**Commonwealth Edison**
Byron Nuclear Station
4450 North German Church Road
Byron, Illinois 61010

April 10, 1990

LTR: BYRON 90-0368

50-454

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Mr. Bert Davis
Administrator
Nuclear Regulatory Commission Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Davis:

Enclosed is Part 3 of the 1989 Byron Station Operating Report, Docket Numbers STN 50-454, and STN 50-455. This report contains the results of the Radiological Environmental and Meteorological Monitoring Programs. Part 1, Facility Operating Experience was submitted under separate cover in February, and Part 2, Radioactive Effluents in February and August.

Two copies of the report are provided for your use. Two copies will be forwarded to the Document Control Desk and one copy to the Resident Inspector.

Sincerely yours,

R. Pleniewicz
Station Manager
Byron Nuclear Power Station

RP/vb

Enclosure

Behind the file 12/31/89



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# BYRON STATION

# ANNUAL ENVIRONMENTAL RADIOLOGICAL OPERATING REPORT

1989

MARCH 1990

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# INTRODUCTION

Byron Station, a two-unit PWR plant, is located about two miles east of the Rock River and approximately three miles southwest of Byron in Ogle County, north central Illinois. Each reactor is designed to have a capacity of 1120 MW net. Unit No. 1 loaded fuel in November 1984 and went on line February 2, 1985. Unit No. 2 went on line January 9, 1987. The plant has been designed to keep releases to the environment at levels below those specified in the regulations.

Liquid effluents from Byron Station are released into the Rock River in controlled batches after radioassay of each batch. Gaseous effluents are released to the atmosphere and are calculated on the basis of analyses of daily grab samples of noble gases and continuously collected composite samples of iodine and particulate matter. The results of effluent analyses are summarized on a monthly basis. Airborne concentrations of noble gases, I-131 and particulate radioactivity in off-site areas are calculated using effluent and meteorological data on isotopic composition of effluents.

Environmental monitoring is conducted by sampling at indicator and reference (background) locations in the vicinity of the Byron Station to measure changes in radiation or radioactivity levels that may be attributable to plant operations. If significant changes attributable to Byron Station are measured, these changes are correlated with effluent releases. External gamma radiation exposure from noble gases and I-131 in milk are the most critical pathways at this site; however, an environmental monitoring program is conducted which includes other pathways of less importance.

## SUMMARY

Gaseous and liquid effluents for the period remained at a fraction of the Technical Specification limits. Calculations of environmental concentrations based on effluent, Rock River flow, and meteorological data for the period indicate that consumption by the public of radionuclides attributable to the plant are well below the regulatory limits. Radiation exposure from radionuclides released to the atmosphere represented the critical pathway for the period with a maximum individual dose estimated to be 6.60E-04 mrem for the year, when a shielding and occupancy factor of 0.7 is assumed. The assessment of radiation doses is performed in accordance with the Offsite Dose Calculation Manual (ODCM). The results of analysis confirm that the station is operating in compliance with 10CFR50 and 40CFR190.

An assessment of radiation doses from liquid and gaseous effluents to members of the public due to their activities inside the site boundary during the reporting period is not included because it is not applicable to Byron Station.

No additional operational controls were implemented in 1989.

No measurements exceeded reporting levels but not result of plant effluents.

The results of the current radiological environmental monitoring program approximate those found during the preoperational studies conducted at Byron Station.

## 1.0 EFFLUENTS

### 1.1 Gaseous Effluents to the Atmosphere

Measured concentrations and isotopic composition of noble gases, radioiodine, and particulate radioactivity released to the atmosphere during the year, are listed in Table 1.1-1. A total of 8.14E+02 curies of fission and activation gases was released with a maximum release rate of 3.74E+03 µCi/sec.

A total of 2.21E-03 curies of I-131 and I-133 was released during the year.

A total of 3.40E-05 curies of beta-gamma emitters and an undetectable amount of alpha emitters were released as airborne particulate matter.

A total of 1.84E+02 curies of tritium was released.

### 1.2 Liquids Released to the Rock River

A total of 3.17E+07 liters of radioactive liquid waste (prior to dilution) containing 0.65 curies (excluding tritium, gases, and alpha) were discharged after dilution with a total of 3.58E+10 liters of water. These wastes were released at a monthly average concentration of 1.82E-08 µCi/ml, discharged on an unidentified nuclide basis. An undetectable amount of alpha radioactivity and 1.29E+03 curies of tritium were released. Monthly release estimates and principal radionuclides in liquid effluents are given in Table 1.2-1.

## 2.0 SOLID RADIOACTIVE WASTE

Solid radioactive wastes were shipped to Barnwell Nuclear Center, South Carolina and Richland, Washington. The record of waste shipments is summarized in Table 2.0-1.

## 3.0 DOSE TO MAN

### 3.1 Gaseous Effluent Pathways

#### Gamma Dose Rates

Gamma air and whole body dose rates off-site were calculated based on measured release rates, isotopic composition of the noble gases, and average meterological data for the period (Table 3.1-1). Isodose contours of whole body dose are shown in Figure 3.1-1 for the year.

Based on measured effluents and meteorological data, the maximum dose to an individual would be 6.60E-04 mrem for the year, with an occupancy or shielding factor of 0.7 included. The maximum gamma air dose was 2.58E-03 mrad.

Beta Air and Skin Rates

The range of beta particles in air is relatively small (on the order of a few meters or less); consequently, plumes of gaseous effluents may be considered "infinite" for purpose of calculating the dose from beta radiation incident on the skin. However, the actual dose to sensitive skin tissues is difficult to calculate because this depends on the beta particle energies, thickness of inert skin, and clothing covering sensitive tissues. For purposes of this report the skin is taken to have a thickness of 7 $mg/cm^2$ and an occupancy factor of 1.0 is used. The skin dose from beta and gamma radiation for the year was 5.34E-03 mrem.

The air concentrations of radioactive noble gases at the off-site receptor locations are given in Figure 3.1-2. The maximum off-site beta air dose for the year was 1.06E-02 mrad.

Radioactive Iodine

The human thyroid concentrates ingested or inhaled iodine, and the radioiodine, I-131. Minimal levels released during routine operation of the plant, may be made available to man thus resulting in a dose to the thyroid. The pathway of interest for this radionuclide is ingestion of radioiodine in milk by an infant. Calculations are performed annually but the levels released from the station in previous years indicate that contributions to doses from inhalation of I-131 and I-133, and I-131 in milk, are negligible.

Iodine-131 Concentrations in Air

The calculated concentration contours for I-131 in air are shown in Figure 3.1-3. Included in these calculations is an iodine cloud depletion factor which accounts for the phenomenon of elemental iodine deposition on the ground. The maximum off-site concentration is estimated to be 4.30E-04 $pCi/m^3$ for the year.

Dose to Infant's Thyroid

The hypothetical thyroid dose to an infant living near the plant via ingestion of milk was calculated. The radionuclide considered was I-131 and the source of milk was taken to be the nearest dairy farm with the cows pastured from May to October. The maximum infant's thyroid dose was 6.07E-02 mrem during the year (Table 3.1-1).

Concentrations of Particulates in Air

Concentration contours of radioactive airborne particulates are shown in Figure 3.1-4. The maximum off-site level is estimated to be 4.43E-06 pCi/$m^3$.

Summary of Doses

Table 3.1-1 summarizes the doses resulting from releases of airborne radioactivity via the different exposure pathways.

## 3.2 Liquid Effluent Pathways

The three principal pathways through the aquatic environment for potential doses to man from liquid waste are ingestion of potable water, eating aquatic foods, and exposure while walking on the shoreline. Not all of these pathways are applicable at a given time or station but a reasonable approximation of the dose can be made by adjusting the dose formula for season of the year or type and degree of use of the aquatic environment. NRC* developed equations were used to calculate the doses to the whole body, lower GI tract, thyroid, bone and skin; specific parameters for use in the equations are given in the Commonwealth Edison Off-site Dose Calculation Manual. The maximum whole body dose for the year was 4.76E-02 mrem and no organ dose exceeded 8.88E-02 mrem.

## 3.3 Direct Radiation

In section 3/4.11 of the Byron Technical Specifications, 40CFR190 calculations of total dose due to the Uranium fuel Cycle are required only when calculated doses from liquid or gaseous releases of radioactivity exceed certain levels. These levels are twice the following limits:

* The RETS limits on dose or dose commitment to a Member of the Public due to radioactive materials in liquid effluents from each reactor unit (1.5 mrem to the whole body and 5 mrem to any organ during any calendar quarter; 3.0 mrem to the whole body and 10 mrem to any organ during any calendar year).

* The RETS limits on air dose in noble gases released in gaseous effluents to a Member of the Public from each reactor unit (5 mrad for gamma radiation or 10 mrad for beta radiation during any calendar quarter; 10 mrad for gamma radiation or 20 mrad for beta radiation during any calendar year).

* The RETS limits on dose to a Member of the Public due to iodine-131, iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released from each reactor unit (7.5 mrem to any organ during any calendar quarter; 15 mrem to any organ during any calendar year).

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* Nuclear Regulatory Commission, Regulatory Guide 1.109 (Rev. 1).

During the period January to December, 1989, Byron Stations did not exceed these criteria.

## 4.0 SITE METEOROLOGY

A summary of the site meteorological measurements taken during each quarter of the year is given in Appendix II. The data are presented as cumulative joint frequency distributions of 250' level wind direction and wind speed class by atmospheric stability class determined from the temperature difference between the 250' and 30' levels. Date recovery for these measurements was about 99.6%.

## 5.0 ENVIRONMENTAL MONITORING

Tables 5.0-1 and 5.0-2 provide an outline of the radiological environmental monitoring program as required in the Technical Specifications. Sampling locations are shown in Figures 5.0-1 through 5.0-4. Concentrations of radioactivity in various media are summarized in Tables 5.0-3 through 5.0-6. Tables listing all data are presented in Appendix VI.

Specific findings for various environmental media are discussed below.

### 5.1 Gamma Radiation

External radiation dose from on-site sources and noble gases released to the atmosphere was measured at nine indicator and three reference (background) locations using $CaSO_4$:Dy thermoluminescent dosimeters (TLD). Additional TLDs, a total of 64, were installed on September 28, 1981, such that each sector was covered at both five miles and the site boundary. Quarterly external radiation dose at twelve air sampling locations averaged (14.6±4.6) mR and was similar to that measured in 1985 (14.4 mR), 1986 (14.9 mR), 1987 (15.3 mR), and 1988 (15.2 mR). The differences are not statistically significant.

### 5.2 Airborne I-131 and Particulate Radioactivity

Airborne I-131 concentration remained below the LLD of 0.07 $pCi/m^3$ throughout the year in all samples.

Gross beta concentrations ranged from 0.005 to 0.066 $pCi/m^3$, and averaged 0.026 $pCi/m^3$, similar to the average concentrations in 1985 (0.026 $pCi/m^3$), 1986 (0.026 $pCi/m^3$, except for the period from May 12 through June 9 when it was influenced by the reactor accident at Chernobyl), 1987 (0.027 $pCi/m^3$), and 1988 (0.031 $pCi/m^3$).

All gamma-emitting isotopes activities were below their respective LLD levels. No radioactivity attributable to plant operation was detected in any of the samples.

## 5.3 Terrestrial Radioactivity

Vegetables were collected in August and October and analyzed for gamma-emitting isotopes. In addition, green leafy vegetables were analyzed for iodine-131. All isotopes were below the limits of detection indicating that there was no measurable amount of radioactivity attributable to the station releases. Identical results were obtained during the period 1985 through 1988.

Well water was collected quarterly from two off-site wells and analyzed for gross beta, tritium, and gamma-emitting isotopes. Gross beta concentration was below LLD of 2.6 pCi/l in all samples and was similar to that measured in 1988 (2.0 pCi/l) and lower than in 1985 (7.3 pCi/l), 1986 (7.5 pCi/l), and 1987 (7.5 pCi/l). Tritium was detected in one sample (236 pCi/l) and was similar to that in 1985 (232 pCi/l), 1986 (<200 pCi/l), 1987 (<200 pCi/l) and in 1988 (260 pCi/l). All other results were below the lower limits of detection. The results were similar to those obtained in 1988.

## 5.4 Aquatic Radioactivity

Surface water samples were collected weekly from three locations. Weekly samples were composited monthly and analyzed for gamma-emitters. Quarterly composites were analyzed for tritium. Cesium-134 and 137 concentrations were below the LLD level of 10 pCi/l. Tritium concentration was below the LLD of 200 pCi/l in all samples collected from Woodland Creek (BY-09) and Upstream (BY-13). These levels were similar to those obtained in 1985 through 1988.

Downstream from discharge, tritium averaged 847 pCi/l, ranging from 532 to 1470 pCi/l. Cs-134 and Cs-137 levels were below the LLD level of 10 pCi/l. All other gamma-emitters were below their respective LLDs. Elevated levels of tritium at discharge pipe are attributable to the station operation. These levels were similar to those obtained in 1985 through 1988.

Sediment samples were collected two times, from one control and one indicator location, and analyzed for gamma-emitters. All concentrations were below the lower limit of detection.

Levels of gamma radioactivity in fish were measured and found in all cases to be below the lower limits of detection for the program. The results were identical to those obtained in 1985 through 1988.

## 5.5 Milk

Milk samples were collected monthly from November through April and bi-weekly from May through October and analyzed for iodine-131 and gamma-emitting isotopes. Iodine-131 level was below the LLD level of 0.5 pCi/l in all samples.

Cs-134 and Cs-137 were below the LLD level of 5 pCi/l. All other gamma-emitting isotopes, except naturally-occurring K-40, were below their respective LLDs. There was no indication of the effect on the environment due to station operation. The results for I-131, Cs-134 and Cs-137 were identical to those obtained during the period 1985 through 1988, except during several months following accident at Chernobyl, which occured on April 26, 1986. During those months I-131 ranged from 0.9 to 58.6 pCi/l, Cs-134 ranged from 5.8 to 10.7 pCi/l and Cs-137 ranged from 5.3 to 17.8 pCi/l.

5.6 Sample Collections

All samples were collected as scheduled except those listed in Listing of Missed Samples, Appendix VI.

5.7 Program Modifications

In April of 1988, milk farm at location BY-16, K. Druien, 3.3 mi 134° was changed to BY-25, B. Leupkes, 3.7 mi 190°. In February of 1989, milk farm at location BY-20 was changed from Ed Seabold, 2.5 mi @ 41° to K. Reeverts, 2.1 mi @ 37°. For additional changes in the program see Appendix IV.

## 6.0 ANALYTICAL PROCEDURES

Procedures used during the period covered by this report remained essentially unchanged. A summary of the procedures used for analyzing radioactivity in environmental samples is given in Appendix V of the report for the period January-December 1988.

## 7.0 MILCH ANIMAL CENSUS

A census of milch animals was conducted within five miles of the Station. The survey was conducted by "door-to-door" canvas and by information from Illinois Agricultural Agents. The census was conducted by L. Coleman on August 21, 1989.

## 8.0 NEAREST RESIDENCES CENSUS

The census of nearest residences within a five (5) mile radius, was conducted by L. Coleman on August 21, 1989.

Results of milch animals and nearest residence census are presented in Appendix VI.

## 9.0 INTERLABORATORY COMPARISON PROGRAM RESULTS

Interlaboratory Comparison Program Results are presented in Appendix III.

## 10.0 ADDENDA

Addenda for January - December, 1989, effluent and waste disposal semi-annual reports are presented in Appendix V.

# APPENDIX I

## DATA TABLES AND FIGURES

TABLE 1.1-1

BYRON NUCLEAR POWER STATION
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR January - June, 1989
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

| | UNITS | JANUARY | FEBRUARY | MARCH | 1st QUARTER | APRIL | MAY | JUNE | 2nd QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| A. Fission and Activation Gas Releases | | | | | | | | | |
| 1. Total Release Activity | Ci | 5.68E+1 | 1.07E+1 | 6.32E0 | 7.38E+1 | 4.58E0 | 6.88E0 | 3.60E+1 | 4.75E+1 |
| 2. Maximum Release Rate | uCi/sec | 5.72E+2 | 4.27E+2 | 1.86E+2 | 5.72E+2 | 1.31E+2 | 2.41E+2 | 4.06E+2 | 4.06E+2 |
| 3. % of 10CFR20 Limits* | | | | | | | | | |
| a. Whole Body (500 mrem/year) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| b. Skin (3000 mrem/year) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4. % of 10CFR50 Limits | | | | | | | | | |
| a. Gamma Quarterly (5 mrad) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| b. Beta Quarterly (10 mrad) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| c. Gamma Annual (10 mrad) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d. Beta Annual (20 mrad) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| B. Iodine Releases | | | | | | | | | |
| 1. Total I-131 and I-133 Activity | Ci | 7.05E-5 | 1.86E-5 | 1.36E-5 | 1.03E-4 | 7.46E-6 | 2.10E-4 | 8.40E-6 | 2.26E-4 |
| 2. % of 10CFR20/10CFR50 Limits** | | | | | | | | | |

* % of 10CFR20 limits is based on the maximum release rate for the period considered.

** Iodine, particulate, and tritium limits are expressed as a total limit. See Step E.

TABLE 1.1-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR July - Dec. 1989**
**GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES**

| | UNITS | JULY | AUG | SEPT | QUARTER | OCT | NOV | DEC | QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| **A. Fission and Activation Gas Releases** | | | | | | | | | |
| 1. Total Release Activity | Ci | 1.13E+2 | 1.76E+2 | 5.23E+1 | 3.41E+2 | 5.79E+1 | 2.27E+2 | 6.71E+1 | 3.52E+2 |
| 2. Maximum Release Rate | uCi/sec | 1.10E+3 | 1.81E+3 | 1.23E+3 | 1.81E+3 | 6.61E+2 | 3.74E+3 | 2.36E+3 | 3.74E+3 |
| 3. % of 10CFR20 Limits* | | | | | | | | | |
| a. Whole Body (500 mrem/year) | % | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.04 | 0.02 | 0.04 |
| b. Skin (3000 mrem/year) | % | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.00 | 0.04 |
| 4. % of 10CFR50 Limits | | | | | | | | | |
| a. Gamma Quarterly (5 mrad) | % | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 |
| b. Beta Quarterly (10 mrad) | % | 0.00 | 0.02 | 0.01 | 0.03 | 0.01 | 0.03 | 0.01 | 0.05 |
| c. Gamma Annual (10 mrad) | % | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 |
| d. Beta Annual (20 mrad) | % | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 |
| **B. Iodine Releases** | | | | | | | | | |
| 1. Total I-131 and I-133 Activity | Ci | 2.38E-4 | 1.61E-4 | 1.13E-4 | 5.12E-4 | 4.43E-4 | 6.59E-4 | 2.64E-4 | 1.37E-3 |
| 2. % of 10CFR20/10CFR50 Limits** | | | | | | | | | |

* % of 10CFR20 limits is based on the maximum release rate for the period considered.

** Iodine, particulate, and tritium limits are expressed as a total limit. See Step E.

TABLE 1.1-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR January - June, 1989**
**GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES**

| | UNITS | JANUARY | FEBRUARY | MARCH | 1st QUARTER | APRIL | MAY | JUNE | 2nd QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| C. Particulate (> 8 day half-life) Releases | | | | | | | | | |
| 1. Gross Activity | Ci | <LLD | <LLD | 3.40E-5 | 3.40E-5 | <LLD | <LLD | <LLD | <LLD |
| 2. Gross Alpha Activity | Ci | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| 3. % of 10CFR20/10CFR50 Limits** | | | | | | | | | |
| D. Tritium Releases | | | | | | | | | |
| 1. Total Release Activity | Ci | 1.82E+2 | 1.26E0 | 1.01E-1 | 1.83E+2 | 1.49E-1 | 8.82E-2 | 6.99E-2 | 3.07E-1 |
| 2. % of 10CFR20/10CFR50 Limits** | | | | | | | | | |
| E. Sum of Iodine, Particulate (> 8 day half-life), and Tritium Releases | | | | | | | | | |
| 1. Total Activity | Ci | 1.82E+2 | 1.26E0 | 1.01E-1 | 1.83E+2 | 1.49E-1 | 8.84E-2 | 6.99E-2 | 3.07E-1 |
| 2. % of 10CFR20 Limit | | | | | | | | | |
| a. Any Organ (1500 mrem/year) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3. % of 10CFR50 Limit | | | | | | | | | |
| a. Quarterly Any Organ (7.5 mrem) | % | 0.77 | 0.00 | 0.00 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 |
| b. Annual Any Organ (15.0 mrem) | % | 0.39 | 0.00 | 0.00 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 |

** Iodine, particulate, and tritium limits are expressed as a total limit. See Step E.

TABLE 1.1-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR July-Dec. 1989**
**GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES**

| | UNITS | JULY | AUG | SEPT | QUARTER | OCT | NOV | DEC | QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| C. Particulate (> 8 day half-life) Releases | | | | | | | | | |
| 1. Gross Activity | Ci | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| 2. Gross Alpha Activity | Ci | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| 3. % of 10CFR20/10CFR50 Limits** | | | | | | | | | |
| D. Tritium Releases | | | | | | | | | |
| 1. Total Release Activity | Ci | 6.65E-2 | 5.76E-2 | 5.61E-2 | 1.08E-1 | 6.17E-2 | 6.32E-2 | 4.70E-2 | 1.72E-1 |
| 2. % of 10CFR20/10CFR50 Limits** | | | | | | | | | |
| E. Sum of Iodine, Particulate (> 8 day half-life), and Tritium Releases | | | | | | | | | |
| 1. Total Activity | Ci | 6.67E-2 | 5.78E-2 | 5.66E-2 | 1.81E-1 | 6.21E-2 | 6.39E-2 | 4.73E-2 | 1.73E-1 |
| 2. % of 10CFR20 Limit | | | | | | | | | |
| a. Any Organ (1500 mrem/year) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3. % of 10CFR50 Limit | | | | | | | | | |
| a. Quarterly Any Organ (7.5 mrem) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.02 |
| b. Annual Any Organ (15.0 mrem) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 |

** Iodine, particulate, and tritium limits are expressed as a total limit. See Step E.

TABLE 1.1-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR January - June, 1989**
**GASEOUS EFFLUENTS - VENT STACK RELEASES**

| ISOTOPES RELEASED | UNITS | JANUARY | FEBRUARY | MARCH | 1st QUARTER | APRIL | MAY | JUNE | 2nd QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| F. Fission and Activation Gas Releases | | | | | | | | | |
| Xe-131m | Ci | 2.60E-1 | 2.36E-1 | 7.84E-2 | 5.74E-1 | <LLD | <LLD | 5.87E-1 | 5.87E-1 |
| Xe-133m | | 4.54E-2 | 2.30E-2 | 5.04E-3 | 7.32E-2 | 8.33E-3 | 1.49E-2 | 1.62E-1 | 1.85E-1 |
| Xe-135m | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Xe-133 | | 5.54E+1 | 9.90E0 | 6.03E0 | 7.13E+1 | 4.51E0 | 6.82E0 | 3.32E+1 | 4.45E+1 |
| Xe-135 | | 1.80E-1 | 3.40E-4 | 2.08E-2 | 2.01E-1 | 2.96E-2 | 2.54E-2 | 1.48E-1 | 2.03E-1 |
| Kr-85m | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | 2.98E-3 | 2.98E-3 |
| Kr-85 | | 9.20E-1 | 5.30E-1 | 2.08E-1 | 1.66E0 | <LLD | <LLD | 1.88E0 | 1.88E0 |
| Kr-87 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Kr-88 | | 2.20E-3 | 3.78E-3 | <LLD | 5.98E-3 | <LLD | <LLD | 4.21E-3 | 4.21E-3 |
| Ar-41 | | 1.37E-2 | 1.08E-2 | 1.29E-2 | 3.74E-2 | 2.70E-2 | 2.01E-2 | 1.95E-2 | 6.66E-2 |
| Others (Specify) | | | | | | | | | |
| G. Iodine Releases | | | | | | | | | |
| I-131 | Ci | 5.25E-5 | 1.86E-5 | <LLD | 7.11E-5 | <LLD | <LLD | <LLD | <LLD |
| I-132 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| I-133 | | 1.80E-5 | <LLD | 1.36E-5 | 3.16E-5 | 7.46E-6 | 2.01E-4 | 8.40E-6 | 2.17E-4 |
| I-134 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| I-135 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Others (Specify) | | | | | | | | | |

TABLE 1.1-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR July-Dec. 1989**
**GASEOUS EFFLUENTS - VENT STACK RELEASES**

| ISOTOPES RELEASED | UNITS | JULY | AUG | SEPT | QUARTER | OCT | NOV | DEC | QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| **F. Fission and Activation Gas Releases** | | | | | | | | | |
| Xe-131m | Ci | 1.54E+0 | 2.39E+0 | 4.77E-1 | 4.41E+0 | 2.11E-1 | 5.80E-1 | 4.94E-1 | 1.69E+0 |
| Xe-133m | | 9.00E-1 | 1.68E+0 | 3.22E-1 | 2.40E+0 | 5.08E-1 | 1.73E+0 | 1.81E-1 | 2.42E+0 |
| Xe-135m | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Xe-133 | | 1.07E+2 | 1.69E+2 | 5.06E+1 | 3.27E+2 | 5.58E+1 | 2.20E+2 | 6.52E+1 | 3.41E+2 |
| Xe-135 | | 1.19E+0 | 3.77E-1 | 2.06E-1 | 1.77E+0 | 6.24E-1 | 2.95E+0 | 2.15E-1 | 3.79E+0 |
| Kr-85m | | 7.55E-3 | 1.40E-2 | 1.82E-2 | 3.98E-2 | 3.54E-2 | 1.73E-1 | <LLD | 2.08E-1 |
| Kr-85 | | 3.52E+0 | 2.54E+0 | 7.19E-1 | 6.78E+0 | 5.81E-1 | 1.53E+0 | 9.00E-1 | 3.01E+0 |
| Kr-87 | | <LLD | <LLD | 1.14E-3 | 1.14E-3 | <LLD | <LLD | <LLD | <LLD |
| Kr-88 | | 1.81E-1 | 1.21E-2 | 1.63E-1 | 3.56E-1 | 9.63E-3 | 4.20E-2 | <LLD | 5.16E-2 |
| Ar-41 | | 1.83E-2 | 2.85E-2 | 1.53E-2 | 6.21E-2 | 3.82E-2 | 9.72E-2 | 5.79E-2 | 1.93E-1 |
| Others (Specify) | | | | | | | | | |
| **G. Iodine Releases** | | | | | | | | | |
| I-131 | Ci | 3.84E-5 | <LLD | 2.62E-5 | 6.46E-5 | 1.29E-4 | 3.55E-4 | 1.39E-4 | 6.23E-4 |
| I-132 | | <LLD | <LLD | <LLD | <LLD | 1.10E-4 | <LLD | <LLD | 1.10E-4 |
| I-133 | | 2.00E-4 | 1.61E-4 | 8.71E-5 | 4.48E-4 | 3.14E-4 | 3.04E-4 | 1.25E-4 | 7.43E-4 |
| I-134 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| I-135 | | <LLD | <LLD | 1.88E-4 | 1.88E-4 | 2.48E-4 | 2.31E-4 | 1.41E-4 | 6.20E-4 |
| Others (Specify) | | | | | | | | | |

TABLE 1.1-1 (continued)

BYRON NUCLEAR POWER STATION
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR January - June, 1989
GASEOUS EFFLUENTS - VENT STACK RELEASES

| ISOTOPES RELEASED | UNITS | JANUARY | FEBRUARY | MARCH | 1st QUARTER | APRIL | MAY | JUNE | 2nd QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| H. Particulate (> 8 day half-life) Releases | | | | | | | | | |
| Mn-54 | Ci | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Fe-55 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Fe-59 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Co-58 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Co-60 | | <LLD | <LLD | 3.40E-5 | 3.40E-5 | <LLD | <LLD | <LLD | <LLD |
| Sr-89 | | - | - | - | | - | - | - | |
| Sr-90 | | - | - | - | | - | - | - | |
| Y-88 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ru-103 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ag-110m | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Cs-134 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Cs-136 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Cs-137 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ba/La-140 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ce-144 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Others (Specify) | | | | | | | | | |

TABLE 1.1-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR July-Dec. 1989**
**GASEOUS EFFLUENTS - VENT STACK RELEASES**

| ISOTOPES RELEASED | UNITS | JULY | AUG | SEPT | QUARTER | OCT | NOV | DEC | QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| H. Particulate (> 8 day half-life) Releases | | | | | | | | | |
| Mn-54 | Ci | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Fe-55 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Fe-59 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Co-58 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Co-60 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Sr-89 | | --- | --- | --- | <LLD | --- | --- | --- | * |
| Sr-90 | | --- | --- | --- | <LLD | --- | --- | --- | * |
| Y-88 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ru-103 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ag-110m | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Cs-134 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Cs-136 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Cs-137 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ba/La-140 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ce-144 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Others (Specify) | | | | | | | | | |

* Analysis completed by offsite vendor
Results are not available at this time.

