12	LT 5	LT 1.1	LT 1.3	LT 2	LT 4	ND

(1) Samples collected and analyzed by Radiation Management Corporation
(2) LT = Less Than
(3) ND = Not detected
(4) Samples collected and analyzed by NUS
(5) Collection stop date is 10/01/83
(6) Collection start date is 10/01/83

Table 14

Gross Alpha in Composited Air Particulate Filters
SSES REMP 1983

(Results in E-03 pCi/m^3 $\pm$ 2s)

Quarter	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
1 (1)	01/02/83 to 03/28/83	7.5 $\pm$ 1.1	4.8 $\pm$ 0.7	4.9 $\pm$ 0.8	4.6 $\pm$ 0.7	8.0 $\pm$ 1.0	6.2 $\pm$ 0.8	2.8 $\pm$ 0.5	6.5 $\pm$ 0.9	5.9 $\pm$ 0.8	4.7 $\pm$ 0.6	-
	01/03/83 to 03/28/83											6.1 $\pm$ 1.1
2 (1)	03/28/83 to 06/30/83	5.8 $\pm$ 0.8	6.7 $\pm$ 0.8	7.7 $\pm$ 1.0	5.3 $\pm$ 0.6	7.4 $\pm$ 0.8	7.0 $\pm$ 0.8	5.2 $\pm$ 0.7	7.1 $\pm$ 0.8	5.8 $\pm$ 1.0	5.6 $\pm$ 0.7	5.0 $\pm$ 0.9
3 (2)	06/30/83 to 09/30/83	3.8 $\pm$ 1.8	3.0 $\pm$ 1.5	2.4 $\pm$ 1.3	3.8 $\pm$ 1.6	4.1 $\pm$ 1.5	4.2 $\pm$ 1.6	2.3 $\pm$ 1.3	4.4 $\pm$ 1.6	3.6 $\pm$ 1.6	2.1 $\pm$ 1.8	(3)
4 (2)	09/30/83 to 01/03/84	8.0 $\pm$ 2.4	7.0 $\pm$ 2.2	4.6 $\pm$ 1.7	5.5 $\pm$ 2.0	4.6 $\pm$ 1.7	6.2 $\pm$ 2.0	2.4 $\pm$ 1.3	6.3 $\pm$ 2.1	4.4 $\pm$ 1.7	4.3 $\pm$ 1.8	3.1 $\pm$ 1.8

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) Samples collected and analyzed by NUS.
(3) Sample destroyed in analysis.

Table 15
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Iodine -131 in Charcoal Cartridges
SSES REMP 1983

(Results in pCi/m3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
Jan[1]	01/02 -01/09/83	LT 0.05[2]	LT 0.05	LT 0.04	LT 0.04	LT 0.02	LT 0.06	LT 0.05	LT 0.05	LT 0.05	LT 0.02	-
	01/03 -01/10/83	-	-	-	-	-	-	-	-	-	-	LT 0.05
	01/09 -01/16/83	NS[3]	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	01/10 -01/17/83	-	-	-	-	-	-	-	-	-	-	LT 0.04
	01/16 -01/23/83	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.01	LT 0.03	LT 0.03	LT 0.04	-	-	-
	01/16 -01/24/83	-	-	-	-	-	-	-	-	LT 0.02	LT 0.012	-
	01/17 -01/24/83	-	-	-	-	-	-	-	-	-	-	LT 0.03
	01/23 -01/30/83	LT 0.002	LT 0.002	LT 0.001	LT 0.0013	LT 0.002	LT 0.0013	LT 0.002	LT 0.001	-	-	-
	01/24 -01/30/83	-	-	-	-	-	-	-	-	LT 0.001	LT 0.002	-
	01/24 -01/31/83	-	-	-	-	-	-	-	-	-	-	LT 0.002
Feb[1]	01/30 -02/06/83	LT 0.002	LT 0.0013	LT 0.0012	LT 0.0008	LT 0.002	LT 0.0013	LT 0.002	LT 0.0008	LT 0.0008	LT 0.0006	-
	01/31 -02/07/83	-	-	-	-	-	-	-	-	-	-	LT 0.0011
	02/06 -02/14/83	LT 0.003	LT 0.004	LT 0.002	LT 0.002	LT 0.002	LT 0.003	LT 0.002	LT 0.0006	LT 0.0010	LT 0.0009	-
	02/07 -02/14/83	-	-	-	-	-	-	-	-	-	-	LT 0.004
	02/14 -02/20/83	LT 0.011	LT 0.012	LT 0.008	NS	LT 0.007	LT 0.006	LT 0.010	LT 0.008	LT 0.008	LT 0.007	-
	02/14 -02/22/83	-	-	-	-	-	-	-	-	-	-	LT 0.03
	02/20 -02/27/83	LT 0.006	LT 0.005	LT 0.005	LT 0.004	LT 0.005	LT 0.006	LT 0.007	LT 0.005	LT 0.008	LT 0.006	-
	02/22 -02/28/83	-	-	-	-	-	-	-	-	-	-	LT 0.009

Note: See footnotes at end of table.

Table 15
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Iodine -131 in Charcoal Cartridges
SSES REMP 1983

(Results in pCi/m3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
March[1]	02/27 -03/06/83	LT 0.008	LT 0.007	LT 0.006	LT 0.008	LT 0.007	LT 0.005	LT 0.008	LT 0.007	LT 0.006	LT 0.006	-
	02/28 -03/07/83	-	-	-	-	-	-	-	-	-	-	LT 0.009
	03/06 -03/13/83	LT 0.008	LT 0.007	LT 0.007	LT 0.007	LT 0.007	LT 0.007	LT 0.007	LT 0.007	LT 0.007	LT 0.007	-
	03/07 -03/14/83	-	-	-	-	-	-	-	-	-	-	LT 0.007
	03/13 -03/20/83	LT 0.006	LT 0.005	LT 0.005	LT 0.004	LT 0.005	LT 0.005	LT 0.005	LT 0.006	LT 0.005	LT 0.005	-
	03/14 -03/21/83	-	-	-	-	-	-	-	-	-	-	LT 0.006
	03/20 -03/28/83	LT 0.005	LT 0.004	LT 0.004	LT 0.004	LT 0.004	LT 0.004	LT 0.004	LT 0.004	LT 0.004	LT 0.004	-
	03/21 -03/28/83	-	-	-	-	-	-	-	-	-	-	LT 0.006
April[1]	03/28 -04/04/83	LT 0.006	LT 0.005	LT 0.005	LT 0.006	LT 0.006	LT 0.005	LT 0.006	LT 0.005	LT 0.005	LT 0.005	LT 0.005
	04/04 -04/11/83	LT 0.005	LT 0.004	LT 0.004	LT 0.005	LT 0.004	LT 0.005	LT 0.005	LT 0.005	LT 0.004	LT 0.004	LT 0.005
	04/11 -04/18/83	LT 0.02	LT 0.007	LT 0.006	LT 0.006	LT 0.007	LT 0.007	LT 0.008	LT 0.009	LT 0.006	LT 0.007	-
	04/11 -04/19/83	-	-	-	-	-	-	-	-	-	-	LT 0.003
	04/18 -04/25/83	LT 0.006	LT 0.006	LT 0.005	LT 0.005	LT 0.005	LT 0.005	LT 0.006	LT 0.006	LT 0.006	LT 0.006	-
	04/19 -04/25/83	-	-	-	-	-	-	-	-	-	-	LT 0.007
	04/25 -05/02/83	LT 0.008	LT 0.006	LT 0.007	LT 0.007	LT 0.007	LT 0.008	LT 0.009	LT 0.007	LT 0.008	LT 0.007	LT 0.009

Note: See footnotes at end of table.

Table 15
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Iodine -131 in Charcoal Cartridges
SSES REMP 1983

(Results in pCi/m3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
May(1)	05/02 -05/09/83	LT 0.006	LT 0.006	LT 0.004	LT 0.004	LT 0.005	LT 0.005	LT 0.006	LT 0.005	LT 0.004	LT 0.004	LT 0.006
	05/09 -05/17/83	LT 0.005	LT 0.005	LT 0.004	LT 0.003	LT 0.003	LT 0.004	LT 0.005	LT 0.004	LT 0.005	LT 0.004	LT 0.005
	05/17 -05/23/83	LT 0.007	LT 0.006	LT 0.005	LT 0.005	LT 0.004	LT 0.005	LT 0.007	LT 0.006	LT 0.006	LT 0.012	LT 0.006
	05/23 -05/30/83	LT 0.005	LT 0.005	LT 0.004	LT 0.004	LT 0.004	LT 0.004	LT 0.005	LT 0.005	LT 0.004	NS	-
	05/23 -05/31/83	-	-	-	-	-	-	-	-	-	-	LT 0.004
June(1)	05/30 -06/05/83	LT 0.006	LT 0.006	LT 0.005	LT 0.004	LT 0.004	LT 0.005	LT 0.005	LT 0.004	LT 0.006	LT 0.011	-
	05/31 -06/06/83	-	-	-	-	-	-	-	-	-	-	LT 0.006
June(4)	06/05 -06/12/83	LT 0.02	LT 0.02	LT 0.016	LT 0.014	LT 0.012	LT 0.012	LT 0.14	LT 0.012	LT 0.016	LT 0.02	-
	06/06 -06/12/83	-	-	-	-	-	-	-	-	-	-	LT 0.02
	06/12 -06/18/83	LT 0.014	LT 0.013	LT 0.016	LT 0.011	LT 0.011	LT 0.010	LT 0.010	LT 0.011	LT 0.012	LT 0.014	LT 0.02
	06/18 -06/24/83	LT 0.02	LT 0.018	LT 0.017	LT 0.018	LT 0.017	LT 0.017	LT 0.016	LT 0.02	LT 0.018	LT 0.02	LT 0.02
	06/24 -06/30/83	LT 0.19	LT 0.015	LT 0.018	LT 0.02	LT 0.015	LT 0.015	LT 0.016	LT 0.018	LT 0.016	LT 0.02	LT 0.02

Note: See footnotes at end of table.

Table 15
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Iodine -131 in Charcoal Cartridges
SSES REMP 1983

(Results in pCi/m3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
July(4)	06/30 -07/06/83	-	-	-	-	-	-	-	-	-	-	LT 0.02
	06/30 -07/07/83	LT 0.019	LT 0.016	LT 0.017	LT 0.018	LT 0.013	LT 0.17	LT 0.02	LT 0.015	-	LT 0.02	-
	06/30 -07/08/83	-	-	-	-	-	-	-	-	LT 0.015	-	-
	07/06 -07/14/83	-	-	-	-	-	-	-	-	-	-	LT 0.016
	07/07 -07/14/83	LT 0.02	LT 0.02	LT 0.014	LT 0.019	LT 0.013	LT 0.015	LT 0.02	LT 0.018	-	LT 0.02	-
	07/08 -07/14/83	-	-	-	-	-	-	-	-	LT 0.02	-	-
	07/14 -07/21/83	-	LT 0.011	LT 0.010	-	LT 0.012	-	-	LT 0.010	-	-	LT 0.012
	07/14 -07/22/83	LT 0.011	-	-	LT 0.011	-	LT 0.010	LT 0.012	-	LT 0.011	LT 0.011	-
	07/21 -07/29/83	-	LT 0.018	LT 0.007	-	LT 0.007	-	-	LT 0.007	-	-	LT 0.019
	07/22 -07/29/83	LT 0.011	-	-	LT 0.010	-	LT 0.02	LT 0.019	-	LT 0.019	LT 0.02	-
Aug(4)	07/29 -08/04/83	LT 0.02	LT 0.016	LT 0.011	LT 0.015	LT 0.014	LT 0.014	LT 0.014	LT 0.014	LT 0.015	LT 0.02	-
	07/29 -08/05/83	-	-	-	-	-	-	-	-	-	-	LT 0.02
	08/04 -08/11/83	LT 0.02	LT 0.018	LT 0.016	LT 0.017	LT 0.016	LT 0.016	LT 0.014	LT 0.016	LT 0.017	LT 0.02	-
	08/05 -08/12/83	-	-	-	-	-	-	-	-	-	-	LT 0.02
	08/11 -08/17/83	-	LT 0.014	LT 0.010	-	LT 0.010	-	-	LT 0.011	LT 0.012	-	-
	08/11 -08/18/83	LT 0.02	-	-	LT 0.017	-	LT 0.017	LT 0.014	-	-	LT 0.02	-
	08/12 -08/19/83	-	-	-	-	-	-	-	-	-	-	LT 0.013
	08/17 -08/25/83	-	LT 0.017	LT 0.014	-	LT 0.017	-	-	LT 0.017	LT 0.010	-	-
	08/18 -08/25/83	LT 0.02	-	-	LT 0.02	-	LT 0.012	LT 0.009	-	-	LT 0.02	-
	08/19 -08/26/83	-	-	-	-	-	-	-	-	-	-	LT 0.009
	08/25 -09/01/83	LT 0.02	LT 0.015	LT 0.018	LT 0.02	LT 0.019	LT 0.015	LT 0.02	LT 0.019	LT 0.016	LT 0.02	-
	08/26 -09/02/83	-	-	-	-	-	-	-	-	-	-	LT 0.019

Note: See footnotes at end of table.

Table 15
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Iodine -131 in Charcoal Cartridges
SSES REMP 1983

(Results in pCi/m3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
Sept[4]	09/01 -09/08/83	LT 0.014	LT 0.011	LT 0.016	LT 0.014	LT 0.012	LT 0.010	LT 0.009	LT 0.012	LT 0.012	LT 0.017	-
	09/02 -09/09/83	-	-	-	-	-	-	-	-	-	-	LT 0.013
	09/08 -09/15/83	LT 0.013	LT 0.014	LT 0.013	LT 0.015	LT 0.013	LT 0.016	LT 0.011	LT 0.015	LT 0.017	LT 0.02	-
	09/09 -09/22/83	-	-	-	-	-	-	-	-	-	-	LT 0.02
	09/15 -09/22/83	LT 0.015	LT 0.02	LT 0.012	LT 0.015	LT 0.012	LT 0.014	LT 0.016	LT 0.014	LT 0.015	LT 0.02	-
	09/22 -09/30/83	LT 0.02	LT 0.02	LT 0.017	LT 0.017	LT 0.015	LT 0.014	LT 0.013	LT 0.017	LT 0.018	-	LT 0.015
	09/22 -10/01/83	-	-	-	-	-	-	-	-	-	LT 0.015	-
Oct[4]	09/30 -10/08/83	LT 0.020	LT 0.015	LT 0.016	LT 0.016	LT 0.015	LT 0.013	LT 0.09	LT 0.015	LT 0.012	-	-
	10/01 -10/08/83	-	-	-	-	-	-	-	-	-	LT 0.02	-
	09/30 -10/07/83	-	-	-	-	-	-	-	-	-	-	LT 0.02
	10/08 -10/15/83	LT 0.02	LT 0.016	LT 0.015	LT 0.013	LT 0.015	LT 0.014	LT 0.014	LT 0.014	LT 0.014	LT 0.019	-
	10/15 -10/22/83	LT 0.017	LT 0.012	LT 0.014	LT 0.012	LT 0.015	LT 0.010	LT 0.010	LT 0.018	LT 0.014	LT 0.014	-
	10/07 -10/22/83	-	-	-	-	-	-	-	-	-	-	LT 0.014
	10/22 -10/29/83	LT 0.015	LT 0.014	LT 0.012	LT 0.012	LT 0.012	LT 0.013	LT 0.012	LT 0.017	LT 0.012	LT 0.018	LT 0.02

Note: See footnotes at end of table.

Table 15
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Iodine -131 in Charcoal Cartridges
SSES REMP 1983

(Results in pCi/m3 ± 2s)

Month	Collection Period	2S2	5S4	11S2	15S4	9B1	1D2	3D1	12E1	7G1	12G1	7H1
Nov(4)	10/29 -11/05/83	LT 0.018	LT 0.019	LT 0.017	LT 0.014	LT 0.016	LT 0.02	LT 0.016	LT 0.02	LT 0.016	LT 0.02	-
	10/29 -11/04/83	-	-	-	-	-	-	-	-	-	-	LT 0.02
	11/05 -11/12/83	LT 0.018	LT 0.02	LT 0.015	LT 0.02	LT 0.016	LT 0.02	LT 0.019	LT 0.018	LT 0.02	LT 0.02	-
	11/04 -11/11/83	-	-	-	-	-	-	-	-	-	-	LT 0.02
	11/12 -11/20/83	LT 0.009	LT 0.007	LT 0.006	LT 0.014	LT 0.006	LT 0.006	LT 0.006	LT 0.007	LT 0.007	LT 0.006	-
	11/20 -11/27/83	LT 0.017	LT 0.015	LT 0.014	LT 0.014	LT 0.014	LT 0.016	LT 0.016	LT 0.014	LT 0.016	LT 0.016	-
	11/11 -11/26/83	-	-	-	-	-	-	-	-	-	-	LT 0.013
Dec(4)	11/27 -12/04/83	LT 0.009	LT 0.008	LT 0.007	LT 0.007	LT 0.007	LT 0.009	LT 0.006	LT 0.007	LT 0.007	LT 0.006	-
	11/26 -12/02/83	-	-	-	-	-	-	-	-	-	-	LT 0.015
	12/04 -12/12/83	LT 0.013	LT 0.012	LT 0.010	LT 0.010	LT 0.015	-	-	LT 0.014	LT 0.015	LT 0.014	-
	12/04 -12/13/83	-	-	-	-	-	LT 0.019	LT 0.012	-	-	-	-
	12/02 -12/09/83	-	-	-	-	-	-	-	-	-	-	LT 0.018
	12/12 -12/19/83	LT 0.017	LT 0.017	LT 0.011	LT 0.02	LT 0.013	-	-	LT 0.013	LT 0.015	LT 0.013	-
	12/13 -12/19/83	-	-	-	-	-	LT 0.015	LT 0.018	-	-	-	-
	12/09 -12/20/83	-	-	-	-	-	-	-	-	-	-	LT 0.009
	12/19 -12/27/83	LT 0.018	LT 0.019	LT 0.013	LT 0.02	LT 0.016	LT 0.02	-	LT 0.015	LT 0.016	LT 0.013	-
	12/20 -12/27/83	-	-	-	-	-	-	LT 0.014	-	-	-	LT 0.02
	12/27/83 -01/03/84	LT 0.015	LT 0.012	LT 0.011	LT 0.02	LT 0.013	LT 0.04	LT 0.013	LT 0.013	LT 0.016	LT 0.014	LT 0.02

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) Less Than
(3) NS = No sample received.
(4) Samples collected and analyzed by NUS.

Table 16

Gamma Spectrometry of Precipitation
SSES REMP 1983

(Results in pCi/l ± 2s)

Quarter	Collection Period	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Be-7
1[1]	01/06-04/07/83	1D2	LT 60[2]	LT 1.5	LT 1.0	LT 0.9	LT 0.9	LT 3	LT 16	LT 12	LT 1.0	LT 2	LT 2	LT 3	LT 15
	01/06-04/07/83	11S2	LT 50	LT 1.3	LT 0.8	LT 0.8	LT 0.8	LT 3	LT 14	LT 12	LT 0.9	LT 2	LT 1.7	LT 2	LT 13
	01/06-04/07/83	5S4	LT 30	LT 0.9	LT 0.7	LT 0.6	LT 0.6	LT 3	LT 9	LT 12	LT 0.7	LT 1.5	LT 1.6	LT 1.6	14 ± 7
	01/06-04/07/83	12G1	LT 30	LT 0.8	LT 0.6	LT 0.6	LT 0.6	LT 2	LT 8	LT 10	LT 0.6	LT 1.3	LT 1.3	LT 1.4	21 ± 7
2[1]	04/07-06/27/83	1D2	LT 17	LT 0.8	LT 0.8	LT 0.6	LT 0.6	LT 2	LT 10	LT 6	LT 0.6	LT 1.2	LT 1.6	LT 1.5	22 ± 5
	04/07-06/27/83	11S2	LT 20	LT 0.9	LT 1.1	LT 0.7	LT 0.8	LT 2	LT 9	LT 6	LT 0.7	LT 1.3	LT 1.7	LT 1.7	27 ± 7
	04/07-06/27/83	5S4	LT 19	LT 0.8	LT 0.8	LT 0.6	LT 0.6	LT 2	LT 10	LT 6	LT 0.7	LT 1.2	LT 1.6	LT 1.4	21 ± 5
	04/07-06/27/83	12G1	LT 30	LT 1.3	LT 0.9	LT 0.9	LT 1.0	LT 3	LT 15	LT 6	LT 1.0	LT 1.8	LT 2	LT 2	33 ± 9
	04/17-06/27/83	15S4	LT 18	LT 0.7	LT 0.6	LT 0.5	LT 0.6	LT 1.8	LT 8	LT 4	LT 0.5	LT 1.0	LT 1.4	LT 1.2	27 ± 7
	04/17-06/27/83	9B1	LT 20	LT 0.9	LT 1.0	LT 0.7	LT 0.7	LT 2	LT 10	LT 5	LT 0.7	LT 1.3	LT 1.6	LT 1.8	29 ± 7
	04/17-06/27/83	7G1	LT 120	LT 6	LT 6	LT 4	LT 5	LT 14	LT 70	LT 30	LT 4	LT 9	LT 11	LT 11	LT 70
	04/17-06/27/83	2S2	LT 30	LT 1.0	LT 1.1	LT 0.7	LT 0.8	LT 2	LT 8	LT 8	LT 0.7	LT 1.4	LT 1.5	LT 1.9	31 ± 7
	04/17-06/27/83	12E1	LT 20	LT 1.0	LT 1.1	LT 0.7	LT 0.8	LT 2	LT 9	LT 6	LT 0.8	LT 1.4	LT 1.7	LT 1.9	35 ± 7
	04/17-06/27/83	3D1	LT 18	LT 0.7	LT 0.7	LT 0.5	LT 0.6	LT 2	LT 8	LT 5	LT 0.6	LT 1.2	LT 1.3	LT 1.3	26 ± 6
3[4]	06/27-09/20/83	1D2	LT 1900	LT 5	LT 2	LT 2	LT 1.8	LT 20	ND[3]	LT 1300	LT 2	LT 5	LT 5	LT 9	ND
	06/27-09/20/83	11S2	LT 600	LT 5	LT 3	LT 3	LT 2	LT 16	ND	LT 300	LT 3	LT 6	LT 7	LT 10	ND
	06/27-09/20/83	5S4	LT 800	LT 7	LT 3	LT 3	LT 3	LT 20	ND	LT 500	LT 3	LT 7	LT 8	LT 12	ND
	06/27-09/19/83	12G1	LT 800	LT 6	LT 3	LT 3	LT 3	LT 20	ND	LT 500	LT 3	LT 6	LT 6	LT 12	ND
	06/27-09/22/83	15S4	LT 1700	LT 4	LT 1.7	LT 1.7	LT 1.7	LT 16	ND	LT 1100	LT 1.9	LT 5	LT 5	LT 9	ND
	06/27-09/20/83	9B1	LT 1900	LT 4	LT 1.8	LT 1.7	LT 1.6	LT 16	ND	LT 1000	LT 1.9	LT 5	LT 4	LT 9	ND
	06/27-09/22/83	7G1	LT 1400	LT 6	LT 3	LT 3	LT 2	LT 20	ND	LT 700	LT 3	LT 6	LT 6	LT 11	ND
	06/27-09/20/83	2S2	LT 7000	LT 5	LT 1.5	LT 1.2	LT 1.3	LT 20	ND	LT 4000	LT 1.6	LT 5	LT 4	LT 10	ND
	06/27-09/19/83	12E1	LT 1800	LT 4	LT 1.7	LT 1.6	LT 1.4	LT 15	ND	LT 1000	LT 1.7	LT 5	LT 4	LT 8	ND
	06/27-09/20/83	3D1	LT 1900	LT 5	LT 2	LT 2	LT 2	LT 20	ND	LT 1200	LT 2	LT 6	LT 6	LT 10	ND
4[4]	09/20-11/14/83	1D2	LT 500	LT 3	LT 1.8	LT 1.6	LT 1.7	LT 12	ND	LT 400	LT 1.8	LT 4	LT 4	LT 7	ND
	09/20-11/14/83	11S2	LT 600	LT 4	LT 2	LT 2	LT 1.7	LT 14	ND	LT 300	LT 2	LT 4	LT 5	LT 8	ND
	09/20-10/15/83	5S4	LT 500	LT 3	LT 1.9	LT 1.6	LT 1.5	LT 12	ND	LT 300	LT 2	LT 4	LT 4	LT 7	ND
	09/19-11/14/83	12G1	LT 700	LT 5	LT 3	LT 2	LT 1.9	LT 16	ND	LT 400	LT 2	LT 5	LT 6	LT 9	ND
	09/22-11/14/83	15S4	LT 700	LT 5	LT 2	LT 2	LT 1.9	LT 15	ND	LT 400	LT 3	LT 5	LT 5	LT 9	ND
	09/20-11/14/83	9B1	LT 700	LT 5	LT 3	LT 2	LT 2	LT 18	ND	LT 500	LT 3	LT 6	LT 7	LT 10	ND
	09/22-10/18/83	7G1	LT 2000	LT 5	LT 2	LT 1.9	LT 1.8	LT 20	ND	LT 1400	LT 2	LT 6	LT 6	LT 10	ND
	09/20-11/14/83	2S2	LT 900	LT 5	LT 3	LT 2	LT 2	LT 20	ND	LT 500	LT 2	LT 5	LT 7	LT 10	ND
	09/19-11/14/83	12E1	LT 800	LT 5	LT 2	LT 2	LT 2	LT 15	ND	LT 500	LT 2	LT 5	LT 6	LT 10	ND
	09/20-11/14/83	3D1	LT 500	LT 4	LT 2	LT 1.6	LT 1.6	LT 13	ND	LT 300	LT 1.9	LT 4	LT 5	LT 7	ND

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) LT = Less Than
(3) ND = Not detected
(4) Samples collected and analyzed by NUS.

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Gamma Spectrometry of Milk
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Collection Date	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
January[1]	01/08/83	12B2	LT 300[2]	LT 3[3]	LT 1.9	LT 1.5	LT 1.6	LT 10	1200 ± 200	LT 50[2]	LT 1.8	LT 6	LT 5	LT 6
	01/07/83	5E1	LT 200[2]	LT 2	LT 1.6	LT 1.0	1.2 ± 0.7	LT 11	1400 ± 200	LT 40[2]	LT 1.4	LT 5	LT 5	LT 4
	01/08/83	13E3	LT 18[2]	LT 4	LT 5	LT 5	LT 5	LT 11	1300 ± 200	LT 8	LT 4	LT 5	LT 11	LT 9
	01/07/83	10G1	LT 20[2]	LT 6	LT 7	LT 7	LT 7	LT 13	1400 ± 200	LT 9	LT 6	LT 7	LT 14	LT 12
	01/08/83	12B3	LT 60[2]	LT 1.9	LT 1.7	LT 1.1	LT 1.1	LT 8	1500 ± 200	LT 15	LT 1.4	LT 3	LT 5	LT 4
	01/07/83	6C1	LT 70[2]	LT 2	LT 1.9	LT 1.1	1.4 ± 0.8	LT 7	1500 ± 200	LT 13	LT 1.6	LT 3	LT 5	LT 4
	01/07/83	10D1	LT 200[2]	LT 2	LT 1.7	LT 1.1	2.0 ± 0.8	LT 10	1500 ± 200	LT 50[2]	LT 1.4	LT 5	LT 5	LT 4
	01/07/83	12D2	LT 200[2]	LT 2	LT 1.4	LT 1.0	1.2 ± 0.7	LT 10	1500 ± 200	LT 50[2]	LT 1.3	LT 4	LT 5	LT 4
February[1]	02/04/83	12B2	LT 160[2]	LT 3	LT 1.7	LT 1.3	LT 1.3	LT 8	1300 ± 200	LT 30[2]	LT 1.6	LT 5	LT 4	LT 5
	02/05/83	5E1	LT 180[2]	LT 3	LT 1.9	LT 1.4	LT 1.7	LT 10	1300 ± 200	LT 40[2]	LT 2	LT 5	LT 5	LT 5
	02/04/83	13E3	LT 140[2]	LT 2	LT 1.7	LT 1.1	1.5 ± 0.9	LT 9	1200 ± 200	LT 30[2]	LT 1.5	LT 4	LT 4	LT 4
	02/04/83	10G1	LT 140[2]	LT 2	LT 1.7	LT 1.1	3.3 ± 0.9	LT 9	1300 ± 200	LT 30[2]	LT 1.4	LT 4	LT 5	LT 4
	02/04/83	12B3	LT 130[2]	LT 2	LT 1.5	LT 1.0	1.2 ± 0.7	LT 8	1600 ± 200	LT 20[2]	LT 1.3	LT 4	LT 5	LT 4
	02/05/83	6C1	LT 130[2]	LT 2	LT 1.9	LT 1.1	LT 1.3	LT 9	1400 ± 200	LT 30[2]	LT 1.5	LT 4	LT 4	LT 4
	02/05/83	10D1	LT 120[2]	LT 2	LT 1.7	LT 1.1	LT 1.1	LT 9	1400 ± 200	LT 30[2]	LT 1.4	LT 4	LT 5	LT 4
	02/04/83	12D2	LT 170[2]	LT 3	LT 1.9	LT 1.4	LT 1.6	LT 9	1700 ± 200	LT 30[2]	LT 1.7	LT 5	LT 5	LT 5

Note: See footnotes at end of table.

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Gamma Spectrometry of Milk
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Collection Date	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
March(1)	03/11/83	12B2	LT 60(2)	LT 1.9	LT 1.7	LT 1.1	LT 1.1	LT 7	1500 ± 200	LT 13	LT 1.4	LT 3	LT 5	LT 4
	03/10/83	5E1	LT 50(2)	LT 1.7	LT 1.6	LT 1.0	1.5 ± 0.7	LT 6	1200 ± 200	LT 11	LT 1.3	LT 3	LT 4	LT 3
	03/11/83	13E3	LT 60(2)	LT 2	LT 1.5	LT 1.2	LT 1.6	LT 6	1400 ± 200	LT 10	LT 1.6	LT 3	LT 4	LT 4
	03/10/83	10G1	LT 70(2)	LT 2	LT 1.9	LT 1.3	LT 1.6	LT 7	1200 ± 200	LT 15	LT 1.8	LT 3	LT 5	LT 4
	03/11/83	12B3	LT 50(2)	LT 2	LT 1.6	LT 1.2	2.3 ± 0.8	LT 6	1400 ± 200	LT 9	LT 1.5	LT 3	LT 4	LT 4
	03/11/83	6C1	LT 60(2)	LT 3	LT 1.9	LT 1.4	LT 1.6	LT 8	1400 ± 200	LT 14	LT 1.9	LT 3	LT 5	LT 4
	03/10/83	10D1	LT 40(2)	LT 1.5	LT 1.4	LT 0.9	1.6 ± 0.7	LT 6	1300 ± 200	LT 10	LT 1.2	LT 2	LT 4	LT 3
	03/10/83	12D2	LT 50(2)	LT 1.9	LT 1.8	LT 1.1	LT 1.3	LT 6	1200 ± 200	LT 11	LT 1.4	LT 3	LT 4	LT 3
April(1)	04/08/83	12B2	LT 30(2)	LT 1.5	LT 1.4	LT 0.9	LT 1.1	LT 5	1300 ± 200	LT 7	LT 1.1	LT 2	LT 4	LT 3
	04/08/83	5E1	LT 50(2)	LT 2	LT 2	LT 1.4	LT 1.6	LT 7	1500 ± 200	LT 10	LT 1.9	LT 3	LT 5	LT 4
	04/09/83	13E3	LT 30(2)	LT 1.5	LT 1.5	LT 1.0	1.4 ± 0.8	LT 6	1600 ± 200	LT 7	LT 1.3	LT 2	LT 4	LT 3
	04/08/83	10G1	LT 40(2)	LT 1.8	LT 1.6	LT 1.1	1.9 ± 0.9	LT 7	1500 ± 200	LT 8	LT 1.4	LT 2	LT 5	LT 3
	04/09/83	12B3	LT 30(2)	LT 1.9	LT 1.8	LT 1.1	2.0 ± 0.9	LT 7	1600 ± 200	LT 6	LT 1.4	LT 2	LT 5	LT 3
	04/08/83	6C1	LT 50(2)	LT 2	LT 1.9	LT 1.4	LT 1.6	LT 7	1400 ± 200	LT 9	LT 1.8	LT 3	LT 5	LT 4
	04/08/83	10D1	LT 30(2)	LT 1.6	LT 1.4	LT 0.9	1.5 ± 0.7	LT 5	1500 ± 200	LT 6	LT 1.2	LT 2	LT 4	LT 3
	04/08/83	12D2	LT 30(2)	LT 1.9	LT 1.8	LT 1.1	LT 1.2	LT 6	1500 ± 200	LT 8	LT 1.4	LT 3	LT 5	LT 3
	04/09/83	12B3(4)	LT 40(2)	LT 2	LT 1.6	LT 1.2	1.6 ± 0.9	LT 6	1500 ± 200	LT 7	LT 1.5	LT 3	LT 4	LT 4
	04/23/83	12B2	LT 30(2)	LT 1.7	LT 1.6	LT 1.0	2.3 ± 0.8	LT 6	1200 ± 200	LT 6	LT 1.3	LT 2	LT 4	LT 3
	04/23/83	5E1	LT 40(2)	LT 1.9	LT 1.4	LT 1.2	LT 1.5	LT 5	1400 ± 200	LT 7	LT 1.5	LT 3	LT 4	LT 3
	04/23/83	13E3	LT 40(2)	LT 2	LT 2	LT 1.4	LT 2	LT 7	1500 ± 200	LT 9	LT 1.9	LT 3	LT 5	LT 4
	04/23/83	10G1	LT 30(2)	LT 1.8	LT 1.8	LT 1.1	1.5 ± 0.7	LT 6	1500 ± 200	LT 7	LT 1.4	LT 2	LT 5	LT 3

Note: See footnotes at end of table.

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Gamma Spectrometry of Milk
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Collection Date	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
May[1]	05/07/83	12B2	LT 30[2]	LT 1.8	LT 1.9	LT 1.2	LT 1.3	LT 5	1500 ± 200	LT 6	LT 1.5	LT 2	LT 4	LT 3
	05/06/83	5E1	LT 30[2]	LT 1.8	LT 1.9	LT 1.1	LT 1.4	LT 6	1400 ± 200	LT 6	LT 1.4	LT 3	LT 4	LT 3
	05/07/83	13E3	LT 30[2]	LT 1.6	LT 1.6	LT 1.1	1.5 ± 0.8	LT 6	1400 ± 200	LT 6	LT 1.5	LT 2	LT 5	LT 3
	05/06/83	10G1	LT 30[2]	LT 1.9	LT 1.6	LT 1.3	LT 1.5	LT 6	1400 ± 200	LT 6	LT 1.5	LT 3	LT 4	LT 3
	05/07/83	12B3	LT 30[2]	LT 1.8	LT 1.8	LT 1.0	2.7 ± 0.9	LT 6	1500 ± 200	LT 5	LT 1.3	LT 2	LT 5	LT 3
	05/07/83	6C1	LT 30[2]	LT 1.8	LT 1.6	LT 1.3	1.4 ± 0.9	LT 5	1600 ± 200	LT 6	LT 1.5	LT 2	LT 4	LT 3
	05/06/83	10D1	LT 40[2]	LT 2	LT 1.9	LT 1.4	LT 1.6	LT 7	1500 ± 200	LT 8	LT 1.9	LT 3	LT 5	LT 4
	05/06/83	12D2	LT 30[2]	LT 1.5	LT 1.5	LT 0.9	2.1 ± 0.9	LT 5	1500 ± 200	LT 5	LT 1.2	LT 1.9	LT 4	LT 3
	05/20/83	12B2	LT 19[2]	LT 1.5	LT 1.6	LT 1.0	LT 1.5	LT 5	1400 ± 200	LT 4	LT 1.3	LT 2	LT 4	LT 3
	05/20/83	5E1	LT 30[2]	LT 2	LT 2	LT 1.4	1.7 ± 1.0	LT 6	1400 ± 200	LT 6	LT 1.8	LT 3	LT 5	LT 4
	05/20/83	13E3	LT 19[2]	LT 1.4	LT 1.4	LT 0.9	1.6 ± 0.8	LT 5	1500 ± 200	LT 4	LT 1.2	LT 1.8	LT 4	LT 3
	05/20/83	10G1	LT 20[2]	LT 1.7	LT 1.9	LT 1.1	LT 1.4	LT 5	1400 ± 200	LT 5	LT 1.4	LT 2	LT 4	LT 3
June[1]	06/15/83[5]	12B2	LT 15	LT 1.5	LT 1.6	LT 1.1	LT 1.3	LT 5	1300 ± 200	LT 3	LT 1.3	LT 1.8	LT 4	LT 3
	06/15/83[5]	5E1	LT 20[2]	LT 1.7	LT 1.6	LT 1.2	2.1 ± 1.0	LT 5	1400 ± 200	LT 4	LT 1.5	LT 2	LT 4	LT 3
	06/15/83[5]	13E3	LT 12	LT 1.5	LT 1.8	LT 1.1	1.6 ± 0.9	LT 4	1500 ± 200	LT 2	LT 1.4	LT 1.8	LT 4	LT 3
	06/15/83[5]	10G1	LT 10	LT 1.4	LT 1.7	LT 1.1	1.1 ± 0.7	LT 4	1300 ± 200	LT 3	LT 1.2	LT 1.7	LT 4	LT 2
	06/27/83	12B2	LT 19[2]	LT 1.6	LT 1.9	LT 1.1	1.5 ± 0.8	LT 5	1400 ± 200	LT 4	LT 1.4	LT 2	LT 4	LT 3
	06/28/83	5E1	LT 17[2]	LT 1.4	LT 1.5	LT 0.9	LT 1.4	LT 4	1400 ± 200	LT 3	LT 1.2	LT 1.8	LT 4	LT 2
	06/27/83	13E3	LT 16[2]	LT 1.5	LT 1.7	LT 1.0	1.4 ± 0.9	LT 5	1200 ± 200	LT 4	LT 1.2	LT 1.9	LT 4	LT 3
	06/27/83	10G1	LT 20[2]	LT 1.9	LT 1.7	LT 1.4	3.2 ± 0.9	LT 5	1200 ± 200	LT 4	LT 1.5	LT 2	LT 4	LT 3

Note: See footnotes at end of table.

Table 17
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Gamma Spectrometry of Milk
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Collection Date	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
June(6)	06/15/83(5)	12B2	LT 20(2)	LT 2	LT 2	LT 1.7	LT 1.9	LT 7	1600 ± 200	LT 10	LT 2	LT 2	LT 5	LT 4
	06/15/83(5)	5E1	LT 30(2)	LT 3	LT 3	LT 2	LT 2	LT 9	2100 ± 300	LT 10	LT 2	LT 3	LT 7	LT 5
	06/15/83(5)	13E3	LT 20(2)	LT 4	LT 4	LT 3	LT 3	LT 12	2200 ± 300	LT 10	LT 3	LT 3	LT 9	LT 7
	06/15/83(5)	10G1	LT 40(2)	LT 4	LT 3	LT 2	LT 3	LT 12	1800 ± 200	LT 18(2)	LT 3	LT 3	LT 8	LT 6
	06/15/83(5)	12B3	LT 18(2)	LT 2	LT 2	LT 1.4	LT 1.7	LT 7	1500 ± 200	LT 9	LT 1.8	LT 2	LT 5	LT 4
	06/15/83(5)	6C1	LT 30(2)	LT 2	LT 2	LT 1.8	3.1 ± 0.9	LT 8	2100 ± 300	LT 11	LT 1.8	LT 2	LT 5	LT 4
	06/15/83(5)	10D1	LT 20(2)	LT 3	LT 3	LT 2	LT 3	LT 10	2100 ± 300	LT 9	LT 3	LT 3	LT 9	LT 9
	06/15/83(5)	12D2	LT 50(2)	LT 4	LT 3	LT 2	LT 2	LT 11	2700 ± 300	LT 19(2)	LT 3	LT 4	LT 8	LT 6
	06/27/83	12B2	LT 30(2)	LT 3	LT 2	LT 1.6	LT 1.8	LT 9	1300 ± 200	LT 14	LT 2	LT 3	LT 6	LT 5
	06/28/83	5E1	LT 30(2)	LT 2	LT 1.9	LT 1.4	LT 1.6	LT 7	1200 ± 200	LT 15	LT 1.7	LT 2	LT 5	LT 4
	06/27/83	13E3	LT 90(2)	LT 3	LT 1.9	LT 1.4	1.7 ± 0.8	LT 10	1500 ± 200	LT 30(2)	LT 1.7	LT 3	LT 5	LT 5
	06/27/83	10G1	LT 40(2)	LT 2	LT 1.7	LT 1.2	1.4 ± 0.8	LT 7	1500 ± 200	LT 14	LT 15	LT 2	LT 5	LT 4
July(6)	07/16/83	12B2	LT 18(2)	LT 5	LT 5	LT 5	LT 5	LT 12	1300 ± 200	LT 7	LT 5	LT 5	LT 13	LT 9
	07/16/83	5E1	LT 12	LT 3	LT 3	LT 2	LT 2	LT 7	1300 ± 200	LT 5	LT 2	LT 3	LT 6	LT 5
	07/16/83	13E3	LT 11	LT 3	LT 3	LT 2	LT 2	LT 7	1400 ± 200	LT 5	LT 3	LT 3	LT 7	LT 5
	07/16/83	10G1	LT 700(2)	LT 4	LT 2	LT 1.5	1.6 ± 0.7	LT 20	1300 ± 200	LT 300(2)	LT 2	LT 11	LT 7	LT 8
	07/16/83	12B3	LT 20(2)	LT 4	LT 5	LT 4	3.1 ± 2.5	LT 10	1200 ± 200	LT 9	LT 4	LT 5	LT 10	LT 7
	07/16/83	6C1	LT 900(2)	LT 5	LT 3	LT 2	LT 2	LT 20	1300 ± 200	LT 400(2)	LT 3	LT 14	LT 8	LT 11
	07/16/83	10D1	LT 700(2)	LT 4	LT 2	LT 1.6	LT 1.7	LT 19	1500 ± 200	LT 300(2)	LT 2	LT 11	LT 6	LT 8
	07/16/83	12D2	LT 300(2)	LT 2	LT 1.0	LT 0.7	LT 0.8	LT 10	1100 ± 200	LT 140(2)	LT 1.0	LT 5	LT 3	LT 4
	07/30/83	12B2	LT 300(2)	LT 3	LT 1.8	LT 1.3	LT 1.4	LT 13	1300 ± 200	LT 90(2)	LT 1.6	LT 6	LT 5	LT 5
	07/30/83	5E1	LT 500(2)	LT 5	LT 3	LT 3	LT 3	LT 20	1400 ± 200	LT 200(2)	LT 3	LT 12	LT 9	LT 10
	07/30/83	13E3	LT 300(2)	LT 3	LT 1.8	LT 1.5	LT 1.6	LT 12	1000 ± 100	LT 110(2)	LT 1.8	LT 7	LT 5	LT 6
	07/30/83	10G1	LT 400(2)	LT 5	LT 3	LT 2	LT 2	LT 18	1300 ± 200	LT 190(2)	LT 3	LT 10	LT 7	LT 9

Note: See footnotes at end of table.