TABLE 1.2-1

BYRON NUCLEAR POWER STATION
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR January - June, 1989
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

| | UNITS | JANUARY | FEBRUARY | MARCH | 1st QUARTER | APRIL | MAY | JUNE | 2nd QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| **I. Fission and Activation Products** | | | | | | | | | |
| 1. Total Activity Released | Ci | 1.73E-1 | 8.01E-2 | 1.19E-1 | 3.72E-1 | 3.88E-2 | 1.06E-1 | 4.18E-2 | 1.87E-1 |
| 2. Average Concentration Released | uCi/ml | 9.77E-8 | 5.64E-8 | 7.53E-9 | 1.96E-8 | 2.75E-8 | 6.06E-8 | 1.98E-8 | 3.54E-8 |
| 3. % of 10CFR50 Limits | | | | | | | | | |
| a. Quarterly Whole Body (1.5 mrem) | % | 0.87 | 0.26 | 1.07 | 2.20 | 0.15 | 0.63 | 0.10 | 0.88 |
| b. Quarterly Any Organ (5.0 mrem) | % | 0.56 | 0.22 | 0.44 | 1.22 | 0.08 | 1.21 | 0.14 | 1.43 |
| c. Annual Whole Body (3.0 mrem) | % | 0.43 | 0.13 | 0.54 | 1.10 | 0.08 | 0.32 | 0.05 | 0.45 |
| d. Annual Any Organ (10.0 mrem) | % | 0.28 | 0.11 | 0.22 | 0.61 | 0.04 | 0.60 | 0.07 | 0.71 |
| **J. Tritium** | | | | | | | | | |
| 1. Total Activity Released | Ci | 6.94E+1 | 5.34E+1 | 8.90E+1 | 2.12E+2 | 8.10E+1 | 1.17E+2 | 1.80E+2 | 3.78E+2 |
| 2. Average Concentration Released | uCi/ml | 4.49E-5 | 3.76E-5 | 5.63E-6 | 1.12E-5 | 5.75E-5 | 6.69E-5 | 8.53E-5 | 7.17E-5 |
| 3. % of Limit (3E-3 uCi/ml) | % | 1.50 | 1.25 | 0.19 | 0.37 | 1.92 | 2.23 | 2.84 | 2.39 |
| **K. Dissolved Noble Gasses** | | | | | | | | | |
| 1. Total Activity Released | Ci | 2.78E-1 | 4.85E-2 | 4.74E-2 | 3.74E-1 | 5.60E-3 | 7.81E-2 | 1.53E-1 | 2.38E-1 |
| 2. Average Concentration Released | uCi/ml | 1.57E-7 | 3.42E-8 | 3.00E-10 | 1.97E-8 | 3.97E-10 | 4.46E-8 | 7.25E-8 | 4.49E-8 |
| 3. % of Limit (2E-4 uCi/ml) | % | 0.08 | 0.02 | 0.00 | 0.01 | 0.00 | 0.02 | 0.04 | 0.02 |
| **L. Gross Alpha** | | | | | | | | | |
| 1. Total Activity Released | Ci | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| 2. Average Concentration Released | uCi/ml | 0.00E0 | 0.00E0 | 0.00E0 | 0.00E0 | 0.00E0 | 0.00E0 | 0.00E0 | 0.00E0 |
| **M. Volume of Liquid Waste to Discharge** | liters | 3.08E+6 | 1.75E+6 | 2.70E+6 | 7.53E+6 | 1.61E+6 | 2.31E+6 | 2.49E+6 | 6.41E+6 |
| **N. Volume of Dilution Water** | liters | 1.77E+9 | 1.42E+9 | 1.58E+10 | 1.90E+10 | 1.41E+9 | 1.75E+9 | 2.11E+9 | 5.27E+9 |

TABLE 1.2-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR July-Dec. 1989**
**LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES**

| | UNITS | JULY | AUG | SEPT | QUARTER | OCT | NOV | DEC | QUARTER |
|---|---|---|---|---|---|---|---|---|---|
| **I. Fission and Activation Products** | | | | | | | | | |
| 1. Total Activity Released | Ci | 1.40E-2 | 1.05E-2 | 1.13E-2 | 3.58E-2 | 4.93E-3 | 3.07E-2 | 1.72E-2 | 5.70E-2 |
| 2. Average Concentration Released | uCi/ml | 8.19E-9 | 4.86E-9 | 6.11E-9 | 6.25E-9 | 2.77E-9 | 1.39E-8 | 9.35 E-9 | 9.06E-9 |
| 3. % of 10CFR50 Limits | | | | | | | | | |
| a. Quarterly Whole Body (1.5 mrem) | % | 0.06 | 0.02 | 0.05 | 0.13 | 0.04 | 0.02 | 0.02 | 0.08 |
| b. Quarterly Any Organ (5.0 mrem) | % | 0.04 | 0.01 | 0.02 | 0.07 | 0.01 | 0.01 | 0.01 | 0.03 |
| c. Annual Whole Body (3.0 mrem) | % | 0.03 | 0.01 | 0.03 | 0.07 | 0.02 | 0.03 | 0.04 | 0.07 |
| d. Annual Any Organ (10.0 mrem) | % | 0.01 | 0.00 | 0.01 | 0.02 | 0.01 | 0.00 | 0.01 | 0.02 |
| **J. Tritium** | | | | | | | | | |
| 1. Total Activity Released | Ci | 1.34E+2 | 1.14E+2 | 1.34E+2 | 3.52E+2 | 1.83E+2 | 1.15E+2 | 4.74E+1 | 3.45E+2 |
| 2. Average Concentration Released | uCi/ml | 6.08E-5 | 5.25E-5 | 7.24E-5 | 6.14E-5 | 1.03E-4 | 5.20E-5 | 2.53E-5 | 5.92E-5 |
| 3. % of Limit (3E-3 uCi/ml) | % | 2.03 | 1.75 | 2.41 | 2.05 | 3.43 | 1.73 | 0.86 | 1.97 |
| **K. Dissolved Noble Gasses** | | | | | | | | | |
| 1. Total Activity Released | Ci | 2.16E-1 | 5.82E-2 | 2.57E-3 | 2.77E-1 | 5.79E-4 | 8.87E-2 | 3.94E-1 | 4.83E-1 |
| 2. Average Concentration Released | uCi/ml | 1.26E-7 | 2.68E-8 | 1.39E-9 | 4.83E-8 | 3.25E-10 | 4.01E-8 | 2.14E-7 | 8.28E-8 |
| 3. % of Limit (2E-4 uCi/ml) | % | 0.06 | 0.01 | 0.00 | 0.02 | 0.00 | 0.02 | 0.11 | 0.04 |
| **L. Gross Alpha** | | | | | | | | | |
| 1. Total Activity Released | Ci | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| 2. Average Concentration Released | uCi/ml | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| **M. Volume of Liquid Waste to Discharge** | liters | 2.61E+6 | 2.76E+6 | 2.85E+6 | 8.22E+6 | 3.05E+6 | 3.45E+6 | 3.08E+6 | 9.58E+6 |
| **N. Volume of Dilution Water** | liters | 1.71E+9 | 2.17E+9 | 1.85E+9 | 5.73E+9 | 1.78E+9 | 2.21E+9 | 1.84E+9 | 5.83E+9 |

TABLE 1.2-1 (continued)

BYRON NUCLEAR POWER STATION
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR January - June, 1989
LIQUID EFFLUENTS

| ISOTOPES RELEASES | | UNITS | JANUARY | FEBRUARY | MARCH | 1st QUARTER | APRIL | MAY | JUNE | 2nd QUARTER |
|---|---|---|---|---|---|---|---|---|---|---|
| D. Liquid Effluents | | | | | | | | | | |
| Sr-89 | | Ci | - | - | - | | - | - | - | |
| Sr-90 | | | - | - | - | | - | - | - | |
| Co-58 | | | 7.16E-2 | 3.84E-2 | 4.20E-2 | 1.52E-1 | 1.21E-2 | 3.66E-2 | 1.28E-2 | 6.15E-2 |
| Co-60 | | | 3.21E-2 | 1.33E-2 | 2.58E-2 | 7.12E-2 | 7.26E-3 | 3.35E-2 | 1.67E-2 | 5.75E-2 |
| Cs-134 | | | 6.59E-3 | 1.97E-3 | 7.28E-3 | 1.58E-2 | 9.80E-4 | 2.97E-3 | 5.48E-4 | 4.50E-3 |
| Cs-135 | | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Cs-137 | | | 7.06E-3 | 2.02E-3 | 1.03E-2 | 1.94E-2 | 1.42E-3 | 4.84E-3 | 7.73E-4 | 7.03E-3 |
| I-131 | | | 1.99E-4 | 1.16E-4 | <LLD | 3.15E-4 | <LLD | 9.53E-5 | <LLD | 9.53E-5 |
| I-133 | | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Ba/La-140 | | | 5.55E-5 | 1.60E-5 | 2.40E-5 | 9.55E-5 | 3.24E-6 | 3.79E-5 | 1.37E-6 | 4.25E-5 |
| Xe-133 | | | 2.77E-1 | 4.82E-2 | 4.74E-2 | 3.73E-1 | 1.12E-2 | 7.78E-2 | 1.52E-1 | 2.41E-1 |
| Xe-135 | | | 2.30E-4 | 2.06E-4 | 4.26E-5 | 4.79E-4 | <LLD | 6.84E-5 | 5.80E-5 | 1.26E-4 |
| Others (Specify) | Cr-51 | | 1.72E-2 | 9.30E-3 | 8.10E-3 | 3.46E-2 | 1.05E-2 | 8.58E-3 | 2.41E-3 | 2.15E-2 |
| | Mn-54 | | 4.18E-3 | 2.50E-3 | 3.62E-3 | 1.03E-2 | 1.26E-3 | 6.02E-3 | 2.95E-3 | 1.02E-2 |
| | Fe-59 | | 1.39E-2 | 5.44E-3 | 6.90E-3 | 1.37E-2 | 2.40E-3 | 3.26E-3 | 1.69E-3 | 7.35E-3 |
| | Co-57 | | 6.41E-5 | 9.76E-5 | 5.00E-5 | 2.12E-4 | 9.04E-6 | 1.72E-4 | 4.50E-5 | 2.26E-4 |
| | Nb-95 | | 8.70E-3 | 3.42E-3 | 4.84E-3 | 1.70E-2 | 1.21E-3 | 4.28E-3 | 2.15E-3 | 7.64E-3 |
| | Zr-95 | | 4.84E-3 | 1.84E-3 | 2.72E-3 | 9.40E-3 | 6.02E-4 | 2.45E-3 | 1.12E-3 | 4.17E-3 |
| | Sb-122 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| | Sb-124 | | 3.51E-4 | 3.26E-5 | 4.30E-4 | 8.20E-4 | 2.30E-5 | 1.29E-5 | <LLD | 3.59E-5 |
| | Sb-125 | | 3.93E-3 | 7.14E-4 | 4.38E-3 | 9.02E-3 | 1.07E-3 | 1.64E-3 | 2.04E-4 | 2.91E-3 |
| | Zn-65 | | 2.78E-4 | 2.34E-4 | 1.74E-4 | 6.86E-4 | <LLD | 7.18E-4 | 1.56E-4 | 8.74E-4 |
| | I-132 | | 6.12E-4 | <LLD | 1.86E-3 | 2.47E-3 | <LLD | 2.39E-4 | <LLD | 2.39E-4 |
| | Sn-113 | | 9.08E-5 | <LLD | 1.73E-4 | 2.64E-4 | 3.20E-6 | 5.14E-4 | 2.08E-4 | 7.25E-4 |
| | Ag-110m | | 7.86E-4 | 8.36E-5 | 2.12E-4 | 1.08E-3 | <LLD | <LLD | <LLD | <LLD |
| | Hf-181 | | 1.23E-4 | 9.92E-5 | 3.96E-5 | 2.62E-4 | <LLD | <LLD | <LLD | <LLD |
| | Ru-103 | | 3.93E-5 | <LLD | <LLD | 3.93E-5 | <LLD | <LLD | <LLD | <LLD |
| | In-113m | | 4.76E-5 | <LLD | <LLD | 4.76E-5 | <LLD | <LLD | <LLD | <LLD |
| | Ce-144 | | 4.93E-4 | 2.04E-4 | 2.86E-4 | 9.83E-4 | <LLD | 3.06E-4 | <LLD | 3.06E-4 |
| | Xe-133m | | 2.58E-4 | 9.78E-5 | <LLD | 3.56E-4 | <LLD | 2.49E-4 | 4.59E-4 | 7.08E-4 |
| | Mo99/Tc99m | | 2.92E-5 | 1.49E-4 | <LLD | 1.69E-4 | <LLD | <LLD | <LLD | <LLD |

TABLE 1.2-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT FOR July-Dec. 1989**
**LIQUID EFFLUENTS**

| ISOTOPES RELEASES | | UNITS | JULY | AUG | SEPT | QUARTER | OCT | NOV | DEC | QUARTER |
|---|---|---|---|---|---|---|---|---|---|---|
| **D. Liquid Effluents** | | | | | | | | | | |
| Sr-89 | | Ci | --- | --- | --- | <LLD | --- | --- | --- | * |
| Sr-90 | | | --- | --- | --- | <LLD | --- | --- | --- | * |
| Co-58 | | | 3.63E-3 | 2.56E-3 | 2.49E-3 | 8.68E-3 | 6.44E-4 | 1.35E-2 | 4.76E-3 | 1.89E-2 |
| Co-60 | | | 7.30E-3 | 5.40E-3 | 6.56E-3 | 1.93E-2 | 3.05E-3 | 9.20E-3 | 8.95E-3 | 2.12E-2 |
| Cs-134 | | | 3.60E-4 | 1.67E-4 | 2.36E-4 | 7.63E-4 | 1.26E-4 | 1.05E-5 | 8.39E-5 | 2.28E-4 |
| Cs-136 | | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| Cs-137 | | | 4.81E-4 | 4.77E-4 | 4.73E-4 | 1.43E-3 | 2.65E-4 | 6.95E-5 | 1.46E-4 | 4.81E-4 |
| I-131 | | | 2.68E-5 | 4.46E-5 | 5.24E-5 | 1.24E-4 | 1.50E-4 | 8.90E-4 | 1.01E-3 | 2.05E-3 |
| I-133 | | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | 5.03E-5 | 5.03E-5 |
| Ba/La-140 | | | <LLD | 3.87E-5 | 3.83E-6 | 4.25E-5 | 3.03E-6 | 9.79E-4 | 9.31E-5 | 1.07E-3 |
| Xe-133 | | | 2.14E-1 | 5.79E-2 | 2.57E-3 | 2.74E-1 | 5.79E-4 | 8.74E-2 | 3.87E-1 | 4.75E-1 |
| Xe-135 | | | 2.05E-5 | <LLD | <LLD | 3.05E-5 | <LLD | 2.65E-5 | 6.21E-5 | 8.86E-5 |
| Others (Specify) | Cr-51 | | 1.16E-4 | 2.30E-4 | <LLD | 3.46E-4 | <LLD | 1.21E-3 | 2.25E-4 | 1.44E-3 |
| | Mn-54 | | 1.05E-3 | 9.09E-4 | 1.00E-3 | 2.96E-3 | 3.82E-4 | 1.32E-3 | 9.35E-4 | 2.64E-3 |
| | Fe-59 | | 1.59E-4 | 8.13E-5 | <LLD | 2.40E-4 | <LLD | 2.67E-3 | 1.02E-4 | 2.77E-3 |
| | Nb-95 | | 5.60E-4 | 4.48E-4 | 2.72E-4 | 1.28E-3 | 4.11E-5 | 6.61E-4 | 3.36E-4 | 1.04E-3 |
| | Zr-95 | | 2.23E-4 | 1.57E-4 | 1.20E-4 | 5.00E-4 | 1.79E-5 | 1.70E-4 | 2.28E-4 | 4.16E-4 |
| | Xe-131m | | 1.33E-3 | 2.79E-4 | <LLD | 1.61E-3 | <LLD | 7.53E-4 | 3.83E-3 | 4.58E-3 |
| | Xe-133m | | 6.57E-4 | 5.61E-5 | <LLD | 7.13E-4 | <LLD | 5.12E-4 | 2.97E-3 | 3.48E-3 |
| | Mo-99 | | 7.08E-5 | <LLD | <LLD | 7.08E-5 | <LLD | 1.00E-5 | <LLD | 1.00E-5 |
| | Zn-65 | | <LLD | 1.70E-5 | <LLD | 1.70E-5 | <LLD | 3.83E-5 | <LLD | 3.83E-5 |
| | Sn-113 | | <LLD | 1.16E-5 | 1.51E-5 | 2.67E-5 | <LLD | <LLD | 5.05E-5 | 5.05E-5 |
| | Co-57 | | <LLD | <LLD | 1.68E-5 | 1.68E-5 | <LLD | 1.11E-5 | 1.17E-5 | 2.28E-5 |
| | Sb-125 | | <LLD | <LLD | 3.23E-5 | 3.23E-5 | 2.44E-4 | <LLD | 6.56E-5 | 3.10E-4 |
| | Br-82 | | <LLD | <LLD | <LLD | <LLD | 5.73E-6 | <LLD | 1.55E-4 | 1.61E-4 |
| | Ar-41 | | <LLD | <LLD | <LLD | <LLD | <LLD | 2.26E-5 | 3.96E-6 | 2.61E-5 |
| | Ba-133 | | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD | 4.01E-5 | 4.01E-5 |
| | Fe-55 | | --- | --- | --- | <LLD | --- | --- | --- | * |

* Analysis completed by offsite vendor. Results are not available at this time.

TABLE 2.0-1

BYRON NUCLEAR POWER STATION
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
SOLID RADIOACTIVE WASTE
MONTH JAN. YEAR 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 1-3 | Dewatered Resin, Class A, LSA, Liner in Cask, none | Exclusive Use | Barnwell, SC | 177.3 | 1.46 |
| 1-9 | Dewatered Resin, Class C, LSA, HIC in Cask, none | Exclusive Use | Barnwell, SC | 135.8 | 330 |
| 1-11 | Dewatered Resin, Class C, LSA, HIC in Cask, none | Exclusive Use | Barnwell, SC | 135.8 | 53.7 |
| 1-20 | Dewatered Resin, Class A, LSA, HIC in Cask, none | Exclusive Use | Barnwell, SC | 178.9 | 9.69 |
| 1-26 | DAW, Class A, LSA, drums, none | Exclusive Use | Vendor for Compaction | 300.6 (final burial volume) | 0.39 |
| 1-30 | Dewatered Resin, Class A, LSA, HIC in Cask, none | Exclusive Use | Barnwell, SC | 178.9 | 24.1 |
| | | MONTHLY TOTALS: | 6 | 1110 | 419 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** FEB. **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 2-1 | Dewatered Resin, Class A, LSA, Liner in Cask, none | Exclusive Use | Barnwell,SC | 177.3 | 0.17 |
| 2-10 | Dewatered Resin, Class A, LSA, Liner in Cask, none | Exclusive Use | Barnwell,SC | 177.3 | 2.33 |
| 2-15 | Dewatered Resin, Class A, LSA, Liner in Cask, none | Exclusive Use | Barnwell,SC | 177.3 | 4.86 |
| 2-24 | DAW, Class A, LSA, drums, none | Exclusive Use | To Vendor for Compaction | 307.1 (final burial volume) | 0.21 |
| | | | **MONTHLY TOTALS:** | 4 | 839 | 7.57 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** MARCH **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 3-8 | Dewatered Resin, Class A, LSA, Liner in cask, none | Exclusive Use | Barnwell, SC | 177.3 | 1.07 |
| 3-13 | Dewatered Resin, Class A, LSA, Liner in cask, none | Exclusive Use | Barnwell, SC | 177.3 | 0.96 |
| 3-17 | Dewatered Resin, Class A, LSA, Liner in cask, none | Exclusive Use | Barnwell, SC | 177.3 | 1.87 |
| 3-22 | Dewatered Resin, Class A, LSA, Liner in cask, none | Exclusive Use | Barnwell, SC | 177.3 | 0.76 |
| 3-29 | Dewatered Resin, Class A, LSA, Liner in cask, none | Exclusive Use | Barnwell, SC | 177.3 | 0.78 |
| | | **MONTHLY TOTALS:** | 5 | 887 | 5.44 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** APRIL **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 4-10 | DAW, Class A, LSA, Seavan, none | Exclusive Use | To Vendor for Compaction | *1280 | 0.11 |
| 4-17 | DAW, Class A, LSA, Seavan, none | Exclusive Use | To Vendor for Compaction | *1280 | 0.17 |
| 4-19 | Dewatered Resin, Class A, LSA, Liner in cask, none | Exclusive Use | Barnwell, SC | 177.3 | 2.20 |
| | | | **MONTHLY TOTALS:** | 3 | 2740 | 2.48 |

*Volume sent to vendor. This is not final burial volume.

TABLE 2.0-1 (continued)

BYRON NUCLEAR POWER STATION
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
SOLID RADIOACTIVE WASTE
MONTH MAY YEAR 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 5-5 | Dewatered Resin, Class A, LSA, Liner in Cask, none | Exclusive Use | Barnwell, SC | 177.3 | 1.65 |
| 5-11 | Spent Filters, Class A, HIC in cask, none | Exclusive Use | Barnwell, SC | 73.4 | 3.92 |
| 5-16 | Dewatered Resin, Class A, LSA, Liner in cask, none | Exclusive Use | Barnwell, SC | 177.3 | 0.68 |
| 5-26 | Dewatered Resin, Class C, LSA, HIC in cask, none | Exclusive Use | Barnwell, SC | 73.4 | 269 |
| | | MONTHLY TOTALS: | 4 | 501 | 275 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** JUNE **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 6-1 | Dewatered Resin, Class C, LSA, HIC in cask, none | Exclusive Use | Barnwell, SC | 135.8 | 175 |
| 6-21 | Dewatered Resin, Class B, LSA, HIC in cask, none | Exclusive Use | Barnwell, SC | 135.8 | 9.92 |
| | | | **MONTHLY TOTALS:** | 2 | 272 | 185 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** July **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 7-5 | Dewatered Resin, Class A, LSA, HIC in Cask, None | Exclusive Use | Barnwell | 177.3 | 14.6 |
| 7-7 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell | 177.3 | 4.72 |
| 7-13 | DAW, Class A, LSA, Seavan, None | Exclusive Use | Vendor for Compaction | 297.0 (Final Burial Volume) | 0.29 |
| 7-19 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell | 177.3 | 2.16 |
| | | | **MONTHLY TOTALS:** | 4 | 829 | 21.8 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** August **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 8-11 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell | 177.3 | 5.26 |
| 8-24 | DAW, Class A. LSA, Drums, None | Exclusive Use | Vendor for Compaction | 330.3 (Final Burial Volume) | 0.9522 |
| | | | MONTHLY TOTALS: | 2 | 508 | 6.21 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** September **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 9-15 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell, SC | 177.3 | 4.41 |
| 9-22 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell, SC | 177.3 | 1.06 |
| | | | MONTHLY TOTALS: | 2 | 355 | 5.47 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** October **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 10-6 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell, SC | 177.3 | 0.205 |
| 10-16 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell, SC | 177.3 | 1.36 |
| 10-16 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell, SC | 139.1 | 1.14 |
| 10-30 | DAW, Class A, LSA, Drums, None | Exclusive Use | Vendor for Compaction | 314.7 (Final Burial Volume) | 0.91 |
| | | | **MONTHLY TOTALS:** 4 | 808 | 3.62 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**
**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**
**SOLID RADIOACTIVE WASTE**
**MONTH** November **YEAR** 1989

| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 11-1 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell, SC | 177.3 | 0.094 |
| 11-2 | DAW (Fuel Racks), Class A, LSA, Steel Box, None | Exclusive Use | Richland, W | 78.0 | 5.53E-5 |
| 11-2 | DAW (Fuel Racks), Class A, LSA, Steel Box, None | Exclusive Use | Richland, W | 190.0 | 7.94E-5 |
| 11-6 | Dewatered Resin, Class C, LSA, HIC in Cask, None | Exclusive Use | Barnwell, SC | 73.4 | 271 |
| 11-20 | Dewatered Resin, Class B, LSA, HIC in Cask, None | Exclusive Use | Barnwell, SC | 135.8 | 75.4 |
| 11-20 | VAN, Class A, LSA, Drums, None | Exclusive Use | Richland, W | 630 | 0.86 |
| 11-27 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell, SC | 135.8 | 9.01 |
| | | | **MONTHLY TOTALS:** | 7 | 1420 | 356 |

TABLE 2.0-1 (continued)

**BYRON NUCLEAR POWER STATION**

**EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**

**SOLID RADIOACTIVE WASTE**

**MONTH** December **YEAR** 1989

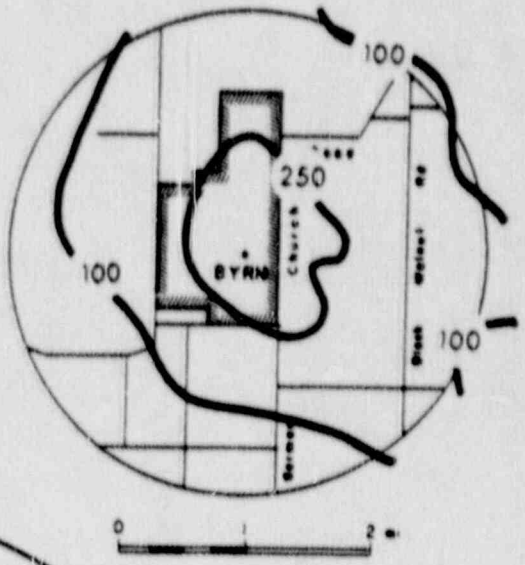
| DATE | Disposition of Material (Description, Class , Type , Solidifying Agent | Mode of Transport | Destination | Volume Per Shipment ($ft^3$) | Curies Per Shipment |
|---|---|---|---|---|---|
| 12-4 | DAW, Class A, LSA, Drums, None | Exclusive Use | Vendor for Compaction | 320.2 | 8.28 |
| 12-5 | DAW (Fuel Racks), Class A, LSA, Steel Box, None | Exclusive Use | Richland, W | 197 | 5.38E-6 |
| 12-5 | Dewatered Resin, Class A, LSA, HIC in Cask, None | Exclusive Use | Barnwell, SC | 178.9 | 3.7 |
| 12-12 | DAW (Fuel Racks), Class A, LSA, Steel Box, None | Exclusive Use | Richland, W | 17.5 | 7.76E-6 |
| 12-13 | Dewatered Resin, Class A, LSA, Liner in Cask, None | Exclusive Use | Barnwell, SC | 177.3 | 0.962 |
| 12-18 | DAW, Class A, LSA, Drums, None | Exclusive Use | Richland, W | 630 | 8E-4 |
| 12-19 | DAW, Class A, LSA, Seavan, None | Exclusive Use | Vendor for Compaction | *928 | 0.08 |
| 12-20 | Dewatered Resin, Class A, LSA, HIC in Cask, None | Exclusive Use | Barnwell, SC | 177.3 | 1.11 |
| 12-26 | Dewatered Resin, Class A, LSA, HIC in Cask, None | Exclusive Use | Barnwell, SC | 177.3 | 0.703 |
| | | | **MONTHLY TOTALS:** | 9 | 2800 | 14.8 |

* Volume sent to vendor. This is not final burial volume.

FIGURE 3.1-1

Estimated Cumulative Gamma Dose (in mrem) from the Byron Station for the period January-December 1989

Isopleth Labels
Small figure - multiply by $10^{-5}$
Large figure - multiply by $10^{-5}$



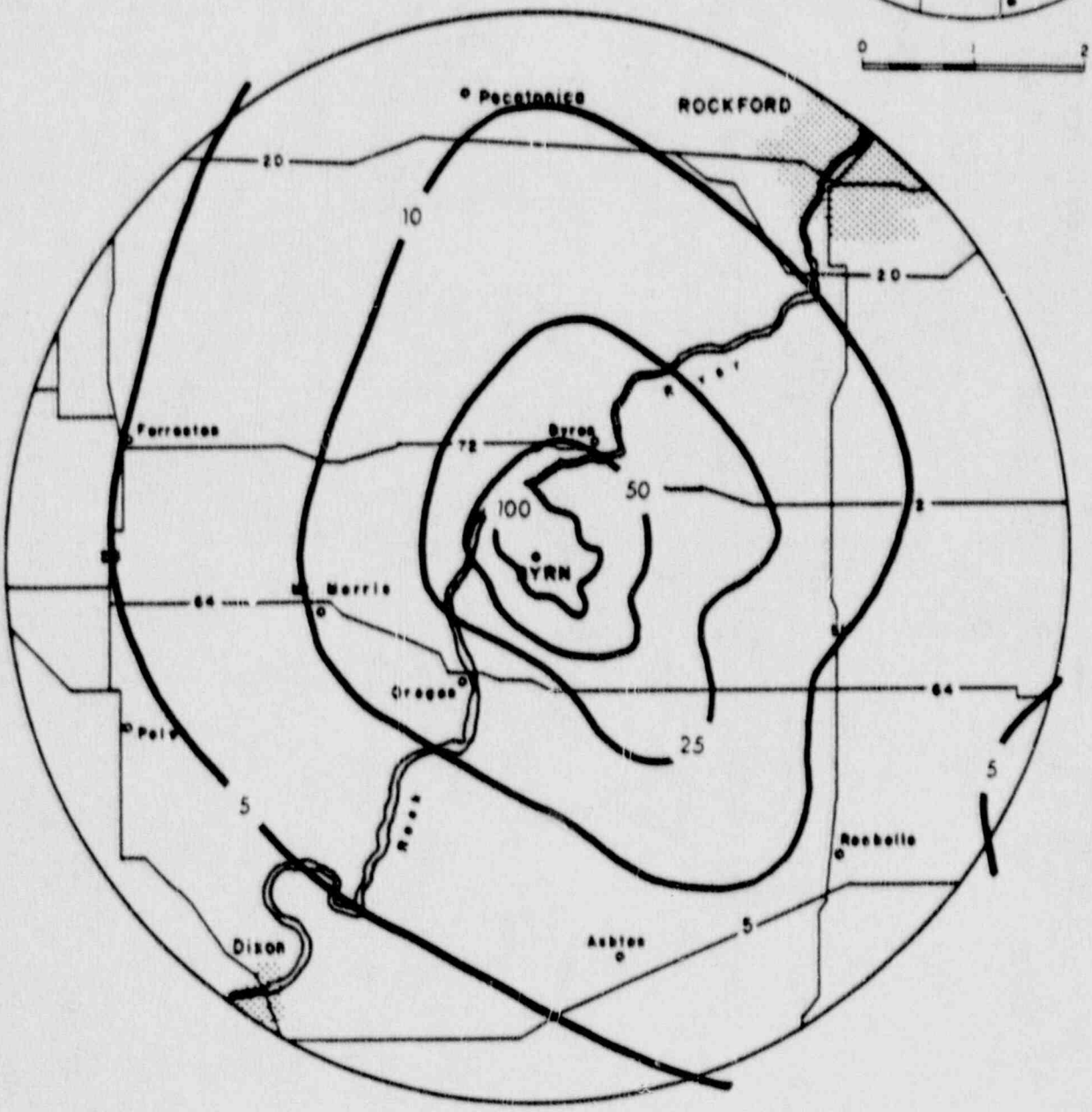
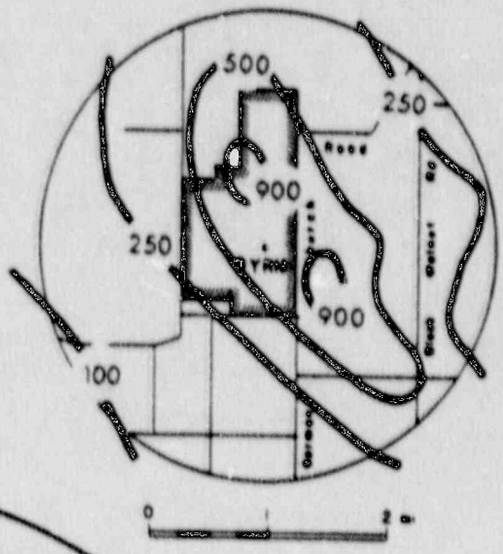



FIGURE 3.1-2

Estimated Total Concentrations (in $pCi/m^3$) of Noble Gases from the Byron Station for the period January-December 1989

Isopleth Labels
Small figure - multiply by $10^{-1}$
Large figure - multiply by $10^{-1}$



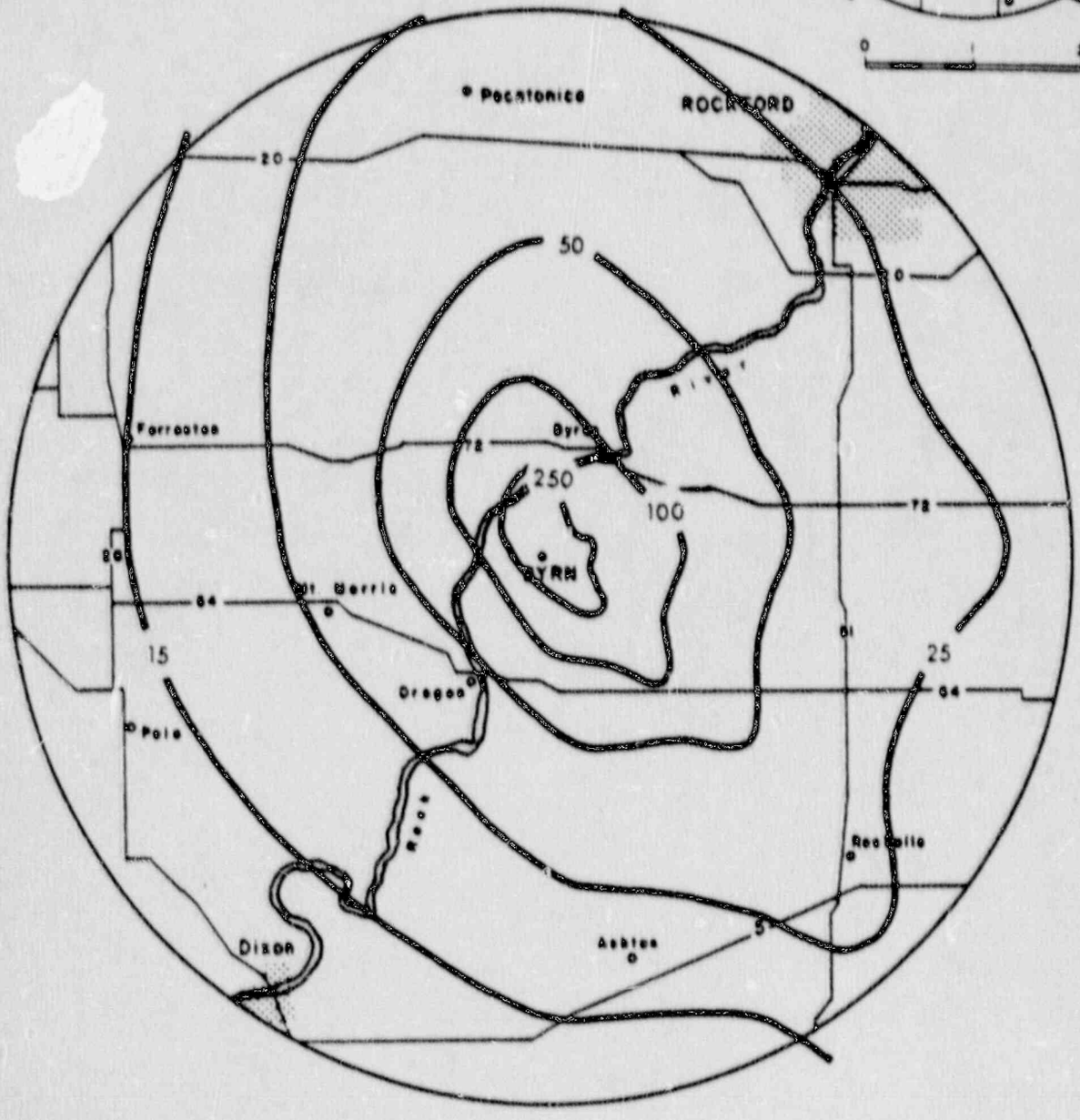



FIGURE 3.1-3

Estimated Total Concentrations (in $pCi/m^3$) of Iodine from the Byron Station for the period January-December 1989

Isopleth Labels
Small figure - multiply by $10^{-6}$
Large figure - multiply by $10^{-6}$

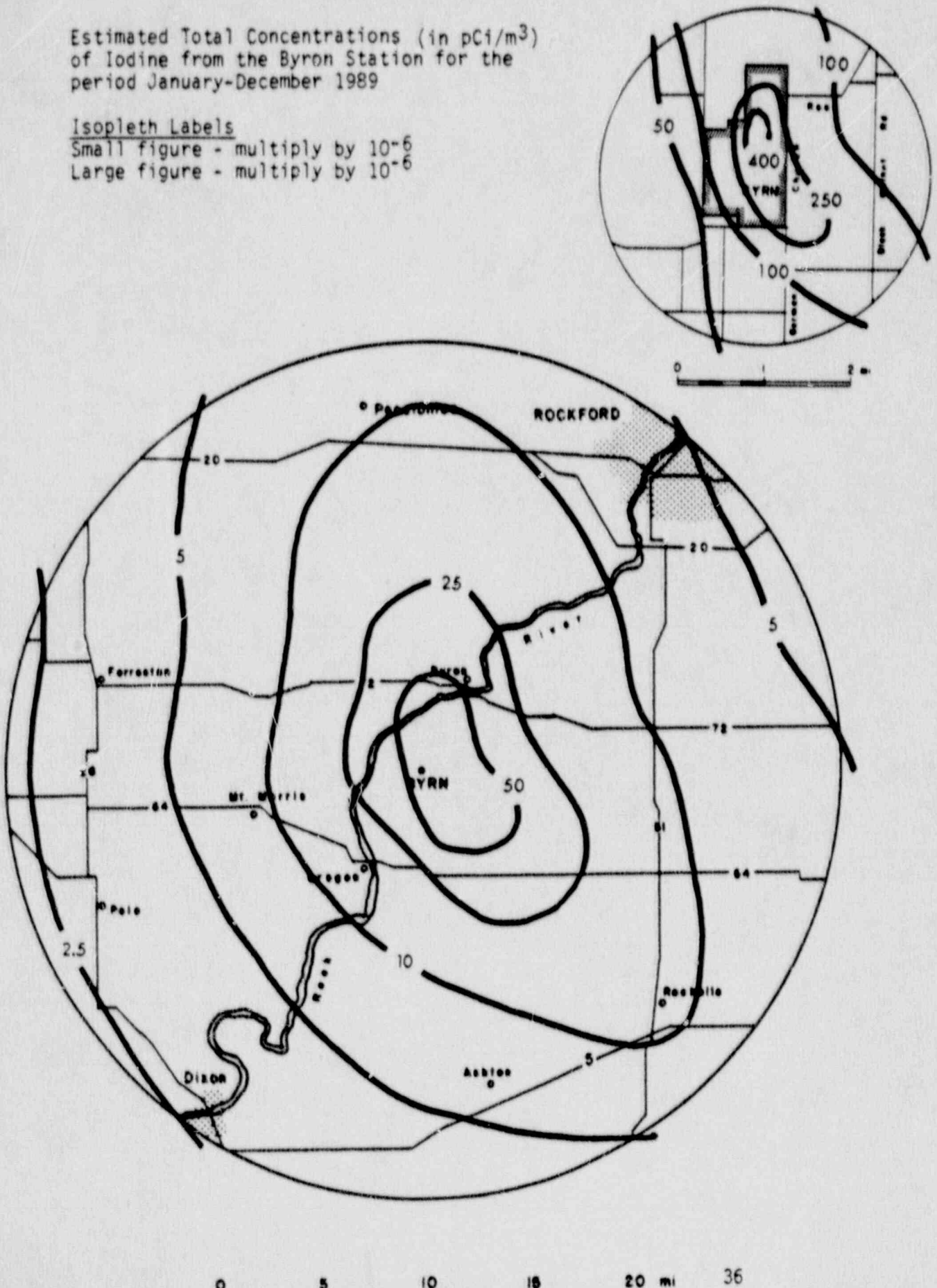


FIGURE 3.1-4

Estimated Total Concentrations (in pCi/m3)
of Particulate Matter from the Byron Station
for the period January-December 1989

Isopleth Labels
Small figure - multiply by $10^{-8}$
Large figure - multiply by $10^{-8}$

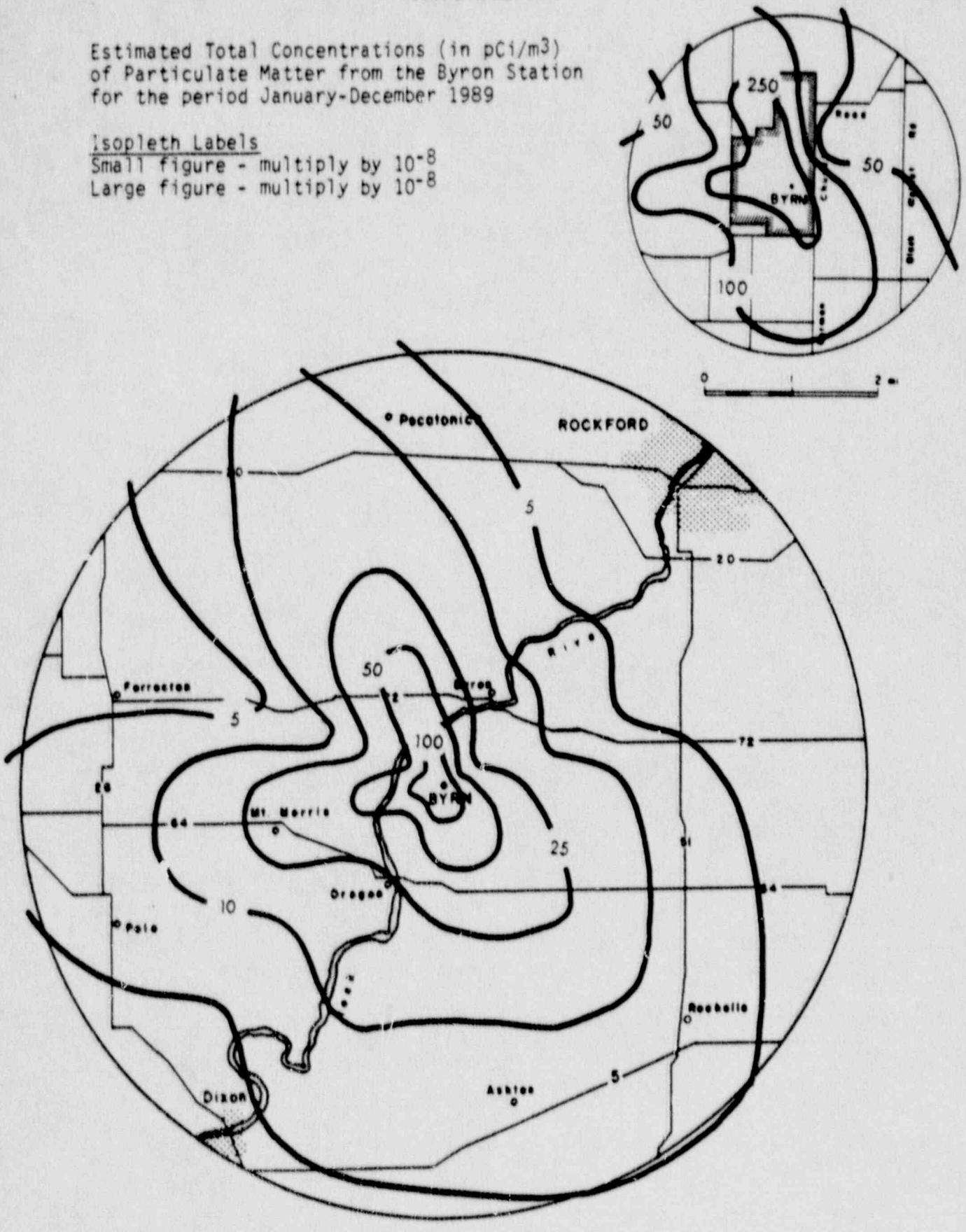


TABLE 3.1-1

BYRON UNIT ONE

1989 ANNUAL REPORT
MAXIMUM DOSES RESULTING FROM AIRBORNE RELEASES
PERIOD OF RELEASE - 01/01/89 TO 12/31/89  CALCULATED 01/16/90
INFANT RECEPTOR

| TYPE | 1ST QUARTER JAN-MAR | 2ND QUARTER APR-JUN | 3RD QUARTER JUL-SEP | 4TH QUARTER OCT-DEC | ANNUAL |
|---|---|---|---|---|---|
| GAMMA AIR | 5.27E-05 | 9.37E-05 | 5.87E-04 | 3.27E-04 | 1.06E-03 |
| (MRAD) | (SE ) | (SE ) | (SE ) | (SE ) | (SE ) |
| BETA AIR | 2.31E-04 | 3.97E-04 | 2.43E-03 | 1.33E-03 | 4.38E-03 |
| (MRAD) | (SE ) | (SE ) | (SE ) | (SE ) | (SE ) |
| TOT. BODY | 1.34E-05 | 2.38E-05 | 1.50E-04 | 8.39E-05 | 2.71E-04 |
| (MREM) | (SE ) | (SE ) | (SE ) | (SE ) | (SE ) |
| SKIN | 1.18E-04 | 2.01E-04 | 1.22E-03 | 6.75E-04 | 2.21E-03 |
| (MREM) | (SE ) | (SE ) | (SE ) | (SE ) | (SE ) |
| ORGAN | 2.93E-02 | 5.07E-05 | 6.32E-04 | 1.20E-03 | 3.11E-02 |
| (MREM) | (NE ) | (NE ) | (NE ) | (NE ) | (NE ) |
| | THYROID | THYROID | THYROID | THYROID | THYROID |

THIS IS A REPORT FOR THE CALENDAR YEAR 1989

COMPLIANCE STATUS - 10 CFR 50 APP. I
INFANT RECEPTOR

| | QTRLY OBJ | % OF APP I. 1ST QTR JAN-MAR | 2ND QTR APR-JUN | 3RD QTR JUL-SEP | 4TH QTR OCT-NOV | YRLY OBJ | % OF APP.I |
|---|---|---|---|---|---|---|---|
| GAMMA AIR (MRAD) | 5.0 | 0.00 | 0.00 | 0.01 | 0.01 | 10.0 | 0.01 |
| BETA AIR (MRAD) | 10.0 | 0.00 | 0.00 | 0.02 | 0.01 | 20.0 | 0.02 |
| TOT. BODY (MREM) | 2.5 | 0.00 | 0.00 | 0.01 | 0.00 | 5.0 | 0.01 |
| SKIN (MREM) | 7.5 | 0.00 | 0.00 | 0.02 | 0.01 | 15.0 | 0.01 |
| ORGAN (MREM) | 7.5 | 0.39 | 0.00 | 0.01 | 0.02 | 15.0 | 0.21 |
| | | THYROID | THYROID | THYROID | THYROID | | THYROID |

RESULTS BASED UPON
ODCM REVISION 11
UPDATE CS204
FEBRUARY 1986

TABLE 3.1-1 (continued)

BYRON UNIT ONE

1989 ANNUAL REPORT
MAXIMUM DOSES RESULTING FROM AIRBORNE RELEASES
PERIOD OF RELEASE - 01/01/89 TO 12/31/89  CALCULATED 01/16/90
ADULT RECEPTOR

| TYPE | 1ST QUARTER JAN-MAR | 2ND QUARTER APR-JUN | 3RD QUARTER JUL-SEP | 4TH QUARTER OCT-DEC | ANNUAL |
|---|---|---|---|---|---|
| GAMMA AIR | 5.27E-05 | 9.37E-05 | 5.87E-04 | 3.27E-04 | 1.06E-03 |
| (MRAD) | (SE ) | (SE ) | (SE ) | (SE ) | (SE ) |
| BETA AIR | 2.31E-04 | 3.97E-04 | 2.43E-03 | 1.33E-03 | 4.38E-03 |
| (MRAD) | (SE ) | (SE ) | (SE ) | (SE ) | (SE ) |
| TOT. BODY | 1.34E-05 | 2.38E-05 | 1.50E-04 | 8.39E-05 | 2.71E-04 |
| (MREM) | (SE ) | (SE ) | (SE ) | (SE ) | (SE ) |
| SKIN | 1.18E-04 | 2.01E-04 | 1.22E-03 | 6.75E-04 | 2.21E-03 |
| (MREM) | (SE ) | (SE ) | (SE ) | (SE ) | (SE ) |
| ORGAN | 1.98E-02 | 7.58E-05 | 3.75E-04 | 6.16E-04 | 2.07E-02 |
| (MREM) | (NE ) | (ESE ) | (ESE ) | (ESE ) | (NE ) |
| | THYROID | THYROID | THYROID | THYROID | THYROID |

THIS IS A REPORT FOR THE CALENDAR YEAR 1989

COMPLIANCE STATUS - 10 CFR 50 APP. I
ADULT RECEPTOR

| | QTRLY OBJ | % OF APP I. 1ST QTR JAN-MAR | 2ND QTR APR-JUN | 3RD QTR JUL-SEP | 4TH QTR OCT-NOV | YRLY OBJ | % OF APP.I |
|---|---|---|---|---|---|---|---|
| GAMMA AIR (MRAD) | 5.0 | 0.00 | 0.00 | 0.01 | 0.01 | 10.0 | 0.01 |
| BETA AIR (MRAD) | 10.0 | 0.00 | 0.00 | 0.02 | 0.01 | 20.0 | 0.02 |
| TOT. BODY (MREM) | 2.5 | 0.00 | 0.00 | 0.01 | 0.00 | 5.0 | 0.01 |
| SKIN (MREM) | 7.5 | 0.00 | 0.00 | 0.02 | 0.01 | 15.0 | 0.01 |
| ORGAN (MREM) | 7.5 | 0.26 | 0.00 | 0.01 | 0.01 | 15.0 | 0.14 |
| | | THYROID | THYROID | THYROID | THYROID | | THYROID |

RESULTS BASED UPON
ODCM REVISION 11
UPDATE CS204
FEBRUARY 1986

TABLE 3.1-1 (continued)

BYRON UNIT TWO

1989 ANNUAL REPORT
MAXIMUM DOSES RESULTING FROM AIRBORNE RELEASES
PERIOD OF RELEASE - 01/01/89 TO 12/31/89  CALCULATED 01/16/90
INFANT RECEPTOR

| TYPE | 1ST QUARTER JAN-MAR | 2ND QUARTER APR-JUN | 3RD QUARTER JUL-SEP | 4TH QUARTER OCT-DEC | ANNUAL |
|---|---|---|---|---|---|
| GAMMA AIR (MRAD) | 1.73E-04 (SE ) | 5.25E-05 (SE ) | 4.84E-04 (SE ) | 8.09E-04 (SE ) | 1.52E-03 (SE ) |
| BETA AIR (MRAD) | 7.24E-04 (SE ) | 2.30E-04 (SE ) | 2.00E-03 (SE ) | 3.23E-03 (SE ) | 6.19E-03 (SE ) |
| TOT. BODY (MREM) | 4.28E-05 (SE ) | 1.36E-05 (SE ) | 1.25E-04 (SE ) | 2.08E-04 (SE ) | 3.89E-04 (SE ) |
| SKIN (MREM) | 3.57E-04 (SE ) | 1.19E-04 (SE ) | 1.01E-03 (SE ) | 1.64E-03 (SE ) | 3.13E-03 (SE ) |
| ORGAN (MREM) | 2.93E-02 (NE ) | 5.07E-05 (NE ) | 2.11E-04 (NE ) | 4.75E-05 (NE ) | 2.96E-02 (NE ) |
| | THYROID | THYROID | THYROID | THYROID | THYROID |

THIS IS A REPORT FOR THE CALENDAR YEAR 1989

COMPLIANCE STATUS - 10 CFR 50 APP. I
INFANT RECEPTOR

| | QTRLY OBJ | % OF APP I. 1ST QTR JAN-MAR | 2ND QTR APR-JUN | 3RD QTR JUL-SEP | 4TH QTR OCT-NOV | YRLY OBJ | % OF APP.I |
|---|---|---|---|---|---|---|---|
| GAMMA AIR (MRAD) | 5.0 | 0.00 | 0.00 | 0.01 | 0.02 | 10.0 | 0.02 |
| BETA AIR (MRAD) | 10.0 | 0.01 | 0.00 | 0.02 | 0.03 | 20.0 | 0.03 |
| TOT. BODY (MREM) | 2.5 | 0.00 | 0.00 | 0.00 | 0.01 | 5.0 | 0.01 |
| SKIN (MREM) | 7.5 | 0.00 | 0.00 | 0.01 | 0.02 | 15.0 | 0.02 |
| ORGAN (MREM) | 7.5 | 0.39 | 0.00 | 0.00 | 0.00 | 15.0 | 0.20 |
| | | THYROID | THYROID | THYROID | THYROID | | THYROID |

RESULTS BASED UPON
ODCM REVISION 11
UPDATE CS204
FEBRUARY 1986

TABLE 3.1-1 (continued)

BYRON UNIT TWO

1989 ANNUAL REPORT
MAXIMUM DOSES RESULTING FROM AIRBORNE RELEASES
PERIOD OF RELEASE - 01/01/89 TO 12/31/89 CALCULATED 01/16/90
ADULT RECEPTOR

| TYPE | 1ST QUARTER JAN-MAR | 2ND QUARTER APR-JUN | 3RD QUARTER JUL-SEP | 4TH QUARTER OCT-DEC | ANNUAL |
|---|---|---|---|---|---|
| GAMMA AIR (MRAD) | 1.73E-04 (SE ) | 5.25E-05 (SE ) | 4.84E-04 (SE ) | 8.09E-04 (SE ) | 1.52E-03 (SE ) |
| BETA AIR (MRAD) | 7.24E-04 (SE ) | 2.30E-04 (SE ) | 2.00E-03 (SE ) | 3.23E-03 (SE ) | 6.19E-03 (SE ) |
| TOT. BODY (MREM) | 4.28E-05 (SE ) | 1.36E-05 (SE ) | 1.25E-04 (SE ) | 2.08E-04 (SE ) | 3.89E-04 (SE ) |
| SKIN (MREM) | 3.57E-04 (SE ) | 1.19E-04 (SE ) | 1.01E-03 (SE ) | 1.64E-03 (SE ) | 3.13E-03 (SE ) |
| ORGAN (MREM) | 1.98E-02 (NE ) | 7.58E-05 (ESE ) | 1.77E-04 (ESE ) | 5.49E-05 (SE ) | 2.01E-02 (NE ) |
| | THYROID | THYROID | THYROID | THYROID | THYROID |

THIS IS A REPORT FOR THE CALENDAR YEAR 1989

COMPLIANCE STATUS - 10 CFR 50 APP. I
ADULT RECEPTOR

| | QTRLY OBJ | % OF APP I. 1ST QTR JAN-MAR | 2ND QTR APR-JUN | 3RD QTR JUL-SEP | 4TH QTR OCT-NOV | YRLY OBJ | % OF APP.I |
|---|---|---|---|---|---|---|---|
| GAMMA AIR (MRAD) | 5.0 | 0.00 | 0.00 | 0.01 | 0.02 | 10.0 | 0.02 |
| BETA AIR (MRAD) | 10.0 | 0.01 | 0.00 | 0.02 | 0.03 | 20.0 | 0.03 |
| TOT. BODY (MREM) | 2.5 | 0.00 | 0.00 | 0.00 | 0.01 | 5.0 | 0.01 |
| SKIN (MREM) | 7.5 | 0.00 | 0.00 | 0.01 | 0.02 | 15.0 | 0.02 |
| ORGAN (MREM) | 7.5 | 0.26 | 0.00 | 0.00 | 0.00 | 15.0 | 0.13 |
| | | THYROID | THYROID | THYROID | THYROID | | THYROID |

RESULTS BASED UPON
ODCM REVISION 11
UPDATE CS204
FEBRUARY 1986

TABLE 3.2-1

BYRON UNIT ONE
ADULT RECEPTOR

1989 ANNUAL REPORT
MAXIMUM DOSES (MREM) RESULTING FROM LIQUID EFFLUENTS
PERIOD OF RELEASE - 01/01/89 TO 12/31/89 CALCULATED 01/16/90

| DOSE TYPE | 1ST QUARTER JAN-MAR | 2ND QUARTER APR-JUN | 3RD QUARTER JUL-SEP | 4TH QUARTER OCT-DEC | ANNUAL |
|---|---|---|---|---|---|
| TOTAL BODY | 1.65E-02 | 5.49E-03 | 1.20E-03 | 5.49E-04 | 2.38E-02 |
| INTERNAL ORGAN | 2.74E-02 | 1.27E-02 | 2.35E-03 | 2.01E-03 | 4.44E-02 |
| | GI-LLI | GI-LLI | GI-LLI | GI-LLI | GI-LLI |