Table 17
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Gamma Spectrometry of Milk
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Collection Date	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
August[6]	08/16/83	12B2	LT 14	LT 2	LT 3	LT 2	LT 2	LT 7	1300 ± 200	LT 7	LT 2	LT 3	LT 6	LT 5
	08/17/83	5E1	LT 12	LT 3	LT 3	LT 3	LT 3	LT 7	1300 ± 200	LT 5	LT 3	LT 3	LT 7	LT 6
	08/16/83	13E3	LT 18[2]	LT 3	LT 3	LT 2	LT 3	LT 8	1400 ± 200	LT 8	LT 3	LT 3	LT 7	LT 6
	08/16/83	10G1	LT 80[2]	LT 1.7	LT 1.3	LT 0.8	1.9 ± 0.5	LT 7	1200 ± 200	LT 30[2]	LT 1.1	LT 3	LT 3	LT 3
	08/22/83[5]	12B3	LT 60[2]	LT 1.7	LT 1.3	LT 0.9	2.4 ± 0.6	LT 7	1100 ± 200	LT 30[2]	LT 1.1	LT 3	LT 3	LT 3
	08/22/83[5]	6C1	LT 60[2]	LT 1.8	LT 1.4	LT 0.9	1.8 ± 0.6	LT 7	1200 ± 200	LT 30[2]	LT 1.2	LT 3	LT 4	LT 3
	08/22/83[5]	10D1	LT 130[2]	LT 4	LT 3	LT 2	LT 2	LT 14	1100 ± 200	LT 60[2]	LT 3	LT 7	LT 7	LT 7
	08/22/83[5]	12D2	LT 120[2]	LT 4	LT 3	LT 2	LT 2	LT 16	1500 ± 200	LT 50[2]	LT 3	LT 7	LT 9	LT 8
	09/06/83[5]	12B2	LT 60[2]	LT 3	LT 2	LT 1.9	LT 2	LT 10	1100 ± 200	LT 30[2]	LT 2	LT 5	LT 7	LT 6
	09/06/83[5]	5E1	LT 40[2]	LT 2	LT 1.9	LT 1.1	LT 1.4	LT 8	1300 ± 200	LT 18[2]	LT 1.5	LT 3	LT 5	LT 4
	09/06/83[5]	13E3	LT 50[2]	LT 2	LT 2	LT 1.4	1.6 ± 0.8	LT 9	1500 ± 200	LT 18[2]	LT 1.8	LT 4	LT 5	LT 4
	09/06/83[5]	10G1	LT 90[2]	LT 4	LT 3	LT 2	LT 2	LT 12	1200 ± 200	LT 40[2]	LT 3	LT 6	LT 7	LT 7

Note: See footnotes at end of table.

Table 17
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Gamma Spectrometry of Milk
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Collection Date	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
September (6)	09/20/83	12B2	LT 40[2]	LT 2	LT 2	LT 1.4	LT 1.5	LT 8	1400 ± 200	LT 16[2]	LT 1.8	LT 2	LT 5	LT 4
	09/20/83	5E1	LT 70[2]	LT 4	LT 3	LT 2	LT 2	LT 11	1300 ± 200	LT 30[2]	LT 2	LT 3	LT 7	LT 6
	09/20/83	13E3	LT 40[2]	LT 2	LT 1.8	LT 1.3	LT 1.5	LT 8	1200 ± 200	LT 20[2]	LT 1.6	LT 2	LT 5	LT 4
	09/21/83	10G1	LT 200[2]	LT 4	LT 2	LT 1.9	LT 2	LT 14	920 ± 100	LT 110[2]	LT 2	LT 4	LT 7	LT 7
	09/20/83	12B3	LT 40[2]	LT 2	LT 2	LT 1.3	3.0 ± 0.8	LT 8	1300 ± 200	LT 18[2]	LT 1.8	LT 2	LT 5	LT 2
	09/20/83	6C1	LT 60[2]	LT 3	LT 2	LT 1.9	2.2 ± 1.1	LT 10	1400 ± 200	LT 20[2]	LT 2	LT 3	LT 6	LT 5
	09/20/83	10D1	LT 60[2]	LT 3	LT 2	LT 1.6	LT 1.8	LT 10	1200 ± 200	LT 30[2]	LT 1.9	LT 3	LT 3	LT 5
	09/21/83	12D2	LT 3000[2]	LT 8	LT 3	LT 2	LT 3	LT 40	1600 ± 200	LT 1400[2]	LT 3	LT 8	LT 9	LT 15
	10/12/83[5]	12B2	LT 700[2]	LT 5	LT 3	LT 1.8	LT 2	LT 20	1200 ± 200	LT 300[2]	LT 2	LT 5	LT 8	LT 9
	10/12/83[5]	5E1	LT 1500[2]	LT 8	LT 4	LT 3	LT 3	LT 30	1200 ± 200	LT 700[2]	LT 4	LT 9	LT 13	LT 15
	10/12/83[5]	13E3	LT 1400[2]	LT 8	LT 4	LT 3	LT 4	LT 30	1600 ± 200	LT 600[2]	LT 4	LT 8	LT 11	LT 14
	10/12/83[5]	10G1	LT 900[2]	LT 6	LT 3	LT 2	1.8 ± 1.2	LT 3	1300 ± 200	LT 400[2]	LT 3	LT 6	LT 9	LT 11

Note: See footnotes at end of table.

Table 17
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Gamma Spectrometry of Milk
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Collection Date	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
October[6]	10/19/83[5]	12B2	LT 300[2]	LT 4	LT 2	LT 1.6	LT 1.7	LT 16	1400 ± 200	LT 100[2]	LT 2	LT 4	LT 7	LT 7
	10/19/83[5]	5E1	LT 700[2]	LT 5	LT 3	LT 2	LT 2	LT 30	1300 ± 200	LT 300[2]	LT 3	LT 6	LT 10	LT 11
	10/19/83[5]	13E3	LT 600[2]	LT 4	LT 2	LT 1.7	LT 1.9	LT 20	1400 ± 200	LT 300[2]	LT 2	LT 5	LT 7	LT 8
	10/18/83[5]	10G1	LT 700[2]	LT 5	LT 2	LT 1.8	LT 2	LT 20	1300 ± 200	LT 300[2]	LT 2	LT 5	LT 7	LT 9
	10/19/83[5]	12B3	LT 300[2]	LT 4	LT 2	LT 1.7	LT 2	LT 15	1200 ± 200	LT 140[2]	LT 2	LT 4	LT 6	LT 7
	10/19/83[5]	6C1	LT 600[2]	LT 5	LT 2	LT 1.7	1.4 ± 1.0	LT 20	1400 ± 200	LT 200[2]	LT 2	LT 5	LT 8	LT 9
	10/19/83[5]	10D1	LT 800[2]	LT 6	LT 3	LT 2	LT 2	LT 20	1400 ± 200	LT 400[2]	LT 3	LT 6	LT 10	LT 10
	10/19/83[5]	12D2	LT 1000[2]	LT 6	LT 3	LT 3	LT 3	LT 30	1300 ± 200	LT 400[2]	LT 3	LT 7	LT 9	LT 12
	10/30/83	12B2	LT 500[2]	LT 5	LT 3	LT 2	LT 2	LT 20	1200 ± 200	LT 300[2]	LT 3	LT 5	LT 8	LT 9
	10/30/83	5E1	LT 20[2]	LT 3	LT 3	LT 2	LT 2	LT 9	1200 ± 200	LT 13	LT 3	LT 3	LT 7	LT 5
	10/30/83	5E1(4)	LT 500[2]	LT 5	LT 3	LT 2	LT 2	LT 20	1300 ± 200	LT 190[2]	LT 3	LT 5	LT 9	LT 9
	10/30/83	13E3	LT 30[2]	LT 3	LT 3	LT 2	LT 3	LT 9	1400 ± 200	LT 13	LT 3	LT 3	LT 7	LT 6
	10/30/83	13E3(4)	LT 600[2]	LT 6	LT 3	LT 2	LT 3	LT 20	1300 ± 200	LT 300[2]	LT 3	LT 6	LT 9	LT 11
	10/30/83	10G1	LT 700[2]	LT 6	LT 4	LT 3	LT 3	LT 30	1400 ± 200	LT 400[2]	LT 3	LT 7	LT 10	LT 11
November[6]	11/16/83	12B2	LT 11	LT 2	LT 2	LT 1.9	LT 2	LT 5	1200 ± 200	LT 5	LT 2	LT 2	LT 5	LT 4
	11/16/83	5E1	LT 13	LT 3	LT 3	LT 2	LT 3	LT 8	1300 ± 200	LT 7	LT 3	LT 3	LT 7	LT 5
	11/16/83	13E3	LT 15	LT 3	LT 3	LT 2	LT 2	LT 7	1300 ± 200	LT 8	LT 2	LT 3	LT 6	LT 5
	11/17/83	10G1	LT 20[2]	LT 3	LT 3	LT 2	LT 3	LT 8	1300 ± 200	LT 11	LT 3	LT 3	LT 7	LT 5
	11/17/83	10G1(4)	LT 30[2]	LT 4	LT 4	LT 3	LT 3	LT 11	1300 ± 200	LT 15	LT 3	LT 4	LT 8	LT 6
	11/16/83	12B3	LT 15	LT 3	LT 3	LT 2	LT 3	LT 8	1300 ± 200	LT 7	LT 3	LT 3	LT 7	LT 6
	11/16/83	6C1	LT 13	LT 3	LT 3	LT 2	LT 3	LT 7	1500 ± 200	LT 6	LT 2	LT 3	LT 7	LT 5
	11/16/83	10D1	LT 18[2]	LT 3	LT 4	LT 3	LT 3	LT 9	1400 ± 200	LT 9	LT 3	LT 3	LT 8	LT 6
	11/16/83	12D2	LT 18[2]	LT 4	LT 4	LT 3	LT 3	LT 9	1400 ± 200	LT 10	LT 3	LT 4	LT 8	LT 6

Note: See footnotes at end of table.

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Gamma Spectrometry of Milk
SSES REMP 1983

(Results in pCi/l ± 2s)

Month	Collection Date	Station	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95
December[6]	12/14/83	12B2	LT 13	LT 4	LT 5	LT 4	LT 4	LT 11	1200 ± 200	LT 7	LT 4	LT 4	LT 11	LT 7
	12/14/83	5E1	LT 9	LT 2	LT 2	LT 1.9	LT 2	LT 5	1300 ± 200	LT 4	LT 2	LT 2	LT 5	LT 4
	12/15/83	13E3	LT 20[2]	LT 4	LT 5	LT 4	LT 4	LT 12	1400 ± 200	LT 10	LT 4	LT 4	LT 10	LT 8
	12/14/83	10G1	LT 20[2]	LT 4	LT 5	LT 3	LT 4	LT 11	1300 ± 200	LT 10	LT 4	LT 4	LT 10	LT 7
	12/14/83	12B3	LT 9	LT 2	LT 3	LT 1.9	1.6 ± 1.2	LT 6	1400 ± 200	LT 4	LT 2	LT 2	LT 6	LT 4
	12/14/83	6C1	LT 16[2]	LT 4	LT 4	LT 3	LT 4	LT 10	1500 ± 200	LT 7	LT 4	LT 4	LT 9	LT 7
	12/15/83	10D1	LT 30[2]	LT 6	LT 7	LT 5	LT 6	LT 16	1300 ± 200	LT 14	LT 6	LT 6	LT 14	LT 11
	12/15/83	12D2	LT 15	LT 4	LT 5	LT 3	LT 4	LT 10	1500 ± 200	LT 8	LT 4	LT 4	LT 10	LT 6

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) Lower sensitivity due to delay in analysis.
(3) LT = Less Than.
(4) Duplicate sample and analysis.
(5) Duration between samples did not meet defined specifications for this frequency.
(6) Samples collected and analyzed by NUS.

Table 18
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Iodine-131 in Milk
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Station	Collection Date	I-131 Activity
January[1]	12B2	01/08/83	LT 0.14[2]
	5E1	01/07/83	LT 0.14
	13E3	01/08/83	LT 0.16
	10G1	01/07/83	LT 0.14
	12B3	01/08/83	LT 0.15
	6C1	01/07/83	LT 0.14
	10D1	01/07/83	LT 0.14
	12D2	01/07/83	LT 0.15
February[1]	12B2	02/04/83	LT 0.2
	5E1	02/05/83	LT 0.2
	13E3	02/04/83	LT 0.3
	10G1	02/04/83	LT 0.2
	12B3	02/04/83	LT 0.3
	6C1	02/05/83	LT 0.2
	10D1	02/05/83	LT 0.2
	12D2	02/04/83	LT 0.2
March[1]	12B2	03/11/83	LT 0.11
	5E1	03/10/83	LT 0.18
	13E3	03/11/83	LT 0.14
	10G1	03/10/83	LT 0.15
	12B3	03/11/83	LT 0.15
	6C1	03/11/83	LT 0.12
	10D1	03/10/83	LT 0.13
	12D2	03/10/83	LT 0.13
April[1]	12B2	04/08/83	LT 0.12
	5E1	04/08/83	LT 0.11
	13E3	04/09/83	LT 0.13
	10G1	04/08/83	LT 0.13
	12B3	04/09/83	LT 0.10
	6C1	04/08/83	LT 0.08
	10D1	04/08/83	LT 0.14
	12D2	04/08/83	LT 0.12
	12B3	04/09/83	LT 0.10[3]
	12B2	04/23/83	LT 0.10
	5E1	04/23/83	LT 0.11
	13E3	04/23/83	LT 0.13
	10G1	04/23/83	LT 0.11

Note: See footnotes at end of table.

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Iodine-131 in Milk
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Station	Collection Date	I-131 Activity
May(1)	12B2	05/07/83	LT 0.12
	5E1	05/06/83	LT 0.14
	13E3	05/07/83	LT 0.13
	10G1	05/06/83	LT 0.13
	12B3	05/07/83	LT 0.09
	6C1	05/07/83	LT 0.14
	10D1	05/06/83	LT 0.10
	12D2	05/06/83	LT 0.12
	8D1(4)	05/06/83	LT 0.14
	12B2	05/20/83	LT 0.13
	5E1	05/20/83	LT 0.11
	13E3	05/20/83	LT 0.10
	10G1	05/20/83	LT 0.12
June(1)	12B2	06/15/83(5)	LT 0.10
	5E1	06/15/83(5)	LT 0.09
	13E3	06/15/83(5)	LT 0.11
	10G1	06/15/83(5)	LT 0.12
	12B2	06/27/83	LT 0.07
	5E1	06/28/83	LT 0.07
	13E3	06/27/83	LT 0.09
	10G1	06/27/83	LT 0.09
June(6)	12B2	06/15/83(5)	LT 0.08
	5E1	06/15/83(5)	LT 0.08
	13E3	06/15/83(5)	LT 0.07
	10G1	06/15/83(5)	LT 0.09
	12B3	06/15/83(5)	LT 0.07
	6C1	06/15/83(5)	LT 0.09
	10D1	06/15/83(5)	LT 0.05
	12D2	06/15/83(5)	LT 0.09
	8D1(4)	06/15/83	LT 0.18
	12B2	06/27/83	LT 0.04
	5E1	06/28/83	LT 0.05
	13E3	06/27/83	LT 0.03
	10G1	06/27/83	LT 0.05

Note: See footnotes at end of table.

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Iodine-131 in Milk
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Station	Collection Date	I-131 Activity
July (6)	12B2	07/16/83	LT 0.08
	5E1	07/16/83	LT 0.08
	13E3	07/16/83	LT 0.08
	10G1	07/16/83	LT 0.10
	12B3	07/16/83	LT 0.09
	6C1	07/16/83	LT 0.09
	10D1	07/16/83	LT 0.09
	12D2	07/16/83	LT 0.07
	8D1(4)	07/16/83	(7)
	12B2	07/30/83	LT 0.1
	5E1	07/30/83	LT 0.2
	13E3	07/30/83	LT 0.08
	10G1	07/30/83	LT 0.03
August (6)	12B2	08/16/83	LT 0.07
	5E1	08/17/83	LT 0.07
	13E3	08/16/83	LT 0.09
	10G1	08/16/83	LT 0.10
	12B3	08/22/83(5)	LT 0.06
	6C1	08/22/83(5)	LT 0.03
	10D1	08/22/83(5)	LT 0.08
	12D2	08/22/83(5)	LT 0.05
	12B2	09/06/83(5)	LT 0.3
	5E1	09/06/83(5)	LT 0.3
	13E3	09/06/83(5)	LT 0.2
	10G1	09/06/83(5)	LT 0.3
September (6)	12B2	09/20/83	LT 0.11
	5E1	09/20/83	LT 0.4
	13E3	09/20/83	LT 0.14
	10G1	09/21/83	(7)
	12B3	09/20/83	LT 0.12
	6C1	09/20/83	LT 1.1(8)
	10D1	09/20/83	LT 0.2
	12D2	09/21/83	(7)
	12B2	10/12/83(5)	LT 0.1
	5E1	10/12/83(5)	LT 0.1
	13E3	10/12/83(5)	LT 0.1
	10G1	10/12/83(5)	LT 0.1

Note: See footnotes at end of table.

Table 18
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Iodine-131 in Milk
SSES REMP 1983

(Results in Units of pCi/l ± 2s)

Month	Station	Collection Date	I-131 Activity
October (6)	12B2	10/19/83(5)	LT 0.07
	5E1	10/19/83(5)	LT 0.09
	13E3	10/19/83(5)	LT 0.07
	10G1	10/18/83(5)	LT 0.07
	12B3	10/19/83(5)	LT 0.05
	6C1	10/19/83(5)	LT 0.11
	10D1	10/19/83(5)	LT 0.12
	12D2	10/19/83(5)	LT 0.15
	12B2	10/30/83	LT 0.06
	5E1	10/30/83	LT 0.08
	13E3	10/30/83	LT 0.06
	10G1	10/30/83	LT 0.07
	5E1(3)	10/30/83	LT 0.06
	13E3(3)	10/30/83	LT 0.06
November (6)	12B2	11/16/83	LT 0.07
	5E1	11/16/83	(7)
	13E3	11/16/83	LT 0.08
	10G1	11/17/83	LT 0.04
	12B3	11/16/83	LT 0.07
	6C1	11/16/83	LT 0.08
	10D1	11/16/83	LT 0.07
	12D2	11/16/83	LT 0.08
	8D1(4)	11/17/83	LT 0.2
	10G1	11/17/83	LT 0.07
December (6)	12B2	12/14/83	LT 0.08
	5E1	12/14/83	LT 0.08
	13E3	12/15/83	LT 0.10
	10G1	12/14/83	LT 0.08
	12B3	12/14/83	LT 0.08
	6C1	12/14/83	LT 0.08
	10D1	12/15/83	LT 0.10
	12D2	12/15/83	LT 0.11

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) LT = Less Than
(3) Duplicate sample and analysis.
(4) Goat Milk
(5) Duration between samples did not meet defined specifications for this frequency.
(6) Samples collected and analyzed by NUS.
(7) Sample destroyed in analysis.
(8) Lower sensitivity due to delay in counting.

Table 19a

Gamma Spectrometry of Pasture Grass
SSES REMP 1983

(Results in pCi/kg (dry) ± 2s)

Month	Type	Station	Collection Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Be-7
Jan[1]	Pasture	8D1	01/08/83	LT 1000(2)	LT 200	LT 300	LT 190	LT 200	LT 400	LT 300	7500 ± 2500	LT 300	LT 200	LT 200	LT 500	LT 400	5100 ± 1400
	Grass	15A1	01/08/83	LT 1400	LT 300	LT 300	LT 200	LT 300	LT 500	LT 400	11000 ± 2000	LT 400	LT 300	LT 300	LT 500	LT 500	7100 ± 2000
Feb[1]	Pasture	8D1	02/05/83	LT 900	LT 200	LT 300	LT 170	LT 200	LT 400	LT 300	2000 ± 600	LT 200	LT 190	LT 200	LT 400	LT 300	7500 ± 1300
	Grass	15A1	02/04/83	LT 1200	LT 200	LT 300	LT 200	LT 300	LT 500	LT 300	LT 3000	LT 400	LT 200	LT 300	LT 600	LT 400	9500 ± 1800
Mar[1]	Pasture Grass	15A1	03/11/83	LT 1100	LT 170	LT 190	LT 170	LT 200	LT 400	LT 300	LT 3000	LT 200	LT 180	LT 200	LT 400	LT 300	3500 ± 1200
Apr[1]	Pasture	8D1	04/09/83	LT 700	LT 120	LT 160	LT 120	LT 140	LT 300	LT 190	3700 ± 2100	LT 300	LT 120	LT 140	LT 300	LT 300	7900 ± 1100
	Grass	15A1	04/08/83	LT 3000	LT 600	LT 600	LT 500	LT 500	LT 1000	LT 900	LT 9000	LT 800	LT 500	LT 600	LT 1100	LT 900	13000 ± 3000
		15A1(3)	04/08/83	LT 800	LT 150	LT 200	LT 130	LT 160	LT 300	LT 200	6800 ± 1900	LT 200	LT 140	LT 150	LT 300	LT 300	10000 ± 2000
May[1]	Pasture Grass	15A1	05/06/83	LT 1100	LT 190	LT 200	LT 170	LT 200	LT 400	LT 300	30000 ± 3000	LT 300	LT 190	LT 200	LT 500	LT 400	2600 ± 1100
June[1]	Pasture	8D1	06/15/83	LT 1000	LT 180	LT 180	LT 150	LT 180	LT 300	LT 300	13000 ± 2000	LT 200	LT 160	LT 180	LT 400	LT 300	LT 1600
	Grass	15A1	06/15/83	LT 600	LT 110	LT 130	LT 100	LT 120	LT 300	LT 160	8100 ± 1600	LT 170	LT 100	LT 130	LT 300	LT 190	1200 ± 600

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) Less Than
(3) Replicate

Table 19b

Gamma Spectrometry of Pasture Grass
SSES REMP 1983

(Results in pCi/kg (wet) ± 2s)

Month	Type	Station	Collection Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Be-7
July[1]	Pasture Grass	15A1	07/16/83	LT 30[2]	LT 10	LT 13	LT 9	13 ± 6	LT 30	LT 12	9300 ± 1400	LT 13	LT 10	LT 10	LT 30	LT 18	630 ± 100
Aug[1]	Pasture Grass	15A1	08/16/83	LT 40	LT 8	LT 9	LT 7	23 ± 4	LT 20	LT 20	5300 ± 600	LT 16	LT 7	LT 8	LT 20	LT 13	1300 ± 200
Sept[1]	Pasture Grass	15A1	09/21/83	LT 30	LT 7	LT 7	LT 6	11 ± 4	LT 17	LT 20	2800 ± 300	LT 15	LT 6	LT 8	LT 16	LT 12	1100 ± 200
Oct[1]	Pasture Grass(3)	15A1	10/18/83	LT 200	LT 60	LT 60	LT 5	30 ± 3	LT 140	LT 100	28000 ± 3000	LT 100	LT 50	LT 60	LT 150	LT 100	8000 ± 800
Nov[1]	Pasture Grass	15A1	11/16/83	LT 70	LT 11	LT 12	LT 9	9.8 ± 5.4	LT 30	LT 50	2600 ± 300	LT 30	LT 10	LT 11	LT 30	LT 20	1800 ± 200
Dec (4)																	

(1) Samples collected and analyzed by NUS.
(2) Less Than
(3) Dry Weight
(4) Sample was not available due to heavy snow and ice cover.

Table 20
(Page 1 of 3)

Gamma Spectrometry of Food Products (Fruits and Vegetables)
SSES REMP 1983

(Results in pCi/kg (wet) ± 2s)

Month	Type	Station	Collection Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Be-7
June(1)	Spinach	7S5	06/28/83	LT 110	LT 19	LT 20	LT 16	LT 19(2)	LT 40	LT 30	4900 ± 500	LT 20	LT 17	LT 20	LT 40	LT 30	LT 170
	Lettuce	7S5	06/28/83	LT 120	LT 20	LT 30	LT 20	LT 20	LT 50	LT 40	3800 ± 400	LT 40	LT 20	LT 30	LT 60	LT 40	LT 190
	Endive	7S5	06/28/83	LT 70	LT 11	LT 16	LT 11	LT 14	LT 30	LT 20	3900 ± 400	LT 19	LT 12	LT 13	LT 30	LT 20	190 ± 70
June(3)	Strawberries	11D1	06/15/83	LT 15	LT 4	LT 4	LT 3	LT 3	LT 10	LT 9	1600 ± 200	LT 9	LT 4	LT 4	LT 10	LT 6	26 ± 13
	Spinach	7S5	06/28/83	LT 12	LT 3	LT 4	LT 3	2.3 ± 1.6	LT 10	LT 6	4200 ± 500	LT 5	LT 3	LT 3	LT 10	LT 6	160 ± 20
	Lettuce	7S5	06/28/83	LT 17	LT 4	LT 4	LT 3	4.8 ± 1.8	LT 11	LT 10	2600 ± 300	LT 8	LT 3	LT 4	LT 11	LT 7	120 ± 20
	Endive	7S5	06/28/83	LT 20	LT 4	LT 4	LT 4	14 ± 2	LT 11	LT 12	4100 ± 500	LT 9	LT 4	LT 4	LT 11	LT 7	210 ± 30
July(3)	Lettuce	7S5	07/12/83	LT 20	LT 7	LT 8	LT 6	LT 7	LT 18	LT 10	1900 ± 200	LT 12	LT 7	LT 7	LT 20	LT 13	LT 50
	Lettuce	7S5	07/12/83	LT 20	LT 7	LT 9	LT 6	LT 7	LT 20	LT 10	4600 ± 400	LT 11	LT 7	LT 7	LT 20	LT 12	LT 50
	Lettuce	7S5	07/12/83	LT 30	LT 7	LT 8	LT 6	6.0 ± 2.1	LT 18	LT 12	3700 ± 400	LT 11	LT 7	LT 7	LT 19	LT 12	43 ± 33
	Beans	7S5	07/12/83	LT 18	LT 5	LT 5	LT 5	LT 5	LT 13	LT 9	2100 ± 300	LT 8	LT 5	LT 5	LT 13	LT 9	LT 40
	Beans	12S4	07/25/83	LT 20	LT 6	LT 7	LT 6	LT 6	LT 17	LT 10	3400 ± 400	LT 9	LT 6	LT 7	LT 18	LT 11	ND(4)
	Lettuce	12S4	07/25/83	LT 19	LT 6	LT 7	LT 5	LT 5	LT 16	LT 9	6300 ± 700	LT 8	LT 5	LT 6	LT 17	LT 10	290 ± 30
	Endive	12S4	07/25/83	LT 19	LT 6	LT 8	LT 6	LT 6	LT 18	LT 8	5700 ± 600	LT 9	LT 7	LT 6	LT 20	LT 11	230 ± 30
Aug(3)	Cabbage	7S5	08/02/83	LT 19	LT 4	LT 6	LT 3	12 ± 2	LT 14	LT 10	2700 ± 300	LT 9	LT 4	LT 4	LT 12	LT 7	ND
	Lettuce	7S5	08/02/83	LT 30	LT 10	LT 13	LT 10	13 ± 6	LT 20	LT 10	3700 ± 400	LT 11	LT 10	LT 10	LT 30	LT 17	200 ± 50
	Lettuce	12S4	08/02/83	LT 19	LT 5	LT 6	LT 4	LT 4	LT 15	LT 9	4300 ± 500	LT 9	LT 5	LT 5	LT 15	LT 9	190 ± 20
	Spinach	12S4	08/02/83	LT 20	LT 6	LT 8	LT 5	LT 6	LT 18	LT 10	7900 ± 800	LT 9	LT 6	LT 6	LT 19	LT 11	340 ± 40
	Spinach	7S5	08/02/83	LT 19	LT 5	LT 5	LT 4	20 ± 3	LT 14	LT 10	6700 ± 300	LT 7	LT 5	LT 5	LT 14	LT 8	230 ± 30

Note: See footnote at end of table.

Table 20
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Gamma Spectrometry of Food Products (Fruits and Vegetables)
SSES REMP 1983

(Results in pCi/kg (wet) ± 2s)

Month	Type	Station	Collection Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Be-7
Aug (cont) (3)	Corn	7S5	08/10/83	LT 20	LT 4	LT 4	LT 3	LT 3	LT 11	LT 14	1900 ± 200	LT 11	LT 3	LT 4	LT 9	LT 7	ND
	Potatoes	7S5	08/15/83	LT 20	LT 3	LT 4	LT 3	LT 3	LT 10	LT 13	2800 ± 300	LT 9	LT 3	LT 3	LT 8	LT 6	ND
	Peppers	11D1	08/17/83	LT 16	LT 4	LT 5	LT 4	LT 4	LT 12	LT 9	1700 ± 200	LT 7	LT 4	LT 4	LT 11	LT 8	ND
	Cabbage	11D1	08/17/83	LT 20	LT 5	LT 6	LT 4	LT 5	LT 13	LT 10	2500 ± 300	LT 10	LT 5	LT 5	LT 13	LT 8	ND
	Potatoes	11D1	08/17/83	LT 20	LT 5	LT 5	LT 4	LT 4	LT 13	LT 10	3500 ± 400	LT 9	LT 5	LT 5	LT 12	LT 9	ND
	Corn	11D1	08/17/83	LT 20	LT 5	LT 5	LT 4	LT 5	LT 12	LT 10	1900 ± 200	LT 10	LT 5	LT 4	LT 12	LT 8	ND
Sept[3]	Tomatoes	7S5	09/01/83	LT 8	LT 1.9	LT 2	LT 1.4	LT 1.6	LT 5	LT 5	1700 ± 200	LT 4	LT 1.7	LT 1.8	LT 5	LT 3	ND
	Tomatoes	12S4	09/01/83	LT 20	LT 3	LT 3	LT 1.6	LT 1.9	LT 8	LT 18	2600 ± 300	LT 9	LT 2	LT 2	LT 6	LT 5	ND
	Cabbage	12S4	09/07/83	LT 30	LT 4	LT 4	LT 3	LT 3	LT 12	LT 30	2500 ± 300	LT 13	LT 4	LT 4	LT 10	LT 8	ND
	Swiss Chard Red	7S5	09/07/83	LT 40	LT 6	LT 6	LT 5	LT 5	LT 18	LT 30	5400 ± 600	LT 16	LT 5	LT 6	LT 16	LT 11	60 ± 26
	Swiss Chard White	12S4	09/07/83	LT 18	LT 4	LT 4	LT 3	LT 3	LT 10	LT 12	4700 ± 500	LT 7	LT 4	LT 4	LT 10	LT 7	39 ± 16
	Corn	12S4	09/01/83	LT 18	LT 4	LT 5	LT 4	LT 4	LT 11	LT 9	1200 ± 200	LT 10	LT 4	LT 4	LT 10	LT 7	ND
	Swiss Chard Red	12S4	09/07/83	LT 20	LT 6	LT 7	LT 4	LT 5	LT 17	LT 10	6200 ± 700	LT 10	LT 5	LT 5	LT 17	LT 9	71 ± 20
	Potatoes	12S4	09/07/83	LT 16	LT 4	LT 5	LT 4	LT 4	LT 12	LT 8	3800 ± 400	LT 7	LT 4	LT 4	LT 12	LT 8	ND
	Swiss Chard White	7S5	09/07/83	LT 20	LT 4	LT 4	LT 3	LT 3	LT 12	LT 15	6400 ± 700	LT 8	LT 3	LT 4	LT 11	LT 6	56 ± 14
	Cabbage	11D1	09/13/83	LT 20	LT 7	LT 8	LT 5	LT 6	LT 17	LT 10	2700 ± 300	LT 10	LT 7	LT 7	LT 17	LT 12	ND
	Spinach	7S5	09/22/83	LT 18	LT 4	LT 5	LT 3	16 ± 2	LT 13	LT 10	6400 ± 700	LT 8	LT 4	LT 5	LT 13	LT 8	65 ± 16

Note: See footnote at end of table.

Table 20
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Gamma Spectrometry of Food Products (Fruits and Vegetables)
SSES REMP 1983

(Results in pCi/kg (wet) $\pm$ 2s)

Month	Type	Station	Collection Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Be-7
Oct[3]	Tomatoes	7S5	10/05/83	LT 20	LT 7	LT 8	LT 6	LT 6	LT 19	LT 10	1900 $\pm$ 200	LT 11	LT 6	LT 7	LT 18	LT 12	ND
	Tomatoes	12S4	10/05/83	LT 30	LT 7	LT 9	LT 6	LT 7	LT 20	LT 10	2400 $\pm$ 300	LT 12	LT 7	LT 8	LT 20	LT 13	ND
	Swiss Chard Red	7S5	10/05/83	LT 12	LT 3	LT 4	LT 3	3.5 $\pm$ 1.6	LT 10	LT 6	3800 $\pm$ 400	LT 6	LT 3	LT 4	LT 10	LT 6	57 $\pm$ 13
	Swiss Chard Red	12S4	10/05/83	LT 30	LT 8	LT 9	LT 6	LT 7	LT 20	LT 10	4700 $\pm$ 500	LT 13	LT 7	LT 8	LT 20	LT 13	67 $\pm$ 26
	Swiss Chard White	7S5	10/05/83	LT 20	LT 5	LT 5	LT 3	3.5 $\pm$ 1.8	LT 14	LT 13	3800 $\pm$ 400	LT 9	LT 4	LT 6	LT 13	LT 8	56 $\pm$ 16
	Lettuce	7S5	10/05/83	LT 30	LT 5	LT 6	LT 4	6.8 $\pm$ 2.7	ND	LT 17	3300 $\pm$ 400	LT 14	LT 5	LT 6	LT 15	LT 9	110 $\pm$ 20
	Swiss Chard White	12S4	10/05/83	LT 30	LT 7	LT 7	LT 5	LT 6	LT 20	LT 20	5100 $\pm$ 600	LT 16	LT 6	LT 8	LT 18	LT 12	54 $\pm$ 25
Mar[3,5]	Apples	7B2	03/08/84	LT 30	LT 10	LT 13	LT 11	LT 11	LT 20	LT 11	830 $\pm$ 720	LT 17	LT 11	LT 11	LT 30	LT 19	ND
1984	Apples	2H	03/08/84	LT 40	LT 14	LT 15	LT 16	LT 16	LT 30	LT 16	1200 $\pm$ 200	LT 16	LT 14	LT 13	LT 30	LT 20	ND
	Honey	7B2	03/08/84	LT 50	LT 19	LT 20	LT 19	54 $\pm$ 14	LT 40	LT 30	1700 $\pm$ 200	LT 20	LT 20	LT 18	LT 50	LT 40	ND
	Apples	12B1	03/08/84	LT 30	LT 10	LT 13	LT 10	LT 12	LT 20	LT 12	880 $\pm$ 110	LT 14	LT 10	LT 10	LT 30	LT 18	ND

(1) Samples collected and analyzed by Radiation Management Corporation.
(2) LT = Less Than
(3) Samples collected and analyzed by NUS.
(4) ND = Not detected
(5) Samples were collected in March 1984 but they represent the 1983 growing season.

Table 21

Gamma Spectrometry of Game, Poultry, and Eggs
SSES REMP 1983

(Results in pCi/kg, (wet) ± 2s)

Month	Sample Type	Station	Collection Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	I-131	K-40	La-140	Mn-54	Nb-95	Zn-65	Zr-95	Be-7
Oct [1]	Squirrel	A-15	10/19/83	LT 1400	LT 40	LT 30	LT 20	1200 ± 200	LT 120	ND[2]	3200 ± 400	LT 700	LT 30	LT 40	LT 70	LT 70	LT 500[3]
	Squirrel	A-16	10/15/83	LT 700	LT 13	LT 9	LT 8	1400 ± 200	LT 40	ND	3500 ± 400	LT 300	LT 9	LT 14	LT 20	LT 20	LT 200
	Squirrel	A-2	10/15/83	LT 2000	LT 40	LT 30	LT 30	3600 ± 400	LT 120	ND	3200 ± 400	LT 900	LT 30	LT 40	LT 70	LT 70	LT 700
	Squirrel	A-16	10/19/83	LT 1200	LT 40	LT 30	LT 20	770 ± 80	LT 120	ND	3500 ± 400	LT 700	LT 20	LT 40	LT 60	LT 70	LT 400
	Squirrel	A-1	10/15/83	LT 600	LT 14	LT 11	LT 9	810 ± 90	LT 50	ND	2500 ± 300	LT 300	LT 9	LT 15	LT 20	LT 30	LT 200
	Squirrel	A-1	10/19/83	LT 800	LT 20	LT 18	LT 13	1500 ± 200	LT 80	ND	3000 ± 300	LT 400	LT 15	LT 20	LT 40	LT 30	LT 300
	Squirrel	B-16	10/15/83	LT 500	LT 10	LT 7	LT 6	1900 ± 200	LT 30	ND	3300 ± 400	LT 180	LT 6	LT 10	LT 18	LT 17	LT 170
	Squirrel	B-1	10/15/83	LT 4000	LT 70	LT 50	LT 40	1200 ± 200	LT 200	ND	3300 ± 500	LT 1700	LT 40	LT 70	LT 100	LT 130	LT 900
Nov [1]	Deer	A-16	11/30/83	LT 500	LT 15	LT 11	LT 8	39 ± 7	LT 50	LT 1100	2500 ± 300	LT 200	LT 10	LT 15	LT 30	LT 30	ND
Dec [1]	Eggs	12B1	12/30/83	LT 50	LT 15	LT 17	LT 15	LT 16	LT 30	LT 20	990 ± 200	LT 20	LT 15	LT 14	LT 40	LT 30	LT 120
	Poultry	12B1	12/30/83	LT 50	LT 11	LT 13	LT 10	LT 11	LT 30	LT 30	2600 ± 300	LT 30	LT 11	LT 12	LT 30	LT 20	ND
	Deer	A-2	12/14/83	LT 400	LT 20	LT 17	LT 12	19 ± 7	LT 60	LT 700	3100 ± 400	LT 200	LT 13	LT 20	LT 40	LT 40	ND
	Deer	A-2	12/10/83	LT 300	LT 17	LT 13	LT 9	15 ± 6	LT 50	LT 500	3000 ± 300	LT 150	LT 12	LT 17	LT 30	LT 30	ND

(1) ND = Not Detected
(2) LT = Less Than

Table 22

SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
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Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f) (2) (Range)	Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
Fish (pCi/kg (wet))	Gamma Spec - 24						0
	K-40	-	3300 (13/13) (2700-3600)	Station IND 0.9-1.4 miles ESE	3300 (11/11) (2700-3600)	3100 (11/11) (2400-3500)	
	Cs-134	130	LLD			LLD	
	Cs-137	150	15 (4/13) (9.2-18)	Station IND 0.9-1.4 miles ESE	15 (4/11) (9.2-18)	11 (1/11) (11-11)	
	Co-58	130	LLD			LLD	
	Co-60	130	LLD			LLD	
	Fe-59	260	LLD			LLD	
	Mn-54	130	LLD			LLD	
	Zn-65	260	LLD			LLD	
Direct Radiation (mrad/day)	TLD - 262	-	0.21 (234/234) (0.14-0.34)	Station 11S3 0.3 miles SW	0.28 (4/4) (0.25-0.32)	0.20 (28/28) (0.15-0.28)	0

Note: See footnotes at end of table.