THIS IS A REPORT FOR THE CALENDAR YEAR 1989

COMPLIANCE STATUS - 10 CFR 50 APP. I

| | QTRLY OBJ | % OF APP I. 1ST QTR JAN-MAR | 2ND QTR APR-JUN | 3RD QTR JUL-SEP | 4TH QTR OCT-NOV | YRLY OBJ | % OF APP.I |
|---|---|---|---|---|---|---|---|
| TOTAL BODY (MREM) | 1.5 | 1.10 | 0.37 | 0.08 | 0.04 | 3.0 | 0.79 |
| CRIT. ORGAN(MREM) | 5.0 | 0.55 | 0.25 | 0.05 | 0.04 | 10.0 | 0.44 |
| | | GI-LLI | GI-LLI | GI-LLI | GI-LLI | | GI-LLI |

RESULTS BASED UPON
ODCM REVISION 11
UPDATE CS204
FEBRUARY 1986

TABLE 3.2-1 (continued)

BYRON UNIT TWO
ADULT RECEPTOR

1989 ANNUAL REPORT
MAXIMUM DOSES (MREM) RESULTING FROM LIQUID EFFLUENTS
PERIOD OF RELEASE - 01/01/89 TO 12/31/89 CALCULATED 01/16/90

| DOSE TYPE | 1ST QUARTER JAN-MAR | 2ND QUARTER APR-JUN | 3RD QUARTER JUL-SEP | 4TH QUARTER OCT-DEC | ANNUAL |
|---|---|---|---|---|---|
| TOTAL BODY | 1.65E-02 | 5.49E-03 | 1.20E-03 | 5.49E-04 | 2.38E-02 |
| INTERNAL ORGAN | 2.74E-02 | 1.27E-02 | 2.35E-03 | 2.01E-03 | 4.44E-02 |
| | GI-LLI | GI-LLI | GI-LLI | GI-LLI | GI-LLI |

THIS IS A REPORT FOR THE CALENDAR YEAR 1989

COMPLIANCE STATUS - 10 CFR 50 APP. I

| | QTRLY OBJ | % OF APP I. 1ST QTR JAN-MAR | 2ND QTR APR-JUN | 3RD QTR JUL-SEP | 4TH QTR OCT-NOV | YRLY OBJ | % OF APP.I |
|---|---|---|---|---|---|---|---|
| TOTAL BODY (MREM) | 1.5 | 1.10 | 0.37 | 0.08 | 0.04 | 3.0 | 0.79 |
| CRIT. ORGAN(MREM) | 5.0 | 0.55 | 0.25 | 0.05 | 0.04 | 10.0 | 0.44 |
| | | GI-LLI | GI-LLI | GI-LLI | GI-LLI | | GI-LLI |

RESULTS BASED UPON
ODCM REVISION 11
UPDATE CS204
FEBRUARY 1986

FIGURE

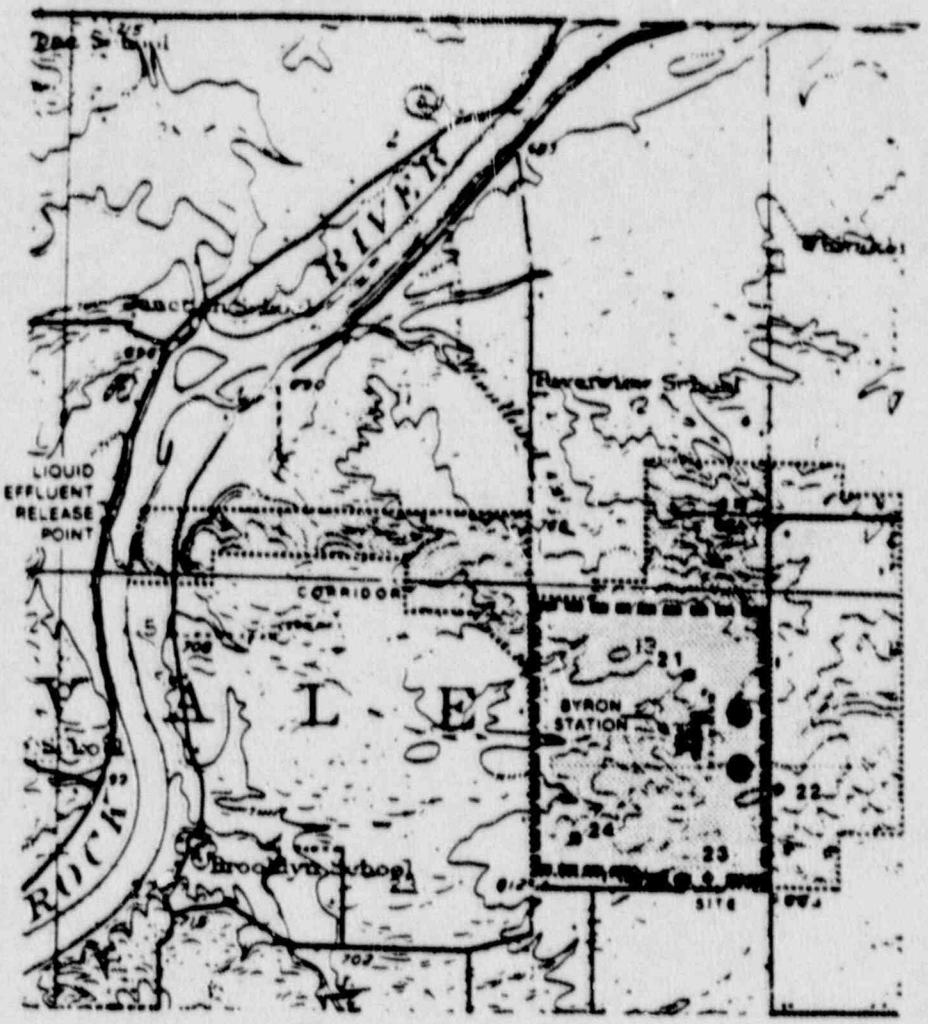

RIVER
LIQUID EFFLUENT RELEASE POINT
CORRIDOR
BYRON STATION
ROCK
0 1/2 1 KM
0 1/2 1 MILE
EXCLUSION AREA BOUNDARY
RESTRICTED AREA BOUNDARY
BY-21
BY-22
BY-23
BY-24
BYRON STATION
ONSITE AIR SAMPLING AND TLD LOCATIONS

FIGURE 5.0-2

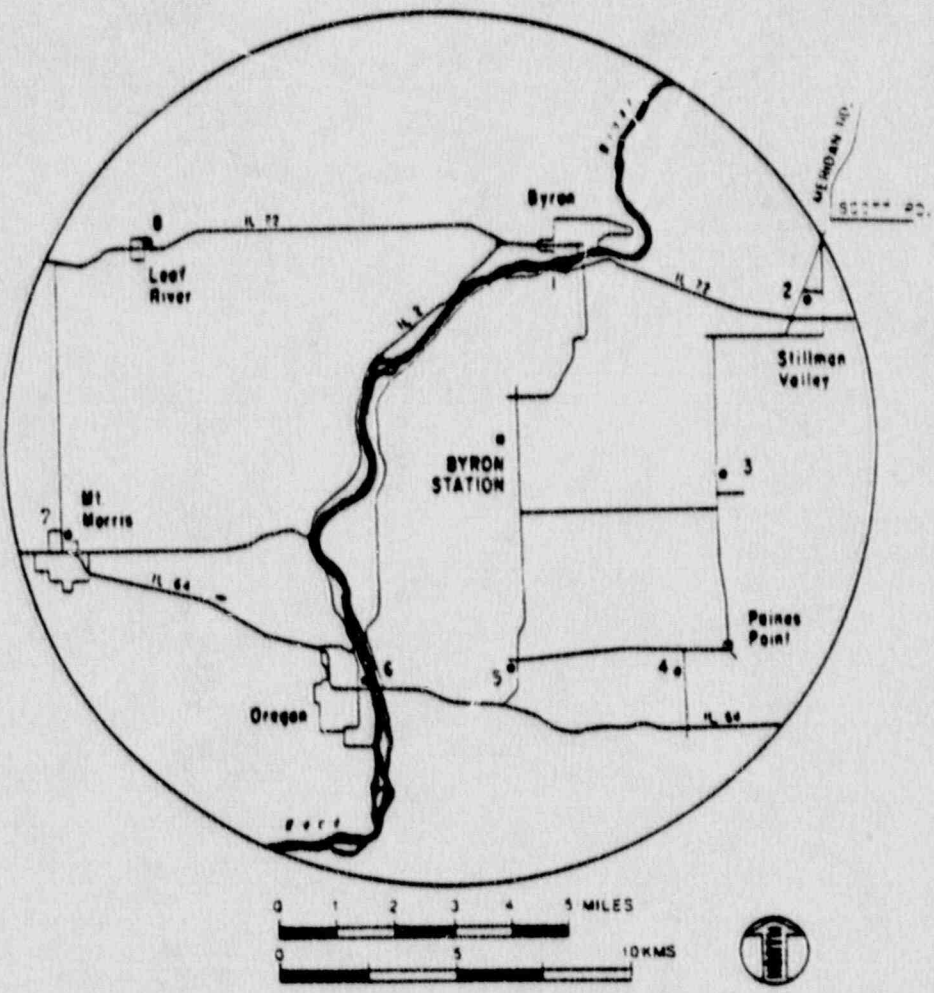
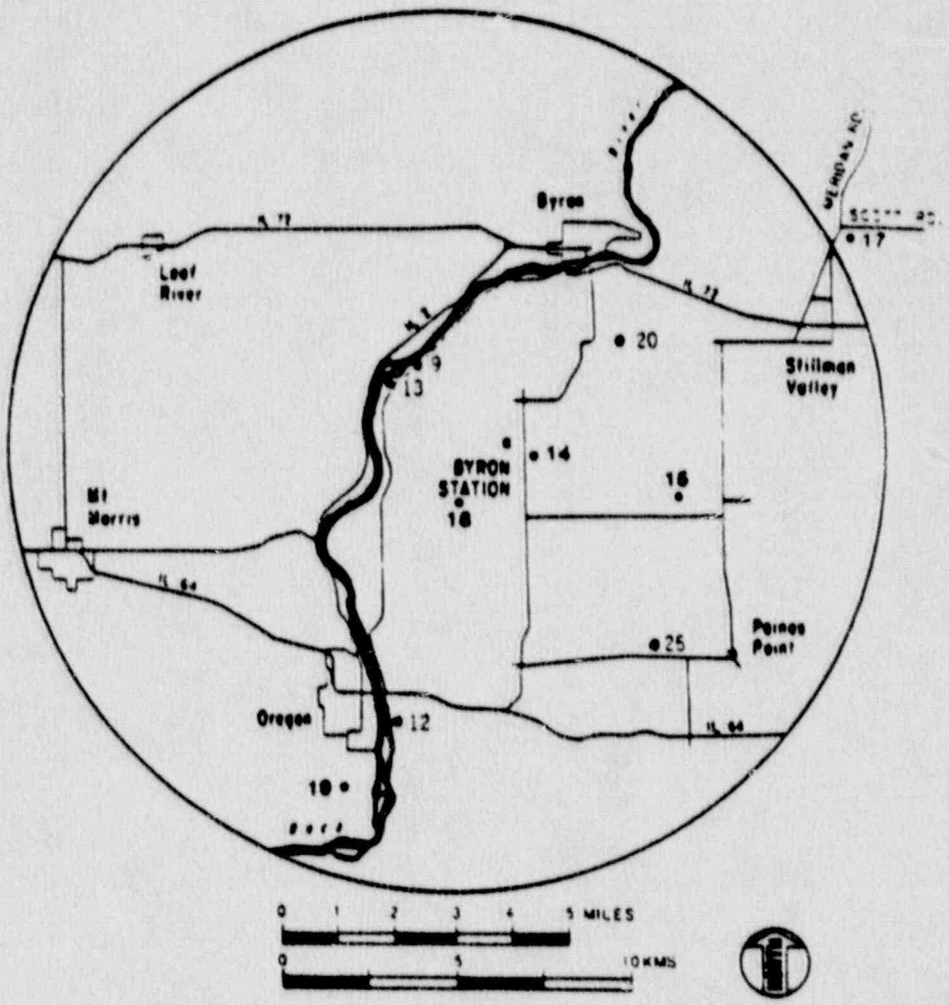

Byron
Leaf River
Stillman Valley
BYRON STATION
Mt Morris
Paines Point
Oregon
0 1 2 3 4 5 MILES
0 5 10KMS
BY-01
BY-02
BY-03
BY-04
BY-05
BY-06
BY-07
BY-08
BYRON STATION
OFFSITE AIR SAMPLING AND TLD LOCATIONS

FIGURE 5.0-3

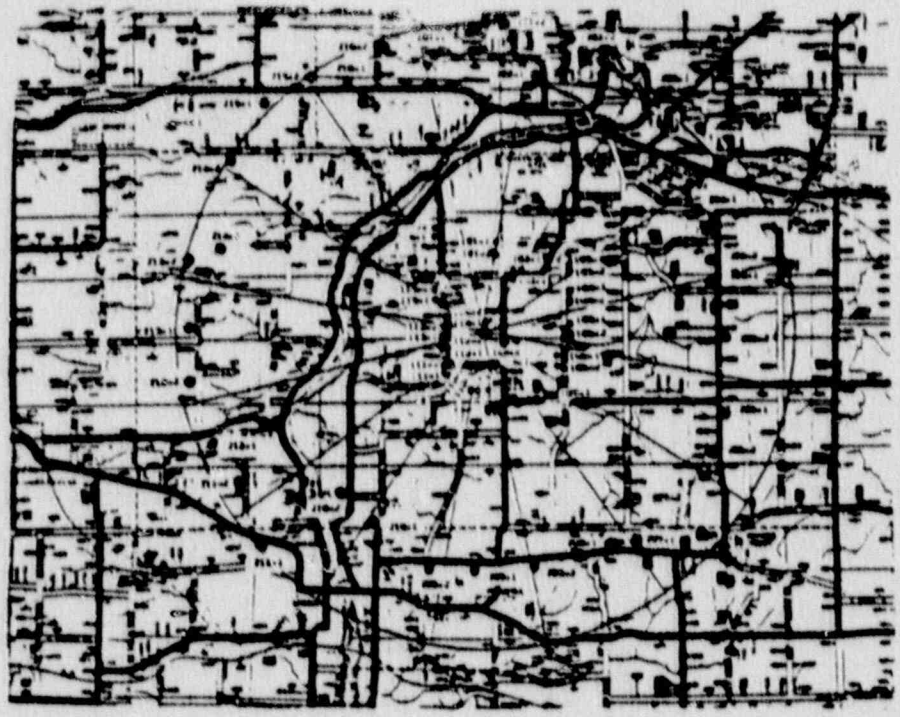


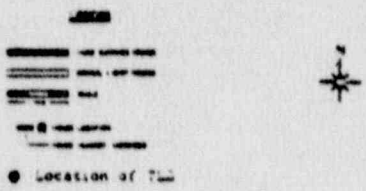

BY-09 Woodland Creek
BY-12 Oregon Pool of Rock River
BY-13 Rock River, Upstream
BY-14 Offsite Well Water
BY-15 W. Danakas
BY-17 Whitten Holstein Dairy
BY-18 McCoy Farmstand
BY-19-1 Oregon Farmstand
BY-19-2 Oregon Farmstand
BY-20 K. Reeverts
BY-25 Bill Leupke Farm

**BYRON STATION**

INGESTION AND WATERBORNE EXPOSURE PATHWAY SAMPLE LOCATIONS

FIGURE 5.0-4







| BYRON STATION |
| --- |
| INNER RING AND OUTER RING TLD LOCATIONS |

TABLE 5.0-1

## Byron Station
## Radiological Environmental Monitoring
## Locations

| | Air Sampling TLD | Cooling Water | Fish | Lake Water | Milk | Public Water | Rabbits | Sediments | Surface Water | Vegetables | Ground/Well Water |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BY-01 Byron | O | | | | | | | | | | |
| BY-02 Sullman Valley | O | | | | | | | | | | |
| BY-03 Nearsite-East | O | | | | | | | | | | |
| BY-04 Paynes Point | O | | | | | | | | | | |
| BY-05 Nearsite-South | O | | | | | | | | | | |
| BY-06 Oregon | O | | | | | | | | | | |
| BY-07 Mt. Morris | O | | | | | | | | | | |
| BY-08 Leaf River | O | | | | | | | | | | |
| BY-09 Woodland Creek | | | | | | | | | O | | |
| BY-12 Oregon Pool of Rock River | | | O | | | | | O | O | | |
| BY-13 Rock River, Upstream | | | O | | | | | O | O | | |
| BY-14 Offsite Well Water | | | | | | | | | | | O |
| BY-15 J. A. Reeverts Pine Hill Dairy | | | | | O | | | | | | |
| BY-17 Whitten Holstein Dairy | | | | | O | | | | | | |
| BY-18 McCoy Farmstand Well | | | | | | | | | | | O |
| BY-19-1 966 E Weld Bark Rd | | | | | | | | | | O | |
| BY-19-2 6993 N River Rd | | | | | | | | | | O | |
| BY-20 Kenneth Reeverts Farm | | | | | O | | | | | | |
| BY-21 Near Site N | O | | | | | | | | | | |
| BY-22 Near Site ESE | O | | | | | | | | | | |
| BY-23 Near Site S | O | | | | | | | | | | |
| BY-24 Near Site SW | O | | | | | | | | | | |
| BY-25 Bill Leupkes Farm | O | | | | | | | | | | |
| | | | | | O | | | | | | |

**CENSUS**
Dairy
Residence

TABLE 5.0-2

BYRON STATION

ENVIRONMENTAL RADIOLOGIAL MONITORING PROGRAM, SAMPLING LOCATIONS

1. AIR SAMPLERS

| Site Code[a] | Location | Distance (miles) | Direction (°) |
|---|---|---|---|
| BY-01 | Byron | 3.5 | 25 |
| BY-02 (C) | Stillman Valley | 6.2 | 56 |
| BY-03 | Nearsite - East | 3.8 | 85 |
| BY-04 | Paynes Point | 4.5 | 140 |
| BY-05 | Nearsite - South | 3.6 | 180 |
| BY-06 | Oregon | 4.6 | 213 |
| BY-07 (C) | Mt. Morris | 7.8 | 240 |
| BY-08 (C) | Leaf River | 7.0 | 315 |
| BY-21 | Nearsite North | 0.3 | 9 |
| BY-22 | Nearsite East-Southeast | 0.3 | 101 |
| BY-23 | Nearsite South | 0.6 | 182 |
| BY-24 | Nearsite Southwest | 0.6 | 229 |

2. TLDs

a. Same as No. 1

b. Special TLD Samplers

| Site Code | Distance (miles) | Direction (°) |
|---|---|---|
| Inner Ring | | |
| BY-101-1,2 | 1.2 | 13 |
| BY-102-1,2 | 1.0 | 25 |
| BY-103-1,2 | 1.7 | 51 |
| BY-104-1,2 | 1.4 | 64 |
| BY-105-1,2 | 1.3 | 84 |
| BY-106-1,2 | 1.4 | 108 |
| BY-107-1,2 | 1.4 | 141 |
| BY-108-1,2 | 0.6 | 158 |
| BY-109-1,2 | 0.6 | 183 |
| BY-110-1,2 | 0.6 | 201 |
| BY-111-1,2 | 0.9 | 235 |
| BY-112-1,2 | 0.8 | 247 |

[a] Control (reference) locations are denoted by a "C" after site code. All other locations are indicators.

TABLE 5.0-2 (continued)

BYRON STATION

ENVIRONMENTAL RADIOLOGIAL MONITORING PROGRAM, SAMPLING LOCATIONS

2. TLDs

b. Special TLD Samplers (continued)

| Site Code | Distance (miles) | Direction (°) |
|---|---|---|
| BY-113-1,2 | 0.7 | 270 |
| BY-114-1,2 | 0.8 | 298 |
| BY-115-1,2 | 1.0 | 314 |
| BY-116-1,2 | 1.4 | 329 |
| Outer Ring | | |
| BY-201-1,2 | 4.8 | 360 |
| BY-202-1,2 | 4.5 | 13 |
| BY-203-1,2 | 5.1 | 42 |
| BY-204-1,2 | 4.2 | 66 |
| BY-205-1,2 | 3.9 | 89 |
| BY-206-1,2 | 4.2 | 112 |
| BY-207-1,2 | 4.2 | 140 |
| BY-208-1,2 | 4.1 | 159 |
| BY-209-1,2 | 3.8 | 189 |
| BY-210-1,2 | 3.6 | 218 |
| BY-211-1,2 | 5.2 | 238 |
| BY-212-1,2 | 4.9 | 257 |
| BY-213-1,2 | 5.0 | 280 |
| BY-214-1,2 | 4.8 | 298 |
| BY-215-1,2 | 5.2 | 322 |
| BY-216-1,2 | 4.8 | 337 |

3. MILK

| Site Code[a] | Location | Distance (miles) | Direction (°) |
|---|---|---|---|
| BY-15 | Warren Danakas Dairy | 3.3 | 110 |
| BY-17 (C) | Whitten Holstein Dairy | 9.0 | 270 |
| BY-20 | Kenneth Reeverts Farm | 2.1 | 37 |
| BY-25 | Bill Leupkes Farm | 3.7 | 190 |

[a] Control (reference) locations are denoted by a "C" after site code. All other locations are indicators.

TABLE 5.0-2 (continued)

BYRON STATION

ENVIRONMENTAL RADIOLOGIAL MONITORING PROGRAM, SAMPLING LOCATIONS

4. VEGETABLES

| Site Code | Location | Distance (miles) | Direction (°) |
|---|---|---|---|
| BY-19-1 | 966 East Weld Park Road | 5.1 | 200 |
| BY-19-2 | 6993 North River Road | 5.1 | 200 |

5. GROUND/WELL WATER

| Site Code | Location | Distance (miles) | Direction (°) |
|---|---|---|---|
| BY-14 | CECo Off-site Well | 0.3 | 101 |
| BY-18 | McCoy Farmstead (CECo-owned well) | 1.0 | 235 |

6. SURFACE WATER

| Site Code | Location | Distance (miles) | Direction (°) |
|---|---|---|---|
| BY-09 | Woodland Creek | 2.1 | 320 |
| BY-12 | Oregon Pool of Rock River | 4.5 | 213 |
| BY-13 | Rock River Upstream | 2.6 | 302 |

7. FISH

| Site Code | Location | Distance (miles) | Direction (°) |
|---|---|---|---|
| BY-12 | Oregon Pool of Rock River | 4.5 | 213 |
| BY-13 | Rock River Upstream | 2.6 | 302 |

8. SHORELINE SEDIMENTS

| Site Code | Location | Distance (miles) | Direction (°) |
|---|---|---|---|
| BY-12 | Oregon Pool of Rock River | 4.5 | 213 |
| BY-13 | Rock River Upstream | 2.6 | 302 |

Table 5.0-2 (continued)

BYRON STATION

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM, SAMPLE COLLECTION AND ANALYSES

| Sample Media | Location Code[a] | Location Site | Collection Frequency | Type of Analysis | Frequency of Analysis | Remarks |
|---|---|---|---|---|---|---|
| 1. Airborne Particulates | BY-1 | Byron | Continuous operation for a week | Gross beta | Weekly | On all samples. |
| | BY-2 (C) | Stillman Valley | | Gamma Isot | Quarterly | On quarterly composites from each location. |
| | BY-3 | Nearsite East | | Gamma Isot | Weekly | If gross beta activity in air particulate samples >10 times the yearly mean of control samples. |
| | BY-4 | Paynes Point | | | | |
| | BY-5 | Nearsite South | | | | |
| | BY-6 | Oregon | | Filter Exchange | Weekly | |
| | BY-7 (C) | Mt. Morris | | | | |
| | BY-8 (C) | Leaf River | | | | |
| | BY-21 | Near Site North | | | | |
| | BY-22 | Near Site East-Southeast | | | | |
| | BY-23 | Near Site South | | | | |
| | BY-24 | Near Site Southwest | | | | |
| 2. Airborne Iodine | Same as 1. | | Continuous operation for a week | I-131 | Weekly | On all samples. |
| 3. Air Sampling Train | Same as 1. | | -- | Test and Maintenance | Weekly | On all samples. |
| 4. TLD | Same as 1. | | Quarterly | Gamma | Quarterly | Two sets at all AP locations. One set read quarterly. Second set read if required by Commonwealth Edison. At other locations, all sets read quarterly. |
| | BY-101-1,2 | Inner Ring | | | | Minimum of two TLDs per set. |
| | 102-1,2 | | | | | |
| | 103-1,2 | | | | | |
| | 104-1,2 | | | | | |
| | 105-1,2 | | | | | |
| | 106-1,2 | | | | | |
| | 107-1,2 | | | | | |
| | 108-1,2 | | | | | |
| | 109-1,2 | | | | | |
| | 110-1,2 | | | | | |
| | 111-1,2 | | | | | |
| | 112-1,2 | | | | | |
| | 113-1,2 | | | | | |
| | 114-1,2 | | | | | |
| | 115-1,2 | | | | | |
| | 116-1,2 | | | | | |

[a] Control (reference) locations are denoted by a "C" in this column. All other locations are indicators.

TABLE 5.0-2 (continued)

BYRON STATION

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM, SAMPLE COLLECTION AND ANALYSES

| Sample Media | Location Code[a] | Location Site | Collection Frequency | Type of Analysis | Frequency of Analysis | Remarks |
|---|---|---|---|---|---|---|
| 4. TLD's (continued) | BY-201-1,2<br>202-1,2<br>203-1,2<br>204-1,2<br>205-1,2<br>206-1,2<br>207-1,2<br>208-1,2<br>209-1,2<br>210-1,2<br>211-1,2<br>212-1,2<br>213-1,2<br>214-1,2<br>215-1,2<br>216-1,2 | Outer Ring | | | | |
| 5. Milk | BY-15 | W. Danekas | Semimonthly May-October | I-131<br>Gamma Isot. | Semimonthly May-October | On all samples. |
| | BY-17 (C) | Whitten Holstein Dairy | | | | |
| | BY-20 | K. Reeverts | Monthly November-April | | Monthly November-April | |
| | BY-25 | Bill Leupkes Farm | Monthly | | | |
| 6. Vegetables | BY-19-1<br>BY-19-2 | | Annually at harvest | Gamma Isot | Annually | Four varieties from each location as available at harvest. (Gamma isotopic on edible portion only.) |
| 7. Ground/Well Water | BY-14 | CECo Off-site Well Office | Semimonthly | Gross beta<br>Gamma Isot<br>Tritium<br>I-131 | Monthly<br>Monthly<br>Quarterly<br>Semimonthly | On monthly composite for each location.<br>On monthly composite for each location.<br>On quarterly composite for each location.<br>On semimonthly composite when dose calculated for water consumption is greater than one mrem per year. |
| | BY-18 | McCoy Farmstead | | | | |
| 8. Surface Water | BY-09 | Woodland Creek | Weekly | Tritium<br>Gamma Isot | Quarterly<br>Monthly | On quarterly composite from each location.<br>On monthly composite from each location. |
| | BY-12 | Oregon Pool of Rock River | | | | |
| | BY-13 (C) | Rock River, upstream | | | | |

[a] Control (references) locations are denoted by a "C" in this column. All other locations are indicators.

TABLE 5.0-2 (continued)

BYRON STATION

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM, SAMPLE COLLECTION AND ANALYSES

| Sample Media | Location Code[a] | Location Site | Collection Frequency | Type of Analysis | Frequency of Analysis | Remarks |
|---|---|---|---|---|---|---|
| 9. Fish | BY-12 | Oregon Pool of Rock River | Three times a year. | Gamma Isot | Three times a year. Spring, Summer, and Fall | From Oregon pool of Rock River, on edible portions only. At least two species. |
| | BY-13 | Rock River, upstream | | | | |
| 10. Shoreline Sediments | BY-12 | Oregon Pool of Rock River | Semiannual | Gamma Isot | Semiannual | On all samples |
| | BY-13 | Upstream of Oregon Dam | | | | |
| 11. Dairy Census | a. Site boundary to 2 miles | | -- | a. Enumeration by a door-to-door or equivalent counting technique. | Annually | During grazing season. |
| | b. 2 miles to 5 miles | | -- | b. Enumeration by using referenced information from county agricultural agents or other reliable sources. | Annually | During grazing season. |
| | c. At dairies listed in Item 5. | | -- | c. Inquire as to feeding practices:<br>1. Pasture only.<br>2. Feed and chop only.<br>3. Pasture and feed; if both, ask farmer to estimate fraction of food from pasture: <25%, 25-50%, 50-75%, or >75%. | Annually | During grazing season. |
| 12. Nearest Residence Census | In all 16 sectors up to 5 miles | | | | Annually | During growing season. |

[a] Control (reference) locations are denoted by a "C" in this column. All other locations are indicators.

# TABLE 5.0-3

## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM QUARTERLY SUMMARY

Name of Facility Byron Nuclear Power Station
Location of Facility Ogle, Illinois (County, State)
Docket No. 50-454, 50-455
Reporting Period 1st Quarter 1989

| Sample Type (Units) | Type and Number of Analyses | | LLD | Indicator Locations Mean[a] Range | Location with Highest Quarterly Mean: Location | Location with Highest Quarterly Mean: Mean Range | Control Locations Mean[a] Range | Number of Non-routine Results |
|---|---|---|---|---|---|---|---|---|
| Air Particulates ($pCi/m^3$) | Gross Beta | 156 | 0.01 | 0.032 (117/117) (0.012-0.066) | By-24, Near-site S.W. 0.65 mi 229° | 0.035 (13/13) (0.023-0.066) | 0.031 (38/39) (0.015-0.056) | 0 |
| | Gamma Spec. | 12 | 0.01 | <LLD | | | <LLD | 0 |
| Airborne Iodine ($pCi/m^3$) | I-131 | 156 | 0.07 | <LLD | - | - | <LLD | 0 |
| Gamma Background (TLDs) (mR/Qtr.) | Gamma Dose | 12 | 3.0 | 12.8 (9/9) (9.6-15.3) | By-22, Onsite 0.3 mi 101° | 15.3 (1/1) - | 11.5 (3/3) (10.9-12.0) | 0 |
| Milk (pCi/l) | I-131 | 11 | 0.5 | <LLD | - | - | <LLD | 0 |
| | Gamma Spec. | 11 | | | | | | |
| | Cs-134 | | 5.0 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 5.0 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 10.0 | <LLD | - | - | <LLD | 0 |
| Surface Water (pCi/l) | Gamma Spec. | 6 | | | | | | |
| | Cs-134 | | 10 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 10 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 15 | <LLD | - | - | <LLD | 0 |
| | Tritium | 3 | 200 | 596 (1/2) | By-12, Downstream of intake 4.5 mi 213° | 596 (1/2) | <LLD | 0 |
| Well Water (pCi/l) | Gross Beta | 5 | 1.8 | <LLD | - | - | None | 0 |
| | Gamma Spec. | 5 | | | | | | |
| | Cs-134 | | 10 | <LLD | - | - | None | 0 |
| | Cs-137 | | 10 | <LLD | - | - | None | 0 |
| | Other Gammas | | 15 | <LLD | - | - | None | 0 |
| | Tritium | 2 | 200 | <LLD | - | - | None | 0 |

[a] Mean and range based on detectable measurements only. Fraction indicated in parenthesis.

# TABLE 5.0-4

## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM QUARTERLY SUMMARY

Name of Facility Byron Nuclear Power Station  Docket No. 50-454, 50-455
Location of Facility Ogle, Illinois (County, State)  Reporting Period 2nd Quarter 1989

| Sample Type (Units) | Type and Number of Analyses | | LLD | Indicator Locations Mean[a] Range | Location with Highest Quarterly Mean | | Control Locations Mean[a] Range | Number of Non-routine Results |
|---|---|---|---|---|---|---|---|---|
| | | | | | Location | Mean Range | | |
| Air Particulates ($pCi/m^3$) | Gross Beta | 156 | 0.01 | 0.021 (116/117) (0.005-0.042) | By-06, Oregon 4.6 mi@ 213° | 0.024 (13/13) (0.015-0.042) | 0.020 (39/39) (0.010-0.035) | 0 |
| | Gamma Spec. | 12 | 0.01 | <LLD | - | - | <LLD | 0 |
| Airborne Iodine ($pCi/m^3$) | I-131 | 156 | 0.07 | <LLD | - | - | <LLD | 0 |
| Gamma Background (TLDs) (mR/Qtr.) | Gamma Dose | 12 | 3.0 | 16.0 (9/9) (11.0-19.0) | By-05, Near site South 3.6 mi @ 180° | 19.0 (1/1) - | 14.6 (3/3) (13.3-15.8) | 0 |
| Milk (pCi/l) | I-131 | 20 | 0.5[b] | <LLD | - | - | <LLD | 0 |
| | Gamma Spec. | 20 | | | | | | |
| | Cs-134 | | 5.0 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 5.0 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 10.0 | <LLD | - | - | <LLD | 0 |
| Surface Water (pCi/l) | Gamma Spec. | 9 | | | | | | |
| | Cs-134 | | 10 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 10 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 15 | <LLD | - | - | <LLD | 0 |
| | Tritium | 3 | 200 | 790 (1/2) | By-12, Downstream of Intake 4.5 mi@ 213° | 790 (1/2) | <LLD | 0 |
| Well Water (pCi/l) | Gross Beta | 6 | 2.4 | <LLD | - | - | None | 0 |
| | Gamma Spec. | 6 | | | | | | |
| | Cs-134 | | 10 | <LLD | - | - | None | 0 |
| | Cs-137 | | 10 | <LLD | - | - | None | 0 |
| | Other Gammas | | 15 | <LLD | - | - | None | 0 |
| | Tritium | 2 | 200 | <LLD | - | - | None | 0 |

## TABLE 5.0-4 (continued)

### ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM QUARTERLY SUMMARY

Name of Facility Byron Nuclear Power Station  Docket No. 50-454, 50-455
Location of Facility Ogle, Illinois (County, State)  Reporting Period 2nd Quarter 1989

| Sample Type (Units) | Type and Number of Analyses | LLD | Indicator Locations Mean[a] Range | Location with Highest Quarterly Mean: Location | Location with Highest Quarterly Mean: Mean Range | Control Locations Mean[a] Range | Number of Non-routine Results |
|---|---|---|---|---|---|---|---|
| Fish (pCi/g wet) | Gamma Spec. 4 | | | | | | |
| | Cs-134 | 0.1 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | 0.1 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | 0.13 | <LLD | - | - | <LLD | 0 |
| Bottom Sediments (pCi/g dry) | Gamma Spec. 2 | | | | | | |
| | Cs-134 | 0.1 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | 0.1 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | 0.2 | <LLD | - | - | <LLD | 0 |

[a] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

# TABLE 5.0-5

## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM QUARTERLY SUMMARY

Name of Facility Byron Nuclear Power Station  Docket No. 50-454, 50-455
Location of Facility Ogle, Illinois (County, State)  Reporting Period 3rd Quarter 1989

| Sample Type (Units) | Type and Number of Analyses | | LLD | Indicator Locations Mean[a] Range | Location with Highest Quarterly Mean: Location | Location with Highest Quarterly Mean: Mean Range | Control Locations Mean[a] Range | Number of Non-routine Results |
|---|---|---|---|---|---|---|---|---|
| Air Particulates ($pCi/m^3$) | Gross Beta | 156 | 0.01 | 0.022 (117/117) (0.006-0.041) | By-21, Nearsite North 0.7 mi 9° | 0.025 (13/13) (0.018-0.038) | 0.021 (39/39) (0.007-0.034) | 0 |
| | Gamma Spec. | 12 | 0.01 | <LLD | - | - | <LLD | 0 |
| Airborne Iodine ($pCi/m^3$) | I-131 | 156 | 0.07[c] | <LLD | - | - | <LLD | 0 |
| Gamma Background (TLDs) (mR/Qtr.) | Gamma Dose | 12 | 3.0 | 15.1 (9/9) (11.4-18.0) | By-22, Onsite ESE 0.3 mi 101° | 18.0 (1/1) - | 14.0 (3/3) (13.3-14.4) | 0 |
| Milk (pCi/l) | I-131 | 24 | 0.5 | <LLD | - | - | <LLD | 0 |
| | Gamma Spec. | 24 | | * | | | | |
| | Cs-134 | | 5.0 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 5.0 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 10.0 | <LLD | - | - | <LLD | 0 |
| Surface Water (pCi/l) | Gamma Spec. | 9 | | | | | | |
| | Cs-134 | | 10 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 10 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 15 | <LLD | - | - | <LLD | 0 |
| | Tritium | 3 | 200 | 532 (1/2) | By-12, Downstream of Oregon Dam, 4.6 mi 213° | 532 (1/1) | <LLD | 0 |

[a] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

TABLE 5.0-5 (continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM QUARTERLY SUMMARY

Name of Facility Byron Nuclear Power Station Docket No. 50-454, 50-455
Location of Facility Ogle, Illinois (County, State) Reporting Period 3rd Quarter 1989

| Sample Type (Units) | Type and Number of Analyses | | LLD | Indicator Locations Mean[a] Range | Location with Highest Quarterly Mean: Location | Location with Highest Quarterly Mean: Mean Range | Control Locations Mean[a] Range | Number of Non-routine Results |
|---|---|---|---|---|---|---|---|---|
| Well Water (pCi/l) | Gross Beta | 6 | 2.6 | <LLD | - | - | None | 0 |
| | Gamma Spec. | 6 | | | | | | |
| | Cs-134 | | 10 | <LLD | - | - | None | 0 |
| | Cs-137 | | 10 | <LLD | - | - | None | 0 |
| | Other Gammas | | 15 | <LLD | - | - | None | 0 |
| | Tritium | 2 | 200 | 236 (1/2) | BY-14, Offsite Well 0.3 mi @ 101° | 236 (1/1) | None | 0 |
| Fish (pCi/g wet) | Gamma Spec. | 4 | | | | | | |
| | Cs-134 | | 0.10 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 0.10 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 0.13 | <LLD | - | - | <LLD | 0 |
| Vegetables (pCi/g wet) | Gamma Spec. | 7 | | | | | | |
| | Cs-134 | | 0.1 | <LLD | - | - | None | 0 |
| | Cs-137 | | 0.1 | <LLD | - | - | None | 0 |
| | Other Gammas | | 0.2 | <LLD | - | - | None | 0 |
| | I-131 | | 0.06 | <LLD | - | - | - | 0 |

[a] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

# TABLE 5.0-6

## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM QUARTERLY SUMMARY

Name of Facility Byron Nuclear Power Station  Docket No. 50-454, 50-455
Location of Facility Ogle, Illinois (County, State)  Reporting Period 4th Quarter 1989

| Sample Type (Units) | Type and Number of Analyses | | LLD | Indicator Locations Mean[a] Range | Location with Highest Quarterly Mean | | Control Locations Mean[a] Range | Number of Non-routine Results |
|---|---|---|---|---|---|---|---|---|
| | | | | | Location | Mean Range | | |
| Air Particulates (pCi/m$^3$) | Gross Beta | 156 | 0.01 | 0.029 (116/117) (0.007-0.051) | BY-24, Nearsite Southwest 0.65 mi @ 229° | 0.032 (13/13) (0.020-0.051) | 0.029 (39/39) (0.014-0.045) | 0 |
| | Gamma Spec. | 12 | 0.01 | <LLD | - | - | <LLD | 0 |
| Airborne Iodine (pCi/m$^3$) | I-131 | 156 | 0.07 | <LLD | - | - | <LLD | 0 |
| Gamma Background (TLDs) (mR/Qtr.) | Gamma Dose | 12 | 3.0 | 15.5 (9/9) (11.5-18.5) | By-22, Onsite, 0.3 mi @ 101° | 18.5 (1/1) - | 14.6 (3/3) (14.0-15.6) | 0 |
| Milk (pCi/l) | I-131 | 16 | 0.5 | <LLD | - | - | <LLD | 0 |
| | Gamma Spec. | 16 | | | | | | |
| | Cs-134 | | 5.0 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 5.0 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 10.0 | <LLD | - | - | <LLD | 0 |
| Surface Water (pCi/l) | Gamma Spec. | 9 | | | | | | |
| | Cs-134 | | 10 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 10 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | | 15 | <LLD | - | - | <LLD | 0 |
| | Tritium | 3 | 200 | 1470 (1/2) | BY-12, Downstream of Oregon Dam 4.6 mi @ 213° | 1470 (1/1) | <LLD | 0 |

# TABLE 5.0-6 (continued)

## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM QUARTERLY SUMMARY

Name of Facility Byron Nuclear Power Station  Docket No. 50-454, 50-455
Location of Facility Ogle, Illinois (County, State)  Reporting Period 4th Quarter 1989

| Sample Type (Units) | Type and Number of Analyses | LLD | Indicator Locations Mean[a] Range | Location with Highest Quarterly Mean | | Control Locations Mean[a] Range | Number of Non-routine Results |
|---|---|---|---|---|---|---|---|
| | | | | Location | Mean Range | | |
| Well Water (pCi/l) | Gross Beta 2 | 2.6 | <LLD | - | - | None | 0 |
| | Gamma Spec. 2 | | | | | | |
| | Cs-134 | 10 | <LLD | - | - | None | 0 |
| | Cs-137 | 10 | <LLD | - | - | None | 0 |
| | Other Gammas | 15 | <LLD | - | - | None | 0 |
| | Tritium 2 | 200 | <LLD | - | - | None | 0 |
| Fish (pCi/g wet) | Gamma Spec. 4 | | | | | | |
| | Cs-134 | 0.10 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | 0.10 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | 0.13 | <LLD | - | - | <LLD | 0 |
| Bottom Sediments (pCi/g dry) | Gamma Spec. 2 | | | | | | |
| | Cs-134 | 0.1 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | 0.1 | <LLD | - | - | <LLD | 0 |
| | Other Gammas | 0.2 | <LLD | - | - | <LLD | 0 |
| Vegetables | I-131 2 | 0.06 | <LLD | - | - | None | 0 |

[a] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

# APPENDIX II

# METEOROLOGICAL DATA

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JANUARY-MARCH 1989
STABILITY CLASS - EXTREMELY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| S | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 77

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JANUARY-MARCH 1989
STABILITY CLASS - MODERATELY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| S | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| NW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 0 | 0 | 1 | 0 | 1 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 77

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JANUARY-MARCH 1989
STABILITY CLASS - SLIGHTLY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| S | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSW | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| SW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| W | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| WNW | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| NW | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| NNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 4 | 0 | 2 | 1 | 7 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 77

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JANUARY-MARCH 1989
STABILITY CLASS - NEUTRAL (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 4 | 27 | 42 | 20 | 8 | 101 |
| NNE | 0 | 2 | 21 | 22 | 17 | 7 | 69 |
| NE | 0 | 9 | 20 | 16 | 25 | 11 | 81 |
| ENE | 1 | 3 | 9 | 32 | 16 | 0 | 61 |
| E | 0 | 1 | 15 | 29 | 5 | 2 | 52 |
| ESE | 0 | 1 | 0 | 7 | 1 | 0 | 9 |
| SE | 0 | 2 | 6 | 13 | 9 | 8 | 38 |
| SSE | 1 | 5 | 24 | 32 | 14 | 3 | 79 |
| S | 2 | 5 | 20 | 31 | 29 | 9 | 96 |
| SSW | 0 | 5 | 7 | 10 | 28 | 15 | 65 |
| SW | 1 | 4 | 14 | 18 | 17 | 3 | 57 |
| WSW | 0 | 4 | 18 | 42 | 21 | 3 | 88 |
| W | 2 | 6 | 13 | 44 | 17 | 19 | 101 |
| WNW | 2 | 6 | 17 | 29 | 19 | 10 | 83 |
| NW | 1 | 3 | 19 | 28 | 13 | 8 | 72 |
| NNW | 3 | 6 | 22 | 50 | 14 | 1 | 96 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 13 | 66 | 252 | 445 | 265 | 107 | 1148 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 77

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JANUARY-MARCH 1989
STABILITY CLASS - SLIGHTLY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 1 | 1 | 8 | 14 | 5 | 2 | 31 |
| NNE | 1 | 4 | 2 | 10 | 12 | 0 | 29 |
| NE | 1 | 3 | 5 | 5 | 1 | 1 | 16 |
| ENE | 3 | 4 | 3 | 4 | 3 | 0 | 17 |
| E | 0 | 4 | 7 | 16 | 15 | 2 | 44 |
| ESE | 0 | 0 | 5 | 8 | 4 | 3 | 20 |
| SE | 1 | 3 | 5 | 9 | 5 | 0 | 23 |
| SSE | 1 | 2 | 7 | 20 | 21 | 3 | 54 |
| S | 0 | 2 | 7 | 27 | 27 | 17 | 80 |
| SSW | 0 | 5 | 10 | 22 | 43 | 26 | 106 |
| SW | 0 | 4 | 9 | 12 | 13 | 12 | 50 |
| WSW | 1 | 3 | 6 | 25 | 19 | 0 | 54 |
| W | 1 | 4 | 10 | 32 | 18 | 11 | 76 |
| WNW | 0 | 4 | 8 | 32 | 24 | 5 | 73 |
| NW | 1 | 7 | 11 | 41 | 12 | 1 | 73 |
| NNW | 0 | 4 | 12 | 21 | 3 | 3 | 43 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 11 | 54 | 115 | 298 | 225 | 86 | 789 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 77

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JANUARY-MARCH 1989
STABILITY CLASS - MODERATELY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 2 | 5 | 0 | 7 |
| NNE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NE | 0 | 1 | 0 | 2 | 0 | 0 | 3 |
| ENE | 0 | 3 | 5 | 0 | 0 | 0 | 8 |
| E | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ESE | 0 | 0 | 3 | 1 | 2 | 0 | 6 |
| SE | 0 | 0 | 1 | 4 | 4 | 4 | 13 |
| SSE | 0 | 1 | 0 | 6 | 7 | 3 | 17 |
| S | 0 | 2 | 1 | 3 | 5 | 2 | 13 |
| SSW | 0 | 0 | 2 | 3 | 3 | 0 | 8 |
| SW | 0 | 0 | 6 | 1 | 0 | 0 | 7 |
| WSW | 0 | 0 | 2 | 4 | 0 | 0 | 6 |
| W | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| WNW | 0 | 0 | 1 | 5 | 0 | 0 | 6 |
| NW | 0 | 0 | 0 | 10 | 0 | 0 | 10 |
| NNW | 0 | 0 | 1 | 3 | 3 | 0 | 7 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 7 | 23 | 46 | 29 | 9 | 114 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 77

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JANUARY-MARCH 1989
STABILITY CLASS - EXTREMELY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NE | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| ENE | 0 | 2 | 2 | 0 | 0 | 0 | 4 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| SSE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| S | 0 | 0 | 0 | 3 | 2 | 0 | 5 |
| SSW | 0 | 0 | 2 | 3 | 1 | 0 | 6 |
| SW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 1 | 0 | 1 | 0 | 0 | 2 |
| NW | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| NNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 3 | 9 | 9 | 3 | 0 | 24 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 77

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - APRIL-JUNE 1989
STABILITY CLASS - EXTREMELY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| NNE | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| SSE | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| S | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 0 | 3 | 2 | 1 | 6 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 11

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - APRIL-JUNE 1989
STABILITY CLASS - MODERATELY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 1 | 3 | 0 | 0 | 4 |
| NNE | 0 | 0 | 0 | 4 | 7 | 0 | 11 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 0 | 1 | 4 | 5 |
| SE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSE | 0 | 0 | 0 | 3 | 0 | 1 | 4 |
| S | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| SSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SW | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| WSW | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NW | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| NNW | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 2 | 14 | 10 | 5 | 31 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 11

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - APRIL-JUNE 1989
STABILITY CLASS - SLIGHTLY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 1 | 0 | 3 | 0 | 0 | 4 |
| NNE | 0 | 1 | 1 | 1 | 4 | 0 | 7 |
| NE | 0 | 1 | 0 | 2 | 0 | 0 | 3 |
| ENE | 0 | 0 | 1 | 4 | 1 | 0 | 6 |
| E | 0 | 0 | 2 | 0 | 1 | 0 | 3 |
| ESE | 0 | 0 | 1 | 1 | 2 | 1 | 5 |
| SE | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| SSE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| S | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| SSW | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| SW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| W | 0 | 2 | 1 | 0 | 0 | 0 | 3 |
| WNW | 0 | 0 | 3 | 2 | 0 | 0 | 5 |
| NW | 0 | 0 | 5 | 6 | 0 | 0 | 11 |
| NNW | 0 | 1 | 2 | 2 | 0 | 0 | 5 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 6 | 17 | 24 | 10 | 2 | 59 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 11

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - APRIL-JUNE 1989
STABILITY CLASS - NEUTRAL (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 2 | 14 | 23 | 29 | 7 | 0 | 75 |
| NNE | 1 | 12 | 19 | 4 | 7 | 1 | 44 |
| NE | 1 | 8 | 6 | 8 | 2 | 2 | 27 |
| ENE | 0 | 4 | 11 | 18 | 10 | 0 | 43 |
| E | 0 | 7 | 14 | 26 | 10 | 0 | 57 |
| ESE | 0 | 2 | 20 | 11 | 9 | 1 | 43 |
| SE | 2 | 5 | 11 | 17 | 11 | 4 | 50 |
| SSE | 1 | 11 | 20 | 19 | 19 | 6 | 76 |
| S | 1 | 7 | 22 | 20 | 18 | 10 | 78 |
| SSW | 3 | 7 | 17 | 12 | 13 | 7 | 59 |
| SW | 1 | 1 | 14 | 31 | 15 | 1 | 63 |
| WSW | 0 | 13 | 22 | 24 | 4 | 4 | 67 |
| W | 3 | 13 | 26 | 14 | 12 | 14 | 82 |
| WNW | 1 | 17 | 22 | 41 | 22 | 12 | 115 |
| NW | 1 | 15 | 45 | 47 | 13 | 9 | 130 |
| NNW | 2 | 17 | 30 | 19 | 4 | 0 | 72 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 19 | 153 | 322 | 340 | 176 | 71 | 1081 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 11

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - APRIL-JUNE 1989
STABILITY CLASS - SLIGHTLY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 3 | 5 | 7 | 2 | 0 | 17 |
| NNE | 1 | 2 | 3 | 12 | 7 | 1 | 26 |
| NE | 1 | 5 | 2 | 13 | 5 | 0 | 26 |
| ENE | 0 | 3 | 3 | 11 | 15 | 1 | 33 |
| E | 1 | 2 | 4 | 16 | 20 | 2 | 45 |
| ESE | 1 | 1 | 1 | 11 | 16 | 1 | 31 |
| SE | 0 | 3 | 2 | 23 | 8 | 9 | 45 |
| SSE | 1 | 1 | 11 | 6 | 13 | 6 | 38 |
| S | 0 | 3 | 7 | 17 | 24 | 6 | 57 |
| SSW | 0 | 2 | 22 | 18 | 16 | 2 | 60 |
| SW | 0 | 5 | 14 | 16 | 9 | 0 | 44 |
| WSW | 0 | 4 | 14 | 14 | 2 | 0 | 34 |
| W | 0 | 5 | 15 | 13 | 0 | 0 | 33 |
| WNW | 0 | 9 | 20 | 19 | 3 | 0 | 51 |
| NW | 1 | 7 | 16 | 25 | 0 | 0 | 49 |
| NNW | 3 | 6 | 12 | 13 | 0 | 0 | 34 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 9 | 61 | 151 | 234 | 140 | 28 | 623 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 1
Hours of missing stability measurements in all stability classes: 11

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - APRIL-JUNE 1989
STABILITY CLASS - MODERATELY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 4 | 3 | 4 | 0 | 0 | 11 |
| NNE | 0 | 0 | 4 | 7 | 2 | 0 | 13 |
| NE | 1 | 1 | 3 | 1 | 0 | 0 | 6 |
| ENE | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| E | 0 | 0 | 2 | 7 | 10 | 2 | 21 |
| ESE | 2 | 1 | 2 | 4 | 12 | 1 | 22 |
| SE | 0 | 1 | 2 | 5 | 9 | 0 | 17 |
| SSE | 0 | 3 | 1 | 6 | 11 | 2 | 23 |
| S | 0 | 4 | 4 | 11 | 12 | 0 | 31 |
| SSW | 0 | 2 | 7 | 28 | 5 | 0 | 42 |
| SW | 0 | 1 | 6 | 15 | 1 | 0 | 23 |
| WSW | 3 | 0 | 7 | 6 | 0 | 0 | 16 |
| W | 0 | 2 | 6 | 9 | 0 | 0 | 17 |
| WNW | 0 | 1 | 9 | 6 | 0 | 0 | 16 |
| NW | 0 | 2 | 8 | 13 | 0 | 0 | 23 |
| NNW | 0 | 3 | 7 | 2 | 0 | 0 | 12 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 6 | 27 | 71 | 124 | 62 | 5 | 295 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 11

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - APRIL-JUNE 1989
STABILITY CLASS - EXTREMELY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 6 | 4 | 0 | 0 | 10 |
| NNE | 0 | 0 | 1 | 2 | 0 | 0 | 3 |
| NE | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ENE | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| E | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 1 | 0 | 1 | 3 | 8 | 0 | 13 |
| SSE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| S | 0 | 1 | 1 | 0 | 1 | 0 | 3 |
| SSW | 0 | 0 | 2 | 4 | 2 | 0 | 8 |
| SW | 0 | 0 | 1 | 6 | 0 | 0 | 7 |
| WSW | 0 | 0 | 2 | 3 | 0 | 0 | 5 |
| W | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| WNW | 0 | 2 | 5 | 2 | 0 | 0 | 9 |
| NW | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| NNW | 0 | 1 | 7 | 1 | 0 | 0 | 9 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1 | 6 | 32 | 26 | 12 | 0 | 77 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 11

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JULY-SEPTEMBER 1989
STABILITY CLASS - EXTREMELY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNE | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| SSE | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| S | 0 | 0 | 4 | 4 | 0 | 0 | 8 |
| SSW | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| SW | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| WSW | 0 | 0 | 0 | 5 | 0 | 0 | 5 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNW | 0 | 1 | 0 | 4 | 1 | 0 | 6 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 1 | 12 | 19 | 1 | 0 | 33 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 9

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JULY-SEPTEMBER 1989
STABILITY CLASS - MODERATELY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 1 | 5 | 1 | 0 | 0 | 7 |
| NNE | 0 | 1 | 0 | 4 | 0 | 0 | 5 |
| NE | 0 | 0 | 0 | 1 | 1 | 0 | 2 |
| ENE | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| E | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| SSE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| S | 0 | 0 | 5 | 0 | 0 | 0 | 5 |
| SSW | 0 | 0 | 4 | 1 | 0 | 0 | 5 |
| SW | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| WSW | 0 | 0 | 0 | 4 | 0 | 0 | 4 |
| W | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| WNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNW | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 2 | 20 | 15 | 1 | 0 | 38 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 9

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JULY-SEPTEMBER 1989
STABILITY CLASS - SLIGHTLY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| NNE | 0 | 0 | 7 | 1 | 0 | 0 | 8 |
| NE | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| ENE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| E | 0 | 3 | 5 | 1 | 0 | 0 | 9 |
| ESE | 0 | 0 | 1 | 2 | 0 | 0 | 3 |
| SE | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| SSE | 0 | 0 | 2 | 2 | 0 | 0 | 4 |
| S | 0 | 0 | 2 | 2 | 0 | 0 | 4 |
| SSW | 0 | 2 | 3 | 0 | 0 | 0 | 5 |
| SW | 0 | 3 | 0 | 0 | 1 | 0 | 4 |
| WSW | 0 | 0 | 0 | 4 | 0 | 0 | 4 |
| W | 0 | 1 | 0 | 2 | 0 | 0 | 3 |
| WNW | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| NW | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| NNW | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 13 | 22 | 18 | 1 | 0 | 54 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 9

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JULY-SEPTEMBER 1989
STABILITY CLASS - NEUTRAL (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 1 | 12 | 19 | 30 | 0 | 1 | 63 |
| NNE | 1 | 8 | 25 | 16 | 10 | 2 | 62 |
| NE | 0 | 13 | 20 | 17 | 2 | 0 | 52 |
| ENE | 0 | 10 | 17 | 9 | 1 | 0 | 37 |
| E | 0 | 11 | 17 | 6 | 2 | 0 | 36 |
| ESE | 2 | 11 | 8 | 8 | 0 | 0 | 29 |
| SE | 1 | 11 | 10 | 6 | 0 | 0 | 28 |
| SSE | 2 | 14 | 20 | 25 | 3 | 0 | 64 |
| S | 2 | 13 | 25 | 21 | 2 | 0 | 63 |
| SSW | 1 | 18 | 22 | 14 | 5 | 1 | 61 |
| SW | 0 | 17 | 22 | 22 | 1 | 0 | 62 |
| WSW | 4 | 13 | 14 | 10 | 5 | 0 | 46 |
| W | 2 | 21 | 20 | 16 | 3 | 0 | 62 |
| WNW | 0 | 7 | 7 | 5 | 0 | 0 | 19 |
| NW | 0 | 8 | 16 | 5 | 0 | 0 | 29 |
| NNW | 2 | 16 | 13 | 11 | 2 | 0 | 44 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 18 | 203 | 275 | 221 | 36 | 4 | 757 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 9