Table 22

SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
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Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f) (2) (Range)	Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
Sediment (pCi/kg (dry))	Gamma Spec - 15						0
	K-40	-	7600 (9/9) (5500-8800)	Station 12F 6.9 miles WSW	7800 (3/3) (6400-8800)	9400 (6/6) (6900-13000)	
	Ac-228	-	720 (6/9) (550-900)	Station 11C 2.6 miles SW	760 (2/3) (740-770)	860 (4/6) (610-1100)	
	Bi-212	-	990 (1/9) (990-990)	Station 7B 12 miles SE	990 (1/3) (990-990)	1100 (1/6) (1100-1100)	
	Bi-214	-	650 (6/9) (450-820)	Station 11C 2.6 miles SW	700 (2/3) (600-790)	710 (4/6) (510-970)	
	Cs-134	150	LLD			LLD	
	Cs-137	180	71 (3/9) (58-91)	Station 12F 6.9 miles WSW	91 (1/3) (91-91)	170 (3/6) (70-240)	
	Pb-212	-	530 (6/9) (420-670)	Station 12F 6.9 miles WSW	580 (2/3) (490-670)	560 (4/6) (460-780)	
	Pb-214	-	660 (6/9) (430-840)	Station 12F 6.9 miles WSW	700 (2/3) (620-770)	800 (4/6) (480-1100)	
	Ra-226	-	650 (9/9) (440-790)	Station 12F 6.9 miles WSW	690 (3/3) (580-790)	720 (6/6) (500-1000)	
	Tl-208	-	740 (6/9) (540-930)	Station 12F 6.9 miles WSW	770 (2/3) (610-930)	810 (4/6) (630-1100)	
	Th-232	-	760 (3/9) (680-880)	Station 12F 6.9 miles WSW	880 (1/3) (880-880)	890 (2/6) (680-1100)	
	Gross Alpha - 15	-	6000 (4/9) (2900-8800)	Station 11C 2.6 miles SW	8800 (1/3) (8800-8800)	5700 (4/6) (3200-9900)	

Note: See footnotes at end of table.

Table 22

SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
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Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f) (2) (Range)	Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
Potable Water (pCi/l)	Gross Beta - 36	4	5.4 (22/23) (0.38-21)	Station 12H2 RAW[3] 26 miles WSW	7.9 (9/9) (0.38-21)	2.1 (8/13) (1.6-3.2)	0
	I-131 - 87	1.0	0.12 (22/80) (0.053-0.35)	Station 12H2 TREATED[3] 26 miles WSW	0.14 (14/30) (0.053-0.35)	0.10 (1/7) (0.10-0.10)	0
	Gross Alpha - 27	-	10 (8/22) (1.4-25)	Station 12H2 RAW[3] 26 miles WSW	13 (2/8) (1.9-25)	LLD	0
	H-3 - 24	2000	160 (3/20) (99-270)	Station 12H2 RAW[3] 26 miles WSW	180 (2/8) (99-270)	160 (2/4) (76-250)	0
	Gamma Spec - 35						
	Ba-140	60	LLD			LLD	0
	Co-58	15	LLD			LLD	
	Co-60	15	LLD			LLD	
	Cs-134	15	LLD			LLD	
	Cs-137	18	LLD			LLD	
	Fe-59	30	LLD			LLD	
	K-40	-	LLD			LLD	
	La-140	15	LLD			LLD	
	Mn-54	15	LLD			LLD	
	Nb-95	15	LLD			LLD	
	Zn-65	30	LLD			LLD	
	Zr-95	30	LLD			LLD	

Note: See footnotes at end of table.

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SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
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Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean		Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
				Name, Distance and Direction	Mean (f) (2) (Range)		
Surface Water (pCi/l)	Gross Beta - 115	4	7.7 (57/68) (1.3-79)	Station 6S7 Discharge	19 (14/14) (4.3-79)	3.9 (30/47) (1.2-26)	0
	I-131 - 132	1.0	0.17 (26/78) (0.05-0.32)	Station 12F1 5.3 miles WSW	0.23 (3/13) (0.20-0.26)	0.19 (6/54) (0.074-0.45)	0
	H-3 - 35	2000	300 (4/21) (100-730)	Station 6S7 Discharge	730 (1/4) (730-730)	210 (1/14) (210-210)	0
	Gamma Spec - 115						0
	Ba-140	60	LLD			LLD	
	Co-58	15	71 (6/68) (0.91-200)	Station 6S7 Discharge	71 (6/15) (0.91-200)	LLD	
	Co-60	15	9.8 (4/68) (0.88-21)	Station 6S7 Discharge	12.8 (3/15) (8.3-21)	4.8(1/47) (4.8-4.8)	
	Cs-134	15	LLD			LLD	
	Cs-137	18	LLD			LLD	
	Fe-59	30	18 (3/68) (5.8-34)	Station 6S7 Discharge	18 (3/15) (5.8-34)	LLD	
	K-40	-	LLD			LLD	
	La-140	15	LLD			LLD	
	Mn-54	15	45 (7/68) (0.94-130)	Station 6S7 Discharge	45 (7/15) (0.94-130)	LLD	
	Nb-95	15	3.2 (1/68) (3.2-3.2)	Station 6S7 Discharge	3.2 (1/15) (3.2-3.2)	LLD	
	Zn-65	30	4.8 (1/68) (4.8-4.8)	Station 6S7 Discharge	4.8 (1/15) (4.8-4.8)	LLD	
	Cr-51	-	130 (2/68) (92-170)	Station 6S7 Discharge	130 (2/15) (92-170)	LLD	
	Zr-95	30	LLD			LLD	

Note: See footnotes at end of table.

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SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
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Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f) (2) (Range)	Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
Well Water (pCi/l)	Gross Beta - 105	4	3.7 (44/92) (0.58-19)	Station 2S6 0.9 mile NNE	8.5 (3/13) (1.2-19)	2.4 (6/13) (1.4-3.4)	0
	Gross Alpha - 35	-	2.1 (5/31) (1.0-3.1)	Muncy Valley	3.1 (1/1) (3.1-3.1)	1.2 (2/4) (0.94-1.4)	0
	H-3 - 32	2000	180 (8/28) (72-400)	Station 15A4 0.9 miles NW	290 (2/4) (180-400)	210 (1/4) (210-210)	0
	Gamma Spec - 108						0
	Ba-140	60	LLD			LLD	
	Co-58	15	LLD			LLD	
	Co-60	15	LLD			LLD	
	Cs-134	15	LLD			LLD	
	Cs-137	18	LLD			LLD	
	Fe-59	30	LLD			LLD	
	K-40	-	LLD			LLD	
	La-140	15	LLD			LLD	
	Nb-95	15	LLD			LLD	
	Mn-54	15	LLD			LLD	
	Zn-65	30	LLD			LLD	
	Zr-95	30	LLD			LLD	

Note: See footnotes at end of table.

Table 22

SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
(Page 6 of 10)

Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f) (2) (Range)	Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
Air Particulates (E-03 pCi/m3)	Gross Beta - 559	10	13 (407/408) (3.0-31)	Station 2S2 0.9 miles NNE	15 (51/51) (3.2-26)	12 (149/151) (2.0-33)	0
	Gross Alpha - 43	-	5.3 (32/32) (2.3-8.0)	Station 2S2 0.9 miles NNE	6.3 (4/4) (3.8-8.0)	4.6 (11/11) (2.1-6.1)	0
	Gamma Spec - 44						0
	Be-7	-	66 (32/32) (30-110)	Station 12E1 4.7 miles WSW	73 (4/4) (53-99)	62 (12/12) (41-100)	
	Ce-144	-	LLD			LLD	
	Cs-134	50	LLD			LLD	
	Cs-137	60	LLD			LLD	
	Nb-95	-	LLD			LLD	
	Zr-95	-	LLD			LLD	
	K-40	-	12 (1/32) (12-12)	Station 11S2 0.4 miles SW	12 (1/4) (12/12)	LLD	
Air Iodine - (pCi/m3)	I-131 - 567	0.07	LLD			LLD	0
Milk (pCi/l)	I-131 - 136	1.0	LLD			LLD	0
	Gamma Spec - 136						0
	Ba-140	15	LLD			LLD	
	Co-58	-	LLD			LLD	
	Co-60	-	LLD			LLD	
	Cs-134	15	LLD			LLD	
	Cs-137	18	1.8 (34-114) (1.2-3.1)	Station 12B3 2.0 miles WSW	2.2 (9/13) (1.2-3.1)	2.0 (7/22) (1.1-3.3)	
	La-140	-	LLD			LLD	

Note: See footnotes at end of table.

Table 22

SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
(Page 7 of 10)

Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f) (2) (Range)	Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
Precipitation (pCi/l)	H-3 - 34	2000	200 (4/27) (130-290)	Station 9B1 1.3 miles S	290 (1/4) (290-290)	160 (2/7) (120-190)	0
	Gamma Spec - 34						0
	Be-7	-	26 (9/30) (14-35)	Station 12E1 4.7 miles WSW	(1/3) (35-35)	27 (2/4) (21-33)	
	Ba-140	60	LLD			LLD	
	Co-58	15	LLD			LLD	
	Co-60	15	LLD			LLD	
	Cs-134	15	LLD			LLD	
	Cs-137	18	LLD			LLD	
	Fe-59	30	LLD			LLD	
	K-40	-	LLD			LLD	
	La-140	15	LLD			LLD	
	Nb-95	15	LLD			LLD	
	Zn-65	30	LLD			LLD	
	Zr-95	30	LLD			LLD	
	Mn-54	15	LLD			LLD	
Food Products (pCi/kg, wet)	Gamma Spec - 47						0
	Cs-137	80	18 (12/47) (2.3-54)	Station 7B2 1.5 miles SE	54 (1/2) (54-54)	Only indicator locations sampled for this medium	
	K-40	-	4200 (47/47) (830-7900)	Station 12S4 0.5 miles WSW	4300 (14/14) (1200-7900)		
	Be-7	-	180 (22/47) (26-340)	Station 12S4 0.5 miles WSW	160 (8/14) (39-340)		

Note: See footnotes at end of table.

Table 22

SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
(Page 8 of 10)

Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f) (2) (Range)	Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
Food Products (pCi/kg, wet) (cont)	Ba-140	-	LLD				
	Co-58	-	LLD				
	Co-60	-	LLD				
	Cs-134	60	LLD				
	Fe-59	-	LLD				
	I-131	60	LLD				
	La-140	-	LLD				
	Nb-95	-	LLD				
	Mn-54	-	LLD				
	Zn-65	-	LLD				
	Zr-95	-	LLD				
Pasture Grass (pCi/kg, dry)	Gamma Spec - 16						0
	Cs-137	80	17 (5/16) (9.8-30)	Station 15A1 0.9 miles NW	(5/12) (9.8-30)	Only indicator locations sampled for this medium	
	K-40	-	10000 (13/16) (2000-30000)	Station 15A1 0.9 miles NW	12000 (9/12) (2600-30000)		
	Be-7	- -	5300 (15/16) (630-13000)	Station 8D1 3.2 miles SSE	6800 (3/4) (5100-7900)		
	Ba-140	-	LLD				
	Co-58	-	LLD				
	Co-60	-	LLD				
	Cs-134	60	LLD				
	Fe-59	-	LLD				
	I-131	60	LLD				
	La-140	-	LLD				
	Nb-95	-	LLD				
	Mn-54	-	LLD				
	Zn-65	-	LLD				
	Zr-95	-	LLD				

Note: See footnotes at end of table.

Table 22

SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983
(Page 9 of 10)

Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

Medium or Pathway Sampled (Units of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (1)	All Indicator Locations Mean (f) (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f) (2) (Range)	Control Locations Mean (f) (2) (Range)	Number of Nonroutine Reported Measurements
Game (Flesh) (pCi/kg (wet)	Gamma Spec - 13						
	Cs-137	80	1100 (11/11) (15-3600)	Station 16B 1.0-1.3 miles NNW	1900 (1/1) (1900-1900)	Only indicator locations sampled for this medium	0
	K-40	-	3100 (11/11) (2500-3500)	Stations 1B and 16B 1.0-1.3 miles NNW & N	3300 (2/2) (3300-3300)		
	Ba-140	-	LLD				
	Co-58	-	LLD				
	Co-60	-	LLD				
	Cs-134	60	LLD				
	Fe-59	-	LLD				
	I-131	60	LLD				
	La-140	-	LLD				
	Mn-54	-	LLD				
	Nb-95	-	LLD				
	Zn-65	-	LLD				
	Zr-95	-	LLD				
Eggs & Poultry (Flesh) (pCi/kg (wet)	Gamma Spec - 2						
	K-40	-	1800 (2/2) (990-2600)	Only one indicator location was sampled (12B1 1.3 miles WSW).		Only indicator locations sampled for this medium	0
	Ba-140	-	LLD				
	Co-58	-	LLD				
	Co-60	-	LLD				
	Cs-134	60	LLD				
	Cs-137	80	LLD				
	Fe-59	-	LLD				
	I-131	60	LLD				
	La-140	-	LLD				
	Mn-54	-	LLD				
	Nb-95	-	LLD				
	Zn-65	-	LLD				
	Zr-95	-	LLD				

Note: See footnotes at end of table.

Table 22

SUMMARY OF DATA FOR THE SSES OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1983

Name of Facility: Susquehanna Steam Electric Station Docket Nos. 50-387 & 50-388
Location of Facility: Luzerne County, Pennsylvania
Reporting Period: 31 December 1982 to 07 January 1984

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(1) LLD is lower limit of detection as defined and required in PP&L Technical Specifications.

(2) (f) is the ratio of positive results to the number of samples analyzed for the parameter of interest, means are of positive results only.

(3) Station 12H2 was not designated as being Raw or Treated during the first 6 months of 1983. Means were calculated for 12H2 (January - June), 12H2 Raw (June - December), and 12H2 Treated (June - December).

Table 23
(Page 1 of 3)

Nearest Gardens and Residences Identified
During the 1983 SSES Annual Land Use Survey

Sector	Direction	Nearest Residence (Distance/Address)	Nearest Garden (Distance/Address)
1	N	0.6 miles Thomas Residence R. D. 1 Berwick	0.6 miles Thomas Residence R. D. 1 Berwick
2	NNE	1.0 miles Robbins Residence R. D. 1 Berwick	1.1 miles Gordon Residence R. D. 1 Berwick
3	NE	2.3 miles Reinhimer Residence R. D. 1, Box 34B Wapwallopen	2.3 miles Reinhimer Residence R. D. 1, Box 34B Wapwallopen
4	ENE	2.1 miles Knouse Residence R. D. 1, Box 357A Wapwallopen	2.4 miles Rennensnyder Residence R. D. 1, Box 354 Wapwallopen
5	E	0.5 miles Walter's Residence * R. D. 1 Berwick	0.5 miles Walter's Residence * R. D. 1 Berwick
6	ESE	0.5 miles Zwolinski Residence R. D. 1 Berwick	1.4 miles Woodcrest Farm R. D. 1, Box 20 Wapwallopen

Note: See footnote at end of table.

Table 23
(Page 2 of 3)

Nearest Gardens and Residences Identified
During the 1983 SSES Annual Land Use Survey

Sector	Direction	Nearest Residence (Distance/Address)	Nearest Garden (Distance/Address)
7	SE	0.4 miles Kline Residence R. D. 1 Berwick	0.4 mile Kline Residence R. D. 1 Berwick
8	SSE	0.7 miles Naunczek Residence R. D. 1, Bell Bend Road Berwick	0.7 miles Naunczek Residence R. D. 1, Bell Bend Road Berwick
9	S	1.1 miles Bower Residence R. D. 1 Berwick	1.2 miles Cope Residence R. D. 1, Box 274 Berwick
10	SSW	1.5 miles Rehrig Residence R. D. 1 Berwick	1.5 miles Rehrig Residence R. D. 1 Berwick
11	SW	0.6 miles Shortz Residence * R. D. 1 Berwick	0.6 miles Shortz Residence * R. D. 1 Berwick
11	SW	0.8 miles Sink Residence R. D. 1 Berwick	0.8 miles Sink Residence R. D. 1, Box 247 Berwick

Note: See footnote at end of table.

Table 23
(Page 3 of 3)

Nearest Gardens and Residences Identified
During the 1983 SSES Annual Land Use Survey

Sector	Direction	Nearest Residence (Distance/Address)	Nearest Garden (Distance/Address)
12	WSW	1.2 miles Kisner Residence R. D. 1 Berwick	1.2 miles Kisner Residence. R. D. 1 Berwick
13	W	0.8 miles Johnson Residence R. D. 1, Box 240 Berwick	1.3 miles Hummel Residence R. D. 1, Box 230 Berwick
14	WNW	0.8 miles Folk Residence R. D. 1, Box 241 Berwick	0.8 miles Folk Residence R. D. 1, Box 241. Berwick
15	NW	0.9 miles Serafin Residence R. D. 1 Berwick	0.9 miles Serafin Residence R. D. 1 Berwick
16	NNW	0.7 miles Metzler Residence R. D. 1 Berwick	1.4 miles Vogt Residence R. D. 1, Box 96 Berwick

* PP&L property.

Table 24

Nearest Dairy Animals by sector, Identified During the 1983 SSES Annual Land Use Survey

Sector	Direction	Nearest Dairy Animals
1	N	>5 miles
2	NNE	>5 miles
3	NE	>5 miles
4	ENE	2.7 miles Leroy Hess
5	E	4.5 miles Wilbur Bloss *
6	ESE	2.4 miles Luther Travelpiece
7	SE	2.6 miles Joseph Zajac
8	SSE	3.2 miles Poltrock Farm *
9	S	2.4 miles Guy THomas, S. Morris
10	SSW	3.0 miles Ross Ryman *
11	SW	3.5 miles Walter Ryman
12	WSW	1.7 miles Frederick Shultz
13	W	5.0 miles Jack Dent *
14	WNW	>5 miles
15	NW	0.9 miles Michael Serafin *
16	NNW	4.2 miles Harold Shoemaker

* Milk sampling location.

Table 25
(Page 1 of 4)

Comparison of Data from the NUS-RMC Overlap Period[1]
SSES REMP 1983

Medium	Station	Collection Date	Analysis	Nuclide	NUS Data[2]	RMC Data[3]
Fish (pCi/kg (wet))	IND	05/19/83	Gamma	K-40	2700 ± 400	3200 ± 400
	IND	05/19/83	Gamma	K-40	3600 ± 500	3600 ± 400
				Cs-137	LT 30[4]	15 ± 8
	IND	05/27/83	Gamma	K-40	3100 ± 500	2900 ± 300
				Cs-137	LT 30	18 ± 8
	2H	05/31/83	Gamma	K-40	2700 ± 500	3500 ± 400
	2H	05/31/83	Gamma	K-40	2800 ± 300	3300 ± 400
				Cs-137	LT 20	11 ± 5
	2H	06/01/83	Gamma	K-40	2400 ± 400	2800 ± 300
	2H	06/01/83	Gamma	K-40	3100 ± 500	3400 ± 400
	IND	06/14/83	Gamma	K-40	3000 ± 500	3600 ± 400
				Cs-137	LT 20	17 ± 7
Sediment (pCi/kg, (dry))	2B	05/26/83	Gamma	Ac-228	860 ± 210	ND[5]
				Bi-214	740 ± 140	ND
				K-40	8700 ± 1300	8100 ± 900
				Pb-212	470 ± 70	ND
				Pb-214	850 ± 130	ND
				Ra-226	790 ± 140	530 ± 60
				Tl-208	800 ± 170	ND
				Cs-137	LT 90	70 ± 24
				Th-232	ND	680 ± 80
	7B			Ac-228	770 ± 200	ND
				Bi-212	990 ± 610	ND
				Bi-214	680 ± 130	ND
				Cs-137	LT 100	58 ± 19
				K-40	8500 ± 1300	8300 ± 900
				Pb-212	540 ± 80	ND
				Pb-214	840 ± 140	ND
				Ra-226	760 ± 140	530 ± 60
				Tl-208	800 ± 170	ND
				Th-232	ND	680 ± 80

Note: See footnote at end of table.

Table 25
(Page 2 of 4)

Comparison of Data from the NUS-RMC Overlap Period(1)
SSES REMP 1983

Medium	Station	Collection Date	Analysis	Nuclide	NUS Data(2)	RMC Data(3)
Sediment (pCi/kg,(dry)) (cont.)	11C			Ac-228	770 ± 220	ND
				Bi-214	790 ± 140	ND
				Cs-137	LT 100	64 ± 27
				K-40	6300 ± 1000	7700 ± 800
				Pb-212	630 ± 110	ND
				Pb-214	730 ± 130	ND
				Ra-226	760 ± 140	680 ± 70
				Tl-208	780 ± 170	ND
				Th-232	ND	720 ± 100
	2F	05/26/83	Gamma	Ac-228	1100 ± 200	ND
				Bi-212	1100 ± 600	ND
				Bi-214	970 ± 150	ND
				Cs-137	190 ± 60	240 ± 40
				K-40	13000 ± 2000	11000 ± 2000
				Pb-212	780 ± 90	ND
				Pb-214	1100 ± 200	ND
				Ra-226	1000 ± 200	770 ± 80
				Tl-208	1100 ± 200	ND
				Th-232	ND	1100 ± 200
	12F			Ac-228	900 ± 180	ND
				Bi-212	820 ± 120	ND
				Co-58	LT 120	130 ± 40
				Cs-137	LT 90	91 ± 24
				K-40	6400 ± 800	8800 ± 900
				Mn-54	LT 80	65 ± 28
				Pb-212	670 ± 100	ND
				Pb-214	770 ± 110	ND
				Ra-226	790 ± 120	690 ± 70
				Tl-208	930 ± 150	ND
				Th-232	ND	880 ± 90
	2B	05/26/83	Gross Alpha	NA	5400 ± 3700	3200 ± 2900
	7B			NA	6800 ± 3900	2900 ± 2900
	11C			NA	8800 ± 4200	LT 4000
	2F			NA	9900 ± 4300	4400 ± 3100
	12F			NA	5500 ± 3700	LT 4000

Note: See footnote at end of table.

Table 25
(Page 3 of 4)

Comparison of Data from the NUS-RMC Overlap Period[1]
SSES REMP 1983

Medium	Station	Collection Date	Analysis	Nuclide	NUS Data[2]	RMC Data[3]
Water SW [6] (pCi/l)	6S7	04/08/83 to 06/05/83	Gamma	Co-58	28 ± 12	45 ± 5
				Co-60	LT 9	9.2 ± 1.2
				Fe-59	LT 40[7]	5.8 ± 2.2
				Mn-54	41 ± 7	37 ± 4
	6S7	06/05/83 to 07/06/83	Gamma	Co-58	LT 5	0.91 ± 0.57
				Mn-54	LT 3	0.94 ± 0.38
	6S5	06/08/83 to 06/27/83	Gamma	Co-60	LT 4	0.88 ± 0.52
(All other overlapping results (16 water samples for gamma spec analysis)were LLD's)						
SW	6S5	06/08/83 to 06/27/83	Gross Beta	NA	LT 2	1.7 ± 1.2
	6S7	06/05/83 to 07/06/83		NA	5.2 ± 3.4	6.4 ± 1.4
	1D3	06/14/83		NA	4.3 ± 1.5	2.3 ± 1.1
	13E1	06/14/83		NA	LT 2	1.6 ± 1.0
	12F1	06/14/83 (8)		NA	LT 2	3.4 ± 1.1
	12G2	06/14/83		NA	LT 5	2.2 ± 1.1
	6S7	04/08/83 to 06/05/83		NA	28 ± 4	39 ± 4
	12H1	05/05/83 to 06/14/83		NA	LT 2	2.2 ± 1.1
GW [9]	2S6	06/15/83	Gross Beta	NA	LT 2	1.2 ± 1.0
	3S5	06/15/83		NA	LT 2	1.7 ± 1.0
	4S2	06/15/83		NA	3.9 ± 1.5	LT 1.5
	4S4	06/15/83		NA	4.0 ± 1.5	LT 1.5
	11S5	06/15/83		NA	LT 2	1.2 ± 1.0
	15A4	06/15/83		NA	6.0 ± 1.5	6.0 ± 1.3
	12E4	06/14/83		NA	LT 2	1.9 ± 1.0
	12F3	06/14/83		NA	LT 2	2.3 ± 1.3
PW [10]	12F3	05/05/83 to 06/14/83	Gross Beta	NA	2.0 ± 1.4	1.6 ± 1.0
SW	12G2	06/14/83	Iodine		LT 0.15	0.17 ± 0.04

Note: See footnote at end of table.

Table 25
(Page 4 of 4)

Comparison of Data from the NUS-RMC Overlap Period(1)
SSES REMP 1983

Medium	Station	Collection Date	Analysis	Nuclide	NUS Data(2)	RMC Data(3)
Milk	12B2	06/15/83	Gamma	K-40	1600 ± 200	1300 ± 200
(pCi/l)	5E1	06/15/83		K-40	2100 ± 300	1400 ± 200
				Cs-137	LT 2	2.1 ± 1.0
	13E3	06/15/83		K-40	2200 ± 300	1500 ± 200
				Cs-137	LT 3	1.6 ± 0.9
	10G1	06/15/83		K-40	1800 ± 200	1300 ± 200
				Cs-137	LT 3	1.1 ± 0.7
	12B2	06/27/83		K-40	1300 ± 200	1400 ± 200
				Cs-137	LT 1.8	1.5 ± 0.8
	5E1	06/28/83		K-40	1200 ± 200	1400 ± 200
	13E3	06/27/83		K-40	1500 ± 200	1200 ± 200
				Cs-137	1.7 ± 0.8	1.4 ± 0.9
	10G1	06/27/83		K-40	1500 ± 200	1200 ± 200
				Cs-137	1.4 ± 0.8	3.2 ± 0.9
Food Products (pCi/kg, (wet))	7S5 (Spinach)	06/28/83	Gamma	K-40	4200 ± 500	4900 ± 500
				Be-7	160 ± 20	LT 170
				Cs-137	2.3 ± 1.6	LT 19
	7S5 (Lettuce)	06/28/83		K-40	2600 ± 300	3800 ± 400
				Be-7	120 ± 20	LT 190
				Cs-137	4.8 ± 1.8	LT 22
	7S5 (Endive)	06/28/83		K-40	4100 ± 500	3900 ± 400
				Be-7	210 ± 30	190 ± 70
				Cs-137	14 ± 2	LT 14

(1) Data in this table is limited to the results of the analyses of replicate samples which were analyzed by both RMC and NUS and for which a non LLD result was reported by either NUS, RMC, or both.
(2) Samples collected and analyzed by NUS
(3) Samples collected and analyzed by Radiation Management Corporation
(4) LT = Less Than
(5) ND = Not Detected
(6) SW means surface water.
(7) Lower sensitivity due to delay in counting.
(8) RMC lists collection date as 06/15/83.
(9) GW means ground water.
(10) PW means potable water.