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JULY-SEPTEMBER 1989
STABILITY CLASS - SLIGHTLY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 1 | 5 | 10 | 14 | 7 | 3 | 40 |
| NNE | 0 | 5 | 11 | 24 | 18 | 2 | 60 |
| NE | 0 | 9 | 11 | 22 | 4 | 0 | 46 |
| ENE | 0 | 8 | 11 | 13 | 8 | 0 | 40 |
| E | 0 | 6 | 14 | 13 | 9 | 0 | 42 |
| ESE | 1 | 5 | 9 | 8 | 4 | 0 | 27 |
| SE | 0 | 5 | 8 | 15 | 7 | 0 | 35 |
| SSE | 2 | 10 | 11 | 24 | 7 | 0 | 54 |
| S | 1 | 4 | 16 | 22 | 10 | 1 | 54 |
| SSW | 0 | 8 | 17 | 24 | 6 | 1 | 56 |
| SW | 2 | 6 | 16 | 13 | 9 | 0 | 46 |
| WSW | 1 | 5 | 19 | 20 | 2 | 0 | 47 |
| W | 1 | 9 | 9 | 2 | 0 | 1 | 22 |
| WNW | 1 | 2 | 3 | 5 | 0 | 0 | 11 |
| NW | 3 | 4 | 5 | 7 | 2 | 1 | 22 |
| NNW | 1 | 3 | 15 | 13 | 7 | 2 | 41 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 14 | 94 | 185 | 239 | 100 | 11 | 643 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 9

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JULY-SEPTEMBER 1989
STABILITY CLASS - MODERATELY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 2 | 2 | 8 | 2 | 0 | 14 |
| NNE | 2 | 5 | 3 | 5 | 0 | 0 | 15 |
| NE | 0 | 3 | 6 | 5 | 0 | 0 | 14 |
| ENE | 0 | 1 | 1 | 2 | 1 | 0 | 5 |
| E | 0 | 1 | 7 | 11 | 7 | 0 | 26 |
| ESE | 0 | 2 | 3 | 15 | 7 | 0 | 27 |
| SE | 1 | 2 | 18 | 24 | 9 | 0 | 54 |
| SSE | 0 | 2 | 18 | 20 | 10 | 1 | 51 |
| S | 0 | 5 | 10 | 10 | 16 | 0 | 41 |
| SSW | 1 | 0 | 8 | 23 | 9 | 0 | 41 |
| SW | 1 | 4 | 15 | 14 | 2 | 0 | 36 |
| WSW | 1 | 2 | 14 | 4 | 0 | 0 | 21 |
| W | 0 | 1 | 5 | 4 | 0 | 0 | 10 |
| WNW | 2 | 1 | 4 | 4 | 1 | 0 | 12 |
| NW | 0 | 4 | 7 | 16 | 1 | 0 | 28 |
| NNW | 1 | 4 | 3 | 11 | 0 | 0 | 19 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 9 | 39 | 124 | 176 | 65 | 1 | 414 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 9

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - JULY-SEPTEMBER 1989
STABILITY CLASS - EXTREMELY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 2 | 0 | 4 | 0 | 1 | 0 | 7 |
| NNE | 1 | 2 | 3 | 3 | 1 | 0 | 10 |
| NE | 0 | 4 | 5 | 1 | 0 | 0 | 10 |
| ENE | 3 | 2 | 4 | 0 | 0 | 0 | 9 |
| E | 0 | 3 | 3 | 8 | 3 | 0 | 17 |
| ESE | 0 | 2 | 2 | 9 | 3 | 0 | 16 |
| SE | 2 | 2 | 10 | 14 | 2 | 0 | 30 |
| SSE | 0 | 4 | 6 | 17 | 16 | 1 | 44 |
| S | 1 | 1 | 11 | 17 | 18 | 1 | 49 |
| SSW | 1 | 2 | 5 | 12 | 1 | 0 | 21 |
| SW | 3 | 1 | 5 | 8 | 0 | 0 | 17 |
| WSW | 1 | 2 | 4 | 2 | 0 | 0 | 9 |
| W | 2 | 2 | 2 | 1 | 0 | 0 | 7 |
| WNW | 0 | 1 | 3 | 5 | 0 | 0 | 9 |
| NW | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| NNW | 1 | 0 | 0 | 3 | 0 | 0 | 4 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 17 | 28 | 67 | 101 | 45 | 2 | 260 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 9

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - OCTOBER-DECEMBER 1989
STABILITY CLASS - EXTREMELY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| SE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| S | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| SSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 0 | 1 | 2 | 0 | 0 | 3 |
| NW | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| NNW | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 4 | 4 | 1 | 0 | 9 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - OCTOBER-DECEMBER 1989
STABILITY CLASS - MODERATELY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| NNE | 0 | 0 | 0 | 0 | 1 | 2 | 3 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| ESE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| SE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSE | 0 | 0 | 2 | 1 | 0 | 0 | 3 |
| S | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSW | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| SW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 4 | 0 | 0 | 4 |
| W | 0 | 0 | 1 | 1 | 1 | 0 | 3 |
| WNW | 0 | 0 | 0 | 3 | 1 | 0 | 4 |
| NW | 0 | 0 | 1 | 3 | 1 | 0 | 5 |
| NNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 7 | 16 | 4 | 2 | 29 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - OCTOBER-DECEMBER 1989
STABILITY CLASS - SLIGHTLY UNSTABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| NNE | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSE | 0 | 0 | 1 | 7 | 1 | 0 | 9 |
| S | 0 | 0 | 2 | 2 | 0 | 1 | 5 |
| SSW | 0 | 1 | 0 | 2 | 3 | 1 | 7 |
| SW | 0 | 0 | 2 | 1 | 3 | 0 | 6 |
| WSW | 0 | 0 | 2 | 5 | 0 | 0 | 7 |
| W | 0 | 3 | 1 | 2 | 0 | 0 | 6 |
| WNW | 0 | 1 | 2 | 2 | 1 | 0 | 6 |
| NW | 0 | 0 | 5 | 3 | 3 | 0 | 11 |
| NNW | 0 | 1 | 4 | 1 | 1 | 0 | 7 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 6 | 22 | 25 | 13 | 2 | 68 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - OCTOBER-DECEMBER 1989
STABILITY CLASS - NEUTRAL (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 11 | 12 | 38 | 37 | 8 | 106 |
| NNE | 1 | 8 | 17 | 6 | 27 | 5 | 64 |
| NE | 0 | 2 | 8 | 5 | 0 | 2 | 17 |
| ENE | 0 | 8 | 10 | 24 | 0 | 0 | 42 |
| E | 0 | 5 | 4 | 0 | 0 | 0 | 9 |
| ESE | 0 | 2 | 1 | 0 | 2 | 0 | 5 |
| SE | 1 | 0 | 8 | 11 | 0 | 1 | 21 |
| SSE | 0 | 4 | 9 | 16 | 9 | 5 | 43 |
| S | 1 | 7 | 24 | 38 | 24 | 12 | 106 |
| SSW | 0 | 13 | 29 | 32 | 35 | 5 | 114 |
| SW | 2 | 6 | 32 | 35 | 7 | 4 | 86 |
| WSW | 1 | 8 | 16 | 33 | 7 | 0 | 65 |
| W | 4 | 9 | 19 | 30 | 21 | 2 | 85 |
| WNW | 0 | 13 | 32 | 50 | 19 | 14 | 128 |
| NW | 0 | 7 | 32 | 49 | 47 | 16 | 151 |
| NNW | 0 | 8 | 9 | 26 | 42 | 3 | 88 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 10 | 111 | 262 | 393 | 277 | 77 | 1130 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - OCTOBER-DECEMBER 1989
STABILITY CLASS - SLIGHTLY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 2 | 3 | 15 | 5 | 0 | 25 |
| NNE | 0 | 3 | 6 | 5 | 1 | 0 | 15 |
| NE | 0 | 0 | 6 | 2 | 1 | 0 | 9 |
| ENE | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| E | 1 | 3 | 1 | 0 | 1 | 0 | 6 |
| ESE | 0 | 0 | 2 | 0 | 3 | 6 | 11 |
| SE | 0 | 3 | 3 | 3 | 2 | 2 | 13 |
| SSE | 1 | 0 | 6 | 11 | 13 | 5 | 36 |
| S | 0 | 0 | 14 | 23 | 31 | 20 | 88 |
| SSW | 0 | 1 | 5 | 14 | 16 | 18 | 54 |
| SW | 1 | 2 | 8 | 12 | 14 | 6 | 43 |
| WSW | 0 | 4 | 7 | 20 | 7 | 0 | 38 |
| W | 0 | 2 | 14 | 48 | 16 | 0 | 80 |
| WNW | 0 | 3 | 22 | 46 | 6 | 0 | 77 |
| NW | 0 | 8 | 22 | 68 | 11 | 0 | 109 |
| NNW | 0 | 2 | 9 | 36 | 12 | 1 | 60 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 3 | 33 | 128 | 306 | 139 | 58 | 667 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - OCTOBER-DECEMBER 1989
STABILITY CLASS - MODERATELY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 2 | 3 | 2 | 0 | 0 | 7 |
| NNE | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| NE | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| ENE | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| E | 2 | 1 | 1 | 0 | 0 | 0 | 4 |
| ESE | 0 | 1 | 0 | 1 | 1 | 1 | 4 |
| SE | 0 | 0 | 1 | 2 | 5 | 1 | 9 |
| SSE | 0 | 0 | 3 | 3 | 9 | 0 | 15 |
| S | 0 | 0 | 4 | 11 | 64 | 7 | 86 |
| SSW | 0 | 2 | 4 | 8 | 8 | 0 | 22 |
| SW | 0 | 0 | 4 | 2 | 1 | 0 | 7 |
| WSW | 0 | 2 | 6 | 3 | 1 | 0 | 12 |
| W | 0 | 0 | 1 | 6 | 1 | 0 | 8 |
| WNW | 0 | 2 | 2 | 8 | 0 | 0 | 12 |
| NW | 1 | 1 | 2 | 9 | 0 | 0 | 13 |
| NNW | 0 | 0 | 3 | 11 | 0 | 0 | 14 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 4 | 13 | 34 | 66 | 90 | 9 | 216 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

BYRON NUCLEAR POWER STATION
PERIOD OF RECORD - OCTOBER-DECEMBER 1989
STABILITY CLASS - EXTREMELY STABLE (DIFF TEMP 250-30 FT)
WINDS MEASURED AT 250 FEET

| WIND DIRECTION | WIND SPEED (IN MPH) .8-3 | 4- 7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| NNE | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| SE | 0 | 1 | 0 | 0 | 1 | 0 | 2 |
| SSE | 0 | 0 | 0 | 1 | 5 | 3 | 9 |
| S | 1 | 1 | 3 | 5 | 19 | 1 | 30 |
| SSW | 0 | 1 | 2 | 9 | 5 | 0 | 17 |
| SW | 0 | 0 | 2 | 5 | 2 | 0 | 9 |
| WSW | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| NW | 0 | 1 | 1 | 5 | 0 | 0 | 7 |
| NNW | 0 | 0 | 1 | 5 | 0 | 0 | 6 |
| VARIABLE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1 | 7 | 13 | 31 | 32 | 4 | 88 |

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

# APPENDIX III

# INTERLABORATORY COMPARISON PROGRAM RESULTS

## Interlaboratory Comparison Program Results

Teledyne Isotopes Midwest Laboratory (formerly Hazleton Environmental Sciences) has participated in interlaboratory comparison (crosscheck) programs since the formulation of its quality control program in December 1971. These programs are operated by agencies which supply environmental-type samples (e.g., milk or water) containing concentrations of radionuclides known to the issuing agency but not to participant laboratories. The purpose of such a program is to provide an independent check on the laboratory's analytical procedures and to alert it to any possible problems.

Participant laboratories measure the concentrations of specified radionuclides and report them to the issuing agency. Several months later, the agency reports the known values to the participant laboratories and specifies control limits. Results consistently higher or lower than the known values or outside the control limits indicate a need to check the instruments or procedures used.

The results in Table A-1 were obtained through participation in the environmental sample crosscheck program for milk, water, air filters, and food samples during the period January 1986 through November, 1989. This program has been conducted by the U.S. Environmental Protection Agency Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, Las Vegas, Nevada.

The results in Table A-2 were obtained for thermoluminescent dosimeters (TLD's) during the period 1976, 1977, 1979, 1980, 1984, and 1985-1986 through participation in the Second, Third, Fourth, Fifth, Seventh, and Eighth International Intercomparison of Environmental Dosimeters under the sponsorships listed in Table A-2. Also Teledyne testing results are listed.

Table A-3 lists results of the analyses on in-house spiked samples.

Table A-4 lists results of the analyses on in-house "blank" samples.

Attachment B lists acceptance criteria for "spiked" samples.

Addendum to Appendix A provides explanation for out of limit results.

Table A-1. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and Teledyne Isotopes Midwest Laboratory results for milk, water, air filters, and food samples, 1986 through 1989.[a]

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | EPA Result[d] Control Limits |
|---|---|---|---|---|---|---|
| STF-447 | Food | Jan 1986 | Sr-89 | 24.3±2.5 | 25.0±5.0 | 16.3-33.7 |
| | | | Sr-90 | 17.3±0.6 | 10.0±1.5 | 7.4-12.6 |
| | | | I-131 | 22.7±2.3 | 20.0±0.6 | 9.6-30.4 |
| | | | Cs-137 | 16.3±0.6 | 15.0±5.0 | 6.3-23.7 |
| | | | K | 927±46 | 950±144 | 701-1199 |
| STW-448 | Water | Feb 1986 | Cr-51 | 45.0±3.6 | 38.0±5.0 | 29.3-46.7 |
| | | | Co-60 | 19.7±1.5 | 18.0±5.0 | 9.3-26.7 |
| | | | Zn-65 | 44.0±3.5 | 40.0±5.0 | 31.3-48.7 |
| | | | Ru-106 | <9.0 | 0.0±5.0 | 0.0-8.7 |
| | | | Cs-134 | 28.3±2.3 | 30.0±5.0 | 21.3-38.7 |
| | | | Cs-137 | 23.7±0.6 | 22.0±5.0 | 13.3-30.7 |
| STW-449 | Water | Feb 1986 | H-3 | 5176±48 | 5227±525 | 4317<6137 |
| STW-450 | Water | Feb 1986 | U total | 8.0±0.0 | 9.0±6.0 | 0.0-19.4 |
| STM-451 | Milk | Feb 1986 | I-131 | 7.0±0.0 | 9.0±6.0 | 0.0-19.4 |
| STW-452 | Water | Mar 1986 | Ra-226 | 3.8±0.1 | 4.1±0.6 | 3.0-5.2 |
| | | | Ra-228 | 11.0±0.5 | 12.4±1.8 | 9.2-15.5 |
| STW-453 | Water | Mar 1986 | Gr. alpha | 6.7±0.6 | 15.0±5.0 | 6.3-23.7 |
| | | | Gr. beta | 7.3±0.6 | 8.0±5.0 | 0.0-16.7 |
| STW-454 | Water | Apr 1986 | I-131 | 7.0±0.0 | 9.0±6.0 | 0.0-19.4 |
| STW-455 456 | Water (Blind) | Apr 1986 | | | | |
| | Sample A | | Gr. alpha | 15.0±1.0 | 17.0±5.0 | 8.3-25.7 |
| | | | Ra-226 | 3.1±0.1 | 2.9±0.4 | 2.1-3.7 |
| | | | Ra-228 | 1.5±0.2 | 2.0±0.3 | 1.5-2.5 |
| | | | Uranium | 4.7±0.6 | 5.0±6.0 | 0.0-15.4 |
| | Sample B | | Gr. beta | 28.7±1.2 | 35.0±5.0 | 26.3-43.7 |
| | | | Sr-89 | 5.7±0.6 | 7.0±5.0 | 0.0-15.7 |
| | | | Sr-90 | 7.0±0.0 | 7.0±1.5 | 4.4-9.6 |
| | | | Co-60 | 10.7±1.5 | 10.0±5.0 | 1.3-18.7 |
| | | | Cs-134 | 4.0±1.7 | 5.0±5.0 | 0.0-13.7 |
| | | | Cs-137 | 5.3±0.6 | 5.0±5.0 | 0.0-13.7 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | EPA Result[d] Control Limits |
|---|---|---|---|---|---|---|
| STAF-457 | Air Filter | April 1986 | Gr. alpha | 13.7±0.6 | 15.0±5.0 | 6.3-23.7 |
| | | | Gr. beta | 46.3±0.6 | 47.0±5.0 | 38.3-55.7 |
| | | | Sr-90 | 14.7±0.6 | 18.0±1.5 | 15.4-20.6 |
| | | | Cs-137 | 10.7±0.6 | 10.0±5.0 | 1.3-18.7 |
| STU-458 | Urine | April 1986 | Tritium | 4313±70 | 4423±189 | 4096-4750 |
| STW-459 | Water | May 1986 | Sr-89 | 4.3±0.6 | 5.0±5.0 | 0.0-13.7 |
| | | | Sr-90 | 5.0±0.0 | 5.0±1.5 | 2.4-7.6 |
| STW-460 | Water | May 1986 | Gr. alpha | 5.3±0.6 | 8.0±5.0 | 0.0-16.7 |
| | | | Gr. beta | 11.3±1.2 | 15.0±5.0 | 6.3-23.7 |
| STW-461 | Water | June 1986 | Cr-51 | <9.0 | 0.0±5.0 | 0.0-8.7 |
| | | | Co-60 | 66.0±1.0 | 66.0±5.0 | 57.3-74.7 |
| | | | Zn-65 | 87.3±1.5 | 86.0±5.0 | 77.3-94.7 |
| | | | Ru-106 | 39.7±2.5 | 50.0±5.0 | 41.3-58.7 |
| | | | Cs-134 | 49.3±2.5 | 49.0±5.0 | 40.3-57.7 |
| | | | Cs-137 | 10.3±1.5 | 10.0±5.0 | 1.3-18.7 |
| STW-462 | Water | June 1986 | Tritium | 3427±25 | 3125±361 | 2499-3751 |
| STM-464 | Milk | June 1986 | Sr-89 | <1.0 | 0.0±5.0 | 0.0-8.7 |
| | | | Sr-90 | 15.3±0.6 | 16.0±1.5 | 13.4-18.6 |
| | | | I-131 | 48.3±2.3 | 41.0±6.0 | 30.6-51.4 |
| | | | Cs-137 | 43.7±1.5 | 31.0±5.0 | 22.3-39.7 |
| | | | K | 1567±114 | 1600±80 | 1461-1739 |
| STW-465 | Water | July 1986 | Gr. alpha | 4.7±0.6 | 6.0±5.0 | 0.0-14.7 |
| | | | Gr. beta | 18.7±1.2 | 18.0±5.0 | 9.3-26.7 |
| STW-467 | Water | August 1986 | I-131 | 30.3±0.6 | 45.0±6.0 | 34.4-55.4 |
| STW-468 | Water | August 1986 | Pu-239 | 11.3±0.6 | 10.1±1.0 | 8.3-11.9 |
| STW-469 | Water | August 1986 | Uranium | 4.0±0.0 | 4.0±6.0 | 0.0-14.4 |
| STAF-470 471 472 | Air Filter | Sept 1986 | Gr. alpha | 19.3±1.5 | 22.0±5.0 | 13.3-30.7 |
| | | | Gr. beta | 64.0±2.6 | 66.0±5.0 | 57.3-74.7 |
| | | | Sr-90 | 22.0±1.0 | 22.0±5.0 | 19.4-24.6 |
| | | | Cs-137 | 25.7±1.5 | 22.0±5.0 | 13.3-30.7 |
| STW-473 | Water | Sept 1986 | Ra-226 | 6.0±0.1 | 6.1±0.9 | 4.5-7.7 |
| | | | Ra-228 | 8.7±1.1 | 9.1±1.4 | 6.7-11.5 |

Table A-1. (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-474 | Water | Sept 1986 | Gr. alpha | 16.3±3.2 | 15.0±5.0 | 6.3-23.7 |
| | | | Gr. beta | 9.0±1.0 | 8.0±5.0 | 0.0-16.7 |
| STW-475 | Water | Oct 1986 | Cr-51 | 63.3±5.5 | 59.0±5.0 | 50.3-67.7 |
| | | | Co-60 | 31.0±2.0 | 31.0±5.0 | 22.3-39.7 |
| | | | Zn-65 | 87.3±5.9 | 85.0±5.0 | 76.3-93.7 |
| | | | Ru-106 | 74.7±7.4 | 74.0±5.0 | 65.3-82.7 |
| | | | Cs-134 | 25.7±0.6 | 28.0±5.0 | 19.3-36.7 |
| | | | Cs-137 | 46.3±1.5 | 44.0±5.0 | 35.3-52.7 |
| STW-476 | Water | Oct 1986 | H-3 | 5918±60 | 5973±597 | 4938-7008 |
| SPW-477 478 | Water (Blind) | Oct 1986 | | | | |
| | Sample A | | Gr. alpha | 34.0±6.0 | 40.0±5.0 | 31.3-48.7 |
| | | | Ra-226 | 5.8±0.2 | 6.0±0.9 | 4.4-7.6 |
| | | | Ra-228 | 2.7±1.0 | 5.0±0.8 | 3.7-6.3 |
| | | | Uranium | 11.0±0.0 | 10.0±6.0 | 0.0-20.4 |
| | Sample B | | Gr. beta | 38.7±1.2 | 51.0±5.0 | 42.3-59.7 |
| | | | Sr-89 | 5.0±0.0 | 10.0±5.0 | 1.3-18.7 |
| | | | Sr-90 | 3.0±0.0 | 4.0±1.5 | 1.4-6.6 |
| | | | Co-60 | 24.7±1.2 | 24.0±5.0 | 15.3-32.7 |
| | | | Cs-134 | 11.0±2.0 | 12.0±5.0 | 3.3-20.7 |
| | | | Cs-137 | 9.3±1.2 | 8.0±5.0 | 0.0-16.7 |
| STM-479 | Milk | Nov 1986 | Sr-89 | 7.7±1.2 | 9.0±5.0 | 0.3-17.7 |
| | | | Sr-90 | 1.0±0.0 | 0.0±1.5 | 0.0-2.6 |
| | | | I-131 | 52.3±3.1 | 49.0±6.0 | 38.6-59.4 |
| | | | Cs-137 | 45.7±3.1 | 39.0±5.0 | 30.3-47.7 |
| | | | K | 1489±104 | 1565±78 | 1430-1700 |
| STU-480 | Urine | Nov 1986 | H-3 | 5540±26 | 5257±912 | 4345-6169 |
| STW-481 | Water | Nov 1986 | Gr. alpha | 12.0±4.0 | 20.0±5.0 | 11.3-28.7 |
| | | | Gr. beta | 20.0±3.5 | 20.0±5.0 | 11.3-28.7 |
| STW-482 | Water | Dec 1986 | Ra-226 | 6.7±0.2 | 6.8±1.0 | 5.0-8.6 |
| | | | Ra-228 | 5.2±0.2 | 11.1±1.7 | 8.2-14.0 |
| STW-483 | Water | Jan 1987 | Sr-89 | 19.7±5.0 | 25.0±5.0 | 16.3-33.7 |
| | | | Sr-90 | 21.0±2.0 | 25.0±1.5 | 22.4-27.6 |