FIGURES

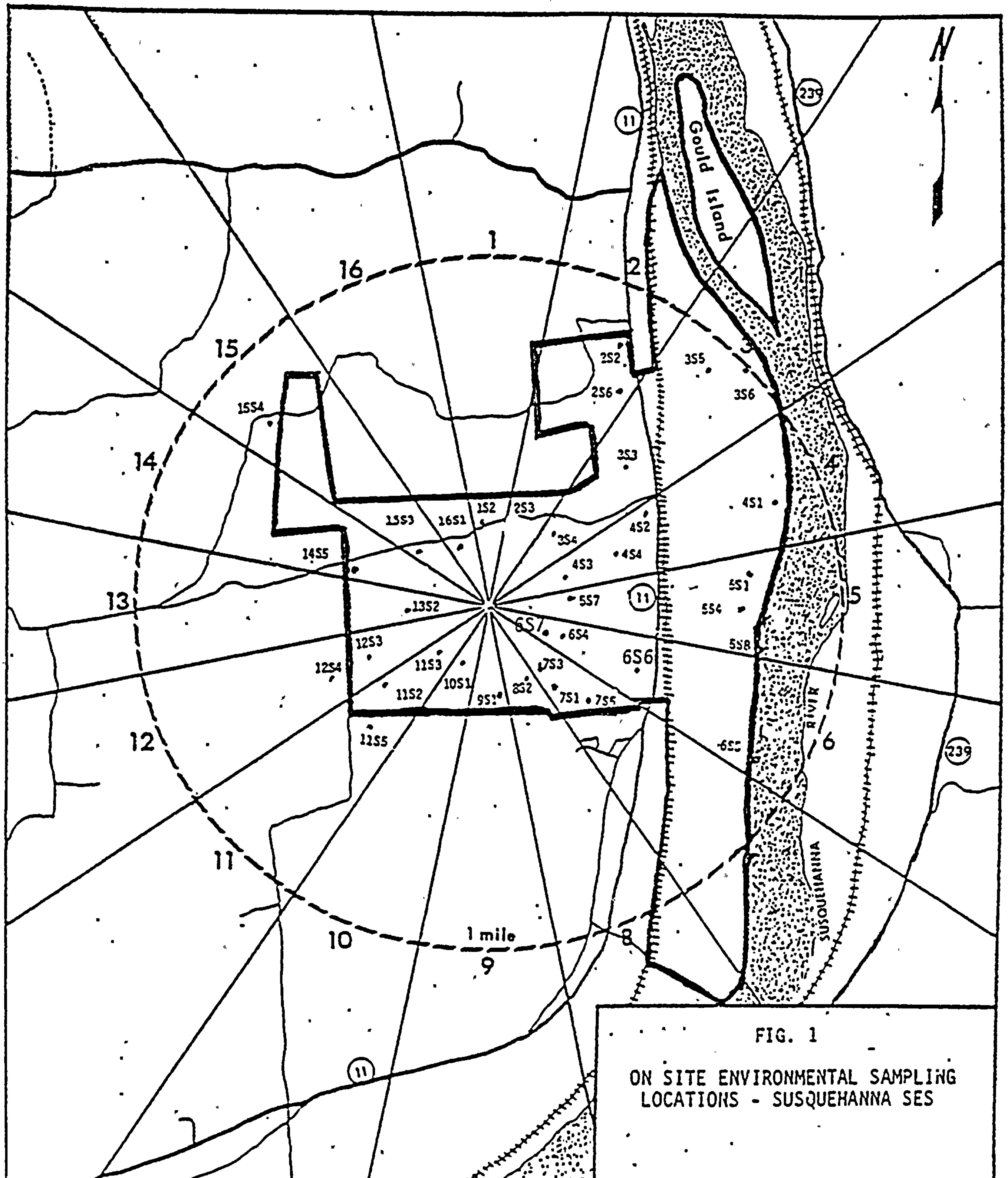


FIG. 1

ON SITE ENVIRONMENTAL SAMPLING LOCATIONS - SUSQUEHANNA SES

FIG. 2

OFF SITE ENVIRONMENTAL SAMPLING LOCATIONS - SUSQUEHANNA SES

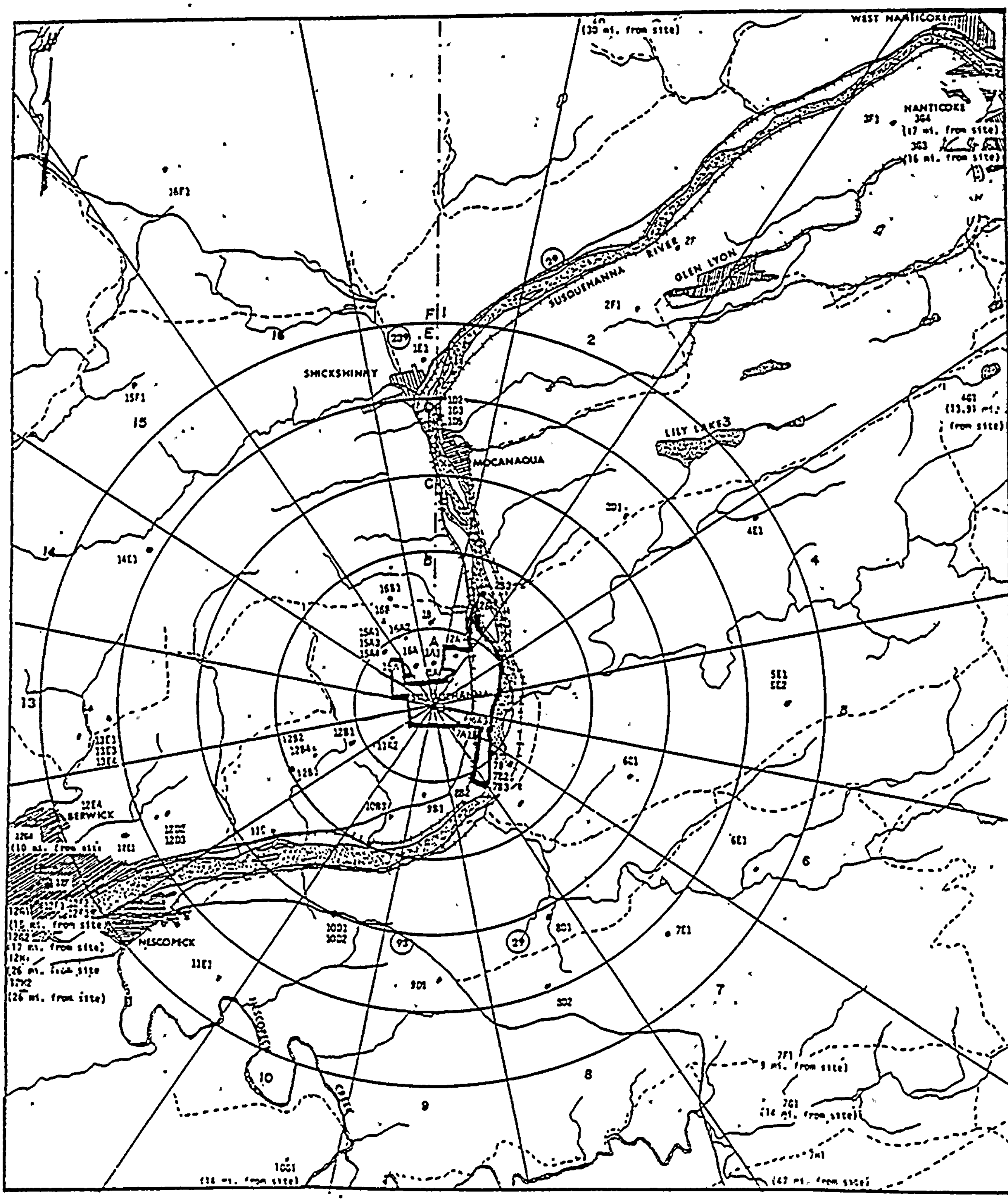


FIG. 3. AVERAGE AMBIENT RADIATION LEVELS
IN THE VICINITY OF THE SSES
1973 THROUGH 1983

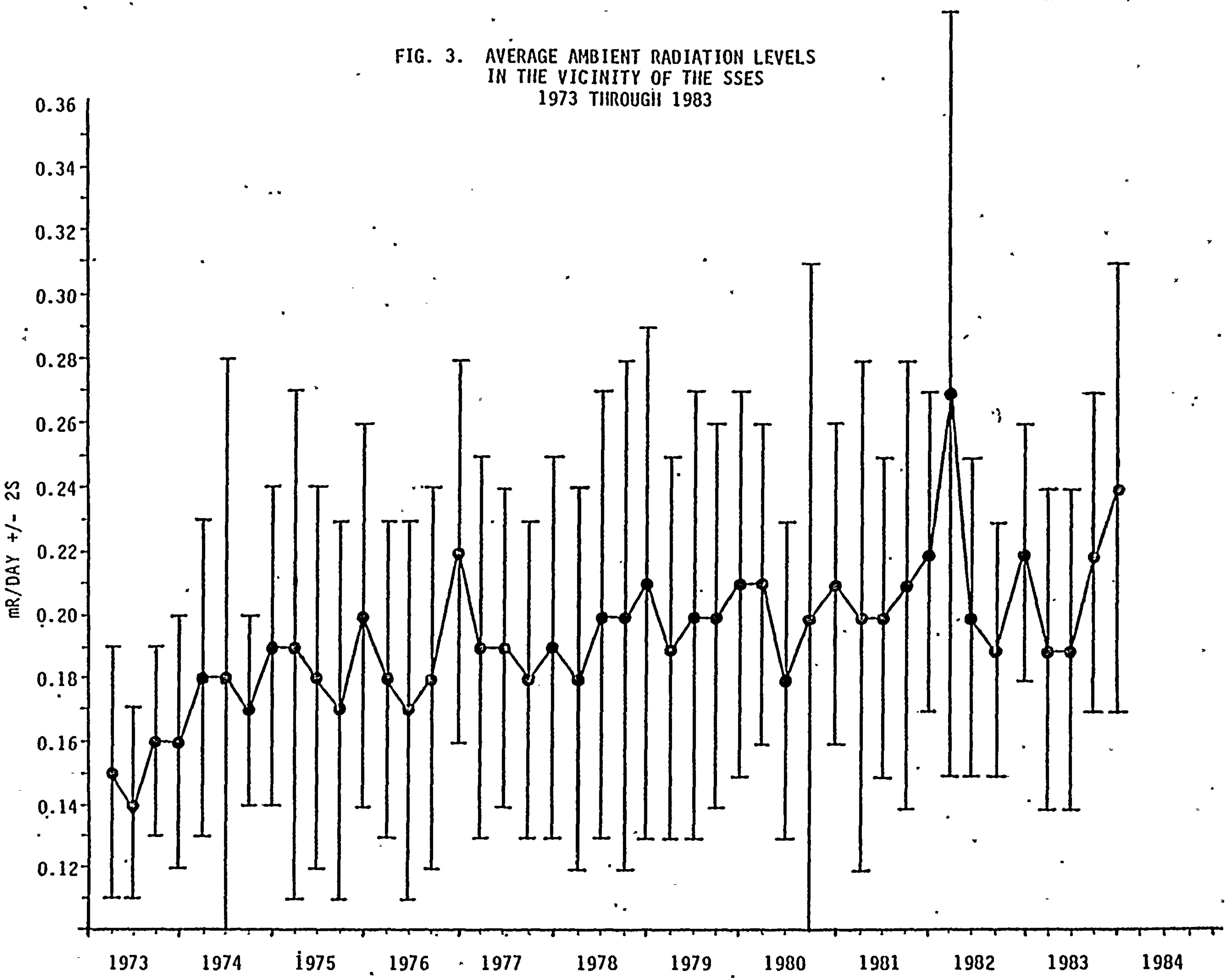


FIG. 4. GROSS BETA ACTIVITY IN AIR PARTICULATES IN THE VICINITY OF THE SSES - 1983

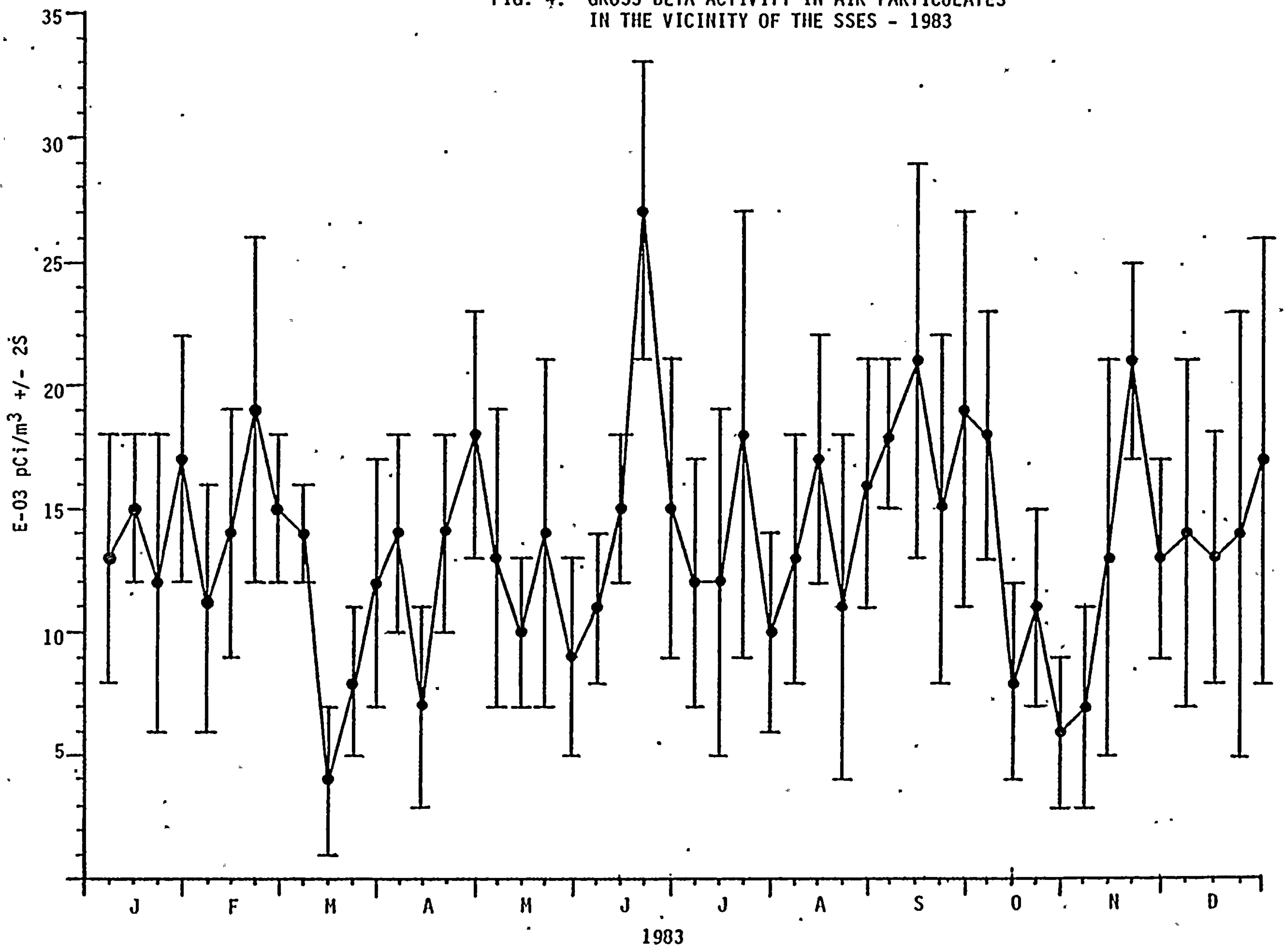


FIG. 5. GROSS BETA ACTIVITY IN AIR PARTICULATES IN THE VICINITY OF THE SSES 1973 THROUGH 1983

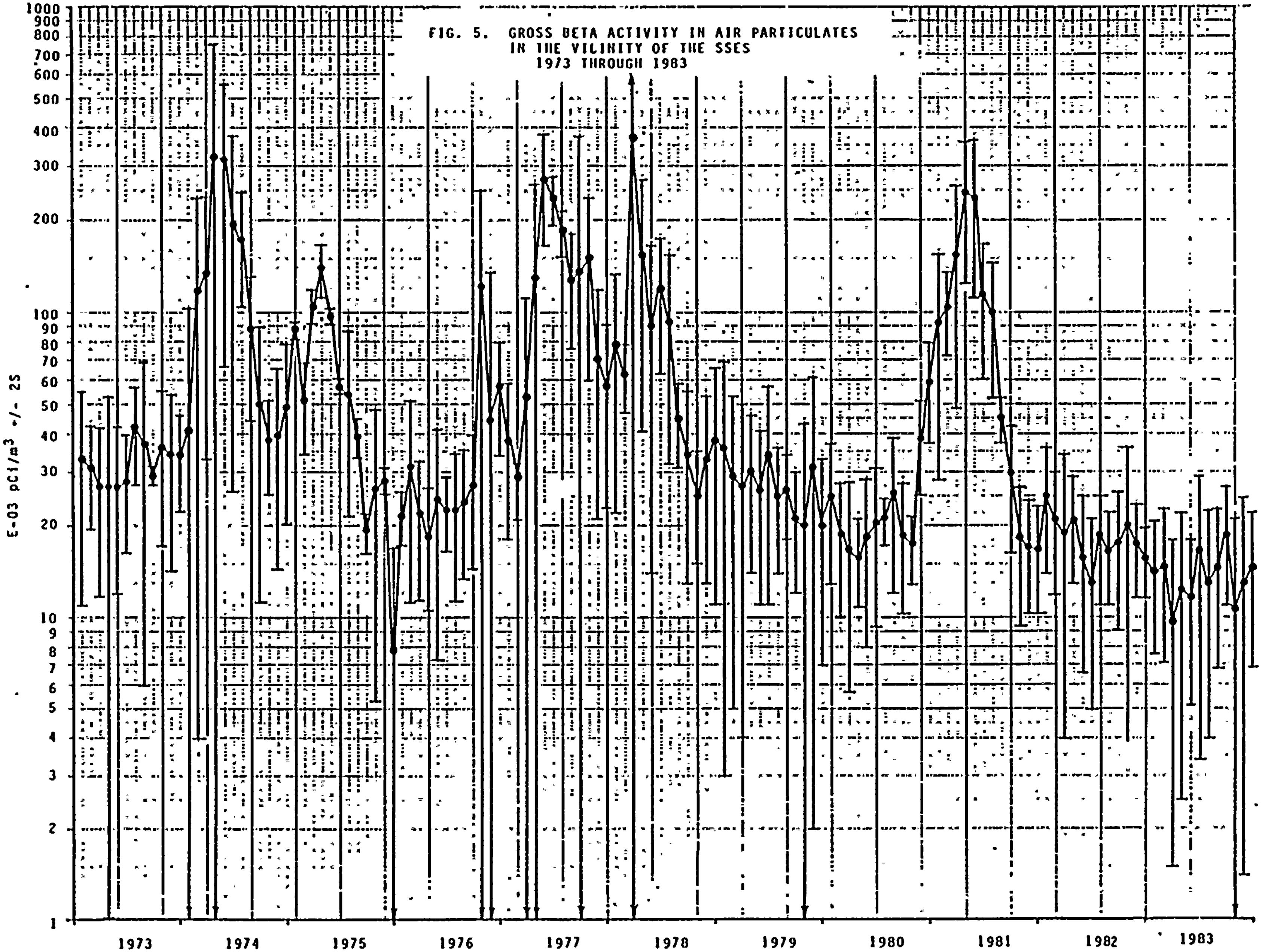
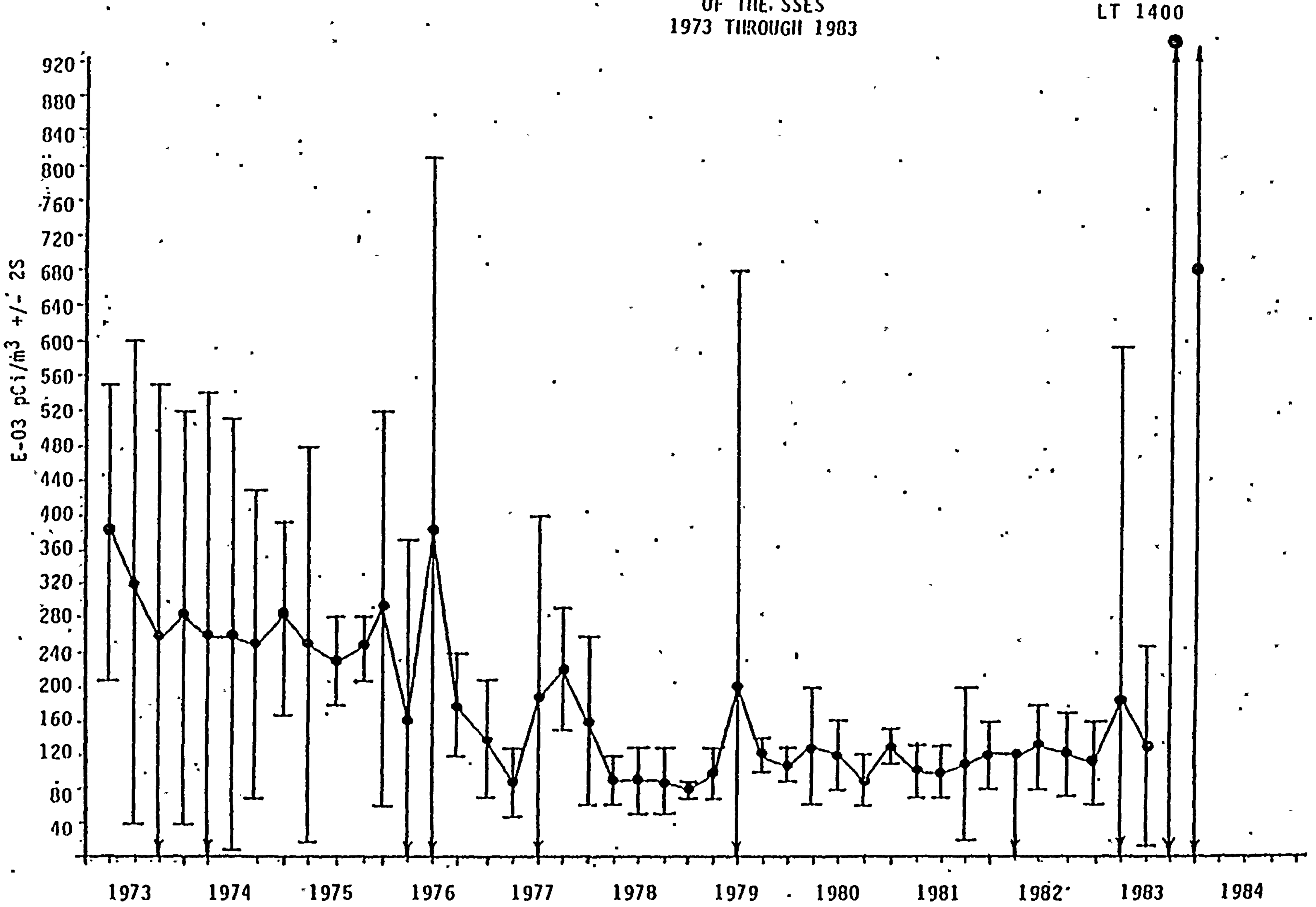


FIG. 6. AVERAGE CONCENTRATIONS OF TRITIUM IN SURFACE WATER IN THE VICINITY OF THE SSES 1973 THROUGH 1983



Appendix A

USEPA Intercomparison Program Results

APPENDIX A

USEPA INTERCOMPARISON PROGRAM RESULTS

The quality assurance procedures employed in the conduct of radiological monitoring programs by the Environmental Services Division Radiological Laboratory are as required in Section 5.0 of the NUS Environmental Services Division Quality Assurance Manual, 9019-XX, and are detailed in the NUS Radiological Laboratory Work Instruction. These procedures include the requirement for laboratory analysis of samples distributed by appropriate government or other standards-maintaining agencies in the laboratory intercomparison program.

Tables are also included which list the results of Radiation Management Corporation's participation in the program. RMC data is drawn from its Quality Control Data Report from June 1983, RMC-QA-83-06. Presentation varies slightly between the two tables. In both cases the laboratory data is compared to the expected EPA result. However, the RMC tables give the expected laboratory precision as the one standard deviation value calculated by the EPA for a single determination. NUS tables present the EPA's expected one standard deviation of three determinations. This value is generally lower (ie. tighter distribution about the mean) than that given by RMC. For comparison purposes, LLD's listed in the table should be treated as the value ± 100% (2s).

The NUS Radiological Laboratory participates in the U. S. Environmental Protection Agency Radioactivity Intercomparison Studies (Cross-check) Program. The NUS results of analyses performed on samples pertinent to the Susquehanna SES program during 1983, and the known values are listed in Table A-1 through H-1.

RESULTS OF 1983 EPA INTERCOMPARISON PROGRAM

A. Gross Alpha Analysis
   1. Water - NUS
   2. Water and Air Particulates (Gross Alpha and Gross Beta) - RMC

B. Gross Beta Analysis
   1. Water - NUS

C. Gamma Spectral Analysis
   1. Milk - NUS
   2. Water - NUS
   3. Water, MIlk, Food Products and Air Particulate Filters - RMC

D. Iodine-131
   1. Milk - NUS
   2. Water - NUS
   3. Water - RMC

E. Tritium
   1. Water - NUS
   2. Water and Urine - RMC

F. Radionuclides on Air Particulate - NUS

G. EPA "Blind" Analysis (water) - NUS

H. Results of Sixth International Intercomparison of Environmental Dosimeters - NUS

A-1

GROSS ALPHA IN WATER - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	EPA Results $\pm$ 1s (pCi/l)	NUS Results $\pm$ 1s (pCi/l)
01/21/83	29 $\pm$ 4	30 $\pm$ 1
03/18/83	31 $\pm$ 4	31 $\pm$ 2
05/20/83	11 $\pm$ 3	16 $\pm$ 2
07/15/83	7.0 $\pm$ 2.9	11 $\pm$ 1
11/18/83	14 $\pm$ 5	11 $\pm$ 0 (1)

(1) Value not reported to EPA in time to be included in report.

Gross Alpha and Gross Beta in Water
and Air Particulate Filters - RMC

USEPA Intercomparison Program - 1983

Date	RMC #	Isotopes	Unit	RMC Mean±s.d.	EPA Mean±s.d.	All Partici Mean±s.d
Jan 1983	92776 Water	α	pCi/l	15±1 (a)	29±7	26±6
		β	pCi/l	30±0	31±5	32±5
Mar 1983	95367 Water	α	pCi/l	8±1 (a)	31±8	27±8
		β	pCi/l	9±2 (a)	28±5	28±4
Mar 1983	96530 APT	α	pCi/filter	26±1	26±11	*
		β	pCi/filter	69±1	68±9	*
May 1983	97241 Water	α	pCi/l	29±2	*	*
		β	pCi/l	87±2	*	*
May 1983	97490 Water	α	pCi/l	2.9±0.1	11±9	*
		β	pCi/l	19±1	57±9	*

* Full reports are not available from the EPA, and will be included as soon as they are received.

(a): Under investigation.

B-1

GROSS BETA IN WATER - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	EPA Results ± 1s (pCi/l)	NUS Results ± 1s (pCi/l)
01/21/83	31 ± 3	33 ± 1
03/18/83	28 ± 3	24 ± 2
05/20/83	57 ± 6	46 ± 5
07/15/83	22 ± 3	27 ± 2
11/18/83	16 ± 5	14 ± 1 (1)

(1) Value not reported to EPA in time to be included in report.

C-1

GAMMA SPECTRAL OF MILK - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	Nuclide	EPA Results ± 1s (pCi/l)	NUS Results ± 1s (pCi/l)
02/25/83	Cs-137	26 ± 3.0	28 ± 1
	Ba-140	0.0 ± 0.0	LT 15
	K-40	1512 ± 40(mg/l)	1530 ± 200(mg/l)
06/10/83	Cs-137	47 ± 3	46 ± 3
	K-40	1486 ± 43(mg/l)	1500 ± 100(mg/l)
10/28/83	Cs-137	33 ± 5.8	32 ± 2
	K-40	1550 ± 90(mg/l)	1633 ± 57

LT = Less Than

GAMMA SPECTRAL OF WATER - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	Nuclides	EPA Results ± 1s (pCi/l)	NUS Results ± 1s (pCi/l)
02/04/83	Cr-51	45 ± 3	LT 40
	Co-60	22 ± 3	22 ± 2
	Zn-65	21 ± 3	19 ± 1
	Ru-106	48 ± 3	41 ± 8
	Cs-134	20 ± 3	20 ± 1
	Cs-137	19 ± 3	20 ± 0
06/03/83	Cr-51	60 ± 3	LT 80
	Co-60	13 ± 3	14 ± 1
	Zn-65	36 ± 3	37 ± 5
	Ru-106	40 ± 3	LT 50
	Cs-134	47 ± 3	42 ± 2
	Cs-137	26 ± 3	26 ± 2
10/07/83	Cr-51	51 ± 5	35 ± 6(1)
	Co-60	19 ± 5	19 ± 1
	Zn-65	40 ± 5	39 ± 1
	Ru-106	52 ± 5	40 ± 3
	Cs-134	15 ± 5	13 ± 1
	Cs-137	22 ± 5	22 ± 1

LT - Less Than

(1) Average counting error for these analyses war ± 14 which overlap the EPA warning and control limits.

Gamma Spectrometry of Water, Milk,
Food Products and Air Particulate Filters - RMC

USEPA Intercomparison Program - 1983

Date	RMC #	Isotope	Unit	RMC Mean±s.d.	EPA Mean±s.d.	All Participants Mean±s.d.
Feb 1983	93729 G09 Water	Cr-51	pCi/l	<100	45±5 (a)	48±10
		Co-60	pCi/l	20±2	22±5	23±3
		Zn-65	pCi/l	26±2	21±5	22±5
		Ru-106	pCi/l	53±3	48±5	47±10
		Cs-134	pCi/l	20±1	20±5	20±3
		Cs-137	pCi/l	18±3	19±5	19±3
Feb 1983	94233 G69 Milk	I-131	pCi/l	56±8	55±5	55±5
		Cs-137	pCi/l	27±1	26±5	26±4
		Ba-140	pCi/l	<63	0	-
		K	mg/l	1643±117	1512±76	1517±162
Mar 1983	94568 G69 Food	I-131	pCi/kg	37±2	37±6	37±4
		Cs-137	pCi/kg	36±1	31±5	33±3
		Ba-140	pCi/kg	<60	0	-
		K	mg/kg	2934±0	2592±130	2649±280
Mar 1983	96530 GB9 APT	Cs-137	pCi/filter	39±3	27±9	*
May 1983	97241 G09 Water	Co-60	pCi/l	31±4	*	*
		Cs-134	pCi/l	32±1	*	*
		Cs-137	pCi/l	25±0	*	*
June 1983	97810 G09 Water	Cr-15	pCi/l	<54	*	*
		Co-60	pCi/l	14±1	*	*
		Zn-65	pCi/l	34±6	*	*
		Ru-106	pCi/l	40±4	*	*
		Cs-134	pCi/l	42±1	*	*
		Cs-137	pCi/l	25±2	*	*
June 1983	97824 G69 Milk	I-131	pCi/l	29±1	*	*
		Cs-137	pCi/l	46±3	*	*
		K	mg/l	1408±0	*	*

* Full reports are not available from the EPA, and will be included as soon as they are received.

(a): Positive activity was not detected due to the low sensitivity of the analysis for Cr-51.

D-1

IODINE IN MILK - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	EPA Results ± 1s (pCi/l)	NUS Results ± 1s (pCi/l)
02/25/83	55 ± 3	56 ± 6
06/10/83	30 ± 3	43 ± 0(1)
10/28/83	40 ± 6.93	27 ± 1.7

(1) Only one number reported due to improper preparation of sample. Insufficient data to determine statistics.

D-2

IODINE-131 IN WATER - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	EPA Results ± 1s (pCi/l)	NUS Results ± 1s (pCi/l)
12/03/82	37 ± 3	35 ± 3
04/01/83	27 ± 3	25 ± 3
08/05/83	14 ± 6	11 ± 1
12/16/83	20 ± 6	16 ± 1

Iodine in Water - RMC

USEPA Intercomparison Program - 1983

Date	RMC #	Unit	RMC Mean±s.d.	EPA Mean±s.d.	All Participants Mean±s.d.
Apr 1983	95633 Water	pCi/l	23±4	27±6	27±5

E-1

TRITIUM IN WATER - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	EPA Results ± 1s (pCi/l)	NUS Results ± 1s (pCi/l)
02/11/83	2560 ± 204	2530 ± 140
04/08/83	3330 ± 210	3500 ± 0
06/10/83	1529 ± 194	1333 ± 58
08/12/83	1836 ± 198	1900 ± 200
10/14/83	1210 ± 190	1167 ± 58
12/09/83	2389 ± 203	2333 ± 58

Tritium in Water and Urine - RMC

USEPA Intercomparison Program - 1983

Date	RMC #	Unit	RMC Mean±s.d.	EPA Mean±s.d.	All Participants Mean±s.d.
Feb 1983	93757 Water	pCi/l	2527±136	2560±353	2534±273
Mar. 1983	95221 Urine	pCi/l	2600±115	2470±352	2349±367
Apr 1983	96405 Water	pCi/l	3257±50	3330±362	3298±241
June 1983	98042 Water	pCi/l	1600±87	*	*
June 1983	97807 Urine	pCi/l	1403±49	*	*

* Full reports are not available from the EPA, and will be included as soon as they are received.

F-1

RADIONUCLIDES ON AIR PARTICULATE - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	Radionuclide	EPA Value ±1s (pCi/filter)	NUS Value ±1s (pCi/filter)	
03/25/83	Alpha	26 ± 3.7	27.3 ± 2	(1)
	Beta	68 ± 3	68 ± 1	
	Sr-90	20 ± 1	22 ± 2	
	Cs-137	27 ± 3	29 ± 6	
08/26/83	Alpha	13 ± 5	10 ± 2	
	Beta	36 ± 5	35 ± 5	
	Sr-90	10 ± 1.5	125 ± 5	(2)
	Cs-137	15 ± 5	13 ± 5	
11/25/83	Alpha	19 ± 2.9	26.7 ± 1.5	
	Beta	50 ± 2.9	53.7 ± 1.2	

(1) Value from original EPA report was incorrect. Report value is recalculated with correct efficiency.

(2) Anomalous results under investigation.

G-1

EPA "Blind" Analysis (water) - NUS

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	Nuclide	EPA Value ± 1s (pCi/l)	NUS Value ± 1s (pCi/l)
05/09/83	Alpha	64 ± 16	57 ± 4 (1)
	Beta	149 ± 7.5	123 ± 6 (1)
	Sr-89	24 ± 3	27 ± 3
	Sr-90	13 ± 1	17 ± 1
	Ra-226	8.5 ± 0.8	9.2 ± 0.1
	Ra-228	4.7 ± 0.4	3.3 ± 0.4
	Co-60	30 ± 3	31 ± 1
	Cs-134	33 ± 3	29 ± 2
	Cs-137	27 ± 3	25 ± 2
	U	25 ± 3	25 ± 2
11/14/83	Alpha	22 ± 5.5	21 ± 2
	Beta	63 ± 5	58 ± 4
	Sr-89	17 ± 5	25 ± 3
	Sr-90	8 ± 1.5	10.57 ± 2.21
	Ra-226	5.1 ± 0.8	5.5 ± 0.3
	Ra-228	2.8 ± 0.4	1.73 ± .23
	Co-60	11 ± 5	15.33 ± 3.1 (2)
	Cs-137	15 ± 5	9.17 ± 3.0
	Cs-134	15 ± 5	9.9 ± 1.82
	U	11 ± 6	12 ± 0

(1) Original EPA report was incorrect, corrected EPA value did not include an error
(2) NUS value is average of one positive value and two LLD's which were reported.

H-1

Results of Sixth International Intercomparison
of Environmental Dosimeters - NUS

	Expected Value ±1s (mR)	NUS Value ±1s (mR)
Field Exposure	43.5 ± 2.2	51.2 ± 7.9
Field Exposure (pre-irradiated)	202 ± 10	218 ± 13
Lab Exposure	158 ± 8	161 ± 11

Appendix B

Summary of Analytical Methods

APPENDIX B

SUMMARY OF ANALYTICAL METHODS

This appendix summarizes the methods used by NUS for sample analysis in the conduct of the Susquehanna SES REMP. Data reporting conventions are discussed in Appendix C.

All SSES REMP samples received by RMC during 1983 were analyzed in accordance with pertinent "Controlled Copy" procedures. In addition, the procedure summaries presented in the 1982 SSES Annual Report would be applicable to the 1983 samples analyzed by RMC (11, 19).

ANALYSIS FOR GROSS ALPHA AND GROSS BETA ACTIVITIES

Determination of Gross Alpha and Gross Beta Activity in Water

A distilled water blank and the current reference standard are processed with each batch of samples.

A 200 milliliter aliquot of each sample is measured into an appropriate glass beaker. A proportioniately smaller volume is used if the sample is known to contain solids in excess of 500 mg/l. The aliquot is evaporated to near dryness on a hot plate, utilizing caution as sample approaches dryness to insure sample does not spatter out of the beaker. A 5 milliliter portion of 16 N HNO_3 is added and evaporated to dryness.

The walls of the beaker are rinsed with a few milliliters of 1 N HNO_3 and swirled to loosen the residue. The aliquot concentrate is quantitatively transferred in small portions (not more than 5 milliliters at a time) to a tared, stainless steel planchet. Each portion is evaporated to dryness under an infrared lamp or in a drying oven set to 105°C.

The planchet is cooled in a desiccator and weighed. The sample residue is stored in a desiccator until ready for counting. The planchet is counted on a gas-flow proportional counter for 200 minutes.

Determination Of Gross Alpha Activity In Sediment

Aggregate material from a sediment sample is broken up and any rocks are retained for future weighing. The sample is dried in a drying oven at about 105°C until dry, usually 24 hours. After grinding with a mortar and pestle, the sample is sieved through a No. 10 standard sieve. If there is any uncrushable, unsievable material, it is removed, weighed with the rocks from the initial sorting and all are discarded. After sieving, the sample is blended and stored for use in the appropriate analyses.

For gross alpha and/or beta analysis, a 100 milligram aliquot of dried, well-blended sample is accurately weighed into a tared 2-inch stainless steel planchet. The sample is slurried with a few drops of water to distribute it uniformly on the planchet and dried under a heat lamp. The planchet is cooled in a desiccator and weighed. The sample residue is stored in a desiccator until ready for counting.

The planchet is counted in a low-background gas proportional counter for 100 minutes. An empty, clean stainless steel planchet is used as the background sample for this analysis.

Determination of Gross Beta Activity On Air Filters

The air filter is placed in a 2 inch stainless steel planchet with the dirty side of the filter face up. If the filter edges curl or otherwise present a 'nonflat' surface, the filter is fixed to bottom of planchet.

The background/blank is determined by counting an unused filter of the same type as used to collect the samples. This should be from the same vendor's batch if at all possible. A filter of the same material (glass fiber, paper, membrane, etc.) is a reasonable substitute.

Each filter is counted for 40 minutes in a low-background gas proportional counter. After counting is completed, the filter is returned to its original envelope to be retained for future analyses.

The efficiency used for this calculation is that for a weightless source.

Determination of Gross Alpha Activity In Composited Air Filters

Composited air filters are transferred to a beaker. A 100 milliliter aliquot of 6 N HCl is slowly added while stirring. The filters are leached by stirring overnight or by heating on a hot plate at medium heat for several hours.

After the filters have been leached, the acid solution is filtered through a glass-fiber filter. The filter is washed with 6 N HCl and again with hot deionized water. The combined filtrates are diluted to a known volume amd stored for subsequent analyses.

For gross alpha analysis a known, appropriately sized aliquot is transferred to a glass beaker. Aliquot size is determined by the sensitivity required and the numbers of additional analyses to be performed on the composite. The aliquot is evaporated to near dryness on a hot plate. Several 5 milliliter portion of 16 N HNO_3 are added and evaporated to dryness.

The beaker is rinsed with a few milliliters of 1 N HNO_3 and the aliquot concentrate is quantitatively transferred in small portions to a tared, stainless steel planchet. The sample is evaporated to dryness under an infrared lamp or drying oven set to 105°C.

The planchet is cooled in a desiccator and weighed. The sample residue is stored in a desiccator until ready for counting. The planchet is counted on a gas-flow proportional counter for 200 minutes.

Calculation of Gross Alpha and Beta Activities

Activities, errors and sensitivities are calculated from the following equations:

$$ACT = \frac{SC - BC}{E * TF * V * T * 2.22}$$

$$ERR = \frac{2 * SQRT(SC + BC)}{E * TF * V * T * 2.22}$$

$$LLD = \frac{4.66 * SQRT(BC)}{E * TF * V * T * 2.22}$$

where

ACT = Activity measured in the sample in pCi per unit mass or volume

ERR = the two standard deviation error of the analysis, in pCi per unit mass or volume, as calculated from counting statistics

LLD = lower limit of detection, as defined above, in pCi per unit mass or volume

SC = sample counts accumulated in "T" minutes

BC = blank counts accumulated in "T" minutes

E = counting efficiency in counts per disintegration for a weightless sample

TF = number of disintegrations from a sample of appreciable weight which are counted by the system, divided by the number of distintegrations from a weightless sample of the same activity which would be counted by the same system

V = sample size in units of mass or volume

T = time in minutes for which the sample was counted

2.22 = number of disintegrations per minute per picocurie

All data analysis is performed on a DEC PDP 11/44 computer system. The programs used for the computation of results, errors and LLDs for non-spectrometric analyses were written inhouse and are documented as required by the ESD QA manual.

GAMMA SPECTROMETRY OF ENVIRONMENTAL SAMPLES

Analysis of Water Samples By Gamma Spectrometry

The aliquot for analysis is poured into a 4-liter beaker and the initial volume is recorded. The sample is evaporated until there are 30 to 40 milliliters in the bottom of the beaker. The sample is then quantitatively transferred into a 60 milliliter bottle. Small quantities of 12N nitric acid are used to loosen any residue on the sides or bottom of the beaker. A wet rubber policeman and irrigation with deionized water are used to to return the residue to solution and to transfer it to the concentrate bottle.

The aliquot concentrate is diluted to the standard volume in the 60 milliliter bottles.

Samples are counted on high-resolution gamma spectrometry detectors and 4,096-channel spectra are accumulated on Canberra Series 85 multichannel analyzers (MCAs). Detectors are individually calibrated for each geometry. Spectral analysis is performed on a PDP 11/44 computer using the Spectran-F data analysis software.

Analysis of Milk Samples By Gamma Spectrometry

A 3 liter aliquot of milk is weighed into an appropriate tared beaker. Glacial acetic acid (15-20 milliliter) is added to the sample with stirring. The beaker is covered with a clean watchglass and the sample is boiled gently until the volume has been reduced to about 200 milliliter. After cooling, the sample is quantitatively transferred to a clean, tared stainless steel container. The container is placed in a muffle furnace and ashed at a temperature of not over 450°C for about 4-5 hours. After cooling, the container is weighed. The sample is transferred to a mortar and pestle, ground and thoroughly blended. The sample is transferred to a clean, tared 2" or 3" plastic dish (depending on the volume of the sample residue) and reweighed.

Samples are counted on high-resolution gamma spectrometry detectors and 4,096-channel spectra are accumulated on Canberra Series 85 multichannel analyzers (MCAs). Detectors are individually calibrated for each geometry. Spectral analysis is performed on a PDP 11/44 computer using the Spectran-F data analysis software.

Analysis of Air Filter Composites By Gamma Spectrometry

The filters are arranged in the order in which they were collected in each composite. The filters are placed in order, dirty side up, in the bottom of a stainless steel planchet. A second planchet is placed, bottom side down, on top of the stack of filters. The filters are compressed into the depth of the first planchet and the two planchets are sealed together with vinyl tape.

Single filters are counted for gamma spectrometry in the same geometry as they are prepared for gross beta analysis.

Filter composites are counted on high-resolution gamma spectrometry detectors and 4,096-channel spectra are accumulated on Canberra Series 85 multichannel analyzers (MCAs). Detectors are individually calibrated for each geometry. Spectral analysis is performed on a PDP 11/44 computer using the Spectran-F data analysis software.

Analysis of Sediment Samples By Gamma Spectrometry

When sediment is received for analysis the aggregate material is broken up and any rocks are retained for future weighing.

The sample is dried in a drying oven at about 100^{o}C until dry, usually 24 hours. After grinding with a mortar and pestle, the sample is sieved through a No. 10 standard sieve. If there is any uncrushable, unsievable material, it is removed, weighed with the rocks from the initial sorting and all are discarded. After sieving, the sample is blended and stored for use in the appropriate analyses.

The dried and sieved sediment sample is thoroughly blended. A clean, tared 3-inch dish is filled with the sample. Filling is accomplished in several increments, followed by shaking and lightly tapping the bottom of the dish on the bench top to help settle the soil between additions. The dish is filled to within 7 mm of the top and reweighed to calculate the net weight. The dish is sealed with vinyl tape and heat sealed in a plastic bag before anaysis by gamma spectrometry.

Samples are counted on high-resolution gamma spectrometry detectors and 4,096-channel spectra are accumulated on Canberra Series 85 multichannel analyzers (MCAs). Detectors are individually calibrated for each geometry. Spectral analysis is performed on a PDP 11/44 computer using the Spectran-F data analysis software.

Analysis of Vegetation And Food Product Samples By Gamma Spectrometry

For animal feeds or human foods, the portion of the sample that is prepared and analyzed is that portion which is consumed. The edible portion is separated from the inedible portion (e.g. bones, etc.). The weight of the inedible and edible portions are obtained and recorded. The aliquot of the sample to be analyzed is transferred to a clean, tared container and dried in a drying oven for 24 hours at about 110° C.

After reweighing to obtain the net dry weight, the sample is ground and blended to obtain a homogenous sample. Depending on the total amount of sample available, a tared 2-inch or 3-inch dish is filled with the sample. Filling is accomplished in several increments, followed by shaking and lightly tapping the bottom of the dish on the bench top to help settle the sample between additions. The dish is filled to within 7 mm of the top and reweighed to calculate the net weight. The dish is sealed with vinyl tape and heat sealed in a plastic bag before analysis by gamma spectrometry.

Samples are counted on high-resolution gamma spectrometry detectors and 4,096-channel spectra are accumulated on Canberra Series 85 multichannel analyzers (MCAs). Detectors are individually calibrated for each geometry. Spectral analysis is performed on a PDP 11/44 computer using the Spectran-F data analysis software.

Preparation of Special Vegetation Samples for I-131 Analysis By Gamma Spectrometry

Sample preparation for I-131 analysis is begun immediately on receipt of the sample due to the short half-life of I-131.

About 1 kg of sample is weighed into a clean, tared 4 liter beaker. One liter of a solution containing 33g of sodium hydroxide and 19.5 milligrams of NaI carrier is added to the vegetation. If the solution does not cover the sample, sufficient deionized water is added to completely immerse the sample. The beaker is covered with a watch glass and the sample is allowed to soak for at least 16 hours.

After standing for the required length of time, the beaker is placed on a hot plate and most of the liquid is evaporated. When nearly dry, the contents are transferred to a tared stainless steel beaker and placed in a muffle furnace. The temperature is slowly brought to 350° C and ashed for at least 4 hours. After cooling, the beaker is weighed to obtain the net ash weight.

The ashed sample is ground thoroughly with a mortar and pestle and blended. Depending on the total amount of ash recovered, a tared 2 inch or 3 inch plastic dish is filled with the blended sample. The filled plastic dish is weighed and the aliquot weight recorded. The plastic dish containing the sample is sealed with vinyl tape and heat sealed in a plastic bag before analysis by gamma spectrometry.

Samples are counted on high-resolution gamma spectrometry detectors and 4,096-channel spectra are accumulated on Canberra Series 85 multichannel analyzers (MCAs). Detectors are individually calibrated for each geometry. Spectral analysis is performed on a PDP 11/44 computer using the Spectran-F data analysis software.

Analysis of Fish Samples By Gamma Spectrometry

Only the edible portions of fish samples are analyzed by gamma spectrometry. Samples are filleted and the inedible portions discarded. The aliquot of the sample to be analyzed is transferred to a clean, tared container and dried in a drying oven for 24 hours at about 110° C.

After reweighing to obtain the net dry weight, the sample is ground and blended to obtain a homogenous sample. A clean, tared 3-inch dish is filled with the sample. Filling is accomplished in several increments, followed by shaking and lightly tapping the bottom of the dish on the bench top to help settle the sample between additions. The dish is filled to within 7 mm of the top and reweighed to calculate the net weight. The dish is sealed with vinyl tape and heat sealed in a plastic bag before analysis by gamma spectrometry.

Samples are counted on high-resolution gamma spectrometry detectors and 4,096-channel spectra are accumulated on Canberra Series 85 multichannel analyzers (MCAs). Spectral analysis is performed on a PDP 11/44 computer using the Spectran-F data analysis software.

Calculation of Gamma Emitters

Activities, errors and sensitivities are calculated from the following equations:

$$ACT = \frac{SC - BC}{E * V * T * 2.22 * AB * \exp(-\lambda * dt)}$$

$$ERR = \frac{2 * SQRT(SC + BC)}{E * V * T * 2.22 * AB * \exp(-\lambda * dt)}$$

$$LLD = \frac{4.66 * SQRT(BK)}{E * V * T * 2.22 * AB * \exp(-\lambda * dt)}$$

where

ACT = Activity measured in the sample in pCi per unit mass or volume

ERR = the two standard deviation error of the analysis, in pCi per unit mass or volume, as calculated from counting statistics

LLD = lower limit of detection in pCi per unit mass or volume

SC = gross counts accumulated in the photopeak of interest in "T" minutes

BC = background counts accumulated under the photopeak of interest in "T" minutes, estimated from the countrate in four baseline channels on each side of the photopeak and the width of the photopeak

BK = background counts accumulated at the energy of interest in "T" minutes, estimated for the number of baseline channels expected for a photopeak at that energy

E = counting efficiency in counts per disintegration at the energy of the photopeak

V = sample size in units of mass or volume

T = time in minutes for which the sample was counted

2.22 = number of disintegrations per minute per picocurie

AB = number of gamma photons with the energy of the photopeak produced per distintegration of the parent isotope

λ = radioactive-decay constant for the particular radionuclide in the reciprocal of the units of dt

dt = elapsed time between sample collection and counting

All data analysis is performed on a DEC PDP 11/44 computer system. High resolution gamma spectra are analyzed utilizing Spectran F, the calculation model developed by Canberra Industries, Inc. for the analysis of GeLi and HpGe spectra.

Analysis of Charcoal Adsorption Cartridges for I-131

Charcoal cartridges are screened in a custom geometry. Samples are inserted in the holder with the intake side against the detector. Analysis is by high resolution gamma spectrometry. A multiple cartridge spectrum is accumulated as part of the initial screening. If no I-131 activity is observed then all of the charcoal cartridge I-131 values are LLDs. These values are individually calculated for each cartridge using its own collection volume.

If any I-131 activity is observed in the screening spectrum, then each cartridge is counted and analyzed separately by high resolution gamma spectrometry.

Samples are counted on high-resolution gamma spectrometry detectors and 4,096-channel spectra are accumulated on Canberra Series 85 multichannel analyzers (MCAs). Spectral analysis is performed on a PDP 11/44 computer using the Spectran-F data analysis software.

Determination of Tritium in Water by Liquid Scintillation Counting

A distilled water blank and current reference standard are processed with each batch of samples.

A clean dry distillation flask is prepared and the flask is rinsed with the sample. Approximately 50 milliliters of the sample are poured into the flask and distillation is begun. The first 5 milliliters of the distillate is discarded. Approximately 25 milliliters are then distilled into a new polyethylene bottle.

The samples are prepared for counting under dim incandescent, preferably red light, not under fluorescent light. Exactly 8 milliliters of the distilled unknown sample are pipetted into a scintillation vial. At least two HTO standard spiked samples and two blanks are prepared with each batch of samples. One of each is counted before and after the unknown samples.

Eleven milliliters of the liquid scintillation cocktail are added and the vial contents are well mixed. The samples are stored in the dark 24 hours before counting to minimize chemiluminescence and to obtain better reproducibilty. Samples may be loaded immediately and the first 24 hours of counting data rejected. Samples are counted in a liquid scintillation counter for 1200 minutes.

Calculation of Tritium Activities

Activities, errors and sensitivities are calculated from the following equations:

$$ACT = \frac{SC - BC}{E * V * T * 2.22 * \exp(-0.05635 * dt)}$$

$$ERR = \frac{2 * SQRT(SC + BC)}{E * V * T * 2.22 * \exp(-0.05635 * dt)}$$

$$LLD = \frac{4.66 * SQRT(BC)}{E * V * T * 2.22 * \exp(-0.05635 * dt)}$$

where

ACT = Activity measured in the sample in pCi per liter

ERR = the two standard deviation error of the analysis, in pCi per liter, as calculated from counting statistics

LLD = lower limit of detection, as defined above, in pCi per liter

SC = sample counts accumulated in "T" minutes

BC = blank counts accumulated in "T" minutes

E = counting efficiency in counts per disintegration, determined from standards counted in the same batch

V = sample size in liters

T = time in minutes for which the sample was counted

2.22 = number of disintegrations per minute per picocurie

0.05635 = radioactive-decay constant for tritium in units of reciprocal years

dt = elapsed time between sample collection and counting in years

All data analysis is performed on a DEC PDP 11/44 computer system. The programs used for the computation of results, errors and LLDs for non-spectrometric analyses were written inhouse and are documented as required by the ESD QA manual.

Determination of I-131 in Milk or Water by Gas Proportional Counting

A one liter powdered milk or water blank and the current reference standard in milk or water is processed with each batch of samples.

A four liter aliquot of the sample is transferred to a suitably sized container, and standardized iodide carrier are added. After stirring for a minimum of 5 minutes, 5 grams of sodium bisulphite is added to each aliquot for analysis.

A water-slurried, anion exchange resin (100 milliliters) in chloride form is added to each container. The samples are then stirred vigorously overnight. After stirring for a minimum of 12 hours, the stirring bars are removed and the resin allowed to settle to the bottom of the beaker for ten minutes. The milk/water samples are carefully decanted and retained for possible use in other analyses. Blank and reference solutions are discarded directly. The resins are washed with distilled water and transferred to an appropriately sized beaker and saved.

While stirring, a 100 milliliter aliquot of 4-6% NaOCl is added to the resin. Stirring is continued vigorously for 15 minutes. Then the resin is filtered and the filtrate is saved. This is repeated with a second 100 milliliters aliquot of NaOCl. The filtrates are combined and the resin is discarded.

The filtrates are transferred to separatory funnels, acidified, and hydroxylamine hydrochloride added. The solutions are extracted twice with 100 milliliters of CCl_4. Both CCl_4 phases are combined and the the aqueous phase is discarded.

The combined organic phases are back-extracted with deionized water and $NaHSO_3$. After separation, the organic phase is discarded, and the aqueous phase is transferred to a clean 50 milliliters centrifuge tube.

CuI is precipitated by adding CuCl and adjusting the pH to between 2.5 and 2.7 with dilute HCl or dilute NH4OH. The precipitate is centrifuged and rinsed twice with deionized water. It is then quantitatively transferred to a tared, 2 inch diameter, ringed, stainless steel planchet.

The planchet is dried; reweighed to determine the chemical recovery; and counted on a gas proportional counter for 300 minutes.

Calculation of Iodine-131 Activities

Activities, errors and sensitivities are calculated from the following equations:

$$ACT = \frac{SC - BC}{E * V * T * 2.22 * Y * \exp(-0.08621 * dt)}$$

$$ERR = \frac{2 * SQRT(SC + BC)}{E * V * T * 2.22 * Y * \exp(-0.08621 * dt)}$$

$$LLD = \frac{4.66 * SQRT(BC)}{E * V * T * 2.22 * Y * \exp(-0.08621 * dt)}$$

where

ACT = Activity measured in the sample in pCi per unit mass or volume

ERR = the two standard deviation error of the analysis, in pCi per unit mass or volume, as calculated from counting statistics

LLD = lower limit of detection, as defined above, in pCi per unit mass or volume

SC = sample counts accumulated in "T" minutes

BC = blank counts accumulated in "T" minutes

E = counting efficiency in counts per disintegration

V = sample size in units of mass or volume

T = time in minutes for which the sample was counted

2.22 = number of disintegrations per minute per picocurie

Y = fractional radiochemical yield

0.08621 = radioactive-decay constant for iodine-131 in units of reciprocal days

dt = elapsed time between sample collection and counting in days

All data analysis is performed on a DEC PDP 11/44 computer system. The programs used for the computation of results, errors and LLDs for non-spectrometric analyses were written inhouse and are documented as required by the ESD QA manual.

Preparation and Analysis of $CaSO_4(Dy)$ TLDs

Dosimeters are kept as clean as possible and properly stored between exposures. Before use in a field cycle, dosimeters are checked for physical damage and cleanliness. Damaged or badly stained TLDs are not used.

The dosimeters are placed on a glass dish and inserted into a preheated oven for annealing. TLDs are annealed for at least 1 hour. After removal from the oven the dosimeters are cooled to room temperature. During cooling and packaging the annealed dosimeters are not exposed to fluorescent light.

Individual dosimeters are placed in black polyethylene pouches and sealed. Each individual bag is labeled with the dosimeter number(s). Two dosimeters may be placed in the bag to obtain a duplicate exposure rate measurement. The plastic bag is inserted into a PB-2 badge with readout area one at the top. The PB-2 badges are closed and labeled with the customer name or code, the sampling location, and the exposure period for which the TLD is being placed.

On their return, TLDs are read immediately. If they cannot be read the same day, the TLDs are stored in a lead shield. If possible, all TLDs from a given set are read on the same day.

TLDs are read in a model 8300 TLD reader after performance of required calibration checks and gain adjustments to ensure that standard readout conditions are present.

Each of the TLD readings are corrected for the individually obtained calibration factors, and for intransit exposure. The intransit exposure is obtained from a set of TLDs prepared and shipped with the field dosimeters and stored in a lead pig for the duration of the field exposure.

TLD exposures are calculated from the following equations:

$$EXT = \frac{\sum_{n=1}^{4} E_n CR_n - NIT}{4}$$

$$NIT = \frac{\sum_{n=1}^{x} \left[GIT_n\ CR_n - (LP * TP)\right]}{x}$$

$$EXR = EXT/TD$$

$$ERT = 2\sqrt{\frac{\sum_{n=1}^{4} (E_n CR_n - EXT)^2}{3} + \frac{\sum_{n=1}^{x} \left[GIT_n\ CR_n - (LP * TP) - NIT\right]^2}{x-1}}$$

$$ERR = ERT/TD$$

where:

EXT = integrated net exposure for the exposure period in mR

ERT = two standard deviation of integrated exposure in mR

EXR = net exposure rate to the TLD in mR/day

ERR = two standard deviation error in mR/day

E_n = exposure readout of area, n

CR_n = calibration factor of area, n

NIT = net intransit exposure after correction for exposure in the lead pig

GIT_n = exposure readout of area n for the intransit TLD

LP = known exposure rate in lead pig in mR/day

TP = number of days the intransit TLDs were in the lead pig

TD = number of days the samples TLDs were in the field

Appendix C

Data Reporting Conventions

APPENDIX C

DATA REPORTING CONVENTIONS

All results from RMC analyses and NUS analyses are reported to two significant figures. Errors are reported to the same decimal place as the result. If the error has no digit before the third figure in the result, the error is rounded up to the second significant figure. If the error is less than 10% of the result, an error of 10% of the result is reported. Detection limits are rounded to one significant figure, unless the first figure is a one. If the first figure is a one, the detection limit is rounded to two significant figures.

In the tables presenting analytical measurements, the calculated value is reported with the counting error of 2 standard deviations (2s) derived from a statistical analysis of both the sample and background count rates. The precision of the results is influenced by the size of the sample, the background count rate, and the method used to round off the value obtained to reflect its degree of significance. For the results of gamma spectrometric analysis, the precision is also influenced by the composition and concentrations of the radionuclides in the sample, the size of the sample, and the assumptions used in selecting the radionuclides to be quantitatively determined. The 2s error for the net counting rate is--

$$2s = 2\sqrt{\frac{R_s}{t_s} + \frac{R_b}{t_b}}$$

where

R_s = sample counting rate

R_b = background counting rate

t_s = sample counting time

t_b = background counting time

If any radioactivity measurement on a given sample is not statistically significant (i.e., the 2s counting error is equal to or greater than the net measured value), then that form of radioactivity is defined as "not detected" in the sample.

Results reported as less than (LT) are below the lower limit of detection (LLD). The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net count (above system background) with a 95 percent probability of detection and with only a 5 percent probability of falsely concluding that a blank observation represents a "real" signal.

For a measurement system that may include radiochemical separation--

$$LLD = \frac{4.66 s_b}{(E)(V)(2.22)(Y)(\exp(-\lambda \Delta t))}$$

where

LLD = lower limit of detection, as defined above, in pCi per unit mass or volume

s_b = standard deviation of the background counting rate or of the counting rate of a blank sample, as appropriate, in counts per minute

E = counting efficiency in counts per disintegration

V = sample size in units of mass or volume

2.22 = number of disintegrations per minute per picocurie

Y = fractional radiochemical yield, when applicable

λ = radioactive-decay constant for the particular radionuclide in units of reciprocal time

Δt = elapsed time between sample collection and counting

The following are definitions of statistical terms used in analyses and reporting of environmental-monitoring results:

1. Mean (or average or arithmetic mean). A measure of the central value of a set; the sum of all values in a set divided by the number of values in that set. The mean is expressed as follows:

$$\overline{X} = (X_1 + X_2 + . . . X_n)/n = \sum_{i=i}^{n} X_i/n$$

2. Precision. The reproducibility of measurements within a set; the scatter or dispersion of a set about its central value.

3. Measures of precision with a set.

   a. Standard deviation. The precision with which the values of a set are measured; the square root of the value yielded by division of the sum of squares of deviations of individual values from the mean by one less than the number of values in the set. The standard deviation, s, is expressed as follows:

$$s = \sqrt{\sum_{i=1}^{n} (X_i - \overline{X})^2/(n-1)}$$

   The standard deviation has the same units as the result. It becomes a more reliable expression of precision as n becomes larger. When the measurements are independent and normally distributed, the most useful statistics are the mean for the central value and the standard deviation for the dispersion.

   b. Relative standard deviation. The standard deviation expressed as a fraction of the mean, $s/\overline{X}$. It is sometimes multiplied by 100 and expressed as a percentage.

   c. Range. The difference in magnitude between the highest and the lowest values in a set. Instead of a single value, the actual limits (i.e., minimum value/maximum value) are sometimes expressed.

RMC-TR-83-02

SUSQUEHANNA STEAM ELECTRIC STATION
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

1982 OPERATIONAL REPORT

Prepared for

Pennsylvania Power and Light Company

by

Radiation Management Corporation

APRIL 1983

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PROGRAM SUMMARY

Since April 1972 Radiation Management Corporation (RMC) has conducted the Preoperational Radiological Environmental Monitoring Program (REMP) for Pennsylvania Power and Light Company (PP&L) at the Susquehanna Steam Electric Station (SES). On September 10, 1982, Unit #1 of the Susquehanna SES became critical, thereby initiating the operational phase of the program.

This report presents the analytical results for samples taken during the operational period of 1982. A total of 1139 analyses on 735 samples including direct radiation, surface water, well water, potable water, sediment, air particulates, air iodine, precipitation, milk, fish, food products, meat, game and pasture grass were performed from September to December 1982.

A variety of radionuclides, both naturally occurring and man-made, were detected in the environs of the Susquehanna SES. Naturally occurring radionuclides were found at levels expected for that environment. The man-made radionuclides found, primarily in air particulates, precipitation and pasture grass, were the fission products typically found in nuclear weapon test fallout. These nuclides were detected at levels which were similar to those found in the preoperational phase of the program. No other unusual radionuclide concentrations or ambient radiation levels were observed as part of the routine environmental surveillance program. Results from indicator locations compared favorably to results from control locations.

It is concluded that the radiological characteristics of the environment surrounding Susquehanna SES were not affected by the operation of the station.

INTRODUCTION

The Susquehanna SES will contain 2 BWR generating units, each with a capacity of about 1050 MWe. Unit #1 achieved initial criticality on September 10, 1982. Unit #2 is scheduled for initial criticality in 1984. This site is located on a 1075 acre tract along the Susquehanna River, five miles northeast of Berwick in Salem Township, Luzerne County, Pennsylvania.

The area surrounding the site can generally be characterized as rural, with forest and agricultural lands predominating. More specific information on the demography, hydrology, meteorology and land use characteristics of the local area may be found in the Environmental Report(1), the Safety Analysis Report(2) and the Draft Environmental Statement - O.L. (3) for Susquehanna SES.

RMC has previously reported results for the preoperational radiological environmental monitoring program (REMP) from 1972-1982 (4-14), the present document continues the series with coverage for the operational period of 1982. It presents in detail the type and number of samples collected, the analyses performed and the data generated.

PROGRAM

The preoperational REMP continued until September 1982 when initial criticality of Unit #1 was achieved. At that time, the operational phase of the program was instituted and will continue thereafter. The REMP was designed utilizing the guidance in the Branch Technical Position to the Nuclear Regulatory Commission Regulatory Guide 4.8, Rev. 1, November 1979 (15) and ORP/SID 72-2, Environmental Radioactivity Surveillance Guide (16). The objectives of the operational radiological environmental monitoring program are:

1. To identify, measure and evaluate existing radionuclides in the environs of the Susquehanna SES site and any fluctuations in radioactivity levels which may occur.

2. To determine whether any significant increase occurs in the concentration of radionuclides in critical pathways.

3. To detect any changes in ambient radiation levels.

4. To verify that Susquehanna SES operations have no detrimental effects on the health and safety of the public or on the environment.

5. To fulfill the obligations of the Radiological Surveillance-Environmental sections of the Environmental Technical Specifications for Susquehanna SES.

Samples for the 1982 REMP were taken from direct, waterborne, airborne and ingestion pathways with emphasis on those media which would yield data for the evaluation of radiation dose to man. Specific sampling locations were chosen on the basis of potential water use, site meteorology, local demography and land uses.

Environmental sampling locations were divided into two classes, indicator and control. Indicator samples were those collected at locations which would be expected to manifest station effects, if any, and were selected on the basis of distance from the site, topography, hydrology, meteorology, demography and drainage characteristics. Control samples were collected at locations which are expected to be unaffected by station operation.

Table 1 summarizes the Susquehanna REMP as performed in the operational period of 1982. Appendix A summarizes the results of the REMP analyses and compares indicator and control location results. Appendix B describes the RMC coding system, which specifies sample type and location. Included in Appendix B, Table B-1 gives the pertinent information on individual sampling locations, while Maps B-1 and B-2 show the sampling locations. The data for individual samples are presented in tabular form in Appendix C. A synopsis of the analytical procedures used for the samples appears in Appendix D. Appendix E contains the results of RMC's participation in the EPA inter-laboratory comparison program. Appendix F contains the results of demographic data surveys performed in 1982.

Sample Collection

Waterborne pathways were examined by analyzing samples of surface water, ground water, potable (drinking) water and sediment. Surface, ground and potable water samples were collected in unused two gallon plastic containers weekly and monthly. Susquehanna River sediment was also sampled.

Airborne pathways were examined by analyzing air particulates, air iodine and precipitation. Air particulates were collected weekly on Gelman type-A/E, glass fiber filters with low volume air samplers. Air iodine was collected on one inch deep Science Applications, Inc. charcoal cartridges. Air sample volumes were measured with temperature-compensated dry-gas meters. Precipitation samples were collected in unused two gallon plastic containers monthly.

Ingestion pathways were examined by analyzing samples of fish, milk, pasture grass, game and locally grown food products. Several species of fish samples were collected in late summer at both the control and indicator locations, filleted and frozen for shipment to RMC. Milk, food products and pasture grass were purchased directly from local farmers. Game samples were obtained by hunting.

Direct radiation measurements were made using thermoluminescent dosimeters (TLDs) consisting of calcium sulfate doped with thulium ($CaSO_4$(Tm)). The TLDs were placed at locations designed to take advantage of local meteorologic and topographic characteristics and population distribution characteristics.

Data Interpretation

The radioanalytical and direct radiation data collected during the preoperational period of 1982, together with that collected previously, will be used as a baseline with which the operational data may be compared. Several factors are important in the interpretation of the data. These factors are discussed here to avoid repetition in sections that follow.

Within the data tables (Appendix C) a 95% (±2 sigma) confidence interval is supplied for each result above the lower limit of detection (LLD) with the exception of strontium-89, -90 analyses, which are reported as minimum detectable level (MDL). Numerically, the LLD is equal to 4.66 times the square root of the background counts. The result is then divided by a dpm/picocurie conversion factor, the counting efficiency, the background counting time and the sample volume. Whereas the MDL is equal to 3 times the square root of the background counts. This result is then divided by the dpm/picocurie conversion factor, the counter efficiency, the background counting time and the sample aliquot (the exact specifications of the calcalations are noted in Appendix D). The MDL or LLD is reported when the 2 sigma error exceeds 100% of the calculated activity. The 2 sigma intervals represent the range of values into which 95% of repeated analyses of the same sample would fall. The LLD quoted for particular sample types (Table C-27) are nominal values. The actual LLD is calculated for each sample analyzed and will show variability due to the amount of sample analyzed, the length of time between sample collection and counting, the length of time a particular sample was counted and fluctuations in counting background.

It is characteristic of environmental monitoring data that many results occur at or below the LLD. In this report, all results occurring at or below the relevant LLD were reported as being "less than" the LLD value.

Results for each type of sample were grouped according to the analysis performed. Averages and standard deviations of these results were calculated when applicable. The calculated standard deviations of grouped data (by location or over time) represent sample rather than analytical variability. For these calculations any values below LLD were considered to be at the LLD; thus these averages were biased high and the corresponding standard deviations were biased low. Averages were not calculated when a group of data was composed of many (>50%) LLD values.

Program Exceptions

As the REMP for Susquehanna SES progressed in the operational period of 1982, certain samples and analyses were inadvertently omitted from the schedule. These exceptions are delineated, and the reasons for the omission stated. However, taking into account all program exceptions, it should be noted that the operational period of the 1982 Susquehanna SES REMP had a 98% completion rate.

Surface Water

1. Surface water was collected downstream in the river (weekly for a monthly composite) in lieu of the discharge line sample until November at which time a composite sampler was installed on the discharge line (hourly for a monthly composite). Surface water is being collected upstream in the river (weekly for a monthly composite) until such time that a composite sampler can be installed in the intake facility (hourly for a monthly composite).

2. The monthly sample from location 6S5 for November was lost in shipment.

3. The iodine-131 analysis for the monthly sample from location 5S8 for November was lost in processing.

Well Water

Monthly samples from location 3S5 were discontinued after October because the well pump is turned off during the winter months.

Drinking Water

One weekly sample for iodine-131 analysis from location 12H2 was lost in analysis due to a detector malfunction.

Precipitation

No samples were received from locations 5S4 and 12G2 in July and August and from location 1D2 in July because the collection containers were broken.

Milk

No sample was available from locations 7C1 and 8D1 in September, November and December because of the limited supply of goat milk.

Food Products

No samples were received from location 2H1 because none were available at the time of collection.

TLD

No samples were received from locations 4S3, 2F1 and 7F1 for the fourth quarter due to a loss in the field.

Program Changes

One addition to the program was made in the operational period of 1982. This was added in order to better reflect any changes in radioactivity levels during Susquehanna SES operation. This change is noted below.

One well water location 12E4 was added in November for monthly collection.

RESULTS AND DISCUSSION

All environmental samples and TLDs were analyzed by standard RMC analytical procedures (17). A synopsis of these procedures appears in Appendix D. Since the precision and accuracy of the analytical results is of paramount importance, RMC devoted a fraction (usually 15-20%) of all analyses to quality control including process quality control, instrument quality control, inter-laboratory cross-check analyses and comprehensive data review. The results of RMC's QC program for 1982 are included in a separate RMC report (18). One important aspect in maintaining laboratory quality control is RMC's participation in the United States Environmental Protection Agency (USEPA) inter-laboratory comparison program. This data appears in RMC's annual QC report and is also presented as Appendix E to this report.

The analytical results of the 1982 REMP have been divided into four categories: waterborne, airborne, ingestion and direct radiation. The individual samples and analyses within each category provide an adequate means of estimating radiation doses to individuals from the principal pathways. The analytical results for the operational period of the 1982 program are summarized in Appendix A. The data for individual samples are presented in tabular form in Appendix C. The sensitivities stated in the Branch Technical Position were met for all samples (15).

Waterborne Pathway

The waterborne pathways of exposure from Susquehanna SES were evaluated by analyzing samples of surface water, well water, potable water and sediment.

Surface Water (Tables C-1, C-2, C-3 and C-4)

The Susquehanna River was sampled monthly at seven locations. Daily grab samples were collected at 12H1 (Merck Company) then composited into a monthly sample. Monthly samples were also composited from weekly grabs at location 5S8 (under the power line) and location 6S5 (outfall area). Monthly grab samples were collected at location 1D3 (Mocanaqua Substation), location 13E1 (Glen Brook Reservoir), location 12F1 (Berwick Bridge) and location 12G2 (between Bloomsburg and Berwick). Monthly surface water samples were analyzed for gross beta, gamma emitters and iodine-131. Quarterly composites were analyzed for tritium, strontium-89 and -90. A monthly effluent water grab sample was collected at location 1D5 (Shickshinny Sewage Treatment facility) for iodine-131 analysis.

Weekly grab samples were collected for one week from locations 1D3, 12F1, 2F2 (Retreat Bridge), 3G1 (Lower Bridge Plymouth) 3G2 (Nanticoke Bridge) and 3G5 (Market Street Bridge) and weekly composite samples were collected from locations 5S8 and 12H1 in order to study the occurrence of detectable concentrations of iodine-131 in the river water. This sampling was discontinued after the September 7, 1983 collection.

Analysis for beta emitters in samples of surface water showed detectable activity in twenty-three of twenty-seven samples, with results ranging from 1.3 to 5.3 picocuries/liter. The gross beta results were consistent with the data previously obtained from the preoperational period of 1972 to August 1982.

No gamma emitting nuclides were detected in any surface water samples. Typical LLDs are found in Table C-27.

Positive iodine results in surface water were reported in two of thirty-seven samples with values ranging from 0.08 to 0.3 picocuries/liter. Iodine-131 has been observed in surface water sporadically during the preoperational period of the REMP (11-14).

The analysis of tritium in surface water showed detectable activity in four of fourteen samples with results ranging from 68 to 167 picocuries/liter. This is well below the action level of 20,000 picocuries/liter as quoted in the Branch Technical Position (15). The average tritium concentrations in surface water samples show a gradual decline for the period 1973 to 1982. This is likely the result of a reduction in atmospheric tritium from nuclear detonations. Average tritium concentrations for all locations since 1973 were graphed in Figure 1. Positive tritium results are reported when the 2 sigma counting error is less than the result. In some cases, this may cause positive results to be reported, which are lower than the calculated LLDs. For clarification of the method of calculation, see Appendix D, Analysis of Water Samples for Tritium.

Levels of strontium-89 were below MDL (0.3 to 0.5 picocuries/liter) in all fourteen samples. Levels of detectable strontium-90 ranged from 0.3 to 0.6 picocuries/liter in six of the fourteen samples. The MDL values ranged from 0.3 to 0.4 picocuries/liter.

Well Water (Tables C-5, C-6 and C-7)

Nine wells, the Services and Administration Building (2S5), the Energy Information Center (2S6), the Riverlands Security Office (3S5), the peach stand on-site (4S2), the Training Center (4S4), the EOF Building (11S5), the Serafin Farm (15A4), the Berwick Hospital (12E4) and the Berwick Water Co. (12F3), were sampled monthly. Gross beta and gamma analyses were performed on the monthly samples. Gross alpha and tritium analyses were performed on quarterly composites of monthly grab samples.

Gross beta results showed positive values in nineteen of thirty-two samples with results ranging from 1.5 to 5.8 picocuries/liter. LLDs ranged from 1.7 to 2.6 picocuries/liter.

No gamma emitting nuclides were detected in any well water samples.

Five of seventeen gross alpha analyses showed detectable activities of 1.2 to 2.5 picocuries/liter. LLDs ranged from 1.0 to 1.9 picocuries/liter.

Eight of seventeen samples showed positive tritium results ranging from 76 to 152 picocuries/liter with LLDs ranging from 108 to 120 picocuries/liter.

Positive results for gross beta, gross alpha and tritium compare closely to the respective LLDs for those analyses and to results found in the preoperational reports (4-14).

Potable (Drinking) Water (Tables C-8, C-9 and C-10)

Potable water was sampled monthly at two locations, the Berwick Water Company (12F3) and the Danville Water Company (12H2). In addition, weekly samples were collected from location 12H2 for iodine-131 analysis. Gross beta and gamma emitters were analyzed monthly. Strontium-89 and -90 were analyzed as quarterly composites. Gross alpha and tritium were analyzed as quarterly composites for location 12F3 and monthly for location 12H2.

Five of eight samples showed positive gross beta results ranging from 1.9 to 4.0 picocuries/liter and averaging 2.9 picocuries/liter. All results from all gamma emitting nuclides were less than LLD.

All samples analyzed for iodine-131 were below the LLD. LLDs ranged from 0.07 to 1.0 picocuries/liter.

One sample of six analyzed for gross alpha showed a positive activity of 1.2 picocuries/liter. The LLDs ranged from 1.2 to 1.4 picocuries/liter. These results compare favorably to the EPA drinking water action level of 15 picocuries/liter for gross alpha (19).

Two of six samples analyzed showed positive tritium results of 83 and 114 picocuries/liter, with LLDs ranging from 108 to 144 picocuries/liter for the others. The results fall below the EPA tritium action level of 20,000 picocuries/liter for drinking water (19). The tritium results, for potable water, were consistent with results for tritium observed in surface water of the Susquehanna River.

All results for strontium-89 were below the MDL of 0.3 to 0.9 picocuries/liter. One detectable concentration of strontium-90 (0.4 picocuries/liter) was observed in four samples. The MDL values ranged from 0.3 to 0.5 picocuries/liter.

Sediment (Tables C-11 and C-12)

Sediment samples were taken in September for the second semiannual period. Samples were taken from five locations in the Susquehanna River. These were Bell Bend (7B), downstream near Hess Island (11C) and the old Berwick test track (12F) and upstream near Gould Island (2B) and between Shickshinny and the former State Hospital (2F). Samples were analyzed for gamma emitting nuclides, gross alpha, strontium-89 and -90.

Naturally-occurring potassium-40, radium-226 and thorium-232 were detected in all samples. Beryllium-7, from cosmic ray activity, was also observed in one of the five samples analyzed. Cesium-137 was detected in all samples, with levels ranging from 0.05 to 0.20 picocuries/gram(dry).

Gross alpha analyses showed positive values for all six samples, ranging from 6.0 to 9.5 picocuries/gram(dry). All strontium-89 results were below the MDL of 0.2 picocuries/gram(dry). Three of five samples showed positive strontium-90 results ranging from 0.02 to 0.52 picocuries/gram(dry). The other results were below the MDL (0.04 picocuries/gram(dry)).

<u>Airborne Pathway</u>

The airborne pathways of exposure from Susquehanna SES were evaluated by analyzing samples of air particulates, air iodine cartridges and precipitation. Samples of air were collected at eleven locations; the Information Center (2S2), the biological laboratory (5S4), the Golomb House (11S2), the transmission line at site 15 (15S4), the transmission line east of route 11 (9B1), the Mocanaqua Substation (1D2), near Pond Hill (3D1), the Berwick Hospital (12E1), the Hazelton Chem Lab (7G1), at Bloomsburg (12G1) and the PP&L roof in Allentown (7H1). Air filters were analyzed weekly for gross beta and quarterly for gamma emitters, gross alpha and strontium-89 and -90. Air iodine was collected on charcoal cartridges in series with the air particulate filter at all locations. The charcoal cartridges have an efficiency of removal of elemental iodine of 99%. Precipitation samples were collected monthly from locations 5S4, 11S2, 1D2 and 12G1 and composited and analyzed quarterly for tritium and gamma emitters.

Air Particulates (Tables C-13, C-14 and C-15)

The gross beta concentration of each sample was determined weekly. These concentrations ranged from 0.009 to 0.034 picocuries/cubic meter in all samples. The annual average for all indicator stations was 0.018 picocuries/cubic meter and for all control stations was 0.017 picocuries/cubic meter. Figure 2 shows graphically the gross beta activity in air particulates for 1982. Figure 3 compares preoperational data to data obtained during the operational period of 1982.

Quarterly composites of air particulate filters from each location were analyzed by gamma spectrometry. Beryllium-7 was detected in all twenty-two samples. The presence of beryllium-7 throughout the year can be attributed to cosmic ray activity.

Gross alpha analyses of quarterly composites showed positive results in all twenty-two samples with values ranging from 0.0019 to 0.0093 picocuries/cubic meter with the average being 0.0039 picocuries/cubic meter.

The strontium-89 analyses performed on the quarterly composites showed all results to be less than the MDL. The MDLs for strontium-89 ranged between 0.0001 and 0.0006 picocuries/cubic meter. Detectable activities of strontium-90 were detected in six of twenty-two samples ranging from 0.00008 to 0.00015 picocuries/cubic meter. MDLs ranged from 0.00007 to 0.0002 picocuries/cubic meter.

Gross beta, gamma spectrometry, gross alpha, strontium-89 and -90 results compared favorably to preoperational data (4-14).

Air Iodine (Table C-16)

Of the 198 air samples analyzed for iodine-131, all were below the LLD. The detection limit for all analyses ranged from 0.004 to 0.034 picocuries/cubic meter.

Precipitation (Table C-17)

All eight samples analyzed for tritium were less than LLD (151 picocuries/liter). Beryllium-7, from cosmic radiation, was observed in six samples ranging from 8.6 to 110 picocuries/liter. All other gamma emitting nuclides were less than LLD.

Ingestion Pathway

Potential ingestion pathways of exposure for Susquehanna SES were evaluated by analyzing samples of milk, fish, food products, meat, game and pasture grass.

Milk (Tables C-18, C-19 and C-20)

Cow milk samples were collected monthly from eight locations; 12B2, 12B3, 6C1, 10D1, 12D2, 5E1, 13E3 and 10G1. Samples were collected semi-monthly in September and October from locations 12B2, 5E1, 13E3 and 10G1. Each monthly sample was analyzed for iodine-131, strontium-89 and -90 and gamma emitters. The additional samples were analyzed for iodine-131 and gamma emitters only.

All of the forty samples analyzed for iodine-131 were below the LLD. The LLDs ranged from 0.07 to 0.4 picocuries/liter.

Potassium-40, as determined by gamma spectrometry, was found in all milk samples with levels ranging from 1000 to 1500 picocuries/liter. Cesium-137 was found in thirty of forty-two samples with levels ranging from 1.1 to 3.7 picocuries/liter.

Strontium-89 was below the MDL in all thirty-two samples. The range of MDL values for strontium-89 was 1.0 to 8.3 picocuries/liter. The concentration of strontium-90 was positive in all thirty-two samples analyzed and averaged 5.9 picocuries/liter. Due to the twenty-eight year half-life and biological assimilation, strontium-90 can be expected to remain long after routine atmospheric testing has ceased. All strontium-89 and -90 analysis chemical yields have been verified by atomic absorption to determine calcium interference.

Goat milk was sampled at two locations quarterly, or more frequently if sufficient milk was available. Goat milk was analyzed for iodine-131 only. Two samples were collected with results of less than 0.1 and less than 0.4 picocuries/liter.

Fish (Table C-21)

Fish was collected from two locations. Three to seven fish of each species, enough to obtain one to two kilograms of filets, were collected at each location. The species included were: walleye, white sucker and channel catfish. Analysis of the flesh for gamma emitters and strontium-89, -90 was performed on each species sampled.

Gamma spectrometry was performed on the flesh portions of fish samples. Naturally-occurring potassium-40 was detected in all six samples with results ranging from 2.6 to 4.0 picocuries/gram(wet). Cesium-137 was detected in two samples with results of 0.009 to 0.014 picocuries/gram(wet). These results were consistent with those previously found. The cesium-137 observed can probably be attributed to nuclear weapons testing fallout.

Strontium-89 was below the MDL (0.01 picocuries/gram(wet)) in all six samples. Strontium-90 was observed in two samples with results of 0.005 and 0.013 picocuries/gram(wet). MDLs ranged from 0.002 to 0.003 picocuries/gram(wet).

Food Products (Table C-22)

Gamma spectrometry was used to analyze various types of food products collected from local farmers within the vicinity of Susquehanna SES. These include apples, honey, corn, cabbage, lettuce, potatoes, squash, spinach, string beans and tomatoes. Naturally-occurring potassium-40 at levels of 0.8 to 7.4 picocuries/gram(wet) was found in all samples. Beryllium-7, from cosmic ray activity, was observed in three leafy vegetable samples ranging from 0.5 to 1.8 picocuries/gram(wet). LLDs ranged from 0.03 to 0.2 picocuries/gram(wet). Cesium-137 was found in one sample.

Meat (Table C-23)

Meat samples consisting of eggs, chicken and duck were collected from two local farms. The flesh was analyzed for gamma emitters. Naturally-occurring potassium-40 was detected in all three samples, 1.0 to 3.9 picocuries/gram(wet). All other gamma emitters were below the LLD.

Game (Table C-24)

Four deer samples and six squirrel samples were collected in the winter and the flesh was analyzed for gamma emitters. Naturally-occurring potassium-40 was found at levels ranging from 2.2 to 4.6 picocuries/gram(wet). Cesium-137 was also found at concentrations of 0.018 to 2.4 picocuries/gram(wet) in all samples. These results were consistent with cesium-137 concentrations found in game samples (especially squirrels) analyzed in previous years (7). All other nuclides searched for were less than LLD.

Pasture Grass (Table C-25)

Pasture grass was collected monthly at the closest farm (15A1). Pasture grass samples from location 8D1 were collected when the goat milk was unavailable. Each sample was analyzed by gamma spectrometry. Potassium-40 was found in four of five samples and ranged from 2.6 to 5.4 picocuries/gram(wet). One sample showed a result of less than 5.0 picocuries/gram(wet) of potassium-40. Beryllium-7 was observed in four samples with results ranging from 0.6 to 8.3 picocuries/gram(wet). The presence of beryllium-7 can be attributed to cosmic radiation.

Direct Radiation (Table C-26)

Direct radiation measurements were made on a quarterly basis. TLD packets were placed at 67 locations on and surrounding the Susquehanna SES. During the operational period of 1982, 131 quarterly TLD packets were collected. Each packet included four dosimeters for a total of 524 analyses.

All TLD results presented in this report have been normalized to a standard month (30.4 days) to eliminate the apparent differences in data caused by variations in length of exposure period. The range of TLD results for indicator locations was 4.80 to 8.41 mrad/standard month and 4.28 to 7.40 mrad/standard month for control locations. The TLD analyses yielded an average dose equivalent rate of 6.27 mrad/standard month at all indicator locations, and an average dose equivalent rate of 5.95 mrad/standard month at all control locations.

The projected annual dose from direct radiation computed from these results is 75 mrads, or 75 mrem assuming a quality factor of 1, at indicator locations, and 71 mrad or 71 mrem at the control locations. The EPA terrestrial and cosmic radiation dose rate calculated for the Wilkes-Barre area is 82 mrem/year, neglecting any neutron contribution (20). This compares favorably with the average TLD measured dose rate of 75 mrem/year for all stations. This difference is not unexpected since the EPA values are gross general averages for an area and do not take into consideration specific terrestrial variations. The average dose rates for all monitoring locations since 1973 are plotted in Figure 4. The differences observed between locations or between sampling periods were similar to those found previously (5-14).

CONCLUSIONS

The Radiological Environmental Monitoring Program for Susquehanna SES was conducted during 1982 as a continuation of the program initiated in 1972. The data collected during the operational period of 1982 can be used for comparison with baseline preoperational data.

The purpose of the Susquehanna SES REMP is:

1. To compare radiological characteristics of the environs of Susquehanna SES to preoperational data;

2. To assure that the media sampled and analyzed are sensitive to fluctuations in the radiological characteristics of the Susquehanna SES environs; and to assure that the program is responsive to station radioeffluent discharge;

3. To monitor potential critical pathways of station radioeffluent to man.

The operational period of the 1982 REMP compares favorably to the baseline radiological characteristics for the vicinity of the Susquehanna SES established between 1972 and August 1982. This is evident by the agreement of data from analyses of the aquatic, atmospheric and terrestrial environments, as well as monitoring of direct radiation. The sampling and analysis of these media reflect the normal background radiation found in this environment.

The media sampled by the Susquehanna REMP are sensitive to radiological fluctuations of the environment monitored. This is evident by the measured gradual decline in the surface water concentration of tritium, primarily due to the decrease in atmospheric nuclear detonations. Gross beta analyses of air particulates are sensitive to atmospheric testing of nuclear weapons as can be seen in Figure 3. Iodine-131 was observed in surface water samples throughout the operational period of the year. The iodine-131 can be attributed to other sources of contamination of the river since the presence of iodine-131 in surface water was detected prior to initial criticality of Unit #1 (11-14). This instance indicates that the Susquehanna SES REMP is sensitive to radiological fluctuations of the environment.

Environmental gamma radiation measurements were made using thermoluminescent dosimeters. Results from the indicator and control locations were found not to be significantly different. Both indicator and control location results were similar to results obtained during the preoperational period (5-14).

The media sampled by the Susquehanna REMP also monitors potential critical pathways of station radioeffluent to man.

Monitoring of the waterborne pathway consisted of sampling surface water, well water, potable water and sediment. These sample types were chosen to reflect the characteristics of normal background radiation for this medium. The airborne pathway was monitored by filtering and analyzing the particulate matter, by passing filtered air through a charcoal filter which was analyzed for the presence of iodine-131 and by analysis of precipitation. The ingestion pathway was monitored by the sampling and analysis of milk, fish, game, various food products and pasture grass.

The results obtained by analysis of these samples were consistent with previously measured levels of radioactivity in their respective media (4-14).

The results obtained from analyses performed on the samples collected in the vicinity of the Susquehanna SES were expected for this environment. The levels and fluctuations of radioactivity detected are consistent with previously accumulated preoperational REMP data (4-14).

REFERENCES

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(18) Radiation Management Corporation, "Quality Control Data - 1982 Annual Report," March, 1983.

(19) National Interim Primary Drinking Water Regulations, Safe Drinking Water Act, Public Law 93523, July 9, 1976.

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TABLE 1

SYNOPSIS OF THE SUSQUEHANNA SES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SEPTEMBER - DECEMBER 1982

SAMPLE TYPE	SAMPLING FREQUENCY	NUMBER OF SAMPLING LOCATIONS	NUMBER COLLECTED	ANALYSIS TYPE	ANALYSIS FREQUENCY	NUMBER PERFORMED
WATERBORNE PATHWAY						
Surface Water	M	8	31	Gross Beta	M	27
				I-131	M	30
				Gamma	M	27
				H-3	QC	14
				Sr-89	QC	14
				Sr-90	QC	14
	W	7	7	I-131	W	7
Well Water	M	9	32	Gross Beta	M	32
				Gamma	M	32
				Gross Alpha	QC	17
				Tritium	QC	17
Potable Water	M	2	8	Gross Beta	M	8
				Gamma	M	8
				Gross Alpha	M/QC	6
				Tritium	M/QC	6
				Sr-89	QC	4
				Sr-90	QC	4
	W	1	18	I-131	W	17
Sediment	SA	5	5	Gross Alpha	SA	5
				Gamma	SA	5
				Sr-89	SA	5
				Sr-90	SA	5
AIRBORNE PATHWAY						
Air Particulate	W	11	198	Gross Beta	W	198
				Gross Alpha	QC	22
				Gamma	QC	22
				Sr-89	QC	22
				Sr-90	QC	22
Air Iodine	W	11	198	I-131	W	198
Precipitation	M	4	19	Tritium	QC	8
				Gamma	QC	8

TABLE 1 (cont.)