Table A-1. (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-484 | Water | Jan 1987 | Pu-239 | 17.0±2.3 | 16.7±1.7 | 13.8-19.6 |
| STF-486 | Food | Jan 1987 | Sr-90 | 36.0±4.0 | 49.0±10.0 | 31.7-66.3 |
| | | | I-131 | 78.0±3.4 | 78.0±8.0 | 64.1-91.9 |
| | | | Cs-137 | 89.7±3.0 | 84.0±5.0 | 75.3-92.7 |
| | | | K | 942±56 | 980±49 | 895-1065 |
| STF-487 | Food (Blank) | Jan 1987 | SR-90 | 2.0±0.0 | --- | |
| | | | I-131 | <3 | --- | |
| | | | Cs-137 | <2 | --- | |
| | | | K | 993±102 | --- | |
| STW-488 | Water | Feb 1987 | Co-60 | 49.0±0.0 | 50.0±5.0 | 41.3-58.7 |
| | | | Zn-65 | 96.0±7.2 | 91.0±5.0 | 82.3-99.7 |
| | | | Ru-106 | 92.0±20.2 | 100.0±5.0 | 91.3-108.7 |
| | | | Cs-134 | 53.0±3.4 | 59.0±5.0 | 50.3-67.7 |
| | | | Cs-137 | 89.3±4.6 | 87.0±5.0 | 78.3-95.7 |
| STW-489 | Water | Feb 1987 | H-3 | 4130±140 | 4209±420 | 3479-4939 |
| STW-490 | Water | Feb 1987 | Uranium | 8.3±1.2 | 8.0±6.0 | 0.0-18.4 |
| STM-491 | Milk | Feb 1987 | I-131 | 10.0±0.0 | 9.0±0.9 | 7.4-10.6 |
| STW-492 | Water | Mar 1987 | Gr. alpha | 3.7±1.2 | 3.0±5.0 | 0.0-11.7 |
| | | | Gr. beta | 11.3±1.2 | 13.0±5.0 | 4.3-21.7 |
| STW-493 | Water | Mar 1987 | Ra-226 | 7.0±0.1 | 7.3±1.1 | 5.4-9.2 |
| | | | Ra-228 | 7.1±2.3 | 7.5±1.1 | 5.5-9.5 |
| STW-494 | Water | Apr 1987 | I-131 | 8.0±0.0 | 7.0±0.7 | 5.8-8.2 |
| STAF-495 | Air Filter | Apr 1987 | Gr. alpha | 15.0±0.0 | 14.0±5.0 | 5.3-22.7 |
| | | | Gr. beta | 41.0±2.0 | 43.0±5.0 | 34.3-51.7 |
| | | | Sr-90 | 16.3±1.2 | 17.0±1.5 | 14.4-19.6 |
| | | | Cs-137 | 7.0±0.0 | 8.0±5.0 | 0.0-16.7 |
| STW-496 497 | Water (Blind) | Apr 1987 | | | | |
| | Sample A | | Gr. alpha | 30.7±1.2 | 30.0±8.0 | 16.1-43.9 |
| | | | Ra-226 | 3.9±0.2 | 3.9±0.6 | 2.9-4.9 |
| | | | Ra-228 | 4.9±0.9 | 4.0±0.6 | 3.0-5.0 |
| | | | Uranium | 5.0±0.0 | 5.0±6.0 | 0.0-15.4 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | EPA Result[d] Control Limits |
|---|---|---|---|---|---|---|
| STW-496 497 | Water (Blind) | Apr 1987 | | | | |
| | Sample B | | Gr. Beta | 69.3±9.4 | 66.0±5.0 | 57.3-74.7 |
| | | | Sr-89 | 16.3±3.0 | 19.0±5.0 | 10.3-27.7 |
| | | | Sr-90 | 10.0±0.0 | 10.0±1.5 | 7.4-12.6 |
| | | | Co-60 | 8.3±3.0 | 8.0±5.0 | 0.0-16.7 |
| | | | Cs-134 | 19.0±2.0 | 20.0±5.0 | 11.3-28.7 |
| | | | Cs-137 | 14.7±1.2 | 15.0±5.0 | 6.3-23.7 |
| STU-498 | Urine | Apr 1987 | H-3 | 6017±494 | 5620±795 | 4647-6593. |
| STW-499 | Water | May 1987 | Sr-89 | 38.0±6.0 | 41.0±5.0 | 32.3-49.7 |
| | | | Sr-90 | 21.0±2.0 | 20.0±1.5 | 17.4-22.6 |
| STW-500 | Water | May 1987 | Gr. alpha | 9.0±3.4 | 11.0±5.0 | 2.3-19.7 |
| | | | Gr. beta | 10.3±1.2 | 7.0±5.0 | 0.0-15.7 |
| STW-501 | Water | June 1987 | Cr-51 | 40.0±8.0 | 41.0±5.0 | 32.3-49.7 |
| | | | Co-60 | 60.3±3.0 | 64.0±5.0 | 55.3-72.7 |
| | | | Zn-65 | 11.3±5.0 | 10.0±5.0 | 1.3-18.7 |
| | | | Ru-106 | 78.3±6.4 | 75.0±5.0 | 66.3-83.7 |
| | | | Cs-134 | 36.7±3.0 | 40.0±5.0 | 31.3-48.7 |
| | | | Cs-137 | 80.3±4.2 | 80.0±5.0 | 71.3-88.7 |
| STW-502 | Water | June 1987 | H-3 | 2906±86 | 2895±357 | 2277-3513 |
| STW-503 | Water | June 1987 | Ra-226 | 6.9±0.1 | 7.3±1.1 | 5.4-9.2 |
| | | | Ra-228 | 13.3±1.0 | 15.2±2.3 | 11.2-19.2 |
| STM-504 | Milk | June 1987 | Sr-89 | 57.0±4.3 | 69.0±5.0 | 60.3-77.7 |
| | | | Sr-90 | 32.0±1.0 | 35.0±1.5 | 32.4-37.6 |
| | | | I-131 | 64.0±2.0 | 59.0±6.0 | 48.6-69.4 |
| | | | Cs-137 | 77.7±0.6 | 74.0±5.0 | 65.3-82.7 |
| | | | K | 1383±17 | 1525±76 | 1393-1657 |
| STW-505 | Water | July 1987 | Gr. alpha | 2.3±0.7 | 5.0±5.0 | 0.0-13.7 |
| | | | Gr. beta | 4.0±1.0 | 5.0±5.0 | 0.0-13.7 |
| STF-506 | Food | July 1987 | I-131 | 82.7±4.6 | 80.0±8.0 | 66.1-93.9 |
| | | | Cs-137 | 53.7±3.0 | 50.0±5.0 | 41.3-58.7 |
| | | | K | 1548±57 | 1680±84 | 1534-1826 |
| STW-507 | Water | Aug 1987 | I-131 | 45.7±4.2 | 48.0±6.0 | 37.6-58.4 |
| STW-508 | Water | Aug 1987 | Pu-239 | 5.8±0.2 | 5.3±0.5 | 4.4-6.2 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-509 | Water | Aug 1987 | Uranium | 13.3±0.3 | 13.0±6.0 | 2.6-23.4 |
| STAF-510 | Air Filter | Aug 1987 | Gr. alpha | 9.7±0.4 | 10.0±5.0 | 1.3-18.7 |
| | | | Gr. beta | 28.3±0.6 | 30.0±5.0 | 21.3-38.7 |
| | | | Sr-90 | 10.0±0.9 | 10.0±1.5 | 7.4-12.6 |
| | | | Cs-137 | 10.0±1.0 | 10.0±5.0 | 1.3-18.7 |
| STW-511 | Water | Sept 1987 | Ra-226 | 9.9±0.1 | 9.7±1.5 | 7.2-12.2 |
| | | | Ra-228 | 8.1±1.4 | 6.3±1.0 | 4.6-8.0 |
| STW-512 | Water | Sept 1987 | Gr. alpha | 2.0±0.6 | 4.0±5.0 | 0.0-12.7 |
| | | | Gr. beta | 11.3±1.3 | 12.0±5.0 | 3.3-20.7 |
| STW-513 | Water | Oct 1987 | H-3 | 4473±100 | 4492±449 | 3714-5270 |
| STW-514 | Water (Blind) | Oct 1987 | | | | |
| | Sample A | | Gr. alpha | 29.3±2.6 | 28.0±7.0 | 15.9-40.1 |
| | | | Ra-226 | 4.9±0.1 | 4.8±0.7 | 3.6-6.1 |
| | | | Ra-228 | 4.2±1.0 | 3.6±0.5 | 2.7-4.5 |
| | | | Uranium | 3.0±0.1 | 3.0±6.0 | 0.0-13.4 |
| | Sample B | | Sr-89 | 14.3±1.3 | 16.0±5.0 | 7.3-24.7 |
| | | | Sr-90 | 9.7±0.4 | 10.0±1.5 | 7.4-12.6 |
| | | | Co-60 | 16.7±3.0 | 16.0±5.0 | 7.3-24.7 |
| | | | Cs-134 | 16.7±2.3 | 16.0±5.0 | 7.3-24.7 |
| | | | Cs-137 | 24.3±3.3 | 24.0±5.0 | 15.3-32.7 |
| STW-516 | Water | Oct 1987 | Cr-51 | 80.3±17.5 | 70.0±5.0 | 61.3-78.7 |
| | | | Co-60 | 16.0±2.3 | 15.0±5.0 | 6.3-23.7 |
| | | | Zn-65 | 46.3±5.6 | 46.0±5.0 | 37.3-54.7 |
| | | | Ru-106 | 57.3±15.4 | 61.0±5.0 | 52.3-69.7 |
| | | | Cs-134 | 23.7±2.5 | 25.0±5.0 | 16.3-33.7 |
| | | | Cs-137 | 51.7±3.2 | 51.0±5.0 | 42.3-59.7 |
| STU-517 | Urine | Nov 1987 | H-3 | 7267±100 | 7432±743 | 6145-8719 |
| STW-518 | Water | Nov 1987 | Gr. alpha | 3.0±2.0 | 7.0±5.0 | 0.0-15.7 |
| | | | Gr. beta | 15.7±2.3 | 19.0±5.0 | 10.3-27.7 |
| STW-519 | Water | Dec 1987 | I-131 | 26.0±3.0 | 26.0±6.0 | 15.6-36.4 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-520 | Water | Dec 1987 | Ra-226 | 5.1±0.8 | 4.8±0.7 | 3.6-6.0 |
| | | | Ra-228 | 3.4±0.1 | 5.3±0.8 | 3.9-6.7 |
| STW-521 | Water | Jan 1988 | Sr-89 | 27.3±5.0 | 30.0±5.0 | 21.3-38.7 |
| | | | Sr-90 | 15.3±1.2 | 15.0±1.5 | 12.4-17.6 |
| STW-523 | Water | Jan 1988 | Gr. alpha | 2.3±1.2 | 4.0±5.0 | 0.0-12.7 |
| | | | Gr. beta | 7.7±1.2 | 8.0±5.0 | 0.0-16.7 |
| STF-524 | Food | Jan 1988 | Sr-89 | 44.0±4.0 | 46.0±5.0 | 37.3-54.7 |
| | | | Sr-90 | 53.0±2.0 | 55.0±2.8 | 50.2-59.8 |
| | | | I-131 | 102.3±4.2 | 102.0±10.2 | 84.3-119.7 |
| | | | Cs-137 | 95.7±6.4 | 91.0±5.0 | 82.3-99.7 |
| | | | K | 1011±158 | 1230±62 | 1124-1336 |
| STW-525 | Water | Feb 1988 | Co-60 | 69.3±2.3 | 69.0±5.0 | 60.3-77.7 |
| | | | Zn-65 | 99.0±3.4 | 94.0±9.4 | 77.7-110.3 |
| | | | Ru-106 | 92.7±14.4 | 105.0±10.5 | 86.8-123.2 |
| | | | Cs-134 | 61.7±8.0 | 64.0±5.0 | 55.3-72.7 |
| | | | Cs-137 | 99.7±3.0 | 94.0±5.0 | 85.3-102.7 |
| STW-526 | Water | Feb 1988 | H-3 | 3453±103 | 3327±362 | 2700-3954 |
| STW-527 | Water | Feb 1988 | Uranium | 3.0±0.0 | 3.0±6.0 | 0.0-13.4 |
| STM-528 | Milk | Feb 1988 | I-131 | 4.7±1.2 | 4.0±0.4 | 3.3-4.7 |
| STW-529 | Water | Mar 1988 | Ra-226 | 7.1±0.6 | 7.6±1.1 | 5.6-9.6 |
| | | | Ra-228 | NA[e] | 7.7±1.2 | 5.7-9.7 |
| STW-530 | Water | Mar 1988 | Gr. alpha | 4.3±1.2 | 6.0±5.0 | 0.0-14.7 |
| | | | Gr. beta | 13.3±1.3 | 13.0±5.0 | 4.3-21.7 |
| STAF-531 | Air Filter | Mar 1988 | Gr. alpha | 21.0±2.0 | 20.0±5.0 | 11.3-28.7 |
| | | | Gr. beta | 48.0±0.0 | 50.0±5.0 | 41.3-58.7 |
| | | | Sr-90 | 16.7±1.2 | 17.0±1.5 | 14.4-19.6 |
| | | | Cs-137 | 18.7±1.3 | 16.0±5.0 | 7.3-24.7 |
| STW-532 | Water | Apr 1988 | I-131 | 9.0±2.0 | 7.5±0.8 | 6.2-8.8 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-533 534 | Water (Blind) | Apr 1988 | | | | |
| | Sample A | | Gr. alpha | ND[f] | 46.0±11.0 | 27.0-65.0 |
| | | | Ra-226 | ND | 6.4±1.0 | 4.7-8.1 |
| | | | Ra-228 | ND | 5.6±0.8 | 4.2-7.0 |
| | | | Uranium | 6.0±0.0 | 6.0±6.0 | 0.0-16.4 |
| | Sample B | | Gr. beta | ND | 57.0±5.0 | 48.3-65.7 |
| | | | Sr-89 | 3.3±1.2 | 5.0±5.0 | 0.0-13.7 |
| | | | Sr-90 | 5.3±1.2 | 5.0±1.5 | 2.4-7.6 |
| | | | Co-60 | 63.3±1.3 | 50.0±5.0 | 41.3-58.7 |
| | | | Cs-134 | 7.7±1.2 | 7.0±5.0 | 0.0-15.7 |
| | | | Cs-137 | 8.3±1.2 | 7.0±5.0 | 0.0-15.7 |
| STU-535 | Urine | Apr 1988 | H-3 | 6483±155 | 6202±620 | 5128-7276 |
| STW-536 | Water | Apr 1988 | Sr-89 | 14.7±1.3 | 20.0±5.0 | 11.3-28.7 |
| | | | Sr-90 | 20.0±2.0 | 20.0±1.5 | 17.4-22.6 |
| STW-538 | Water | June 1988 | Cr-51 | 331.7±13.0 | 302.0±30.0 | 250.0-354.0 |
| | | | Co-60 | 16.0±2.0 | 15.0±5.0 | 6.3-23.7 |
| | | | Zn-65 | 107.7±11.4 | 101.0±10.0 | 83.7-118.3 |
| | | | Ru-106 | 191.3±11.0 | 195.0±20.0 | 160.4-229.6 |
| | | | Cs-134 | 18.3±4.6 | 20.0±5.0 | 11.3-28.7 |
| | | | Cs-137 | 26.3±1.2 | 25.0±5.0 | 16.3-33.7 |
| STW-539 | Water | June 1988 | H-3 | 5586±92 | 5565±557 | 4600-6530 |
| STM-541 | Milk | June 1988 | Sr-89 | 33.7±11.4 | 40.0±5.0 | 31.3-48.7 |
| | | | Sr-90 | 55.3±5.8 | 60.0±3.0 | 54.8-65.2 |
| | | | I-131 | 103.7±3.1 | 94.0±9.0 | 78.4-109.6 |
| | | | Cs-137 | 52.7±3.1 | 51.0±5.0 | 42.3-59.7 |
| | | | K | 1587±23 | 1600±80 | 1461-1739 |
| STW-542 | Water | July 1988 | Gr. alpha | 8.7±4.2 | 15.0±5.0 | 6.3-23.7 |
| | | | Gr. beta | 5.3±1.2 | 4.0±5.0 | 0.0-12.7 |
| STF-543 | Food | July 1988 | Sr-89 | ND | 33.0±5.0 | 24.3-41.7 |
| | | | Sr-90 | ND | 34.0±2.0 | 30.5-37.5 |
| | | | I-131 | 115.0±5.3 | 107.0±11.0 | 88.0-126.0 |
| | | | Cs-137 | 52.7±6.4 | 49.0±5.0 | 40.3-57.7 |
| | | | K | 1190±66 | 1240±62 | 1133-1347 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | EPA Result[d] Control Limits |
|---|---|---|---|---|---|---|
| STW-544 | Water | Aug 1988 | I-131 | 80.0±0.0 | 76.0±8.0 | 62.1-89.9 |
| STW-545 | Water | Aug 1988 | Pu-239 | 11.0±0.2 | 10.2±1.0 | 8.5-11.9 |
| STW-546 | Water | Aug 1988 | Uranium | 6.0±0.0 | 6.0±6.0 | 0.0-16.4 |
| STAF-547 | Air Filter | Aug 1988 | Gr. alpha | 8.0±0.0 | 8.0±5.0 | 0.0-16.7 |
| | | | Gr. beta | 26.3±1.2 | 29.0±5.0 | 20.3-37.7 |
| | | | Sr-90 | 8.0±2.0 | 8.0±1.5 | 5.4-10.6 |
| | | | Cs-137 | 13.0±2.0 | 12.0±5.0 | 3.3-20.7 |
| STW-548 | Water | Sep 1988 | Ra-226 | 9.3±0.5 | 8.4±2.6 | 6.2-10.6 |
| | | | Ra-228 | 5.8±0.4 | 5.4±1.6 | 4.0-6.8 |
| STW-549 | Water | Sep 1988 | Gr. alpha | 7.0±2.0 | 8.0±5.0 | 0.0-16.7 |
| | | | Gr. beta | 11.3±1.2 | 10.0±5.0 | 1.3-18.7 |
| STW-550 | Water | Oct 1988 | Cr-51 | 252.0±14.0 | 251.0±25.0 | 207.7-294.3 |
| | | | Co-60 | 26.0±2.0 | 25.0±5.0 | 16.3-33.7 |
| | | | Zn-65 | 158.3±10.2 | 151.0±15.0 | 125.0-177.0 |
| | | | Ru-106 | 153.0±9.2 | 152.0±15.0 | 126.0-178.0 |
| | | | Cs-134 | 28.7±5.0 | 25.0±5.0 | 16.3-33.7 |
| | | | Cs-137 | 16.3±1.2 | 15.0±5.0 | 6.3-23.7 |
| STW-551 | Water | Oct 1988 | H-3 | 2333±127 | 2316±350 | 1710-2927 |
| STW-552 553 | Water (Blind) | Oct 1988 | | | | |
| | Sample A | | Gr. alpha | 38.3±8.0 | 41.0±10.0 | 23.7-58.3 |
| | | | Ra-226 | 4.5±0.5 | 5.0±0.8 | 3.6-6.4 |
| | | | Ra-228 | 4.4±0.6 | 5.2±0.8 | 3.6-6.4 |
| | | | Uranium | 4.7±1.2 | 5.0±6.0 | 0.0-15.4 |
| | Sample B | | Gr. beta | 51.3±3.0 | 54.0±5.0 | 45.3-62.7 |
| | | | Sr-89 | 3.7±1.2 | 11.0±5.0 | 2.3-19.7 |
| | | | Sr-90 | 10.7±1.2 | 10.0±1.5 | 7.4-12.6 |
| | | | Cs-134 | 15.3±2.3 | 15.0±5.0 | 6.3-23.7 |
| | | | Cs-137 | 16.7±1.2 | 15.0±5.0 | 6.3-23.7 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STM-554 | Milk | Oct 1988 | Sr-89 | 40.3±7.0 | 40.0±5.0 | 31.3-48.7 |
| | | | Sr-90 | 51.0±2.0 | 60.0±3.0 | 54.8-65.2 |
| | | | I-131 | 94.0±3.4 | 91.0±9.0 | 75.4-106.6 |
| | | | Cs-137 | 45.0±4.0 | 50.0±5.0 | 41.3-58.7 |
| | | | K | 1500±45 | 1600±80 | 1461-1739 |
| STU-555 | Urine | Nov 1988 | H-3 | 3030±209 | 3025±359 | 2403-3647 |
| STW-556 | Water | Nov 1988 | Gr. alpha | 9.0±3.5 | 9.0±5.0 | 0.3-17.7 |
| | | | Gr. beta | 9.7±1.2 | 9.0±5.0 | 0.3-17.7 |
| STW-557 | Water | Dec 1988 | I-131 | 108.7±3.0 | 115.0±12.0 | 94.2-135.8 |
| STW-559 | Water | Jan 1989 | Sr-89 | 40.0±8.7 | 40.0±5.0 | 31.3-48.7 |
| | | | Sr-90 | 24.3±3.1 | 25.0±1.5 | 22.4-27.6 |
| STW-560 | Water | Jan 1989 | Pu-239 | 5.8±1.1 | 4.2±0.4 | 3.5-4.9 |
| STW-561 | Water | Jan 1989 | Gr. alpha | 7.3±1.2 | 8.0±5.0 | 0.0-16.7 |
| | | | Gr. beta | 5.3±1.2 | 4.0±5.0 | 0.0-12.7 |
| STW-562 | Water | Feb 1989 | Cr-51 | 245±46 | 235±24 | 193.4-276.6 |
| | | | Co-60 | 10.0±2.0 | 10.0±5.0 | 1.3-18.7 |
| | | | Zn-65 | 170±10 | 159±16 | 139.2-186.7 |
| | | | Ru-106 | 181±7.6 | 178±18 | 146.8-209.2 |
| | | | Cs-134 | 9.7±3.0 | 10.0±5.0 | 1.3-18.7 |
| | | | Cs-137 | 11.7±1.2 | 10.0±5.0 | 1.3-18.7 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-563 | Water | Feb 1989 | I-131 | 109.0±4.0 | 106.0±11.0 | 86.9-125.1 |
| STW-564 | Water | Feb 1989 | H-3 | 2820±20 | 2754±356 | 2137-3371 |
| STW-565 | Water | Mar 1989 | Ra-226 | 4.2±0.3 | 4.9±0.7 | 3.7-6.1 |
| | | | Ra-228 | 1.9±1.0 | 1.7±0.3 | 1.2-2.2 |
| STW-566 | Water | Mar 1989 | U | 5.0±0.0 | 5.0±6.0 | 0.0-15.4 |
| STW-567 | AirFilter | Mar 1989 | Gr. alpha | 21.7±1.2 | 21.0±5.0 | 12.3-29.7 |
| | | | Gr. beta | 68.3±4.2 | 62.0±5.0 | 53.3-70.7 |
| | | | Sr-90 | 20.0±2.0 | 20.0±1.5 | 17.4-22.6 |
| | | | Cs-137 | 21.3±1.2 | 20.0±5.0 | 11.3-28.7 |
| STW-568 569 | Water (Blind) | Apr 1989 | | | | |
| | | Sample A | | | | |
| | | | Gr. alpha | 22.7±2.3 | 29.0±7.0 | 16.9-41.2 |
| | | | Ra-226 | 3.6±0.6 | 3.5±0.5 | 2.6-4.4 |
| | | | Ra-228 | 2.6±1.0 | 3.6±0.5 | 2.7-4.5 |
| | | | U | 3.0±0.0 | 3.0±6.0 | 0.0-13.4 |
| | | Sample B | Gr. beta | 52.3±6.1 | 57.0±5.0 | 43.3-65.7 |
| | | | Sr-89 | 9.3±5.4 | 8.0±5.0 | 0.0-16.7 |
| | | | Sr-90 | 7.0±0.0 | 8.0±1.5 | 5.4-10.6 |
| | | | Cs-134 | 21.0±5.2 | 20.0±5.0 | 11.3-28.7 |
| | | | Cs-137 | 23.0±2.0 | 20.0±5.0 | 11.3-28.7 |
| STW-570 | Milk | Apr 1989 | Sr-89 | 26.0±10.0 | 39.0±5.0 | 30.3-47.7 |
| | | | Sr-90 | 45.7±4.2 | 55.0±3.0 | 49.8-60.2 |
| | | | Cs-137 | 54.0±6.9 | 50.0±5.0 | 41.3-58.7 |
| | | | K-40 | 1521±208 | 1600±80 | 1461-1739 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-571[g] | Water | May 1989 | Sr-89 | <0.7 | 6.0±5.0 | 0.0-14.7 |
| | | | Sr-90 | 5.0±1.0 | 6.0±1.5 | 3.4-8.6 |
| STW-572 | Water | May 1989 | Gr. alpha | 24.0±2.0 | 30.0±8.0 | 16.1-43.9 |
| | | | Gr. beta | 49.3±15.6 | 50.0±5.0 | 41.3-58.7 |
| STW-573 | Water | Jun 1989 | Ba-133 | 50.7±1.2 | 49.0±5.0 | 40.3-57.7 |
| | | | Co-60 | 31.3±2.3 | 31.0±5.0 | 22.3-39.7 |
| | | | Zn-65 | 167±10 | 165±17 | 135.6-194.4 |
| | | | Ru-106 | 123±9.2 | 128±13 | 105.5-150.5 |
| | | | Cs-134 | 40.3±1.2 | 39±5 | 30.3-47.7 |
| | | | Cs-137 | 22.3±1.2 | 20±5 | 11.3-28.7 |
| STW-574 | Water | Jun 1989 | H-3 | 4513±136 | 4503±450 | 3724-5282 |
| STW-575 | Water | Jul 1989 | Ra-226 | 16.8±3.1 | 17.7±2.7 | 13.0-22.4 |
| | | | Ra-228 | 13.8±3.7 | 18.3±2.7 | 13.[illegible] |
| STW-576 | Water | Jul 1989 | U | 40.3±1.2 | 41.0±6.0 | 30 [illegible] |
| STW-577 | Water | Aug 1989 | I-131 | 84.7±5.8 | 83.0±8.0 | 69.1-[illegible] |
| STW-579 | Air Filter | [illegible] 1989 | Gr. alpha | 6.0±0.0 | 6.0±5.0 | 0.0-14.7 |
| | | | Cs-137 | 10.3±2.3 | 10.0±5.0 | 1.3-18.7 |
| STW-580 | Water | Sep 1989 | Sr-89 | 14.7±1.2 | 14.0±5.0 | 5.3-22.7 |
| | | | Sr-90 | 9.7±1.2 | 10.0±1.5 | 7.4-12.6 |
| STW-581 | Water | Sep 1989 | Gr. alpha | 5.0±0.0 | 4.0±5.0 | 0.0-12.7 |
| | | | Gr. Beta | 8.7±2.3 | 6.0±5.0 | 0.0-14.7 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | EPA Result[d] Control Limits |
|---|---|---|---|---|---|---|
| STW-583 | Water | Oct 1989 | Ba-133 | 60.3±10.0 | 59.0±6.0 | 48.6-69.4 |
| | | | Co-60 | 29.0±4.0 | 30.0±5.0 | 21.3-38.7 |
| | | | Zn-65 | 132.3±6.0 | 129.0±13.0 | 106.5-151.5 |
| | | | Ru-106 | 155.3±6.1 | 161.0±16.0 | 133.3-188.7 |
| | | | Cs-134 | 30.7±6.1 | 29.0±5.0 | 20.3-37.7 |
| | | | Cs-137 | 66.3±4.6 | 59.0±5.0 | 50.3-67.7 |
| STW-584 | Water | Oct 1989 | H-3 | 3407±150 | 3496±364 | 2866-4126 |
| STW-585 586 | Water (Blind) | Oct 1989 | | | | |
| | Sample A | | Gr. Alpha | 41.7±9.4 | 49.0±12.0 | 28.2-69.8 |
| | | | Ra-226 | 7.9±0.4 | 8.4±1.3 | 6.2-10.6 |
| | | | Ra-228 | 4.4±0.8 | 4.1±0.6 | 3.1-5.1 |
| | | | U | 12.0±0.0 | 12.0±6.0 | 1.6-22.4 |
| | Sample B | | Gr. Beta | 31.7±2.3 | 32.0±5.0 | 23.3-40.7 |
| | | | Sr-89 | 13.3±4.2 | 15.0±5.0 | 6.3-23.7 |
| | | | Sr-90 | 7.0±2.0 | 7.0±3.0 | 4.4-9.6 |
| | | | Cs-134 | 5.0±0.0 | 5.0±5.0 | 0.0-13.7 |
| | | | Cs-137 | 7.0±0.0 | 5.0±5.0 | 0.0-13.7 |
| STW-587 | Water | Nov 1989 | Ra-226 | 7.9±0.4 | 8.7±1.3 | 6.4-11.0 |
| | | | Ra-228 | 8.9±1.2 | 9.3±1.2 | 6.9-11.7 |
| STW-588 | Water | Nov 1989 | U | 15.0±0.0[g] | 15.0±6.0 | 4.6-25.4 |

[a] Results obtained by Teledyne Isotopes Midwest Laboratory as a participant in the environmental sample crosscheck program operated by the Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency (EPA), Las Vegas, Nevada.

[b] All results are in the pCi/l, except for elemental potassium (K) data in milk, which are in mg/l; air filter samples, which are in pCi/filter; and food, which is in mg/kg.

[c] Unless otherwise indicated, the TIML results are given as the mean ± 2 standard deviations for three determinations.

[d] USEPA results are presented as the known values and expected laboratory precision (1s, 1 determination) and control limits as defined by EPA.

[e] NA = Not analyzed.

[f] ND = No data. Not analyzed due to relocation of the lab.

[g] Sample was analyzed but the results not submitted to EPA because deadline was missed.

Table A-2. Crosscheck program results, thermoluminescent dosimeters (TLDs).

| Lab Code | TLD Type | Measurement | mR: Teledyne Result ±2σ[a] | mR: Known Value[c] | mR: Average ±2 σ[d] (all participants) |
|---|---|---|---|---|---|
| 2nd International Intercomparison[b] | | | | | |
| 115-2 | $CaF_2$:Mn Bulb | Field | 17.0±1.9 | 17.1 | 16.4±7.7 |
| | | Lab | 20.8±4.1 | 21.3 | 18.8±7.6 |
| 3rd International Intercomparison[e] | | | | | |
| 115-3 | $CaF_2$:Mn Bulb | Field | 30.7±3.2 | 34.9±4.8 | 31.5±3.0 |
| | | Lab | 89.6±6.4 | 91.7±14.6 | 86.2±24.0 |
| 4th International Intercomparison[f] | | | | | |
| 115-4 | $CaF_2$:Mn Bulb | Field | 14.1±1.1 | 14.1±1.4 | 16.0±9.6 |
| | | Lab (Low) | 9.3±1.3 | 12.2±2.4 | 12.0±7.6 |
| | | Lab (High) | 40.4±1.4 | 45.8±9.2 | 43.9±13.2 |
| 5th International Intercomparison[g] | | | | | |
| 115-5A | $CaF_2$:Mn Bulb | Field | 31.4±1.8 | 30.0±6.0 | 30.2±14.6 |
| | | Lab at beginning | 77.4±5.8 | 75.2±7.6 | 75.8±40.4 |
| | | Lab at end | 96.6±5.8 | 88.4±8.8 | 90.7±31.2 |

Table A-2. (Continued)

| Lab Code | TLD Type | Measurement | mR | | |
|---|---|---|---|---|---|
| | | | Teledyne Result ±2σ[a] | Known Value[c] | Average ±2σ[d] (all participants) |
| 115-5B | LiF-100 Chips | Field | 30.3±4.8 | 30.0±6.0 | 30.2±14.6 |
| | | Lab at beginning | 81.1±7.4 | 75.2±7.6 | 75.8±40.4 |
| | | Lab at the end | 85.4±11.7 | 88.4±8.8 | 90.7±31.2 |
| 7th International Intercomparison[h] | | | | | |
| 115-7A | LiF-100 Chips | Field | 75.4±2.6 | 75.8±6.0 | 75.1±29.8 |
| | | Lab (Co-60) | 80.0±3.5 | 79.9±4.0 | 77.9±27.6 |
| | | Lab (Cs-137) | 66.6±2.5 | 75.0±3.8 | 73.0±22.2 |
| 115-7B | $CaF_2$:Mn Bulbs | Field | 71.5±2.6 | 75.8±6.0 | 75.1±29.8 |
| | | Lab (Co-60) | 84.8±6.4 | 79.9±4.0 | 77.9±27.6 |
| | | Lab (Cs-137) | 78.8±1.6 | 75.0±3.8 | 73.0±22.2 |
| 115-7C | $CaSO_4$:Dy Cards | Field | 76.8±2.7 | 75.8±6.0 | 75.1±29.8 |
| | | Lab (Co-60) | 82.5±3.7 | 79.9±4.0 | 77.9±27.6 |
| | | Lab (Cs-137 | 79.0±3.2 | 75.0±3.8 | 73.0±22.2 |

Table A-2. (Continued)

| Lab Code | TLD Type | Measurement | mR: Teledyne Result ±2σ[a] | mR: Known Value[c] | mR: Average ±2σ[d] (all participants) |
|---|---|---|---|---|---|
| 8th International Intercomparison[b] | | | | | |
| 115-8A | LiF-100 Chips | Field Site 1 | 29.5±1.4 | 29.7±1.5 | 28.9±12.4 |
| | | Field Site 2 | 11.3±0.8 | 10.4±0.5 | 10.1±9.06 |
| | | Lab (Cs-137) | 13.7±0.9 | 17.2±0.9 | 16.2±6.8 |
| 115-8B | $CaF_2$:Mn Bulbs | Field Site 1 | 32.3±1.2 | 29.7±1.5 | 28.9±12.4 |
| | | Field Site 2 | 9.0±1.0 | 10.4±0.5 | 10.1±9.0 |
| | | Lab (Cs-137) | 15.8±0.9 | 17.2±0.9 | 16.2±6.8 |
| 115-8C | $CaSO_4$:Dy Cards | Field Site 1 | 32.3±0.7 | 29.7±1.5 | 28.9±12.4 |
| | | Field Site 2 | 10.6±0.6 | 10.4±0.5 | 10.1±9.0 |
| | | Lab (Cs-137 | 18.1±0.8 | 17.2±0.9 | 16.2±6.8 |
| Teledyne Testing[j] | | | | | |
| 89-1 | LiF-100 Chips | Lab | 21.0±0.4 | 22.4 | - |
| 89-2 | Teledyne $CaSO_4$:Dy Cards | Lab | 20.9±1.0 | 20.3 | - |

[a] Lab result given is the mean ±2 standard deviations of three determinations.
[b] Second International Intercomparison of Environmental Dosimeters conducted in April of 1976 by the Health and Safety Laboratory (GASL), New York, New York, and the School of Public Health of the University of Texas, Houston, Texas.
[c] Value determined by sponsor of the intercomparison using continously operated pressurized ion chamber.
[d] Mean ±2 standard deviations of results obtained by all laboratories participating in the program.