SYNOPSIS OF THE SUSQUEHANNA SES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SEPTEMBER - DECEMBER 1982

SAMPLE TYPE	SAMPLING FREQUENCY	NUMBER OF SAMPLING LOCATIONS	NUMBER COLLECTED	ANALYSIS TYPE	ANALYSIS FREQUENCY	NUMBER PERFORMED
INGESTION PATHWAY						
Milk	M/SM	8	40	I-131	M/SM	40
				Gamma	M/SM	40
				Sr-89	M	32
				Sr-90	M	32
Goat Milk	Q	2	2	I-131	Q	2
Fish (Flesh)	SA	2	6	Gamma	SA	6
				Sr-89	SA	6
				Sr-90	SA	6
Food Products	A	5	22	Gamma	A	22
Meat & Poultry (Flesh)	SA	2	3	Gamma	SA	3
Game	A	6	10	Gamma	A	10
Pasture Grass	M	2	5	Gamma	M	5
DIRECT RADIATION						
Dosimeters (TLDs)	Q	67	131	Gamma Dose rate	Q	131
Total			735			1139

FIG. 1 AVERAGE CONCENTRATIONS OF TRITIUM IN SURFACE WATER
IN THE VICINITY OF THE SUSQUEHANNA SES
1973 THROUGH 1982

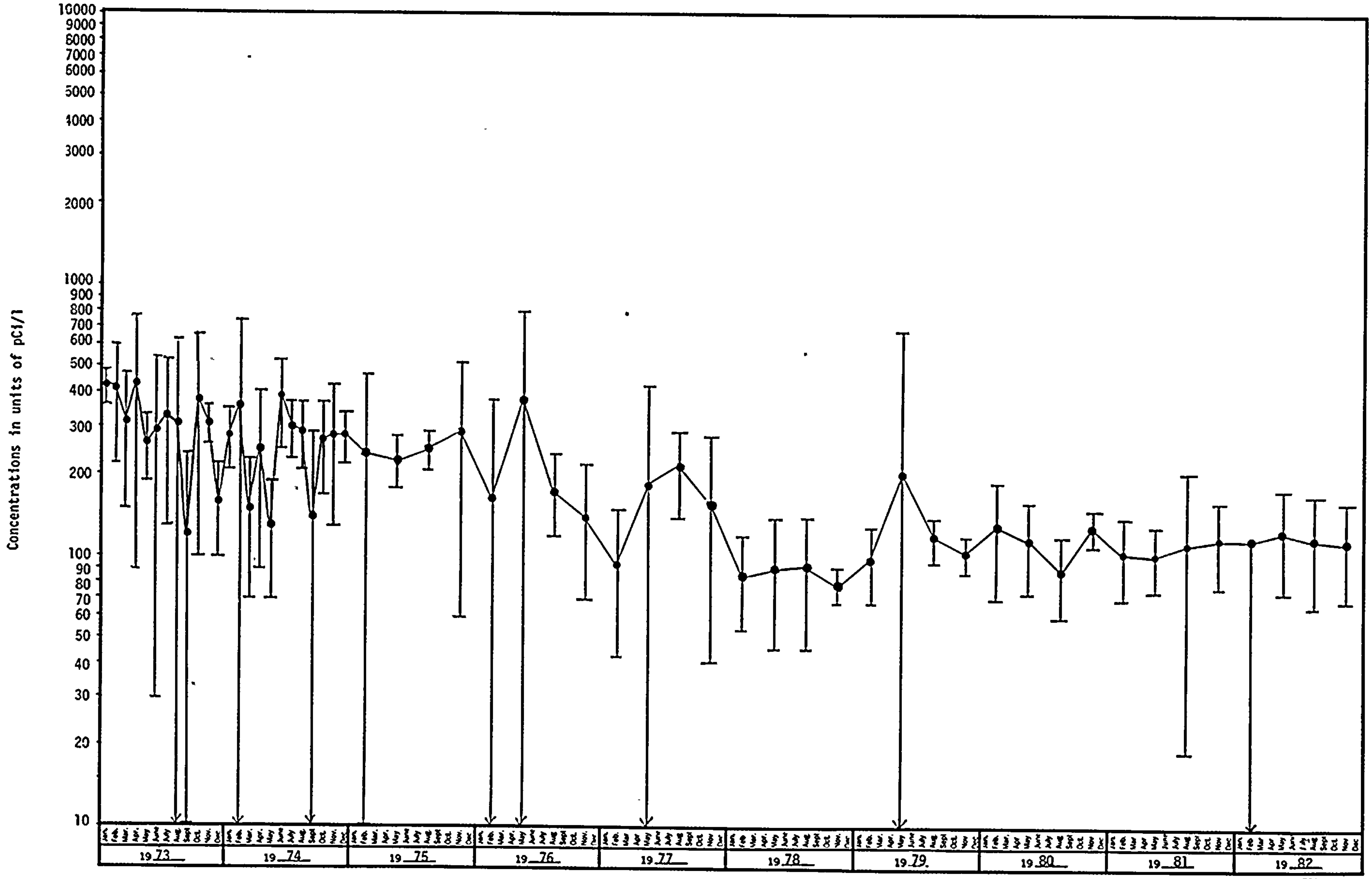


FIG. 2 GROSS BETA ACTIVITY IN AIR PARTICULATES IN THE VICINITY OF THE SUSQUEHANNA SES 1982

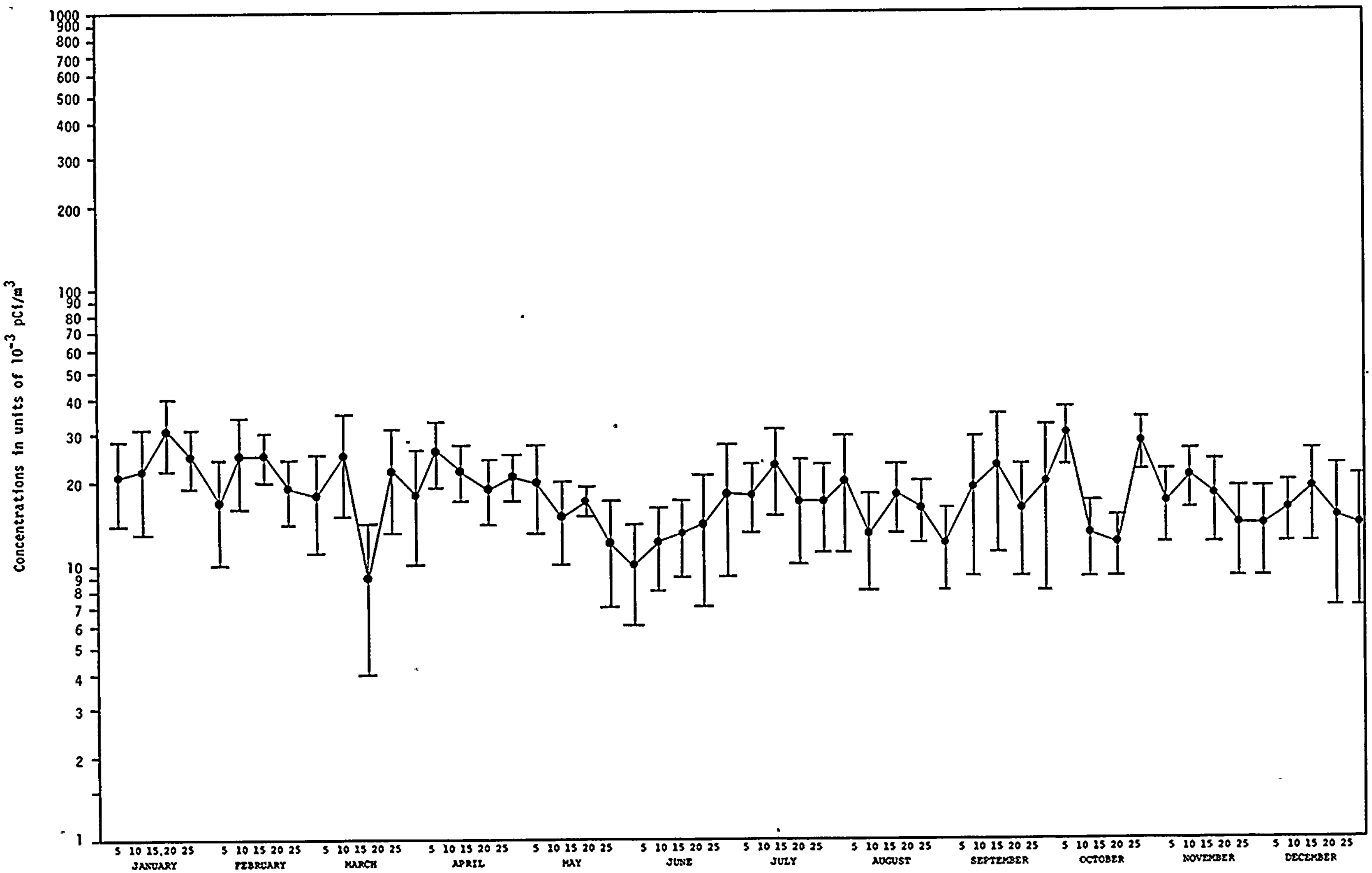


FIG. 3 GROSS BETA ACTIVITY IN AIR PARTICULATES
IN THE VICINITY OF THE SUSQUEHANNA SES
1973 THROUGH 1982

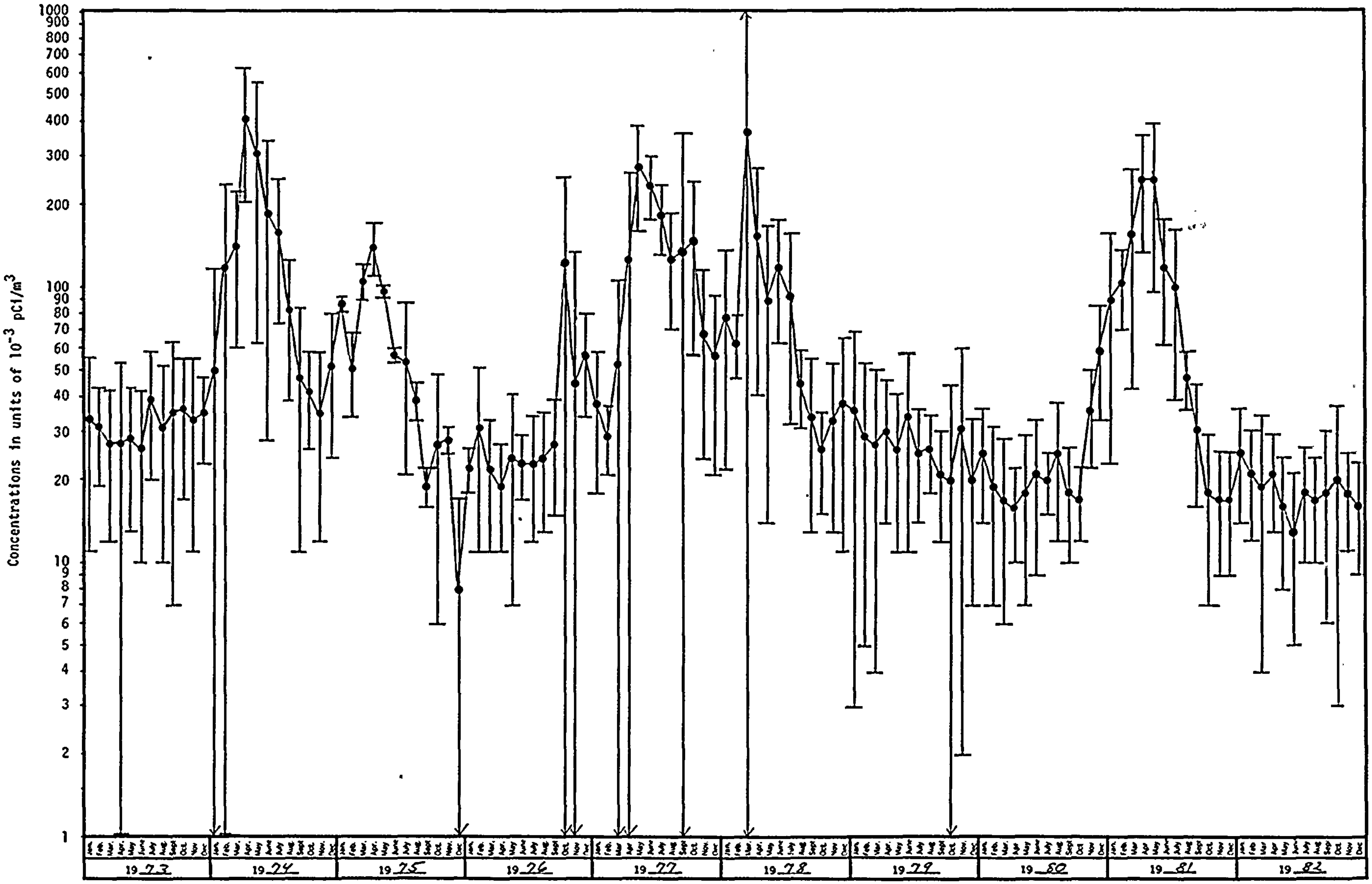
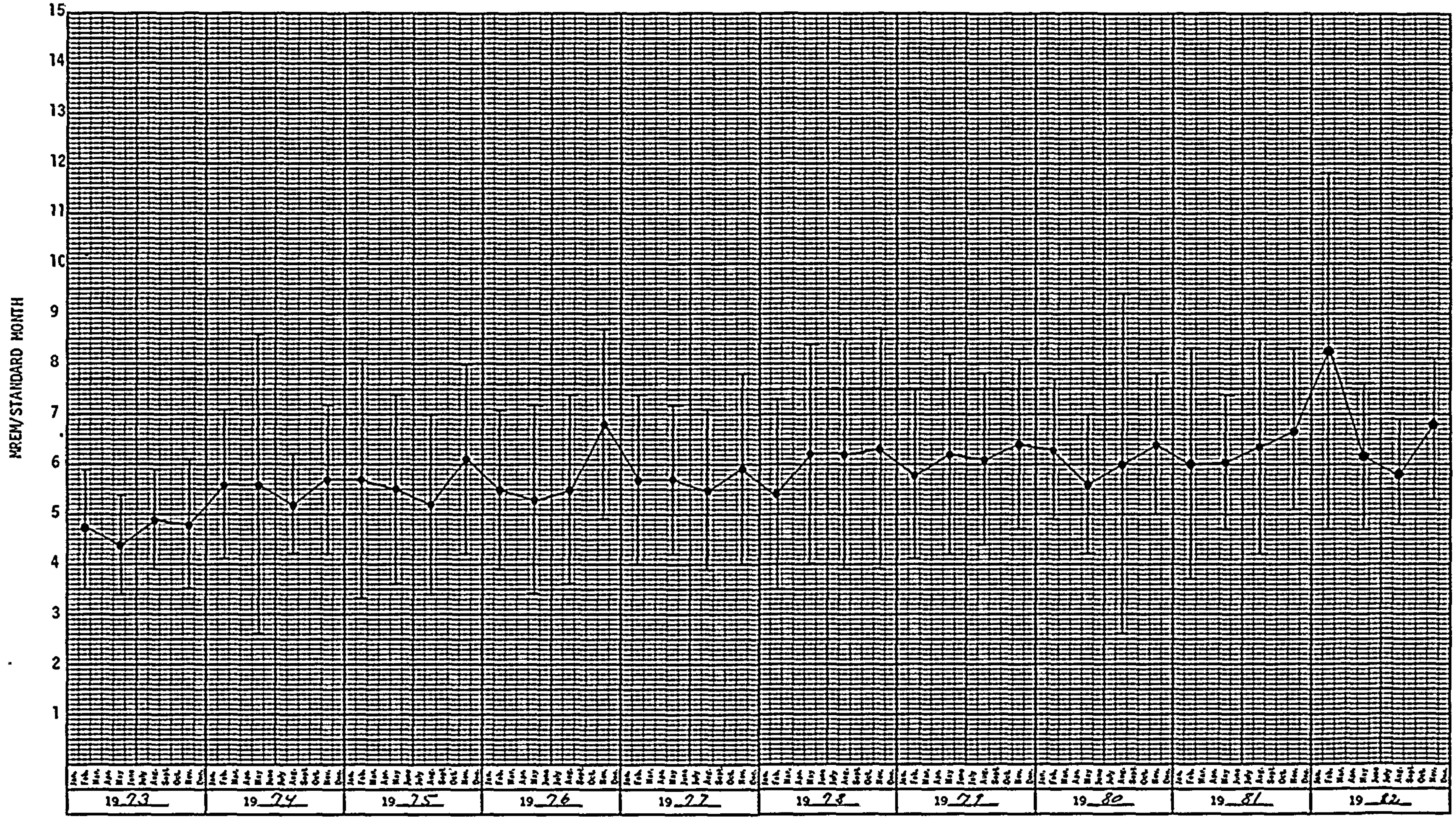


FIG. 4 AVERAGE AMBIENT RADIATION LEVELS
IN THE VICINITY OF THE SUSQUEHANNA SES
1973 THROUGH 1982



APPENDIX A

OPERATIONAL ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Susquehanna SES   Docket No.: 50-387 & 50-388

Berwick Pa.   September 1 to December 31, 1982

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)(1)	ALL INDICATOR LOCATIONS MEAN (2) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE & DIRECTION	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (2) RANGE	CONTROL LOCATION MEAN (2) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Surface Water (pCi/l)	Gross Beta 27	1.9	3.0 (15/15) (1.7-4.7)	1D3 3.9 mi N	3.5 (4/4) (2.1-5.3)	2.9 (8/12) (1.3-5.3)	0
	Gamma 27		- (0/15) -	N/A	N/A	- (0/12) -	0
	I-131 37	0.08	0.6 (1/16) (0.6)	12G2 17 mi WSW	0.6 (1/16) (0.6)	0.4 (1/21) (0.4)	0
	H-3 14	108	126 (3/8) (80-167)	12H1 26 mi WSW	167 (1/2) (167)	68 (1/6) (68)	0
	Sr-89 14	0.3	- (0/8) -	N/A	N/A	- (0/6) -	0
	Sr-90 14	0.3	0.5 (4/8) (0.3-0.6)	12F1 5.3 mi WSW 12H1 26 mi WSW	0.6 (1/2) (0.6) 0.6 (1/2) (0.6)	0.4 (2/6) (0.3-0.5)	0
Well Water (pCi/l)	Gross Beta 32	1.7	2.9 (16/28) (1.5-5.8)	15A4 0.9 mi NW	4.4 (4/4) (2.7-5.8)	2.3 (3/4) (1.3-3.1)	0
	Gamma 32		- (0/28) -	N/A	N/A	- (0/4) -	0
	Gross Alpha 17	1.0	1.8 (4/15) (1.2-2.5)	4S4 0.5 mi ENE	2.1 (2/2) (1.7-2.5)	1.4 (1/2) (1.4)	0
	H-3 17	108	101 (7/15) (76-152)	12E4 4.7 mi WSW	152 (1/2) (152)	135 (1/2) (135)	0
Potable Water (pCi/l)	Gross Beta 8	1.9	2.7 (3/4) (1.9-3.4)	12F3 5.2 mi WSW	3.2 (2/4) (2.3-4.0)	3.2 (2/4) (2.3-4.0)	0
	Gamma 8		- (0/4) -	N/A	N/A	- (0/4) -	0
	I-131 17	0.07	- (0/17) -	N/A	N/A	No Control Samples	0
	Gross Alpha 6	1.2	1.2 (1/4) (1.2)	12H2 26 mi WSW	1.2 (1/4) (1.2)	- (0/2) -	0

APPENDIX A (cont.)

OPERATIONAL ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Susquehanna SES Docket No.: 50-387 & 50-388

Berwick, Pa. September 1 to December 31, 1982

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)(1)	ALL INDICATOR LOCATIONS MEAN (2) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE & DIRECTION	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (2) RANGE	CONTROL LOCATION MEAN (2) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Potable Water (cont.) (pCi/l)	H-3 6	108	83 (1/4) (83)	12F3 5.2 mi WSW	114 (1/2) (114)	114 (1/2) (114)	0
	Sr-89 4	0.3	- (0/2) -	N/A	N/A	- (0/2) -	0
	Sr-90 4	0.3	0.4 (1/2) (0.4)	12F3 5.2 mi WSW	0.4 (1/2) (0.4)	- (0/2) -	0
Sediment (pCi/g-dry)	Gamma 5						
	Be-7	0.3	2.7 (1/3) (2.7)	12F 6.9 mi WSW	2.7 (1/1) (2.7)	0.4 (1/2) (0.4)	0
	K-40		8.9 (3/3) (6.9-12)	12F 6.9 mi WSW	12 (1/1) (12)	8.7 (2/2) (8.1-9.3)	0
	Cs-137		0.1 (3/3). (0.05-0.2)	12F 6.9 mi WSW	0.2 (1/1) (0.2)	0.12 (2/2) (0.08-0.15)	0
	Ra-226		0.6 (3/3) (0.46-0.82)	12F 6.9 mi WSW	0.82 (1/1) (0.82)	0.67 (2/2) (0.61-0.72)	0
	Th-232		0.8 (3/3) (0.6-1.0)	12F 6.9 mi WSW	1.0 (1/1) (1.0)	0.8 (2/2) (0.79-0.8)	0
	Gross Alpha 5		6.8 (3/3) (6.0-7.8)	2B 1.6 mi NNE	9.5 (1/1) (9.5)	9.0 (2/2) (8.5-9.5)	0
	Sr-89 5	0.04	- (0/3) -	N/A	N/A	- (0/2) -	0
	Sr-90 5	0.04	0.19 (3/3) (0.02-0.52)	12F 6.9 mi WSW	0.52 (1/1) (0.52)	- (0/2) -	0
Air Particulates (10^{-3} pCi/m^3)	Gross Beta 198		18 (144/144) (9-34)	7H1 47 mi SE	21 (18/18) (11-32)	17 (54/54) (9-32)	0
	Gamma 22						
	Be-7		62 (16/16) (31-80)	2S2 0.9 mi NNE	72 (2/2) (68-75)	53 (6/6) (39-73)	0
	Gross Alpha 22		3.5 (16/16) (1.9-4.6)	7H1 47 mi SE	7.1 (2/2) (4.8-9.3)	4.7 (6/6) (2.5-9.3)	0

APPENDIX A (cont.)

OPERATIONAL ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Susquehanna SES — Docket No.: 50-387 & 50-388

Berwick, Pa. — September 1 to December 31, 1982

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED		LOWER LIMIT OF DETECTION (LLD)(1)	ALL INDICATOR LOCATIONS MEAN (2) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE & DIRECTION	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (2) RANGE	CONTROL LOCATION MEAN (2) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Air Particulates (cont.) (10^{-3} pCi/m^3)	Sr-89	22	0.1	- (0/16) -	N/A	N/A	- (0/6) -	0
	Sr-90	22	0.07	0.10 (4/16) (0.08-0.15)	1D2 4.0 mi N	0.15 (1/2) (0.15)	0.09 (2/6) (0.08-0.1)	0
Air Iodine (10^{-3} pCi/m^3)	I-131	198	3.6	- (0/144) -	N/A	N/A	- (0/54) -	0
Precipitation (pCi/l)	H-3	8	140	- (0/6) -	N/A	N/A	- (0/2) -	0
	Gamma	8						
	Be-7		11	39 (5/6) (18-110)	5S4 0.8 mi E	68 (2/2) (25-110)	8.6 (1/2) (8.6)	0
Milk (pCi/l)	I-131	42	0.07	- (0/36) -	N/A	N/A	- (0/6) -	0
	Gamma	40						
	K-40			1347 (34/34) (1000-1500)	12D2 3.7 mi WSW	1450 (4/4) (1300-1500)	1300 (6/6) (1200-1400)	0
	Cs-137		1.0	1.6 (23/34) (1.1-3.7)	12B3 2.0 mi WSW	2.5 (4/4) (1.5-3.7)	1.9 (5/6) (1.4-2.8)	0
	Sr-89	32	1.0	- (0/28) -	N/A	N/A	- (0/4) -	0
	Sr-90	32		5.7 (28/28) (1.6-12)	12B3 2.0 mi WSW	8.5 (4/4) (5.6-12)	6.9 (4/4) (4.9-8.8)	0
Fish (pCi/g-wet)	Gamma	6						
	K-40			3.1 (3/3) (2.6-3.5)	2H 30 mi NNE	3.6 (3/3) (3.3-4.0)	3.6 (3/3) (3.3-4.0)	0
	Cs-137		0.006	0.012 (2/3) (0.009-0.014)	IND 0.9-1.4 mi ESE	0.012 (2/3) (0.009-0.014)	- (0/3) -	0
	Sr-89	6	0.004	- (0/3) -	N/A	N/A	- (0/3) -	0
	Sr-90	6	0.002	0.013 (1/3) (0.013)	IND 0.9-1.4 mi ESE	0.013 (1/3) (0.013)	0.005 (1/3) (0.005)	0

APPENDIX A (cont.)

OPERATIONAL ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Susquehanna SES — Docket No.: 50-387 & 50-388

Berwick, Pa. — September 1 to December 31, 1982

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)(1)	ALL INDICATOR LOCATIONS MEAN (2) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE & DIRECTION	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (2) RANGE	CONTROL LOCATION MEAN (2) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Food Products (pCi/g-wet)	Gamma 22						
	Be-7	0.03	1.0 (3/22) (0.5-1.8)	12S4 0.5 mi WSW	1.0 (3/11) (0.5-1.8)	No Control Samples	0
	K-40		2.4 (22/22) (0.8-7.4)	12S4 0.5 mi WSW	2.8 (11/11) (1.1-7.4)	No Control Samples	0
	Cs-137	0.003	0.06 (1/22) (0.06)	7B2 1.5 mi SE	0.06 (1/2) (0.06)	No Control Samples	0
Meat & Poultry (Flesh) (pCi/g-wet)	Gamma 3						
	K-40		2.5 (3/3) (1.0-3.9)	10D1 3.0 mi SSW	3.9 (1/3) (3.9)	No Control Samples	0
Game (Flesh) (pCi/g-wet)	Gamma 10						
	K-40		3.4 (10/10) (2.2-4.6)	16B 1.0-1.3 mi NNW	4.6 (1/1) (4.6)	No Control Samples	0
	Cs-137		1.1 (10/10) (0.018-2.4)	16B 1.0-1.3 mi NNW	2.4 (1/1) (2.4)	No Control Samples	0
Pasture Grass (pCi/g-wet)	Gamma 5						
	Be-7	0.4	3.3 (4/5) (0.6-8.3)	8D1 3.2 mi SSE	8.3 (1/1) (8.3)	No Control Samples	0
	K-40	5.0	3.7 (4/5) (2.6-5.4)	15A1 0.9 mi NW	3.7 (4/4) (2.6-5.4)	No Control Samples	0
Ambient Radiation (mrem/std. month)	TLD 131		6.27 (115/115) (5.01-8.41)	6S4 0.2 mi ESE	7.74 (2/2) (7.48-8.00)	5.95 (16/16) (4.28-7.42)	0

\- · No detectable measurements were found.

(1) The LLDs quoted are the lowest actual LLD obtained in the various media during the reporting period. A typical gamma LLD was determined for each searched for nuclide as found in Table C-27. Where all nuclides were LLD for a specific media, no LLD was listed. Strontium-89 and -90 are reported as minimum detectable levels (MDLs) rather than LLDs.

(2) Mean and range are based upon detectable measurements only. Fraction of detectable measurements is indicated in parentheses.

The mean ($\overline{X}$) is defined as follows: $\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}$

Where: X_i = the activity of an individual measurement (i)

n = number of total measurements

APPENDIX B

Table B-1 lists the sampling locations and includes both the distance and direction from the Susquehanna SES and the media sampled at each location. Maps B-1 and B-2 show the sampling locations with respect to the Susquehanna SES.

Sample Designation

Samples are identified by a three part code. The first two letters are the power station identification code, in this case "SS" for Susquehanna Steam Electric Station. The next three letters are for the media sampled.

AIO	=	Air Iodine	GAD	=	Game, Deer
AQF	=	Fish	GAS	=	Game, Squirrel
AQS	=	Sediment	GMK	=	Goat Milk
APT	=	Air Particulates	IDM	=	Immersion Dose (TLD)
EWA	=	Effluent Water	MLK	=	Milk
FPE	=	Food Products, Eggs	PAS	=	Pasture Grass
FPF	=	Food Products, Fruit	PWT	=	Potable Water, Treated
FPH	=	Food Products, Honey	RWA	=	Precipitation
FPL	=	Food Products, Leafy Vegetables	SWA	=	Surface Water
FPP	=	Food Products, Poultry	WWA	=	Well Water
FPV	=	Food Products, Vegetables			

The last four symbols are a location code based on direction and distance from the site. Of these, the first two represent each of the 16 angular sectors of 22-1/2 degrees centered about the reactor site. Sector one is divided evenly by the north axis and other sectors are numbered in a clockwise direction; i.e., 2=NNE, 3=NE, 4=ENE, etc. The next digit is a letter which represents the radial distance from the station:

S	=	Site[1] location	E	=	4-5 miles off-site
A	=	0-1 miles off-site	F	=	5-10 miles off-site
B	=	1-2 miles off-site	G	=	10-20 miles off-site
C	=	2-3 miles off-site	H	=	>20 miles off-site
D	=	3-4 miles off-site			

The last number is the station numerical designation within each sector and zone; e.g., 1, 2, 3, ...

(1) Site is defined as that area within PP&L's property boundary.

TABLE B-1

SUSQUEHANNA SES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

1982

LOCATION CODE	DESCRIPTION*	SAMPLE TYPES
IND**	0.9-1.4 mile ESE, At or below Discharge Structure	AQF
1S2	0.2 mile N, Security Fence	IDM
2S2	0.9 mile NNE, Energy Information Center	APT,AIO,IDM
2S3	0.2 mile NNE, Security Fence	IDM
2S5	0.1 mile NNE, Service & Administration Bldg.	WWA
2S6	0.9 mile NNE, Energy Information Center	WWA
3S3	0.5 mile NE, Recreational Area	IDM
3S4	0.3 mile NE, Security Fence	IDM
3S5	0.9 mile NE, Riverlands Security Office	WWA
3S6	1.0 mile NE, Riverlands Security Office	FPV
4S1	1.0 mile ENE, Susquehanna River Flood Plain	IDM
4S2	0.5 mile ENE, Site - Peach Stand	WWA
4S3	0.2 mile ENE, Security Fence	IDM
4S4	0.5 mile ENE, Training Center	WWA
5S1	0.8 mile E, North of Biological Consultants	IDM
5S4	0.8 mile E, West of Biological Consultants	APT,AIO,IDM,RWA
5S7	0.2 mile E, Security Fence	IDM
5S8	0.8 mile E, Area under power line	SWA
6S4	0.2 mile ESE, Security Fence	IDM
6S5	0.9 mile ESE, Outfall Area	SWA
7S1	0.2 mile SE on 230 KV tower	IDM
7S3	0.2 mile SE, Security Fence	IDM
7S5	0.4 mile SE, Southeast Garden	FPV,FPL
8S2	0.2 mile SSE, Security Fence	IDM
9S1	0.3 mile S, Security Fence	IDM
10S1	0.4 mile SSW, Security Fence	IDM
11S2	0.4 mile SW, Golomb House	APT,AIO,IDM,RWA
11S3	0.3 mile SW, Security Fence	IDM
11S5	0.5 mile SW, EOF Building	WWA
12S3	0.4 mile WSW, Security Fence	IDM
12S4	0.5 mile WSW, EOF Garden	FPV,FPL

TABLE B-1 (cont.)

SUSQUEHANNA SES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

1982

LOCATION CODE	DESCRIPTION*	SAMPLE TYPES
13S2	0.4 mile W, Security Fence	IDM
14S5	0.5 mile WNW, Site Boundary	IDM
15S3	0.3 mile NW, Security Fence	IDM
15S4	0.6 mile NW, Transmission Corridor	APT,AIO,IDM
16S1	0.3 mile NNW, Security Fence	IDM
1A***	0.3-1.0 mile N, Sybert's Hill Area	GAS,GAD
1A1	0.6 mile N, Thomas Residence	IDM
2A***	0.4-1.0 mile NNE, Sybert's Hill Area	GAS
6A3	0.6 mile ESE, State Police	IDM
7A1	0.4 mile SE, Kline Residence	IDM
11A2	0.6 mile SW, Shortz Residence	IDM
15A***	0.3-1.0 mile NW, Sybert's Hill Area	GAS
15A1	0.9 mile NW, Serafin Farm	PAS
15A3	0.9 mile NW, Serafin Farm	IDM
15A4	0.9 mile NW, Serafin Farm	WWA
16A***	0.3-1.0 mile NNW, Sybert's Hill Area	GAS
16A2	0.8 mile NNW, Rysinski Farm	IDM
1B***	1.0-1.3 miles N, Sybert's Hill Area	GAS
2B***	1.6 miles NNE, Gould Island	AQS
2B3	1.3 miles NNE, Luzerne Outerwear	IDM
7B***	1.2 miles SE, Bell Bend	AQS
7B2	1.5 miles SE, Heller's Orchard	FPF,FPH
7B3	1.7 miles SE, Council Cup	IDM
8B2	1.4 miles SSE, Lawall Residence	IDM
9B1	1.3 miles S, Transmission Line East of Route 11	APT,AIO,IDM
10B2	2.0 miles SSW, Algatt Residence	IDM
10B3	1.7 miles SSW, Car-Mar	IDM

TABLE B-1 (cont.)

SUSQUEHANNA SES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

1982

LOCATION CODE	DESCRIPTION*	SAMPLE TYPES
12B1	1.3 miles WSW, Kisner Farm	FPE,FPF,FPP
12B2	1.7 miles WSW, Shultz Farm	MLK
12B3	2.0 miles WSW, Young Farm	MLK
12B4	1.7 miles WSW, Shultz Farm	IDM
16B***	1.0-1.3 miles NNW, Sybert's Hill Area	GAS
16B1	1.6 miles NNW, Walton Power Line	IDM
6C1	2.7 miles ESE, Moyer Farm	MLK
7C1	2.7 miles SE, Ferry Farm	GMK
11C***	2.6 miles SW, Hess Island	AQS
1D2	4.0 miles N, Near Mocanaqua Substation	APT,AIO,IDM,RWA
1D3	3.9 miles N, Near Mocanaqua Substation	SWA
1D5	3.9 miles N, Shickshinny Sewage Treatment Facility	EWA
3D1	3.4 miles NE, Pond Hill	APT,AIO,IDM
8D1	3.2 miles SSE, Poltrock Farm	GMK,PAS
8D2	4.0 miles SSE, Mowry Residence	IDM
9D1	3.6 miles S, Smith Farm	IDM
10D1	3.0 miles SSW, Ross Ryman Farm	MLK,FPP
10D2	3.0 miles SSW, Ross Ryman Farm	IDM
12D2	3.7 miles WSW, Dogastin Farm	MLK
12D3	3.7 miles WSW, Dogastin Residence	IDM
1E1	4.5 miles N, Lane Residence	IDM
4E1	4.8 miles ENE, Pole #46422 N35-197	IDM
5E1	4.5 miles E, Bloss Farm	MLK
5E2	4.5 miles E, Bloss Farm	IDM
6E1	4.7 miles ESE, St. James Church	IDM
7E1	4.2 miles SE, Harwood Trans. Line Pole #2	IDM

TABLE B-1 (cont.)

SUSQUEHANNA SES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

1982

LOCATION CODE	DESCRIPTION*	SAMPLE TYPES
11E1	4.7 miles SW, Jacobsen Residence	IDM
12E1	4.7 miles WSW, Berwick Hospital	APT,AIO,IDM
12E4	4.7 miles WSW, Berwick Hospital	WWA
13E1	4.5 miles W, Glen Brook Reservoir	SWA
13E3	5.0 miles W, Dent Farm	MLK
13E4	4.1 miles W, Kessler Farm	IDM
14E1	4.1 miles WNW, Knouse Farm	IDM
2F***	6.4 miles NNE, Between Shickshinny and former State Hospital	AQS
2F1	5.9 miles NNE, St. Adalberts Cemetery	IDM
2F2	7.2 miles NNE, Retreat Bridge	SWA
3F1	9.1 miles NE, Valania Residence	IDM
7F1	9.0 miles SE, Conyngham School	IDM
12F***	6.9 miles WSW, Old Berwick Test Track	AQS
12F1	5.3 miles WSW, Berwick Bridge	SWA
12F2	5.2 miles WSW, Berwick Substation	IDM
12F3	5.2 miles WSW, Berwick Water Co.	WWA,PWT
15F1	5.4 miles NW, Zawatski Farm	IDM
16F1	7.8 miles NNW, Hidlay Residence	IDM
3G1	15 miles NE, Lower Bridge Plymouth	SWA
3G2	11 miles NE, Nanticoke Bridge	SWA
3G3	16 miles NE, WB Horton St. Substation	IDM
3G4	17 miles NE, WB Service Center	IDM
3G5	19 miles NE, Market St. Bridge	SWA
4G1	14 miles ENE, Mountain Top - Ind. Park	IDM
7G1	14 miles SE, Hazelton Chem Lab	APT,AIO,IDM
10G1	14 miles SSW, Davis Farm	MLK

TABLE B-1 (cont.)

SUSQUEHANNA SES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

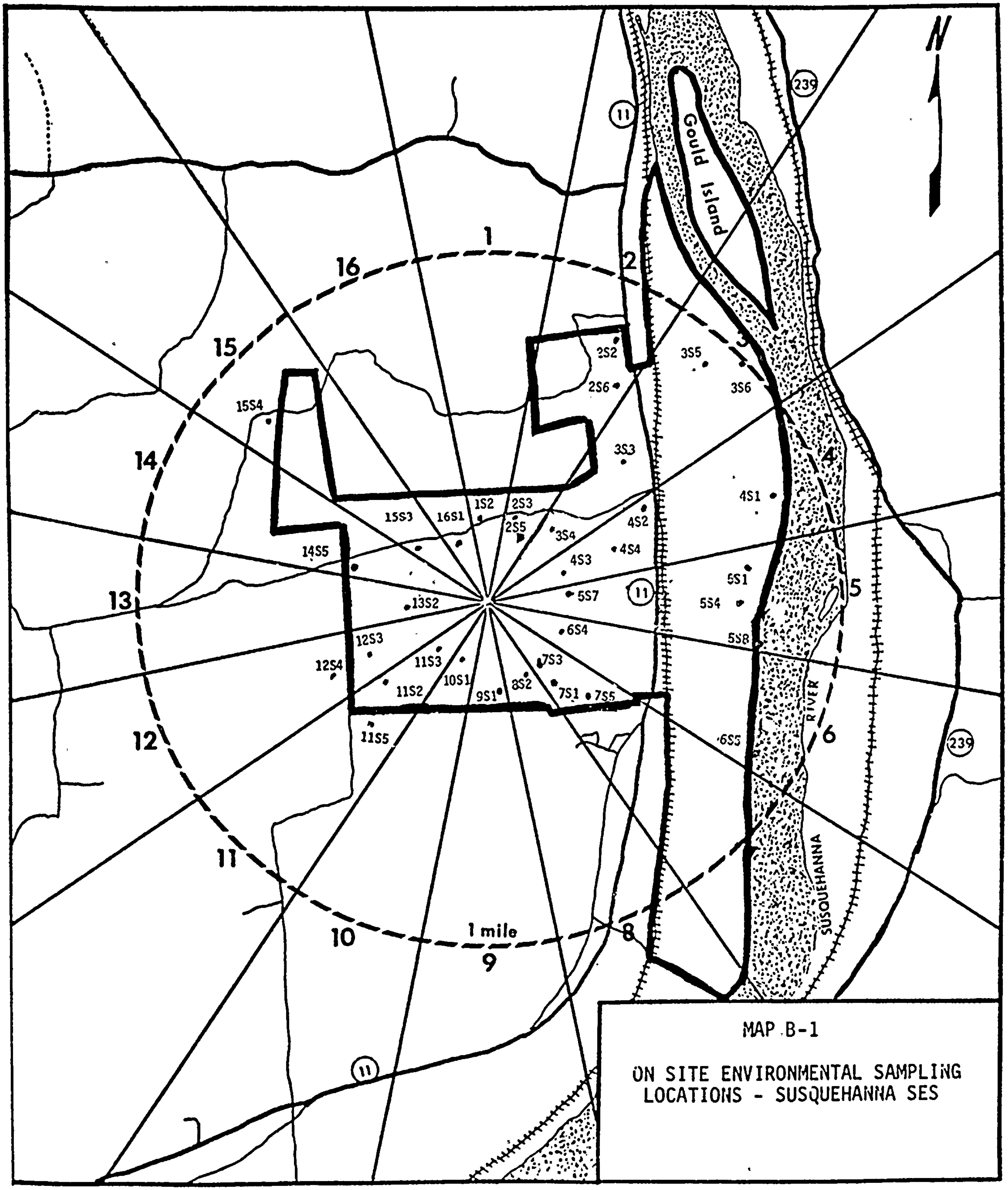
1982

LOCATION CODE	DESCRIPTION*	SAMPLE TYPES
12G1	15 miles WSW, Bloomsburg, PA	APT,AIO,IDM
12G2	17 miles WSW, between Bloomsburg and Berwick, PA	SWA,RWA
12G4	10 miles WSW, Kinery Residence	IDM
2H***	30 miles NNE, Near Falls, PA	AQF
7H1	47 miles SE, PP&L roof, Allentown	APT,AIO
8H1	92 miles SSE, RMC roof, Philadelphia	IDM
12H1	26 miles WSW, Merck Co.	SWA
12H2	26 miles WSW, Danville Water Company	PWT

* All distances measured from vent.

** No actual location is indicated since fish are sampled over an area which extends through 3 sectors (5, 6 and 7) near the outfall area.

*** Station code is omitted because no permanent locations exist; samples are taken based on availability.

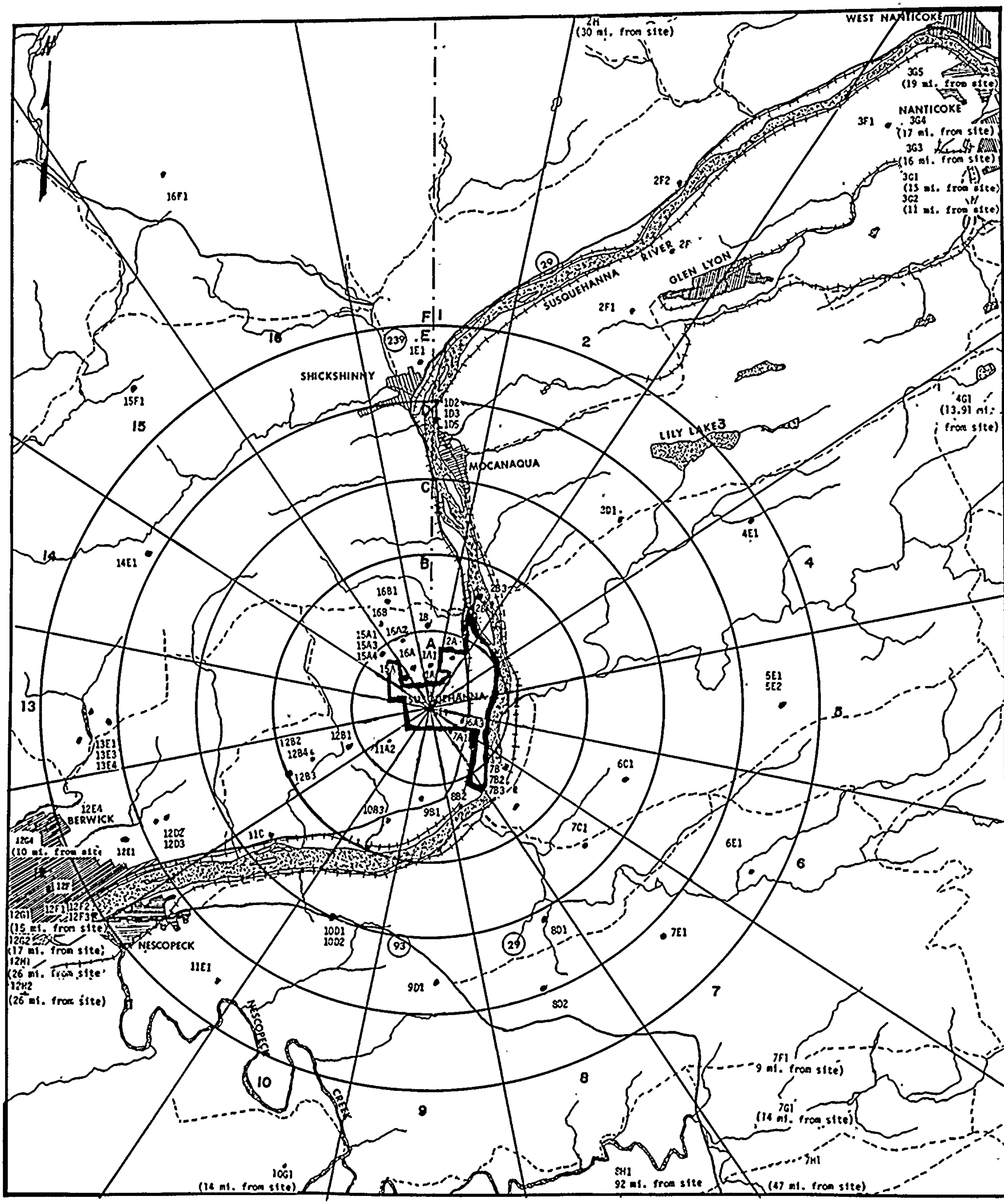


MAP B-1

ON SITE ENVIRONMENTAL SAMPLING LOCATIONS - SUSQUEHANNA SES

MAP B-2

OFF SITE ENVIRONMENTAL SAMPLING LOCATIONS - SUSQUEHANNA SES



APPENDIX C

DATA TABLES

APPENDIX C (cont.)

DATA TABLES

TABLE C-1

CONCENTRATIONS OF BETA EMITTERS IN SURFACE WATER SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO.	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	AVERAGE
SS-SWA-5S8	2.9±1.3	3.2±1.2	<2.7	1.3±1.2	2.5±1.7
SS-SWA-6S5	1.8±1.3	4.0±1.3	(1)	2.1±1.3	2.6±2.4
SS-SWA-1D3	2.9±1.4	5.3±1.4	3.8±1.4	2.1±1.7	3.5±2.7
SS-SWA-13E1	<2.6	1.4±1.2	<1.9	<2.6	-
SS-SWA-12F1	4.5±1.5	3.2±1.3	2.5±1.3	1.8±1.6	3.0±2.3
SS-SWA-12G2	3.9±1.5	2.8±1.3	3.2±1.3	1.7±1.6	2.9±1.8
SS-SWA-12H1	2.9±1.3	3.0±1.3	2.8±1.7	4.7±1.2	3.4±1.8
Monthly Average	3.1±1.8	3.3±2.4	2.8±1.3	2.3±2.2	
				Grand Average	2.9±2.0

(1) Sample was lost in shipment.

TABLE C-2

CONCENTRATIONS OF GAMMA EMITTERS* IN SURFACE WATER SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO. RADIOACTIVITY	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
SS-SWA-5S8	All<LLD	All<LLD	All<LLD	All<LLD
SS-SWA-6S5	All<LLD	All<LLD	(1)	All<LLD
SS-SWA-1D3	All<LLD	All<LLD	All<LLD	All<LLD
SS-SWA-13E1	All<LLD	All<LLD	All<LLD	All<LLD
SS-SWA-12F1	All<LLD	All<LLD	All<LLD	All<LLD
SS-SWA-12G2	All<LLD	All<LLD	All<LLD	All<LLD
SS-SWA-12H1	All<LLD	All<LLD	All<LLD	All<LLD

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.
(1) Sample was lost in shipment.

TABLE C-3

CONCENTRATIONS OF IODINE-131 IN SURFACE WATER AND EFFLUENT WATER SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO.	9-07-82*
SS-SWA-5S8	<0.09
SS-SWA-1D3	<0.08
SS-SWA-2F2	<0.09
SS-SWA-12F1	<0.09
SS-SWA-3G1	<0.1
SS-SWA-3G2	<0.1
SS-SWA-3G5	<0.1

LOCATION NO.	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
SS-SWA-5S8	<0.2	<0.2	(1)	<0.2
SS-SWA-6S5	<0.1	<0.2	(2)	<0.2
SS-SWA-1D3	<0.09	<0.1	0.40±0.08	<0.2
SS-SWA-13E1	<0.1	<0.09	<0.1	<0.2
SS-SWA-12F1	<0.1	<0.09	<0.1	<0.2
SS-SWA-12G2	<0.1	<0.09	0.6±0.1	<0.2
SS-SWA-12H1	<0.1	<0.1	<0.2	<0.1
SS-EWA-1D5	<0.1	<0.1	<0.1	<0.3

* Beginning in mid-September, sampling frequency was changed from weekly to monthly for locations 5S8, 1D3 and 12F1. Sampling from locations 2F2, 3G1, 3G2 and 3G5 was discontinued.

(1) Sample was lost in analysis.

(2) Sample was lost in shipment.

TABLE C-4

CONCENTRATIONS OF TRITIUM* AND STRONTIUM-89** AND -90 IN QUARTERLY COMPOSITE SAMPLES OF SURFACE WATER IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO. RADIOACTIVITY	JULY TO SEPTEMBER	OCTOBER TO DECEMBER
SS-SWA-5S8		
H-3	<121	68±68
Sr-89	<0.5	<0.3
Sr-90	0.5±0.3	0.3±0.3
SS-SWA-6S5		
H-3	<121	<110
Sr-89	<0.5	<0.3
Sr-90	0.6±0.3	0.3±0.3
SS-SWA-1D3		
H-3	<108	<120
Sr-89	<0.3	<0.3
Sr-90	<0.3	<0.3
SS-SWA-13E1		
H-3	<108	<120
Sr-89	<0.3	<0.3
Sr-90	<0.3	<0.3
SS-SWA-12F1		
H-3	80±67	<120
Sr-89	<0.4	<0.3
Sr-90	0.6±0.3	<0.3
SS-SWA-12G2		
H-3	131±67	<120
Sr-89	<0.3	<0.3
Sr-90	<0.3	<0.3
SS-SWA-12H1		
H-3	167±75	<144
Sr-89	<0.3	<0.5
Sr-90	0.6±0.3	<0.4
Strontium-90 Average	0.5±0.3	-

* Positive tritium results are reported when the 2 sigma counting error is less than the results. In some cases, positive results to be reported are lower than the calculated LLDs. For clarification, see the method of calculation found in Appendix D, Analysis of Samples for Tritium.

** Sr-89 results are decay corrected to sample stop date.

TABLE C-5

CONCENTRATIONS OF BETA EMITTERS IN WELL WATER SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO.	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	AVERAGE
SS-WWA-2S5	2.7±1.2	3.3±1.7	3.7±1.4	2.0±1.7	2.9±1.5
SS-WWA-2S6	1.5±1.1	<2.4	<1.9	2.0±1.7	2.0±0.7
SS-WWA-3S5	2.2±1.2	<2.4 (1)	-	-	2.3±0.3
SS-WWA-4S2	2.6±1.2	<2.4	<1.9	<2.6	-
SS-WWA-4S4	<1.7	<2.5	<1.9	1.9±1.7	-
SS-WWA-11S5	2.5±1.2	1.9±1.6	1.8±1.3	<2.6	2.2±0.8
SS-WWA-15A4	4.4±1.3	2.7±1.6	4.6±1.4	5.8±1.8	4.4±2.6
SS-WWA-12E4	-	-	<1.9 (2)	<2.6	-
SS-WWA-12F3	2.5±1.2	3.1±1.6	1.3±1.2	<2.6	2.4±1.5
Monthly Average	2.5±1.8	2.6±0.9	2.4±2.3	2.8±2.5	
				Grand Average	2.6±1.9

\- No result because the sampling location was not in operation.
(1) Sampling is discontinued during the winter months.
(2) Well water location SS-WWA-12E4 was initiated on 11-06-82.

TABLE C-6

CONCENTRATIONS OF GAMMA EMITTERS* IN WELL WATER SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO.	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
SS-WWA-2S5	All<LLD	All<LLD	All<LLD	All<LLD
SS-WWA-2S6	All<LLD	All<LLD	All<LLD	All<LLD
SS-WWA-3S5	All<LLD	All<LLD (1)	-	-
SS-WWA-4S2	All<LLD	All<LLD	All<LLD	All<LLD
SS-WWA-4S4	All<LLD	All<LLD	All<LLD	All<LLD
SS-WWA-11S5	All<LLD	All<LLD	All<LLD	All<LLD
SS-WWA-15A4	All<LLD	All<LLD	All<LLD	All<LLD
SS-WWA-12E4	-	-	All<LLD (2)	All<LLD
SS-WWA-12F3	All<LLD	All<LLD	All<LLD	All<LLD

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.
\- Indicates that the sampling location was not in operation.
(1) Sampling is discontinued during the winter months.
(2) Well water location SS-WWA-12E4 was initiated on 11-06-82.

TABLE C-7

CONCENTRATIONS OF ALPHA EMITTERS AND TRITIUM* IN QUARTERLY COMPOSITE SAMPLES OF WELL WATER IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO. RADIOACTIVITY	JULY TO SEPTEMBER	OCTOBER TO DECEMBER
SS-WWA-2S5		
Alpha	<1.9	<1.3
H-3	100±67	<120
SS-WWA-2S6		
Alpha	<1.2	<1.2
H-3	89±67	<120
SS-WWA-3S5		
Alpha	<1.4	<1.4
H-3	76±67	<120
SS-WWA-4S2		
Alpha	1.2±1.0	<1.4
H-3	<108	<120
SS-WWA-4S4		
Alpha	2.5±1.5	1.7±1.1
H-3	96±67	<120
SS-WWA-11S5		
Alpha	1.8±1.3	<1.0
H-3	100±75	<120
SS-WWA-15A4		
Alpha	<1.1	<1.2
H-3	94±67	<120
SS-WWA-12E4		
Alpha	-	<1.7 (1)
H-3	-	152±75 (1)
SS-WWA-12F3		
Alpha	1.4±1.1	<1.3
H-3	135±68	<120

* Positive tritium results are reported when the 2 sigma counting error is less than the results. In some cases, positive results to be reported are lower than the calculated LLDs. For clarification, see the method of calculation found in Appendix D, Analysis of Samples for Tritium.

\- Indicates that the sampling location was not in operation.

(1) Well water location SS-WWA-12E4 was initiated on 11-06-82.

TABLE C-8

CONCENTRATIONS OF BETA EMITTERS AND GAMMA EMITTERS* IN POTABLE (DRINKING) WATER SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO. RADIOACTIVITY	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	AVERAGE
SS-PWT-12F3					
Beta	4.0±1.5	2.3±1.2	<1.9	<2.6	2.7±1.8
Gamma Emitters	All<LLD	All<LLD	All<LLD	All<LLD	
SS-PWT-12H2					
Beta	2.8±1.3	3.4±1.4	<2.6	1.9±0.6	2.7±1.2
Gamma Emitters	All<LLD	All<LLD	All<LLD	All<LLD	
				Beta Grand Average	2.7±1.4

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.

TABLE C-9

CONCENTRATIONS OF IODINE-131 IN POTABLE (DRINKING) WATER SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO.	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
SS-PWT-12H2	<0.1	<0.4	<0.1	<0.09
	<0.1	<0.07	<0.1	<0.3
	<0.2	<0.1	<0.1	<0.08
	<0.1	<0.08	(1)	<0.2
		<0.1		<1.0 (2)

(1) Data was lost in analysis due to detector malfunction.
(2) Large LLD is due to delay in counting resulting from detector malfunction.

TABLE C-10

CONCENTRATIONS OF ALPHA EMITTERS, TRITIUM* AND STRONTIUM-89** AND -90 IN QUARTERLY (AND MONTHLY) COMPOSITE SAMPLES OF POTABLE (DRINKING) WATER IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO. RADIOACTIVITY	JULY TO SEPTEMBER	OCTOBER TO DECEMBER
SS-PWT-12F3		
Sr-89	<0.3	<0.3
Sr-90	<0.3	<0.3
Alpha	<1.5	<1.2
H-3	114±67	<120
SS-PWT-12H2		
Sr-89	<0.9	<0.6
Sr-90	0.4±0.3	<0.5

LOCATION NO. RADIOACTIVITY	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
SS-PWT-12H2				
Alpha	<1.3	<1.4	1.2±1.1	<1.4
H-3	83±74	<108	<111	<144

* Positive tritium results are reported when the 2 sigma counting error is less than the results. In some cases, positive results to be reported are lower than the calculated LLDs. For clarification, see the method of calculation found in Appendix D, Analysis of Samples for Tritium.

** Sr-89 results are decay corrected to sample stop date.

TABLE C-11

CONCENTRATIONS OF GAMMA EMITTERS* IN SEDIMENT SAMPLES FROM THE SUSQUEHANNA RIVER
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/g(dry) ± 2 sigma

LOCATION NO. DATE	SS-AQS-2B** 9-24-82	SS-AQS-7B** 9-24-82	SS-AQS-11C** 9-24-82	SS-AQS-2F** 9-24-82	SS-AQS-12F** 9-24-82	AVERAGE
Be-7	<0.3	<0.3	<0.3	0.4±0.2	2.7±0.5	-
K-40	8.1±0.8	7.8±0.8	6.9±0.7	9.3±0.9	12±1	8.8±4.0
Cs-137	0.08±0.02	0.05±0.02	0.05±0.02	0.15±0.03	0.20±0.04	0.1±0.1
Ra-226	0.61±0.06	0.53±0.05	0.46±0.05	0.72±0.07	0.82±0.08	0.6±0.3
Th-232	0.80±0.08	0.70±0.07	0.60±0.07	0.79±0.08	1.0±0.1	0.8±0.3

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.
** Location code is omitted because no exact locations exist; samples are taken based on availability.

TABLE C-12

CONCENTRATIONS OF ALPHA EMITTERS AND STRONTIUM-89* AND -90 IN SEDIMENT SAMPLES FROM THE SUSQUEHANNA RIVER IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/g(dry) ± 2 sigma

LOCATION NO. DATE	SS-AQS-2B** 9-24-82	SS-AQS-7B** 9-24-82	SS-AQS-11C** 9-24-82	SS-AQS-2F** 9-24-82	SS-AQS-12F** 9-24-82	AVERAGE
Alpha	9.5±5.3	7.8±4.3	6.6±4.8	8.5±5.2	6.0±4.7	7.7±2.8
Sr-89	<0.04	<0.04	<0.07	<0.05	<0.2	-
Sr-90	<0.04	0.04±0.03	0.02±0.02	<0.04	0.52±0.08	0.1±0.4

* Sr-89 results are decay corrected to the sample stop date.

** Location code is omitted because no exact locations exist; samples are taken based on availability.

TABLE C-13

CONCENTRATIONS OF BETA EMITTERS IN AIR PARTICULATE SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

SAMPLE START DATE	SAMPLE STOP DATE	SS-APT 2S2	SS-APT 5S4	SS-APT 11S2	SS-APT 15S4	SS-APT 9B1	SS-APT 1D2	SS-APT 3D1	SS-APT 12E1	AVERAGE
8-28-82	9-05-82	12±3	13±2	14±3	11±2	10±2	13±2	10±2	12±3	12±3
9-05-82	9-12-82	20±4	14±5	20±3	23±3	21±3	20±3	14±2	23±3	19±7
9-12-82	9-19-82	27±4	26±3	25±3	25±3	30±3	26±3	12±2	26±3	25±11
9-19-82	9-26-82	20±4	17±3	17±3	16±3	15±3	20±3	10±2	17±3	17±6
9-26-82	10-03-82	30±4	24±3	26±3	14±2	24±3	23±3	13±2	15±3	21±13
10-03-82	10-09-82	33±4	28±3	34±4	28±4	33±3	32±4	24±3	28±3	30±7
10-09-82	10-17-82	14±3	14±3	13±3	14±3	13±2	14±3	9±3	11±2	13±4
10-17-82	10-24-82	12±3	13±3	13±3	11±3	13±2	13±3	9±3	14±3	12±3
10-24-82	10-31-82	25±3	31±3	33±4	31±3	28±3	26±4	27±3	30±3	29±6
10-31-82	11-07-82	18±3	21±3	20±3	15±2	19±3	20±4	12±3	17±3	18±6
11-07-82	11-14-82	22±4	21±3	22±3	21±3	21±3	21±3	16±3	23±3	21±4
11-14-82	11-21-82	18±3	19±3	20±3	20±3	17±3	23±3	18±3	21±3	20±4
11-21-82	11-28-82	11±3	13±3	16±3	14±3	14±3	15±3	11±3	17±3	14±4
11-28-82	12-05-82	15±3	14±3	12±2	14±2	17±3	17±3	11±2	14±3	14±4
12-05-82	12-12-82	17±3	17±3	15±3	17±3	16±3	17±3	14±3	14±3	16±3
12-12-82	12-19-82	25±4	17±3	18±3	21±3	19±3	19±3	16±3	22±3	20±6
12-19-82	12-27-82	16±2	16±2	14±2	13±1	14±2	14±2	12±2	15±2	14±3
12-27-82	1-02-83	13±3	15±3	14±3	14±3	14±3	14±3	10±3	14±3	14±3
Average		19±13	19±11	19±13	18±12	19±13	19±11	14±10	19±11	

Indicator Average 18±12

TABLE C-13 (cont.)

CONCENTRATIONS OF BETA EMITTERS IN AIR PARTICULATE SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

SAMPLE START DATE	SAMPLE STOP DATE	SS-APT 7G1	SS-APT 12G1	SAMPLE START DATE	SAMPLE STOP DATE	SS-APT 7H1	AVERAGE
8-28-82	9-05-82	14±3 (1)	9±2	8-30-82	9-06-82	15±3	13±6
9-05-82	9-12-82	10±2	20±3	9-06-82	9-13-82	28±4	19±18
9-12-82	9-19-82	24±3	12±2	9-13-82	9-20-82	24±4	20±14
9-19-82	9-26-82	18±3	10±2	9-20-82	9-25-82	17±4	15±9
9-26-82	10-03-82	16±3	18±3	9-25-82	10-04-82	15±3	16±3
10-03-82	10-09-82	29±3	26±3	10-04-82	10-11-82	32±4	29±6
10-09-82	10-17-82	14±3	11±2	10-11-82	10-18-82	11±3	12±3
10-17-82	10-24-82	10±2	10±2	10-18-82	10-25-82	13±3	11±3
10-24-82	10-31-82	28±3	22±3	10-25-82	11-01-82	31±5	27±9
10-31-82	11-07-82	16±3	16±3	11-01-82	11-08-82	16±3	16
11-07-82	11-14-82	24±3	17±3	11-08-82	11-14-82	21±4	21±7
11-14-82	11-21-82	15±3	11±2	11-14-82	11-22-82	20±4	15±9
11-21-82	11-28-82	14±3	12±3	11-22-82	11-28-82	19±4	15±7
11-28-82	12-05-82	12±2	12±2	11-28-82	12-06-82	18±4	14±7
12-05-82	12-12-82	15±3	16±3	12-06-82	12-13-82	22±4	18±8
12-12-82	12-19-82	16±3	12±3	12-13-82	12-20-82	23±5	17±11
12-19-82	12-27-82	13±2	10±1	12-20-82	12-28-82	26±4	16±17
12-27-82	1-02-83	14±3	9±3	12-28-82	1-03-83	22±4	15±13
Average		17±11	14±10			21±12	
						Control Average	17±12

(1) Sampling period was 8-29-82 to 9-05-82.

TABLE C-14

CONCENTRATIONS OF GAMMA EMITTERS* IN QUARTERLY COMPOSITES OF AIR PARTICULATE SAMPLES IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

LOCATION NO.		JULY TO SEPTEMBER	OCTOBER TO DECEMBER
SS-APT-2S2 Be-7		75±13	68±12
SS-APT-5S4 Be-7		56±11	56±9
SS-APT-11S2 Be-7		73±12	69±11
SS-APT-15S4 Be-7		70±10	45±11
SS-APT-9B1 Be-7		42±9	75±11
SS-APT-1D2 Be-7		80±11	53±10
SS-APT-3D1 Be-7		52±10	31±10
SS-APT-12E1 Be-7		80±11	61±12
SS-APT-7G1 Be-7		48±9	39±15
SS-APT-12G1 Be-7		47±9	46±8
SS-APT-7H1 Be-7		73±12	67±7
Average		63±29	55±28
	Be-7 Grand Average		59±29

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.

TABLE C-15

CONCENTRATIONS OF ALPHA EMITTERS, STRONTIUM-89* AND -90 IN QUARTERLY COMPOSITES OF AIR PARTICULATE SAMPLES IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

LOCATION NO.	JULY TO SEPTEMBER			OCTOBER TO DECEMBER		
	Alpha	Sr-89	Sr-90	Alpha	Sr-89	Sr-90
SS-APT-2S2	3.9±0.6	<0.2	<0.1	3.8±0.6	<0.2	<0.1
SS-APT-5S4	3.4±0.5	<0.1	<0.1	4.1±0.5	<0.1	<0.1
SS-APT-11S2	3.9±0.6	<0.3	<0.08	4.6±0.6	<0.2	<0.1
SS-APT-15S4	2.2±0.4	<0.4	<0.07	4.4±0.6	<0.2	<0.09
SS-APT-9B1	3.5±0.5	<0.4	<0.07	3.7±0.5	<0.2	<0.1
SS-APT-1D2	3.5±0.5	<0.6	0.15±0.09	4.3±0.6	<0.2	<0.08
SS-APT-3D1	2.1±0.4	<0.1	<0.08	1.9±0.4	<0.2	0.08±0.08
SS-APT-12E1	3.1±0.5	<0.1	0.1±0.1	4.2±0.6	<0.1	0.08±0.07
SS-APT-7G1	4.1±0.6	<0.1	<0.1	4.2±0.6	<0.1	0.08±0.07
SS-APT-12G1	2.5±0.5	<0.1	0.10±0.08	3.0±0.5	<0.1	<0.07
SS-APT-7H1	4.8±0.7	<0.2	<0.2	9.3±1.0	<0.3	<0.1
Average	3.4±1.7	-	-	4.3±3.6	-	
					Alpha Grand Average	3.9±2.5

* Sr-89 results are decay corrected to sample stop date.

TABLE C-16

CONCENTRATIONS OF IODINE-131 IN FILTERED AIR
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

SAMPLE START DATE	SAMPLE STOP DATE	SS-AIO 2S2	SS-AIO 5S4	SS-AIO 11S2	SS-AIO 15S4	SS-AIO 9B1	SS-AIO 1D2	SS-AIO 3D1	SS-AIO 12E1
8-28-82	9-05-82	<5.5	<4.4	<5.2	<4.6	<3.9	<4.6	<5.1	<5.0
9-05-82	9-12-82	<5.7	<9.0	<5.1	<5.1	<4.5	<4.4	<4.2	<5.2
9-12-82	9-19-82	<15	<7.9	<9.5	<9.3	<9.6	<9.6	<9.5	<11
9-19-82	9-26-82	<17	<10	<12	<10	<10	<14	<13	<13
9-26-82	10-03-82	<7.7	<5.0	<5.1	<5.1	<5.0	<5.7	<4.8	<5.5
10-03-82	10-09-82	<8.2	<4.8	<8.3	<6.7	<5.4	<6.7	<6.3	<6.1
10-09-82	10-17-82	<8.4	<6.9	<6.5	<6.9	<7.0	<6.6	<8.6	<5.1
10-17-82	10-24-82	<6.1	<4.6	<6.3	<6.3	<4.8	<6.5	<7.3	<4.9
10-24-82	10-31-82	<5.4	<4.3	<5.4	<4.8	<4.5	<5.2	<5.8	<5.0
10-31-82	11-07-82	<5.7	<4.0	<3.9	<3.6	<4.1	<5.7	<4.7	<4.2
11-07-82	11-14-82	<6.1	<5.1	<4.3	<4.9	<4.9	<5.7	<4.8	<4.6
11-14-82	11-21-82	<6.5	<5.8	<5.5	<5.5	<6.2	<7.1	<6.3	<5.4
11-21-82	11-28-82	<5.3	<4.9	<4.6	<4.1	<4.9	<5.5	<5.0	<5.0
11-28-82	12-05-82	<5.7	<4.7	<4.7	<4.7	<7.4	<5.8	<5.3	<5.2
12-05-82	12-12-82	<9.2	<7.8	<8.3	<7.9	<9.1	<9.8	<12	<13
12-12-82	12-19-82	<6.4	<7.1	<6.7	<5.7	<7.1	<8.6	<6.7	<6.9
12-19-82	12-27-82	<25	<23	<24	<19	<14	<29	<26	<28
12-27-82	1-02-83	<29	<27	<26	<23	<25	<34	<29	<28

TABLE C-16 (cont.)

CONCENTRATIONS OF IODINE-131 IN FILTERED AIR
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

SAMPLE START DATE	SAMPLE STOP DATE	SS-AIO 7G1	SS-AIO 12G1	SAMPLE START DATE	SAMPLE STOP DATE	SS-AIO 7H1
8-28-82	9-05-82	<6.2 (1)	<4.5	8-30-82	9-06-82	<4.7
9-05-82	9-12-82	<4.9	<4.7	9-06-82	9-13-82	<6.5
9-12-82	9-19-82	<12	<11	9-13-82	9-20-82	<26
9-19-82	9-26-82	<14	<14	9-20-82	9-25-82	<27
9-26-82	10-03-82	<6.4	<5.6	9-25-82	10-04-82	<5.3
10-03-82	10-09-82	<5.3	<6.9	10-04-82	10-11-82	<7.6
10-09-82	10-17-82	<7.7	<7.3	10-11-82	10-18-82	<4.8
10-17-82	10-24-82	<5.6	<5.7	10-18-82	10-25-82	<5.5
10-24-82	10-31-82	<4.2	<3.8	10-25-82	11-01-82	<6.8
10-31-82	11-07-82	<4.4	<4.2	11-01-82	11-08-82	<4.6
11-07-82	11-14-82	<5.0	<4.0	11-08-82	11-14-82	<6.7
11-14-82	11-21-82	<5.7	<5.3	11-14-82	11-22-82	<7.9
11-21-82	11-28-82	<4.9	<5.1	11-22-82	11-28-82	<6.4
11-28-82	12-05-82	<5.3	<5.0	11-28-82	12-06-82	<9.1
12-05-82	12-12-82	<14	<13	12-06-82	12-13-82	<9.4
12-12-82	12-19-82	<7.4	<7.4	12-13-82	12-20-82	<15
12-19-82	12-27-82	<26	<14	12-20-82	12-28-82	<17
12-27-82	1-02-83	<29	<16	12-28-82	1-03-83	<19

(1) Sampling period was 8-29-82 to 9-05-82.

TABLE C-17

CONCENTRATIONS OF TRITIUM AND GAMMA EMITTERS* IN PRECIPITATION SAMPLES IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO. RADIOACTIVITY	JULY TO SEPTEMBER	OCTOBER TO DECEMBER	AVERAGE
SS-RWA-5S4			
Tritium	<140 (1)	<151	-
Gamma Emitters			
Be-7	110±11 (1)	25±6	68±120
SS-RWA-11S2			
Tritium	<140	<151	-
Gamma Emitters			
Be-7	<11	20±5	16±13
SS-RWA-1D2			
Tritium	<140 (2)	<151	-
Gamma Emitters			
Be-7	18±5 (2)	23±5	21±7
SS-RWA-12G2			
Tritium	<140 (1)	<151	-
Gamma Emitters			
Be-7	<14 (1)	8.6±5.1	11±8
		Be-7 Grand Average	29±67

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.

(1) Analysis of September sample only since no sample was collected in July and August due to a broken sample container.

(2) Analysis of August and September samples only since no sample was collected in July due to a broken sample container.

TABLE C-18

CONCENTRATIONS OF IODINE-131* IN MILK IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO.	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
SS-MLK-12B2	<0.08 <0.2	<0.09 <0.1	<0.1	<0.3
SS-MLK-12B3	<0.09	<0.1	<0.1	<0.3
SS-MLK-6C1	<0.09	<0.1	<0.1	<0.3
SS-MLK-10D1	<0.08	<0.1	<0.1	<0.3
SS-MLK-12D2	<0.1	<0.1	<0.1	<0.3
SS-MLK-5E1	<0.08 <0.1	<0.1 <0.1	<0.1	<0.4
SS-MLK-13E3	<0.07 <0.1	<0.1 <0.1	<0.09	<0.4
SS-MLK-10G1	<0.1 <0.2	<0.1 <0.1	<0.1	<0.4
SS-GMK-7C1	(1)	<0.1	(1)	(1)
SS-GMK-8D1	(1)	<0.4	(1)	(1)

* Iodine-131 results are corrected for decay to the sample stop date.
(1) Goat milk was not available.

TABLE C-19

CONCENTRATIONS OF GAMMA EMITTERS* IN MILK IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

MONTH	SS-MLK-12B2 K-40	SS-MLK-12B2 Cs-137	SS-MLK-12B3 K-40	SS-MLK-12B3 Cs-137	SS-MLK-6C1 K-40	SS-MLK-6C1 Cs-137	SS-MLK-10D1 K-40	SS-MLK-10D1 Cs-137
SEPTEMBER	1300±130 1200±120	<1.1 1.5±0.7	1200±120	3.7±0.9	1300±130	1.8±0.8	1100±110	1.4±0.9
OCTOBER	1400±140 1400±140	1.2±0.8 <1.7	1400±140	1.9±0.8	1200±120	1.4±0.8	1300±130	1.4±0.8
NOVEMBER	1400±140	1.1±0.7	1000±100	2.8±0.9	1500±150	<1.3	1300±130	<1.8
DECEMBER	1100±110	<1.7	1500±150	1.5±0.7	1400±140	<1.2	1500±150	1.4±0.8
AVERAGE	1300±253	1.4±0.6	1275±443	2.5±2.0	1350±258	1.4±0.5	1300±327	1.5±0.4

MONTH	SS-MLK-12D2 K-40	SS-MLK-12D2 Cs-137	SS-MLK-5E1 K-40	SS-MLK-5E1 Cs-137	SS-MLK-13E3 K-40	SS-MLK-13E3 Cs-137	SS-MLK-10G1 K-40	SS-MLK-10G1 Cs-137	MONTHLY AVERAGE K-40	MONTHLY AVERAGE Cs-137
SEPTEMBER	1300±130	1.7±0.8	1400±140 1100±110	1.6±0.7 1.7±0.9	1400±140 1300±130	1.6±0.9 1.4±0.8	1200±120 1200±120	1.4±0.8 <1.9	1250±200	1.7±1.3
OCTOBER	1500±150	<1.4	1400±140 1400±140	1.5±0.9 1.1±0.6	1300±130 1400±140	1.3±0.7 <1.0	1300±130 1300±130	2.8±0.9 1.6±1.0	1358±159	1.5±1.0
NOVEMBER	1500±150	<1.4	1500±150	1.4±0.8	1300±130	1.7±0.9	1400±140	1.9±0.9	1363±337	1.7±1.1
DECEMBER	1500±150	<1.1	1500±150	<1.2	1500±150	1.5±0.9	1400±140	1.8±0.8	1425±278	1.4±0.5
AVERAGE	1450±200	-	1383±294	1.4±0.5	1367±163	1.4±0.5	1300±179	1.9±1.0		

Grand Average
K-40 1340±263
Cs-137 1.6±1.0

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.

TABLE C-20

CONCENTRATIONS OF STRONTIUM-89* AND -90 IN MILK
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/l ± 2 sigma

LOCATION NO.	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	AVERAGE
SS-MLK-12B2					
Sr-89	<1.7	<2.7	<1.0	<3.1	-
Sr-90	2.6±0.8	3.5±0.8	2.8±0.7	3.2±1.4	3.0±0.8
SS-MLK-12B3					
Sr-89	<3.1	<3.6	<2.0	<1.0	-
Sr-90	12±1	8.8±1.0	7.7±0.8	5.6±0.6	8.5±5.3
SS-MLK-6C1					
Sr-89	<1.7	<2.4	<4.9	<1.4	-
Sr-90	6.3±0.7	9.8±3.2	6.5±1.2	3.9±1.0	6.6±4.9
SS-MLK-10D1					
Sr-89	<5.3	<4.0	<8.3	<1.2	-
Sr-90	4.3±1.3	7.8±1.1	2.5±1.8	6.1±0.7	5.2±4.6
SS-MLK-12D2					
Sr-89	<3.0	<1.6	<3.6	<1.0	-
Sr-90	1.6±0.8	4.2±2.3	3.9±3.0	2.7±0.6	3.1±2.4
SS-MLK-5E1					
Sr-89	<2.0	<4.6	<2.9	<1.5	-
Sr-90	5.6±0.9	9.5±1.3	9.4±1.7	6.2±0.9	7.7±4.1
SS-MLK-13E3					
Sr-89	<3.3	<4.1	<1.6	<1.4	-
Sr-90	6.7±1.6	5.9±1.3	5.3±1.2	5.4±0.8	5.8±1.3
SS-MLK-10G1					
Sr-89	<2.8	<2.5	<1.6	<1.9	-
Sr-90	8.3±1.3	4.9±0.7	5.6±1.0	8.8±1.3	6.9±3.9
Average					
Sr-90	5.9±6.6	6.8±5.0	5.5±4.8	5.2±3.9	
				Sr-90 Average	5.9±5.0

* Sr-89 results are decay corrected to sample stop date.

TABLE C-21

CONCENTRATIONS OF GAMMA EMITTERS* AND STRONTIUM-89** AND -90 IN FISH FLESH
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/g(wet) ± 2 sigma

LOCATION NUMBER	SAMPLE TYPE	SAMPLE DATE	K-40	Cs-137	Sr-89	Sr-90
SS-AQF-Indicator	Walleye	10-06-82	2.6±0.3	0.014±0.006	<0.006	<0.003
	White Sucker	10-06-82	3.5±0.4	0.009±0.005	<0.013	0.013±0.007
	Channel Catfish	10-06-82	3.1±0.3	<0.006	<0.005	<0.003
SS-AQF-2H***	Walleye	10-12-82	4.0±0.4	<0.011	<0.006	0.005±0.004
	White Sucker	10-12-82	3.6±0.4	<0.009	<0.004	<0.002
	Channel Catfish	10-12-82	3.3±0.3	<0.011	<0.004	<0.002
		Average	3.4±1.0	-	-	-

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.
** Sr-89 results are decay corrected to sample stop date.
*** Location code is omitted because no exact sampling locations exist; samples are taken based on availability.

TABLE C-22

CONCENTRATIONS OF GAMMA EMITTERS* IN VARIOUS FOOD PRODUCTS
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/g(wet) ± 2 sigma

LOCATION NO.	SAMPLE DATE	DESCRIPTION	Be-7	K-40	Cs-137
SS-FPV-3S6	9-30-82	Zucchini	<0.06	2.7±0.3	<0.005
SS-FPL-7S5	9-20-82	Cabbage	<0.2	2.1±0.3	<0.02
SS-FPV-7S5	9-20-82	String Beans	<0.04	1.6±0.2	<0.004
SS-FPV-7S5	9-20-82	Zucchini	<0.03	2.3±0.2	<0.003
SS-FPV-7S5	10-07-82	Corn	<0.06	2.1±0.2	<0.006
SS-FPV-7S5	10-07-82	Tomato	<0.04	2.2±0.2	<0.004
SS-FPV-7S5	10-25-82	Potatoes	<0.06	2.7±0.3	<0.06
SS-FPV-7S5	10-25-82	Potatoes	<0.09	3.1±0.3	<0.008
SS-FPL-12S4	9-20-82	Cabbage	<0.1	1.1±0.2	<0.01
SS-FPV-12S4	9-20-82	String Beans	<0.05	1.5±0.2	<0.004
SS-FPV-12S4	9-20-82	Zucchini	<0.03	1.9±0.2	<0.003
SS-FPV-12S4	10-04-82	Zucchini	<0.04	1.8±0.2	<0.003
SS-FPV-12S4	10-06-82	Beans	<0.06	1.7±0.2	<0.005
SS-FPV-12S4	10-07-82	Corn	<0.06	1.7±0.2	<0.006
SS-FPV-12S4	10-07-82	Tomato	<0.04	1.4±0.1	<0.004
SS-FPV-12S4	10-25-82	Potatoes	<0.09	2.9±0.3	<0.008
SS-FPL-12S4	12-07-82	Lettuce	0.8±0.2	5.6±0.6	<0.03
SS-FPL-12S4	12-07-82	Lettuce	1.8±0.3	7.4±0.9	<0.05
SS-FPL-12S4	12-07-82	Spinach	0.5±0.2	4.1±0.6	<0.04
SS-FPF-7B2	12-07-82	Apples	<0.1	0.8±0.2	<0.01
SS-FPH-7B2	12-07-82	Honey	<0.2	1.6±0.2	0.06±0.01
SS-FPF-12B1	12-07-82	Apples	<0.1	1.0±0.1	<0.01
Average			-	2.4±3.1	-

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.

TABLE C-23

CONCENTRATIONS OF GAMMA EMITTERS* IN MEAT SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/g(wet) ± 2 sigma

LOCATION NO.	SAMPLE DATE	DESCRIPTION	K-40
SS-FPE-12B1	12-07-82	Eggs	1.0±0.2
SS-FPP-12B1	12-07-82	Chicken	2.7±0.3
SS-FPP-10D1	12-07-82	Duck	3.9±0.4
Average			2.5±2.9

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.

TABLE C-24

CONCENTRATIONS OF GAMMA EMITTERS* IN GAME SAMPLES
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/g(wet) ± 2 sigma

LOCATION NO.	SAMPLE DATE	DESCRIPTION	K-40	Cs-137
SS-GAS-1A**	10-18-82	Squirrel	4.1±0.4	2.4±0.2
SS-GAS-2A**	10-18-82	Squirrel	4.1±0.4	2.2±0.2
SS-GAS-15A**	10-18-82	Squirrel	4.0±0.4	2.0±0.2
SS-GAS-16A**	10-18-82	Squirrel	3.2±0.3	1.9±0.2
SS-GAS-1B**	10-18-82	Squirrel	4.2±0.4	0.24±0.03
SS-GAS-16B**	10-18-82	Squirrel	4.6±0.5	2.4±0.2
SS-GAD-1A**	11-30-82	Deer	2.2±0.2	0.018±0.007
SS-GAD-1A**	12-01-82	Deer	2.7±0.3	0.026±0.008
SS-GAD-1A**	12-01-82	Deer	2.3±0.2	0.029±0.009
SS-GAD-1A**	12-13-82	Deer	2.6±0.3	0.018±0.009
Average			3.4±1.8	1.1±2.3

* All other gamma emitters searched for were <LLD; typical LLDs are found on Table C-27.
** Location code is omitted because no exact location exists; samples are taken based on availability.

TABLE C-25

CONCENTRATIONS OF GAMMA EMITTERS* IN PASTURE GRASS
IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of pCi/g(wet) ± 2 sigma

LOCATION NO.	SAMPLE DATE	DESCRIPTION	Be-7	K-40
SS-PAS-15A1	9-04-82	Grass	1.0±0.2	5.4±0.6
SS-PAS-15A1	10-11-82	Grass	<0.4	3.6±0.5
SS-PAS-15A1	11-06-82	Grass	0.6±0.4	3.3±0.8
SS-PAS-15A1	12-09-82	Grass	3.2±0.6	2.6±1.3
SS-PAS-8D1 (1)	12-10-82	Grass	8.3±1.8	<5.0
Average			2.7±6.7	4.0±2.4

* All other gamma emitters searched for <LLD; typical LLDs are found on Table C-27.
(1) Pasture grass is sampled from SS-PAS-8D1 during the months milk is not collected.

TABLE C-26

RESULTS OF QUARTERLY TLD MEASUREMENTS IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of mrem/standard month

LOCATION NO.	JULY TO SEPTEMBER	OCTOBER TO DECEMBER	AVERAGE
SS-IDM-1S2	6.44±0.38	7.04±0.70	6.74±0.85
SS-IDM-2S2	5.98±0.18	6.16±0.98	6.07±0.25
SS-IDM-2S3	5.96±0.74	6.41±0.86	6.19±0.64
SS-IDM-3S3	5.43±0.17	6.02±0.76	5.73±0.83
SS-IDM-3S4	5.44±0.55	6.85±0.48	6.15±1.99
SS-IDM-4S1	5.34±0.51	5.81±0.26	5.58±0.66
SS-IDM-4S3	6.18±0.57	(1)	6.18
SS-IDM-5S1	5.15±0.29	5.28±0.45	5.22±0.18
SS-IDM-5S4	5.64±0.37	6.34±0.58	5.99±0.99
SS-IDM-5S7	5.90±0.22	6.48±0.84	6.19±0.82
SS-IDM-6S4	7.48±0.40	8.00±1.28	7.74±0.74
SS-IDM-7S1	5.56±0.62	6.57±0.38	6.07±1.43
SS-IDM-7S3	5.83±0.54	6.36±0.86	6.10±0.75
SS-IDM-8S2	6.10±0.35	7.05±0.27	6.58±1.34
SS-IDM-9S1	5.72±0.13	6.55±0.26	6.14±1.17
SS-IDM-10S1	5.84±0.36	6.03±1.15	5.94±0.27
SS-IDM-11S2	5.85±0.92	5.67±0.34	5.76±0.25
SS-IDM-11S3	6.06±0.40	8.33±1.37	7.20±3.21
SS-IDM-12S3	5.75±0.37	8.41±0.78	7.08±3.76
SS-IDM-13S2	6.10±0.48	7.22±1.07	6.66±1.58
SS-IDM-14S5	6.26±0.90	7.91±0.54	7.09±2.33
SS-IDM-15S3	6.13±0.82	7.21±0.29	6.67±1.53
SS-IDM-15S4	5.46±0.32	6.69±0.33	6.08±1.74
SS-IDM-16S1	6.37±0.17	7.25±0.53	6.81±1.24
SS-IDM-1A1	5.87±0.26	6.29±0.90	6.08±0.59
SS-IDM-6A3	6.06±0.19	6.61±0.97	6.34±0.78
SS-IDM-7A1	5.61±0.08	6.77±0.62	6.19±1.64
SS-IDM-11A2	5.55±0.31	6.37±0.65	5.96±1.16
SS-IDM-15A3	5.34±0.34	7.01±0.52	6.18±2.36
SS-IDM-16A2	5.77±0.27	6.45±0.38	6.11±0.96

TABLE C-26 (cont.)

RESULTS OF QUARTERLY TLD MEASUREMENTS IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of mrem/standard month

LOCATION NO.	JULY TO SEPTEMBER	OCTOBER TO DECEMBER	AVERAGE
SS-IDM-2B3	5.72±0.27	6.59±0.91	6.16±1.23
SS-IDM-7B3	6.27±0.44	6.52±0.89	6.40±0.35
SS-IDM-8B2	5.85±0.46	6.42±0.50	6.14±0.81
SS-IDM-9B1	5.38±0.48	6.56±0.20	5.97±1.67
SS-IDM-10B2	4.80±0.10	5.73±0.45	5.27±1.32
SS-IDM-10B3	5.38±0.41	5.98±0.63	5.68±0.85
SS-IDM-12B4	5.01±0.50	6.25±0.62	5.63±1.75
SS-IDM-16B1	4.80±0.21	5.85±0.88	5.33±1.48
SS-IDM-1D2	6.19±0.13	6.63±0.96	6.41±0.62
SS-IDM-3D1	6.65±0.44	7.53±0.32	7.09±1.24
SS-IDM-8D2	6.30±0.44	6.65±0.87	6.48±0.49
SS-IDM-9D1	5.93±0.32	6.49±0.27	6.21±0.79
SS-IDM-10D2	6.19±0.40	6.97±0.29	6.58±1.10
SS-IDM-12D3	5.92±0.53	7.11±1.08	6.52±1.68
SS-IDM-1E1	5.57±0.53	5.88±0.33	5.73±0.44
SS-IDM-4E1	5.98±0.26	7.26±0.14	6.62±1.81
SS-IDM-5E2	6.28±0.24	6.98±0.53	6.63±0.99
SS-IDM-6E1	6.55±0.22	7.56±0.63	7.06±1.43
SS-IDM-7E1	6.33±0.19	6.79±0.32	6.56±0.65
SS-IDM-11E1	5.15±0.28	5.87±0.70	5.51±1.02
SS-IDM-12E1	5.78±0.36	6.93±0.59	6.36±1.63
SS-IDM-13E4	6.61±0.40	6.99±0.25	6.80±0.54
SS-IDM-14E1	5.86±0.42	7.13±0.43	6.50±1.80
SS-IDM-2F1	5.84±0.45	(1)	5.84
SS-IDM-3F1	5.69±0.33	6.32±0.40	6.01±0.89
SS-IDM-7F1	5.52±0.16	(1)	5.52
SS-IDM-12F2	5.82±0.59	7.45±0.84	6.64±2.31
SS-IDM-15F1	6.43±0.39	7.15±0.39	6.79±1.02
SS-IDM-16F1	6.01±0.26	6.46±0.66	6.24±0.64
SS-IDM-3G3	5.94±0.30	6.92±0.32	6.43±1.39
SS-IDM-3G4	5.67±0.35	7.42±0.66	6.55±2.47

TABLE C-26 (cont.)

RESULTS OF QUARTERLY TLD MEASUREMENTS IN THE VICINITY OF SUSQUEHANNA SES

Results in Units of mrem/standard month

LOCATION NO.	JULY TO SEPTEMBER	OCTOBER TO DECEMBER		AVERAGE
SS-IDM-4G1	5.78±0.31	6.85±0.22		6.32±1.51
SS-IDM-7G1	5.90±0.88	7.40±0.56		6.65±2.12
SS-IDM-12G1	4.92±0.12	5.44±0.52		5.18±0.74
SS-IDM-12G4	6.56±0.31	7.13±0.57		6.85±0.81
SS-IDM-7H1	4.28±0.12	4.77±0.10		4.53±0.69
SS-IDM-8H1	4.75±0.28	5.46±0.65		5.11±1.0
Average	5.82±1.04	6.67±1.41		
			Grand Average	6.23±1.49

(1) TLD lost in field.

TABLE C-27

TYPICAL LLDs* FOR GAMMA SPECTROMETRY

NUCLIDE	SURFACE WATER (pCi/l)	WELL WATER (pCi/l)	POTABLE WATER (pCi/l)	SEDIMENT (pCi/g-dry)	AIR PARTICULATES (10^{-3} pCi/m^3)	PRECIPITATION (pCi/l)
Be-7	5.4	5.4	5.1	0.3	**	11
K-40	6.5	5.8	5.5	**	10	8.0
Cr-51	6.3	6.2	7.0	0.5	7.6	8.5
Mn-54	0.5	0.5	0.4	0.03	0.6	0.5
Co-57	0.3	0.3	0.5	0.02	0.4	0.4
Co-58	0.5	0.5	0.6	0.03	0.4	0.6
Fe-59	1.4	1.1	1.3	0.08	0.7	1.5
Co-60	0.6	0.6	0.6	0.03	0.7	0.6
Zn-65	1.1	1.1	1.2	0.06	1.5	1.1
Zr-95	1.0	1.0	1.0	0.06	1.1	1.2
Nb-95	0.7	0.6	0.7	0.05	0.7	0.8
Mo-99	20	17	18	-	5.5	-
Ru-103	0.7	0.7	0.7	0.04	0.7	0.9
Ru-106	4.5	4.5	4.4	0.2	5.5	4.8
Ag-110m	0.5	0.5	0.5	0.03	0.6	0.5
Sb-125	1.5	1.5	1.5	0.06	1.8	1.6
Te-129m	20	23	21	1.5	23	28
I-131	1.9	2.0	2.3	0.5	1.6	6.0
Cs-134	0.5	0.5	0.5	0.02	0.6	0.5
Cs-136	1.0	1.0	1.2	0.02	1.0	2.0
Cs-137	0.5	0.5	0.5	**	0.7	0.6
Ba-140	4.8	5.0	5.4	0.7	4.9	10
La-140	1.5	1.4	1.7	0.2	0.8	2.9
Ce-141	1.0	1.1	1.2	0.06	0.9	1.1
Ce-144	2.7	2.7	4.2	0.1	3.3	2.9
Ra-226	1.1	1.0	1.1	**	1.3	1.0
Th-232	1.6	1.6	1.7	**	1.8	1.7
Np-239	130	120	120	-	30	-

TABLE C-27 (cont.)

TYPICAL LLDs* FOR GAMMA SPECTROMETRY

NUCLIDE	MILK (pCi/l)	FISH (pCi/g-wet)	FOOD PRODUCTS (pCi/g-wet)	MEAT (FLESH) (pCi/g-wet)	GAME (FLESH) (pCi/g-wet)	PASTURE GRASS (pCi/g-wet)
Be-7	9.1	0.09	0.03	0.09	0.2	0.4
K-40	**	**	**	**	**	5.0
Cr-51	11	0.2	0.03	0.1	0.3	0.3
Mn-54	1.0	0.007	0.003	0.01	0.01	0.03
Co-57	0.6	0.005	0.002	0.006	0.007	0.04
Co-58	1.1	0.01	0.004	0.01	0.02	0.04
Fe-59	3.3	0.03	0.01	0.02	0.04	0.08
Co-60	1.1	0.008	0.004	0.01	0.01	0.04
Zn-65	2.7	0.02	0.009	0.03	0.03	0.08
Zr-95	2.0	0.02	0.006	0.02	0.03	0.06
Nb-95	1.4	0.02	0.004	0.01	0.02	0.04
Mo-99	49	-	0.03	0.2	-	0.1
Ru-103	1.2	0.01	0.004	0.01	0.03	0.04
Ru-106	7.6	0.06	0.02	0.09	0.09	0.3
Ag-110m	0.9	0.007	0.003	0.009	0.01	0.03
Sb-125	2.2	0.02	0.007	0.03	0.03	0.1
Te-129m	45	0.5	0.2	0.4	0.8	1.1
I-131	4.2	0.2	0.02	0.03	0.2	0.05
I-133		-	0.5	-	-	1.3
Cs-134	0.8	0.006	0.003	0.01	0.009	0.03
Cs-136	2.8	0.06	0.01	0.02	0.06	0.04
Cs-137	1.0	0.006	0.003	0.01	**	0.04
Ba-140	10	0.3	0.04	0.09	0.4	0.2
La-140	2.0	0.06	0.01	0.03	0.07	0.05
Ce-141	1.5	0.02	0.004	0.01	0.04	0.08
Ce-144	4.7	0.04	0.01	0.05	0.06	0.3
Ra-226	1.6	0.01	0.006	0.03	0.02	0.07
Th-232	2.5	0.02	0.009	0.04	0.03	0.1
Np-239	380	-	0.2	1.0	-	0.5

* Decay corrected to sample stop date. The large LLDs are due to short half-life.
** Indicates a positive concentration was measured in all samples analyzed.
\- Indicates that no LLD was calculated for that nuclide in that media.

GROSS ALPHA ANALYSIS OF SAMPLES

Total Water (AØ)

A 500 ml aliquot is evaporated to dryness and transferred to a preweighed, 2" x 1/4" ringed planchet and reweighed. The planchet is then counted in a low background gas-flow proportional counter. Self-absorption corrections are made based on the measured residue weight and calculated thickness. The calibration standard used is Pu-239. A 500 ml sample of distilled water is evaporated in the same manner and used as a blank.

Sediment (A9)

A 200 mg portion of finely divided sediment is slurried with water, transferred to a planchet and dried. The sample is counted in a low background, gas-flow proportional counter. Self absorption corrections are made on the basis of the weight of material counted. An empty planchet is prepared with water and used as a blank.

Air Particulates (AE)

A 20% aliquot of the leached sample is evaporated to dryness on a preweighed, 2" x 1/4", ringed, stainless steel planchet and the planchet is reweighed. The planchet is counted in a low background, gas-flow proportional counter. Self absorption corrections are made on the basis of residual weight. An unused filter paper is prepared in the same manner and counted as the blank.

Calculations of the results, the two sigma error and the lower limit of detection (LLD).

$$\text{Result (pCi/vol or mass)} = ((S/T) - (B/t)) \, / \, (2.22\ V\ E\ TF)$$

$$\text{2 sigma error (pCi/vol or mass)} = 2\ ((S/T^2) + (B/t^2))^{1/2} \, / \, (2.22\ V\ E\ TF)$$

$$\text{LLD (pCi/vol or mass)} = 4.66\ (B^{1/2}) \, / \, (2.22\ V\ E\ TF\ t)$$

where:

S	=	Gross counts of sample including blank
B	=	Counts of blank
E	=	Fractional Pu-239 counting efficiency
T	=	Number of minutes sample was counted
t	=	Number of minutes blank was counted
V	=	Sample aliquot size (liters, cubic meters or grams)
TF	=	Transmission factor (based on net weight of sample in counting planchet)

GROSS BETA ANALYSIS OF SAMPLES

Total Water (BØ)

A 250 ml aliquot is evaporated to dryness and transferred to a preweighed, 2" x 1/4" ringed planchet and reweighed. The planchet is then counted in a low background gas-flow proportional counter. Self-absorption corrections are made based on the measured residue weight and calculated thickness. The calibration standard used is Sr-90 - Y-90. A 250 ml sample of distilled water is evaporated in the same manner and used as a blank.

Calculations of the results, the two sigma error and the lower limit of detection (LLD).

Result (pCi/l) = ((S/T) / (B/t)) / (2.22 V E TF)

2 sigma error (pCi/l) = $2\ ((S/T^2) + (B/t^2))^{1/2}$ / (2.22 V E TF)

LLD (pCi/l) = $4.66\ (B^{1/2})$ / (2.22 V E TF t)

where:
- S = Gross counts of sample including blank
- B = Counts of blank
- E = Fractional Sr-90 - Y-90 counting efficiency
- T = Number of minutes sample was counted
- t = Number of minutes blank was counted
- V = Sample aliquot size (liters)
- TF = Transmission factor (based on net weight of sample in counting planchet)

Air Particulates (BD)

After a delay of two to five days, allowing for the radon-222 and radon-220 (thoron) daughter products to decay, the filters are counted in a gas-flow proportional counter. An unused filter paper is counted as the blank.

Calculations of the results, the two sigma error and the lower limit of detection (LLD).

Result (pCi/m^3) = ((S/T) - (B/t)) / (2.22 V E)

2 sigma error (pCi/m^3) = $2\ ((S/T^2) + (B/t^2))^{1/2}$ / (2.22 V E)

LLD (pCi/m^3) = $4.66\ (B^{1/2})$ / (2.22 V E t)

where:
- S = Gross counts of sample including blank
- B = Counts of blank
- E = Fractional Sr-90-Y-90 counting efficiency
- T = Number of minutes sample was counted
- t = Number of minutes blank was counted
- V = Sample aliquot size (cubic meters)

ENVIRONMENTAL DOSIMETRY (D1)

By RMC definition, a thermoluminescent dosimeter (TLD) is considered one end of a capillary tube containing calcium sulfate (Tm) powder as the thermoluminescent material. This material was chosen for its characteristic high light output, minimal thermally induced signal loss (fading), and negligible self-dosing. The energy response curve has been flattened by a complex multiple element energy compensator shield supplied by Panasonic Corporation, manufacturer of the TLD reader. There exists four dosimeters per station sealed in a polyethylene bag to demonstrate integrity at the time of measurement, and for visualization of the sample placement instructions. The zero dose is determined from TLDs located in the lead shield found at RMC, Philadelphia.

Following the predesignated exposure period the TLDs are placed in the TLD reader. The reader heats the calcium sulfate (Tm) and the measured light emission (luminescence) is used to calculate the environmental radiation exposure.

Data are normalized to standard machine conditions by correcting machine settings to designated values before readout. Data are also corrected for in-transit dose using a set of TLDs kept in a lead shield in the field, exposed only during transit. The average dose per exposure period, and its associated error is then calculated.

The Cs-137 source is used to expose TLDs as a reference sample. An absorbed dose in tissue is determined using the 0.955 rad/Roentgen conversion factor and dose equivalent (mrem) by using a quality factor of 1.

Calculation of results and two sigma error:

$$T = (G-Z)\ R\ C\ 0.955 \text{ mrad/Roentgen}$$

$$I = SZ - (RZ\ DL\ /\ DR)$$

$$N = T-I$$

$$\text{Average} = \left(\left(\sum_{i=1}^{n} N\right) / n\right)(30.4\ /\ DL)$$

$$\text{Error} = t(n-1)\ (SD\ /\ n^{1/2})\ (30.4\ /\ DL)$$

where:		
T	=	Individual TLD reading corrected to standard instrument conditions
G	=	Gross reading of dosimeter i
Z	=	Zero for dosimeter, i
R	=	Correction factor of reader
C	=	Calibration factor for dosimeter i
I	=	In-transit dose
SZ	=	Mean of n dosimeters in site lead shield
RZ	=	Mean of n dosimeters in RMC lead shield
DL	=	Exposure period of location (days)
DR	=	Exposure period of RMCØ (days)
Average	=	Mean exposure per standard exposure period at a given station
N	=	Net dose obtained during exposure period in the field
n	=	Number of readings
30.4	=	Days in standard exposure period
Error	=	The 95% confidence limit error of the average
t(n-1)	=	t-distribution (student) factor for 95% CL
SD	=	Standard deviation of n readings of sum N

GAMMA SPECTROMETRY OF SAMPLES

Water (G1)

Four liters of sample is reduced to 100 ml and sealed in a standard container. The container is counted with a Ge(Li) detector coupled to a multi-channel pulse-height analyzer. The counting time is 50,000 seconds.

Milk (G7)

A three liter aliquot is dried at 175°C, ashed at 500°C until no carbon residue is present, compressed and sealed in a standard container. The container is counted with a Ge(Li) detector, coupled to a multi-channel pulse-height analyzer. The counting time is 50,000 seconds.

Dried Solids (G8)

A large quantity of the sample is dried at a low temperature, less than 100°C. A 100 gram aliquot (or the total sample if less than 100 grams) is taken, compressed to a known geometry and sealed in a standard container. The container is counted with a Ge(Li) detector, coupled to a multi-channel pulse-height analyzer. The counting time is 50,000 seconds.

Air Dried Solids (GA)

A large quantity of sample is air dried, compressed to a known geometry and sealed in a standard container. The container is counted with a Ge(Li) detector, coupled to a multi-channel pulse-height analyzer. The counting time is 50,000 seconds.

Air Particulate (GB)

All samples received for the quarter are mixed and sealed in the standard container. The container is counted with the high resolution Ge(Li) detector, coupled to a multi-channel pulse-height analyzer.

Calculation of results, two sigma error and the lower limit of detection (LLD).

The data are obtained by smoothing the spectrum to minimize the effects of random statistical fluctuations. Peaks are identified by changes in the slope of the gross spectrum. The net area, in counts, above the baseline is determined. The calculations of the results, two sigma error and the lower limit of detection (LLD) for each nuclide are then expressed in activity (pCi) per unit volume or mass (liters or grams).

Result (pCi/vol or mass) = $((S/T) - (B/t)) / (2.22\ E\ V\ F)$

2 sigma error (pCi/vol or mass) = $2\ ((S/T^2) + (B/t^2))^{1/2} / (2.22\ E\ V\ F)$

LLD (pCi/vol or mass) = $4.66\ (6\ S)^{1/2} / (2.22\ E\ V\ F\ T)$

where:

- S = Net area, in counts, of sample (Region of spectrum of interest)
- B = Net area, in counts, of background (Region of spectrum of interest)
- T = Number of minutes sample was counted
- t = Number of minutes background was counted
- E = Detector efficiency for energy of interest
- V = Sample aliquot size (liters, cubic meters or grams)
- F = Fractional gamma abundance (specific for each emitted nuclide)

ANALYSIS OF SAMPLES FOR TRITIUM

Water (H2)

A 15 ml aliquot of the sample is vacuum distilled to eliminate dissolved gases and non-volatile matter. The distillate is frozen in a trap cooled with a dry ice-isopropanol mixture. Eight (8) ml of the distillate are mixed with ten (10) ml of Insta-Gel liquid scintillation solution. The sample is then counted for tritium in a liquid scintillation counter. A sample of low tritium (<50 pCi/l) water is vacuum distilled as a blank and is counted with each batch of samples. In the calculation of the result it is assumed that the condensated and original sample are of equivalent volumes. The volume change associated with the removal of dissolved gases and non-volatile matter is not significant compared to the other errors in the analysis.

Calculations of the results, the two sigma error and the lower limit of detection (LLD).

$$\text{Result (pCi/l)} = ((S/T) - (B/t)) / (2.22\ V\ E)$$

$$\text{2 sigma error (pCi/l)} = 2\ ((S/T^2) \pm (B/t^2))^{1/2} / (2.22\ V\ E)$$

$$\text{LLD (pCi/l)} = 4.66\ (B^{1/2}) / (2.22\ V\ E\ t)$$

where:

where:	S	=	Gross counts of sample including blank
	B	=	Counts of blank
	E	=	Fractional H-3 counting efficiency
	T	=	Number of minutes sample was counted
	t	=	Number of minutes blank was counted
	V	=	Sample aliquot size (liters)

ANALYSIS OF SAMPLES FOR IODINE-131

Milk or Water (IØ)

The initial stable iodide concentration in milk is determined with an iodide ion specific electrode. Thirty milligrams of stable iodide carrier is then added to four (4) liters of milk. The iodide is removed from the milk by passage through ion-exchange resin. The iodide is eluted from the resin with sodium hypochlorite, and purified by a series of solvent extractions with the final extraction into a toluene phase. The toluene phase is mixed with a toluene-based liquid scintillation solution. The sample is then counted in a beta-gated gamma coincidence detector, shielded by six inches of steel. Distilled water is used as a blank. The yield is calculated from stable iodide recovery based on the recovered volume. Results are corrected for decay from the sampling time to the middle of the counting period, using a half-life value for I-131 of 8.06 days.

The data are obtained by smoothing the spectrum to minimize random statistical fluctuations. Iodine-131 is identified by changes in the slope of the gross spectrum, and noting the net area, in counts, above the baseline. The calculations of the results, the two sigma error and the lower limit of detection (LLD) for iodine-131 are then expressed in activity (pCi) per unit volume (liter).

Calculation of results, two sigma error and the lower limit of detection (LLD).

$$\text{Result (pCi/l)} = (S-B) / (2.22\ E\ V\ Y\ F\ T)$$

$$\text{2 sigma error (pCi/l)} = 2\ (S+B)^{1/2} / (2.22\ E\ V\ Y\ F\ T)$$

$$\text{LLD (pCi/l)} = 4.66\ (B^{1/2}) / (2.22\ E\ V\ Y\ F\ T)$$

where:
- S = Gross sample counts in I-131 peak
- B = Baseline counts in region of I-131 peak
- T = Number of minutes sample was counted
- E = I-131 counting efficiency
- V = Sample aliquot size (liters)
- F = Fractional gamma abundance (0.824 for I-131)
- Y = Chemical yield of Iodine

Air Cartridges (I1)

An iodine adsorber composed of charcoal is emptied into an aluminum can (6 cms high by 8 cms in diameter) and counted with a NaI(Tl) detector, coupled to a multi-channel pulse height analyzer.

The data are obtained by smoothing the spectrum to minimize random statistical fluctuations. Iodine-131 is identified by changes in the slope of the gross spectrum, and noting the net area, in counts, above the baseline. The calculations of the results, the two sigma error and the lower limit of detection (LLD) for iodine-131 are then expressed in activity (pCi) per unit volume.

$$\text{Result (pCi/m}^3) = ((S/T) - (B/t)) / (2.22\ E\ V\ F)$$

$$\text{2 sigma error (pCi/m}^3) = 2\ ((S/T^2) - (B/t^2))^{1/2}\ /\ (2.22\ E\ V\ F)$$

$$\text{LLD (pCi/m}^3) = 4.66\ (.63(Q^{1/2})b)^{1/2}\ /\ (2.22\ V\ E\ F\ T)$$

where:

S	=	Net area, in counts, of sample in I-131 peak
B	=	Net area, in counts, of background in I-131 peak
b	=	Counts in I-131 peak channel
T	=	Number of minutes sample was counted
t	=	Number of minutes background was counted
Q	=	Channel number (36 for I-131)
E	=	I-131 counting efficiency
V	=	Sample aliquot size (cubic meters)
F	=	Fractional gamma abundance (0.824 for I-131)

ANALYSIS OF SAMPLES FOR STRONTIUM-89 AND -90

Total Water (SØ, TØ)

A two liter aliquot of sample is used. Stable strontium carrier is added to the liquid to facilitate chemical separation of Sr-89 and -90, and to determine the strontium recovery. Strontium concentration and purification is ultimately realized by at least two precipitations of strontium nitrate in concentrated nitric acid. Additional iron/rare earth hydroxide precipitations and barium chromate separations are performed to remove suspected interfering nuclides. After purification, the Y-90 is allowed to ingrow for a known period of time. Sr-90 is then determined by counting yttrium oxalate after initially precipitating Y-90 as yttrium hydroxide. Sr-89 is determined by counting strontium carbonate and correcting the observed activity for the amount of Sr-90 and Y-90 on the planchet. A sample of distilled water is used as a blank.

Milk (S4, T4)

A one and half liter aliquot of milk is ashed to destroy organic material and then dissolved in concentrated mineral acid. Stable strontium is added to the eluted liquid or dissolved ash to facilitate chemical separation of Sr-89 and -90, and to determine the strontium recovery. Strontium concentrations and purification is ultimately realized by at least two precipitations of strontium nitrate in concentrated nitric acid. Additional iron/rare earth hydroxide precipitations and barium chromate separations are performed to remove suspected interfering nuclides. After purification, the Y-90 is allowed to ingrow for a known period of time. Sr-90 is then determined by counting yttrium oxalate after initially precipitating Y-90 as yttrium hydroxide. Sr-89 is determined by counting strontium carbonate and correcting the observed activity for the amount of Sr-90 and Y-90 on the planchet. A sample of distilled water is used as a blank.

Sediment (S6, T6)

Sediment samples are leached with HCl and HNO_3 after being dried. Stable strontium carrier is added to facilitate chemical isolation of Sr-89 and -90 and for determination of the strontium recovery in the procedure. Strontium concentration and purification is ultimately realized by at least two precipitations of strontium nitrate in concentrated nitric acid. Additional iron/rare earth hydroxide precipitations and barium chromate separations are performed. After purification, the Y-90 is allowed to ingrow for a known period of time. Sr-90 is then determined by counting yttrium oxalate after initially precipitating Y-90 as yttrium hydroxide. Sr-89 is determined by counting strontium carbonate and correcting the observed activity for the amount of Sr-90 and Y-90 on the planchet. A sample of distilled water is used as a blank.

Organic Solids (S8, T8)

A 250 g wet portion of the sample is ashed, then dissolved in concentrated nitric or mineral acid. Stable strontium carrier is added to the dissolved sample to facilitate chemical separation of Sr-89 and -90, and to determine the strontium recovery. Strontium concentration and purification is ultimately realized by at least two precipitations of strontium nitrate in concentrated nitric acid. Additional iron/rare earth hydroxide precipitations and barium chromate separations were performed. After purification, the Y-90 is allowed to ingrow for a known period of time. Sr-90 is then determined by counting yttrium oxalate after initially precipitating Y-90 as yttrium hydroxide. Sr-89 is determined by counting strontium carbonate and correcting the observed activity for the amount of Sr-90 and Y-90 on the planchet. A sample of distilled water is used as a blank.

Air Particulates (SA, TA)

Air particulate filters are leached with HCl and HNO_3. Stable strontium carrier is added to facilitate chemical isolation of Sr-89 and -90 and for determination of the strontium recovery. Strontium concentration and purification is ultimately realized by at least two precipitations of strontium nitrate in concentrated nitric acid. Additional iron/rare earth hydroxide precipitations and barium chromate separations are performed to remove suspected interfering nuclides. After purification, the Y-90 is allowed to ingrow for a known period of time. Sr-90 is then determined by counting yttrium oxalate after initially precipitating Y-90 as yttrium hydroxide. Sr-89 is determined by counting strontium carbonate and correcting the observed activity for the amount of Sr-90 and Y-90 on the planchet. An unused filter paper is used as a blank.

Calculations of the results, the two sigma errors and minimum detectable levels (MDL) for Sr-89, -90 are expressed in activity (pCi) per unit volume (liter) or mass (gram).

Result Sr-90 = $(A/T1-B/T2) / (2.22\ V\ E\ Y\ X\ \exp(-0.693\ t1/64.1)(1-\exp(-0.693t2/64.1)))$
(pCi/vol or mass)

2 sigma error Sr-90 = $2(A/T1^2+B/T2^2)^{1/2} / (2.22\ V\ E\ Y\ X\ \exp(-0.693t1/64.1)(1-\exp(-0.693\ t2/64.1)))$
(pCi/vol or mass)

MDL Sr-90 = $3\ B^{1/2} / (2.22\ T2\ V\ E\ Y\ X\ \exp(-0.693t1/64.1)(1-\exp(-0.693t2/64.1)))$
(pCi/vol or mass)

where:
- A = Gross Y-90 counts
- B = Blank counts of yttrium
- T1 = Y-90 counting time
- T2 = Blank counting time
- V = Sample aliquot size
- E = Y-90 counting efficiency
- Y = Yttrium chemical yield
- X = Strontium chemical yield
- t1 = Time in hours from second separation of Y-90 until counting time of yttrium planchet plus one half the counting time
- t2 = Time in hours between first and second separations of Y-90 (ingrowth time)

Result Sr-89 = $(C/T3 - D/T4 - G - H) / (2.22\ V\ F\ X\ \exp(-0.693t4/50.5))$
(pCi/vol or mass)

2 sigma error Sr-89 = $2\ (C/T3^2 + D/T4^2 + G/T3 + H/T3)^{1/2} / (2.22\ V\ F\ X\ \exp(-0.693t4/50.5))$
(pCi/vol or mass)

MDL Sr-89 = $3\ (D+GT3+HT3)^{1/2} / (2.22\ T4\ V\ F\ X\ \exp(-0.693t4/50.5))$
(pCi/vol or mass)

where:
- C = Gross strontium counts
- D = Blank counts of strontium
- G = Additional background from Sr-90 activity
  = (Sr-90 activity of sample) (2.22 VXJ)

H	=	Additional background from Y-90 activity
	=	(Sr-90 activity of sample) (2.22 VXE) (1-exp(-0.693t5/64.1))
V	=	Sample aliquot size
J	=	Sr-90 counting efficiency
F	=	Sr-89 counting efficiency
X	=	Strontium chemical yield
t4	=	Time in days from sampling date to strontium count date
T3	=	Strontium counting time
T4	=	Blank counting time
t5	=	Time in hours from second separation of Y-90 to counting of strontium planchet plus one half the counting time

INTER-LABORATORY COMPARISON PROGRAM

RMC participates in the EPA radiological interlaboratory comparison (cross check) program. This participation includes a number of analyses on various sample media as found in the Susquehanna SES REMP. As a result of participation in the program an objective measure of analytical precision and accuracy as well as a bias estimation of RMC results is obtained. Of the 98 analyses performed, 91 fell within the EPA mean and standard deviation. Reference 18 discusses any discrepancies between the data. Tables E-1, E-2, E-3, E-4 and E-5 summarize the results of the 1982 samples.

TABLE E-1

INTER-LABORATORY COMPARISONS
GROSS ALPHA AND BETA IN WATER
(pCi/liter and AIR PARTICULATES (pCi/filter)

DATE	RMC #	SAMPLE TYPE	ANALYSIS	RMC MEAN±s.d.	EPA MEAN±s.d.	All Participants MEAN±s.d.
Jan 1982	67011	Water	α	22±2	24±6	21±6
			β	29±1	32±5	31±6
March 1982	70043	Water	α	15±1	19±5	18±4
			β	19±1	19±5	20±4
March 1982	70631	APT	α	24±3	27±7	26±4
			β	58±2	55±5	59±8
April 1982	72020	Water	α	50±3	85±21	75±16
			β	93±2 (a)	106±5	106±13
May 1982	73330	Water	α	22±1	28±7	25±7
			β	31±3	29±5	30±6
July 1982	76747	Water	α	11±2	16±5	16±5
			β	22±1	23±5	21±5
Sept 1982	81226	Water	α	20±1	29±7	26±6
			β	34±1	40±5	38±6
Sept 1982	81457	APT	α	27±3	32±8	28±6
			β	38±2 (b)	67±5	61±8
Oct 1982	83052	Water	α	48±2	55±14	47±14
			β	101±1	81±5	76±11
Nov 1982	84691	Water	α	17±2	19±5	17±4
			β	22±2	24±5	24±3
Nov 1982	91763	APT	α	28±1	27±7	29±4
			β	64±2	59±5	66±7.

(a) Insufficient sample to reanalyze. Probable reasons for discrepancy are incomplete transfer of sample to planchet, incorrect pipetting of sample aliquot and nonhomogeneity of sample.

(b) Calculation was verified. Sample could not be reanalyzed because it was destroyed in the strontium analysis. Gross alpha, gamma and strontium-90 for that sample were in agreement with the EPA.

TABLE E-2

INTER-LABORATORY COMPARISONS
GAMMA(1)

DATE	RMC #	SAMPLE TYPE	ISOTOPE	RMC MEAN±s.d.	EPA MEAN±s.d.	All Participants MEAN±s.d.
Feb 1982	68029	Water	Cr-51	<56	0	5±9
			Co-60	22±4	20±5	20±5
			Zn-65	16±3	15±5	15±4
			Ru-106	<32 (a)	20±5	19±8
			Cs-134	20±1	22±5	21±3
			Cs-137	22±0	23±5	24±4
March 1982	70631	APT	Cs-137	32±1	23±5	27±6
April 1982	72020	Water	Co-60	<3	0	5±10
			Cs-134	16±1	15±5	15±4
			Cs-137	16±2	16±5	17±4
April 1982	72074	Milk	Co-60	30±2	30±5	31±4
			Cs-137	28±3	28±5	30±4
			Ba-140	<147	0	5±7
			K	1530±204	1500±75	1495±178
June 1982	74569	Water	Cr-51	<72 (b)	23±5	25±13
			Co-60	29±2	29±5	31±4
			Zn-65	26±3	26±5	27±6
			Ru-106	<30	0	10±11
			Cs-134	34±1	35±5	34±4
			Cs-137	24±2	25±5	27±4
July 1982	76127	Food	I-131	105±13	94±9	100±9
			Cs-137	27±4	20±5	26±4
			Ba-140	<19	0	0
			K	2660±244	2400±120	2645±244
Sept 1982	81457	APT	Cs-137	25±4	27±5	25±4
Oct 1982	82539	Water	Cr-51	<93 (b)	51±5	51±15
			Co-60	21±4	20±5	20±3
			Zn-65	21±6	24±5	24±4
			Ru-106	41±6	30±5	31±8
			Cs-134	16±2	19±5	18±3
			Cs-137	17±3	20±5	21±3

TABLE E-2 (cont.)

INTER-LABORATORY COMPARISONS
GAMMA(1)

DATE	RMC #	SAMPLE TYPE	ISOTOPE	RMC MEAN±s.d.	EPA MEAN±s.d.	All Participants MEAN±s.d.
Oct 1982	83052	Water	Co-60	<4	0	3±7
			Cs-134	<3	2±5	6±11
			Cs-137	21±2	20±5	20±3
Oct 1982	83535	Milk	I-131	47±5	42±6	40±7
			Cs-137	35±4	34±5	35±3
			Ba-140	<31	0	2±5
			K	1682±68	1560±78	1528±196
Nov 1982	84177	Food	I-131	30±6	25±6	25±5
			Cs-137	28±4	27±5	29±4
			Ba-140	<32	0	0
			K	2934±118	2780±140	2846±207
Nov 1982	91763	APT	Cs-137	31±2	27±5	30±5

(1) Results reported in pCi/liter for milk and water, pCi/sample for air particulates, and pCi/kilograms for food products except K which is reported in mg/liter for milk and mg/kilogram for food products.

(a) Positive activity was not detected due to the low sensitivity of the analysis for Ru-106.

(b) Positive activity was not detected due to the low sensitivity of the analysis for Cr-51.

TABLE E-3

INTER-LABORATORY COMPARISONS
TRITIUM IN WATER
pCi/liter

DATE	RMC #	SAMPLE TYPE	ANALYSIS	RMC MEAN±s.d.	EPA MEAN±s.d.	All Participants MEAN±s.d.
Feb 1982	67807	Water	H-3	1913±138	1820±342	1853±229
Apr 1982	71295	Water	H-3	2800±89	2860±360	2812±242
June 1982	74602	Water	H-3	1867±590	1830±340	1765±229
Aug 1982	77486	Water	H-3	3077±100	2890±360	2847±270
Oct 1982	82727	Water	H-3	2473±58	2560±350	2517±250
Dec 1982	90744	Water	H-3	2007±75	1990±345	2009±233

TABLE E-4

INTER-LABORATORY COMPARISONS
IODINE-131 IN WATER
pCi/liter

DATE	RMC #	SAMPLE TYPE	ANALYSIS	RMC MEAN±s.d.	EPA MEAN±s.d.	All Participants MEAN±s.d.
Jan 1982	67243	Water	I-131	7.0±0.1	8.4±1.5	8.3±1.0
Apr 1982	70963	Water	I-131	66±4	62±6	63±8
June 1982	75597	Water	I-131	3.9±0.7	4.4±0.7	4.5±1.1
July 1982	77316	Water	I-131	5.5±0.3	5.4±0.8	5.7±1.5
Aug 1982	78175	Water	I-131	88±2	87±9	86±10
Dec 1982	90378	Water	I-131	40±3	37±6	38±5

TABLE E-5

INTER-LABORATORY COMPARISONS[1]
STRONTIUM-89 AND STRONTIUM-90

DATE	RMC #	SAMPLE TYPE	ANALYSIS	RMC MEAN±s.d.	EPA MEAN±s.d.	All Participants MEAN±s.d.
Jan 1982	66079	Water	Sr-89 Sr-90	15±1 12±1	21±5 12±2	20±4 11±2
March 1982	70631	APT	Sr-90	28±6 (a)	16±1	16±2
April 1982	72020	Water	Sr-89 Sr-90	14±8 (a) 10±1	24±5 12±2	24±4 12±2
April 1982	72074	Milk	Sr-89 Sr-90	<23 <26	25±5 16±2	22±5 14±3
May 1982	73333	Water	Sr-89 Sr-90	17±2 13±2	22±5 13±2	22±5 12±2
July 1982	76127	Food	Sr-89 Sr-90	22±11 18±8	26±5 20±5	29±7 23±2
Sept 1982	80211	Water	Sr-89 Sr-90	19±1 15±1	25±5 15±2	24±4 14±2
Sept 1982	81457	APT	Sr-90	17±1	20±2	17±2
Oct 1982	83052	Water	Sr-89 Sr-90	<5 12±1	0 17±2	13±20 16±2
Oct 1982	83535	Milk	Sr-89 Sr-90	<5 17±1	0 19±2	3±3 17±3
Nov 1982	84177	Food	Sr-89 Sr-90	16±2 22±17	0 28±2	7±13 26±7
Nov 1982	91763	APT	Sr-90	16±1	16±2	16±2

(1) Results reported in pCi/l for water and milk, pCi/filter for air particulates, and pCi/kg for food.

(a) A new strontium procedure was introduced in March 1982. These intercomparison samples were analyzed in the testing stage and showed the need for retraining in separation technique.

SITE SPECIFIC DEMOGRAPHIC DATA

The Branch Technical Position (15) requires the annual collection of certain demographic data in order to determine if any changes to the REMP are necessary. The nearest milk producer and vegetable garden over 50 square meters in each sector must be determined. The nearest residence in each sector was also determined.

Dairy Animal Survey

In August 1982, a dairy animal survey was performed in the vicinity of the Susquehanna Steam Electric Station. The information, pertaining to the location of the nearest dairy animal (within 5 miles) is listed in Table F-1. One goat farmer in sector 7 no longer raises goats, therefore the nearest dairy animal changed from 2.1 miles to 2.2 miles.

Vegetable Garden Survey

The location of the nearest vegetable garden over 50 square meters in each sector is listed in Table F-2. In addition, broad leaf vegetation was collected from site boundary gardens in the sectors which have been determined to have the highest D/Q and analyzed for iodine-131. This data appears in Table C-22.

Residence

The location of the nearest residence in each sector is listed in Table F-3.

TABLE F-1

NEAREST DAIRY ANIMAL OPERATION BY SECTOR

Sector	Direction	1982 Distance
1	N	>5
2	NNE	>5
3	NE	>5
4	ENE	2.7
5	E	4.5
6	ESE	2.4
7	SE	2.2+*
8	SSE	3.2+*
9	S	2.4
10	SSW	3.0*
11	SW	3.5
12	WSW	1.7*
13	W	5.0*
14	WNW	>5
15	NW	0.9*
16	NNW	4.2

+ Goat farm.
* Participant in Susquehanna SES Radiological Environmental Monitoring Program.

TABLE F-2

NEAREST VEGETABLE GARDENS

Sector	Direction	1982 Distance
1	N	0.6
2	NNE	1.1
3	NE	1.0
4	ENE	2.4
5	E	0.5
6	ESE	1.4
7	SE	0.4
8	SSE	0.7
9	S	1.2
10	SSW	1.5
11	SW	0.6
12	WSW	0.5
13	W	1.3
14	WNW	0.7
15	NW	0.9
16	NNW	1.4

TABLE F-3

NEAREST RESIDENCE

Sector		Distance (Miles)	Residence
1	N	0.6	Bruce Thomas
2	NNE	1.0	L. M. Robbins
3	NE	2.3	John Henry Owner: Norman Reinhimer
4	ENE	2.1	James Cruise
5	E	0.5	Dorothy Walters Owner: PP&L
6	ESE	0.5	Christopher Zwolinski Owner: Robert Zwolinski
7	SE	0.4	Dennis Kline Owner: Harry Kline
8	SSE	0.7	John Naunczek
9	S	1.1	James D. Bower
10	SSW	1.5	Frank Rehrig
11	SW	0.6	Stanley Shortz
12	WSW	1.2	William Kisner
13	W	0.8	William Johnson
14	WNW	0.7	Headley E. Folk
15	NW	0.9	Michael Serafin
16	NNW	0.6	William Metzler