Table A-2. (continued)

| Lab Code | TLD Type | Measurement | mR: Teledyne Result $\pm 2\sigma$[a] | mR: Known Value[c] | mR: Average $\pm 2\sigma$[d] (all participants) |
|---|---|---|---|---|---|

Footnotes continued

[e] Third International Intercomparison of Environmental Dosimeters conducted in summer of 1977 by Oak Ridge National Laboratory and the School of Public Health of the University of Texas, Houston, Texas.

[f] Fourth International Intercomparison of Environmental Dosimeters conducted in summer of 1979 by the School of Public Health of the University of Texas, Houston, Texas.

[g] Fifth International Intercomparison of Environmental Dosimeter conducted in fall of 1980 at Idaho Falls, Idaho and sponsored by the School of Public Health of the University of Texas, Houston, Texas and Environmental Measurements Laboratory, New York, New York, U.S. Department of Energy.

[h] Seventh International Intercomparison of Environmental Dosimeters conducted in the spring and summer of 1984 at Las Vegas, Nevada, and sponsored by the U.S. Department of Energy, the U.S. Nuclear Regulatory Commission, and the U.S. Environmental Protection Agency.

[i] Eighth International Intercomparison of Environmental Dosimeters conducted in the fall and winter of 1985-1986 at New York, New York, and sponsored by the U.S. Department of Energy.

[j] Chips were submitted in September, 1989 and cards were submitted in November, 1989 to Teledyne Isotopes, Inc., Westwood, NJ for irradiation.

Table A-3. In-house spiked samples.

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-MI-6 | Milk | Feb. 1986 | Sr-89 | 6.0±1.9 | 6.4±3.0 | 8.7 |
| | | | Sr-90 | 14.2±1.7 | 12.9±2.0 | 5.2 |
| | | | I-131 | 34.2±3.8 | 35.2±3.5 | 10.4 |
| | | | Cs-134 | 32.0±1.8 | 27.3±5.0 | 8.7 |
| | | | Cs-137 | 35.8±2.1 | 35.0±5.0 | 8.7 |
| QC-W-14 | Water | Mar. 1986 | Sr-89 | 1.6±0.4 | 1.6±1.0 | 7.1 |
| | | | Sr-90 | 2.4±0.2 | 2.4±2.0 | 4.2 |
| QC-W-15 | Water | Apr. 1986 | I-131 | 44.9±2.4 | 41.5±7.0 | 10.6 |
| | | | Co-60 | 10.6±1.7 | 12.1±5.0 | 7.1[b] |
| | | | Cs-134 | 30.2±2.4 | 25.8±8.0 | 7.1[b] |
| | | | Cs-137 | 21.9±1.9 | 19.9±5.0 | 7.1[b] |
| QC-MI-7 | Milk | Apr. 1986 | I-131 | 39.7±3.3 | 41.5±7.0 | 10.4 |
| | | | Cs-134 | 28.7±2.8 | 25.8±8.0 | 8.7 |
| | | | Cs-137 | 21.2±2.8 | 19.9±5.0 | 8.7 |
| SPW-1 | Water | May 1986 | Gross alpha | 15.8±1.8 | 18.0±5.0 | 5[c] |
| QC-W-16 | Water | June 1986 | Gross alpha | 16.2±0.7 | 16.9±2.5 | 8.7 |
| | | | Gross beta | 38.4±3.5 | 30.2±5.0 | 8.7 |
| QC-MI-9 | Milk | June 1986 | Sr-89 | <1.0 | 0.0 | 7.1[b] |
| | | | Sr-90 | 12.6±1.8 | 13.3±3.0 | 4.2[b] |
| | | | I-131 | 38.9±7.0 | 34.8±7.0 | 10.4 |
| | | | Cs-134 | 33.0±3.4 | 36.1±5.0 | 8.7 |
| | | | Cs-137 | 38.5±2.8 | 39.0±5.0 | 8.7 |
| SPW-2 | Water | June 1986 | Gross alpha | 16.8±1.8 | 18.0±5.0 | 5[c] |
| SPW-3 | Water | June 1986 | Gross alpha | 17.7±0.8 | 18.0±5.0 | 5[c] |
| QC-W-18 | Water | Sep. 1986 | Cs-134 | 34.7±5.6 | 31.3±5.0 | 8.7 |
| | | | Cs-137 | 51.1±7.0 | 43.3±8.0 | 8.7 |
| QC-W-19 | Water | Sep. 1986 | Sr-89 | 13.6±4.1 | 15.6±3.5 | 7.1[b] |
| | | | Sr-90 | 6.4±1.6 | 6.2±2.0 | 4.2[b] |

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-W-21 | Water | Oct. 1986 | C -60 | 19.2±2.2 | 18.5±3.0 | 8.7 |
| | | | Cs-134 | 31.7±5.2 | 25.6±8.0 | 8.7 |
| | | | Cs-137 | 23.8±1.0 | 21.6±5.0 | 8.7 |
| QC-MI-11 | Milk | Oct 1986 | Sr-89 | 12.3±1.8 | 14.3±3.0 | 8.7 |
| QC-W-20 | Water | Nov. 1986 | H-3 | 3855±180 | 3960±350 | 520[b] |
| QC-W-22 | Water | Dec. 1986 | Gross alpha | 9.8±1.4 | 11.2±4.0 | 8.7 |
| | | | Gross beta | 21.7±2.0 | 23.8±5.0 | 8.7 |
| QC-W-23 | Water | Jan. 1987 | I-131 | 29.8±2.5 | 27.9±3.0 | 10.4 |
| QC-MI-12 | Milk | Jan. 1987 | I-131 | 36.5±1.3 | 32.6±5.0 | 10.4 |
| | | | Cs-137 | 32.6±4.2 | 27.4±8.0 | 8.7 |
| QC-MI-13 | Milk | Jan 1987 | Sr-89 | 10.4±2.1 | 12.2±4.0 | 8.7 |
| | | | Sr-90 | 14.6±1.6 | 12.6±3.0 | 5.2 |
| | | | I-131 | 49.5±1.2 | 54.9±8.0 | 10.4 |
| | | | Cs-134 | <1.6 | 0.0 | 8.7 |
| | | | Cs-137 | 33.3±0.6 | 27.4±8.0 | 8.7 |
| QC-W-24 | Water | Mar 1987 | Sr-89 | 24.7±3.6 | 25.9±5.0 | 8.7 |
| | | | Sr-90 | 23.9±3.8 | 22.8±8.0 | 5.2 |
| QC-W-25 | Water | Apr 1987 | I-131 | 28.0±1.9 | 29.3±5.0 | 10.6 |
| QC-MI-14 | Milk | Apr 1987 | I-131 | 25.0±2.2 | 23.9±5.0 | 10.4 |
| | | | Cs-134 | <2.1 | 0.0 | 8.7 |
| | | | Cs-137 | 34.2±2.0 | 27.2±7.0 | 8.7 |
| QC-W-26 | Water | Jun 1987 | H-3 | 3422±100 | 3362±300 | 520 |
| | | | Co-60 | 24.8±1.4 | 26.5±7.0 | 8.7 |
| | | | Cs-134 | <2.0 | 0.0 | 8.7 |
| | | | Cs-137 | 21.2±0.5 | 21.6±7.0 | 8.7 |
| QC-W-27 | Water | Jun 1987 | Gr. alpha | 8.5±1.9 | 10.1±4.0 | 8.7 |
| | | | Gr. beta | 22.6±1.9 | 21.2±5.0 | 8.7 |
| QC-W-28 | Water | Jun 1987 | Gr. alpha | 8.7±1.3 | 10.1±4.0 | 8.7 |
| | | | Gr. beta | 12.2±5.2 | 9.4±3.0 | 8.7 |

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-W-29 | Water | Jun 1987 | Gr. alpha | 16.4±1.3 | 18.9±5.0 | 8.7 |
| | | | Gr. beta | 15.9±4.0 | 11.8±4.0 | 8.7 |
| QC-MI-15 | Milk | Jul 1987 | Sr-90 | 19.4±1.6 | 18.8±3.5 | 5.2 |
| | | | I-131 | 43.5±0.7 | 45.3±7.0 | 10.4 |
| | | | Cs-134 | 17.9±2.2 | 16.0±5.3 | 8.7 |
| | | | Cs-137 | 25.4±1.8 | 22.7±5.0 | 8.7 |
| QC-W-30 | Water | Sep 1987 | Sr-89 | 17.5±3.0 | 14.3±5.0 | 8.7 |
| | | | Sr-90 | 18.4±2.2 | 17.5±2.2 | 5.2 |
| QC-W-31 | Water | Oct 1987 | H-3 | 2053±939 | 2059±306 | 520 |
| QC-W-32 | Water | Dec 1987 | Gr. alpha | 8.6±1.0 | 10.1±5.0 | 8.7 |
| | | | Gr. beta | 15.2±0.1 | 13.1±3.0 | 8.7 |
| QC-W-33 | Water | Dec 1987 | Gr. alpha | 7.7±1.4 | 10.1±5.0 | 8.7 |
| | | | Gr. beta | 10.9±1.0 | 7.9±3.0 | 8.7 |
| QC-W-34 | Water | Dec 1987 | Gr. alpha | 4.0±0.9 | 5.1±3.0 | 8.7 |
| | | | Gr. beta | 9.4±0.9 | 7.9±3.0 | 8.7 |
| QC-MI-16 | Milk | Feb 1988 | Sr-89 | 31.8±4.7 | 31.7±6.0 | 8.7 |
| | | | Sr-90 | 25.5±2.7 | 27.8±3.5 | 5.2 |
| | | | I-131 | 26.4±0.5 | 23.2±5.0 | 10.4 |
| | | | Cs-134 | 23.8±2.3 | 24.2±6.0 | 8.7 |
| | | | Cs-137 | 26.5±0.8 | 25.1±6.0 | 8.7 |
| QC-MI-17 | Milk | Feb 1988 | I-131 | 10.6±1.2 | 14.3±1.6 | 10.4 |
| QC-W-35 | Water | Feb 1988 | I-131 | 9.7±1.1 | 11.6±1.1 | 10.4 |
| QC-W-36 | Water | Feb 1988 | I-131 | 10.5±1.3 | 11.6±1.0 | 10.4 |
| QC-W-37 | Water | Mar 1988 | Sr-89 | 17.1±2.0 | 19.8±8.0 | 8.7 |
| | | | Sr-90 | 18.7±0.9 | 17.3±5.0 | 5.2 |
| QC-MI-18 | Milk | Mar 1988 | I-131 | 33.2±2.3 | 26.7±5.0 | 10.4 |
| | | | Cs-134 | 31.3±2.1 | 30.2±5.0 | 8.7 |
| | | | Cs-137 | 29.9±1.4 | 26.2±5.0 | 8.7 |

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-W-38 | Water | Apr 1988 | I-131 | 17.1±1.1 | 14.2±5.0 | 10.4 |
| QC-W-39 | Water | Apr 1988 | H-3 | 4439±31 | 4176±500 | 724 |
| QC-W-40 | Water | Apr 1988 | Co-60 | 23.7±0.5 | 26.1±4.0 | 8.7 |
| | | | Cs-134 | 25.4±2.6 | 29.2±4.5 | 8.7 |
| | | | Cs-137 | 26.6±2.3 | 26.2±4.0 | 8.7 |
| QC-W-41 | Water | Jun 1988 | Gr. alpha | 12.3±0.4 | 13.1±5.0 | 8.7 |
| | | | Gr. beta | 22.6±1.0 | 20.1±5.0 | 8.7 |
| QC-MI-19 | Milk | Jul 1988 | Sr-89 | 15.1±1.6 | 16.4±5.0 | 8.7 |
| | | | Sr-90 | 18.0±0.6 | 18.3±5.0 | 5.2 |
| | | | I-131 | 88.4±4.9 | 86.6±8.0 | 10.4 |
| | | | Cs-137 | 22.7±0.8 | 20.8±6.0 | 8.7 |
| QC-W-42 | Water | Sep 1988 | Sr-89 | 48.5±3.3 | 50.8±8.0 | 8.7 |
| | | | Sr-90 | 10.9±1.0 | 11.4±3.5 | 5.2 |
| QC-W-43 | Water | Oct 1988 | Co-60 | 20.9±3.2 | 21.4±3.5 | 8.7 |
| | | | Cs-134 | 38.7±1.6 | 38.0±6.0 | 8.7 |
| | | | Cs-137 | 19.0±2.4 | 21.0±3.5 | 8.7 |
| QC-W-44 | Water | Oct 1988 | I-131 | 22.2±0.6 | 23.3±3.5 | 10.4 |
| QC-W-45 | Water | Oct 1988 | H-3 | 4109±43 | 4153±500 | 724 |
| QC-MI-20 | Milk | Oct 1988 | I-131 | 59.8±0.9 | 60.6±9.0 | 10.4 |
| | | | Cs-134 | 49.6±1.8 | 48.6±7.5 | 8.7 |
| | | | Cs-137 | 25.8±4.6 | 24.7±4.0 | 8.7 |
| QC-W-46 | Water | Dec 1988 | Gr. alpha | 11.5±2.3 | 15.2±5.0 | 8.7 |
| | | | Gr. beta | 26.5±2.0 | 25.7±5.0 | 8.7 |
| QC-MI-21 | Milk | Jan 1989 | Sr-89 | 25.5±10.3 | 34.0±10.0 | 8.7 |
| | | | Sr-90 | 28.3±3.2 | 27.1±3.0 | 5.2 |
| | | | I-131 | 540±13 | 550±20 | 10.4 |
| | | | Cs-134 | 24.5±2.6 | 22.6±5.5 | 8.7 |
| | | | Cs-137 | 24.0±0.6 | 20.5±5.0 | 8.7 |

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-W-47 | Water | Mar 1989 | Sr-89 | 15.2±3.8 | 16.1±5.0 | 8.7 |
| | | | Sr-90 | 16.4±1.7 | 16.9±3.0 | 5.2 |
| QC-MI-22 | Milk | Apr 1989 | I-131 | 36.3±1.1 | 37.2±5.0 | 10.4 |
| | | | Cs-134 | 20.8±2.8 | 20.7±8.0 | 8.7 |
| | | | Cs-137 | 22.2±2.4 | 20.4±8.0 | 8.7 |
| QC-W-48 | Water | Apr 1989 | Co-60 | 23.5±2.0 | 25.1±8.0 | 8.7 |
| | | | Cs-134 | 24.2±1.1 | 25.9±8.0 | 8.7 |
| | | | Cs-137 | 23.6±1.2 | 23.0±8.0 | 8.7 |
| QC-W-49 | Water | Apr 1989 | I-131 | 37.2±3.7 | 37.2±5.0 | 10.4 |
| QC-W-50 | Water | Apr 1989 | H-3 | 3011±59 | 3089±500 | 724 |
| QC-W-51 | Water | Jun 1989 | Gr. alpha | 13.0±1.8 | 15.0±5.0 | 8.7 |
| | | | Gr. beta | 26.0±1.2 | 25.5±8.0 | 8.7 |
| QC-MI-23 | Milk | Jul 1989 | Sr-89 | 19.4±6.5 | 22.0±10.0 | 8.7 |
| | | | Sr-90 | 27.6±3.5 | 28.6±3.0 | 5.2 |
| | | | I-131 | 46.8±3.2 | 43.4±5.0 | 10.4 |
| | | | Cs-134 | 27.4±1.8 | 28.3±6.0 | 8.7 |
| | | | Cs-137 | 24.1±1.8 | 20.8±6.0 | 8.7 |
| QC-MI-24 | Milk | Aug 1989 | Sr-89 | 25.4±2.7 | 27.2±10.0 | 8.7 |
| | | | Sr-90 | 46.0±1.1 | 47.8±9.6 | 8.3 |
| QC-W-52 | Water | Sep 1989 | I-131 | 9.6±0.3 | 9.7±1.9 | 10.4 |
| QC-W-53 | Water | Sep 1989 | I-131 | 19.0±0.2 | 20.9±4.2 | 10.4 |
| QC-W-54 | Water | Sep 1989 | Sr-89 | 25.8±4.6 | 24.7±4.0 | 8.7 |
| | | | Sr-90 | 26.5±5.3 | 29.7±5.0 | 5.2 |

[a] n=3 unless noted otherwise.
[b] n=2.
[c] n=1.

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-MI-25 | Milk | Oct 1989 | I-131 | 70.0±3.3 | 73.5±20.0 | 10.4 |
| | | | Cs-134 | 22.1±2.6 | 22.6±8.0 | 8.7 |
| | | | Cs-137 | 29.4±1.5 | 27.5±8.0 | 8.7 |
| QC-W-55 | Water | Oct 1989 | I-131 | 33.3±1.3 | 35.3±10.0 | 10.4 |
| QC-W-56 | Water | Oct 1989 | Co-60 | 15.2±0.9 | 17.4±5.0 | 8.7 |
| | | | Cs-134 | 22.1±4.4 | 18.9±8.0 | 8.7 |
| | | | Cs-137 | 27.2±1.2 | 22.9±8.0 | 8.7 |
| QC-W-57 | Water | Oct 1989 | H-3 | 3334±22 | 3379±500 | 724 |
| QC-W-58 | Water | Nov 1989 | Sr-89 | 10.9±1.4[d] | 11.1±1.0[d] | 8.7 |
| | | | Sr-90 | 10.4±1.0[d] | 10.3±1.0[d] | 5.2 |
| QC-W-59 | Water | Nov 1989 | Sr-89 | 101.0±6.0[d] | 104.1±10.5[d] | 17.5 |
| | | | Sr-90 | 98.0±3.0[d] | 95.0±10.0[d] | 17.0 |
| QC-W-60 | Water | Dec 1989 | Gr. alpha | 10.8±1.1 | 10.6±4.0 | 8.7 |
| | | | Gr. beta | 11.6±0.5 | 11.4±4.0 | 8.7 |

[a] n=3 unless noted otherwise.
[b] n=2.
[c] n=1.
[d] Concentration in pCi/ml

Table A-4. In-house "blank" samples.

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| BL-1 | D.I. Water | Nov. 1985 | Gross alpha | <0.1 | <1 |
| | | | Gross beta | <0.4 | <4 |
| BL-2 | D.I. Water | Nov. 1985 | Cs-137 (gamma) | <1.9 | <10 |
| BL-3 | D.I. Water | Nov. 1985 | Sr-89 | <0.5 | <5 |
| | | | Sr-90 | <0.6 | <1 |
| BL-5 | D.I. Water | Nov. 1985 | Ra-226 | <0.4 | <1 |
| | | | Ra-228 | <0.4 | <1 |
| SPW-2265 | D.I. Water | Apr. 1985 | Gross alpha | <0.6 | <1 |
| | | | Gross beta | <2.2 | <4 |
| | | | Sr-89 | <0.2 | <5 |
| | | | Sr-90 | <0.4 | <1 |
| | | | I-131 | <0.2 | <1 |
| | | | Cs-137 (gamma) | <7.4 | <10 |
| BL-6 | D.I. Water | Apr. 1986 | Gross alpha | <0.4 | <1 |
| BL-7 | D.I. Water | Apr. 1986 | Gross alpha | <0.4 | <1 |
| BL-8 | D.I. Water | June 1986 | Gross alpha | <0.4 | <1 |
| BL-9 | D.I. Water | June 1986 | Gross alpha | <0.3 | <1 |
| SPW-3185 | D.I. Water | Jan 1987 | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <0.9 | <1 |
| SPS-3292 | Milk | Jan 1987 | I-131 | <0.1 | <1 |
| | | | Cs-134 | <6.2 | <10 |
| | | | Cs-137 | <6.4 | <10 |
| SPW-3554 | D.I. Water | Feb 1987 | H-3 | <180 | <300 |
| | | | Gross beta | <2.6 | <4 |
| SPS-3555 | Milk | Feb 1987 | Sr-89 | <0.6 | <5 |
| | | | Sr-90 | 1.9±0.4[a] | <1 |
| SPS-3731 | Milk | Mar 1987 | Cs-134 | <2.2 | <10 |
| | | | Cs-137 | <2.5 | <10 |

[a] Low level (1 - 5 pCi/l) of Sr-90 concentration in milk is not unusual.

Table A-4. In-house "blank" samples (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Concentration in pCi/l Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| SPS-3732 | D.I. Water | Mar 1987 | Sr-89 | <0.9 | <5 |
| | | | Sr-90 | <0.8 | <1 |
| | | | I-131 | <0.3 | <1 |
| | | | Co-60 | <2.3 | <10 |
| | | | Cs-134 | <2.2 | <10 |
| | | | Cs-137 | <2.4 | <10 |
| | | | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <1.0 | <1 |
| | | | Np-237 | <0.04 | <1 |
| | | | Th-230 | <0.05 | <0.1 |
| | | | Th-232 | <0.02 | <0.1 |
| | | | U-234 | <0.05 | <0.1 |
| | | | U-235 | <0.03 | <0.1 |
| | | | U-238 | <0.03 | <0.1 |
| SPS-4023 | Milk | May 1987 | I-131 | <0.1 | <1 |
| SPS-4203 | D.I. Water | May 1987 | Gross alpha | <0.7 | <1 |
| | | | Gross beta | <1.7 | <4 |
| SPS-4204 | Milk | May 1987 | Sr-89 | <0.5 | <5 |
| | | | Sr-90 | 2.4±0.6[a] | <1 |
| SPS-4390 | Milk | Jun 1987 | Cs-134 | <4.7 | <10 |
| | | | Cs-137 | <5.2 | <10 |
| SPS-4391 | D.I. Water | Jun 1987 | Sr-89 | <0.4 | <5 |
| | | | Sr-90 | <0.4 | <1 |
| | | | I-121 | <0.1 | <1 |
| | | | Co-60 | <3.8 | <10 |
| | | | Cs-137 | <5.7 | <10 |
| | | | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <0.9 | <1 |
| SPW-4627 | D.I. Water | Aug 1987 | Gross alpha | <0.6 | <1 |
| | | | Gross beta | <1.4 | <4 |
| | | | Tritium | <150 | |
| SPS-4628 | Milk | Aug 1987 | Sr-89 | <0.6 | <5 |
| | | | Sr-90 | 2.4±0.6[a] | <1 |
| SPS-4847 | Milk | Sep 1987 | Cs-134 | <4.4 | <10 |
| | | | Cs-137 | <5.3 | <10 |

[a] Low level (1 - 5 pCi/l) of Sr-90 concentration in milk is not unusual.

Table A-4. In-house "blank" samples (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Concentration in pCi/l Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| SPS-4848 | D.I. Water | Sep 1987 | I-131 | <0.2 | <1 |
| SPW-4849 | D.I. Water | Sep 1987 | Co-60 | <4.1 | <10 |
| | | | Cs-134 | <4.8 | <10 |
| | | | Cs-137 | <4.0 | <10 |
| | | | Sr-89 | <0.7 | <5 |
| | | | Sr-90 | <0.7 | <1 |
| SPW-4850 | D.I. Water | Sep 1987 | Th-228 | <0.04 | <1 |
| | | | Th-232 | <0.8 | <1 |
| | | | U-234 | <0.03 | <1 |
| | | | U-235 | <0.03 | <1 |
| | | | U-238 | <0.02 | <1 |
| | | | Am-241 | <0.06 | <1 |
| | | | Cm-242 | <0.04 | <1 |
| | | | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <1.0 | <2 |
| SPW-4859 | D.I. Water | Oct 1987 | Fe-55 | <0.5 | <1 |
| SPS-5348 | Milk | Dec 1987 | Cs-134 | <2.3 | <10 |
| | | | Cs-137 | <2.5 | <10 |
| SPW-5384 | D.I. Water | Dec 1987 | Co-60 | <2.8 | <10 |
| | | | Cs-134 | <2.6 | <10 |
| | | | Cs-137 | <2.8 | <10 |
| | | | I-131 | <0.2 | <1 |
| | | | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <1.2 | <2 |
| | | | Sr-89 | <0.5 | <1 |
| | | | Sr-90 | <0.4 | <1 |
| SPW-5385 | D.I. Water | Nov 1987 | Gr. alpha | <0.4 | <1 |
| | | | Gr. beta | <2.2 | <4 |
| | | | Fe-55 | <0.3 | <1 |
| SPS-5386 | Milk | Jan 1988 | I-131 | <0.1 | <1 |
| SPW-5448 | "Dead" Water | Jan 1988 | H-3 | <177 | <300 |

Table A-4. In-house "blank" samples (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Concentration in pCi/l Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| SPS-5615 | Milk | Mar 1988 | Cs-134 | <2.4 | <10 |
| | | | Cs-137 | <2.5 | <10 |
| | | | I-131 | <0.3 | <1 |
| | | | Sr-89 | <0.4 | <5 |
| | | | Sr-90 | 2.4±0.5[a] | <1 |
| SPS-5650 | D.I. Water | Mar 1988 | Th-228 | <0.3 | <1 |
| | | | Th-230 | <0.04 | <1 |
| | | | Th-232 | <0.05 | <1 |
| | | | U-234 | <0.03 | <1 |
| | | | U-235 | <0.03 | <1 |
| | | | U-238 | <0.03 | <1 |
| | | | Am-241 | <0.05 | <1 |
| | | | Cm-242 | <0.01 | <1 |
| | | | Pu-238 | <0.08 | <1 |
| | | | Pu-240 | <0.02 | <1 |
| SPS-6090 | Milk | Jul 1988 | Sr-89 | <0.5 | <1 |
| | | | Sr-90 | 1.8±0.5[a] | <1 |
| | | | I-131 | <0.4 | <1 |
| | | | Cs-137 | <0.4 | <10 |
| SPW-6209 | Water | Jul 1988 | Fe-55 | <0.8 | <1 |
| SPW-6292 | Water | Sep 1988 | Sr-89 | <0.7 | <1 |
| | | | Sr-90 | <0.7 | <1 |
| SPS-6477 | Milk | Oct 1988 | I-131 | <0.2 | <1 |
| | | | Cs-134 | <6.1 | <10 |
| | | | Cs-137 | <5.9 | <10 |
| SPW-6478 | Water | Oct 1988 | I-131 | <0.2 | <1 |
| SPW-6479 | Water | Oct 1988 | Co-60 | <5.7 | <10 |
| | | | Cs-134 | <3.7 | <10 |
| | | | Cs-137 | <4.3 | <10 |
| SPW-6480 | Water | Oct 1988 | H-3 | <170 | <300 |
| SPW-6625 | Water | Dec 1988 | Gr. alpha | <0.7 | <1 |
| | | | Gr. beta | <1.9 | <4 |

[a] Low level (1 - 5 pCi/l) of Sr-90 concentration in milk is not unusual.

Table A-4. In-house "blank" samples (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Concentration in pCi/l Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| SPS-6723 | Milk | Jan 1989 | Sr-89 | <0.6 | <5 |
| | | | Sr-90 | 1.9±0.5[a] | <1 |
| | | | I-131 | <0.2 | <1 |
| | | | Cs-134 | <4.3 | <10 |
| | | | Cs-137 | <4.4 | <10 |
| SPW-6877 | Water | Mar 1989 | Sr-89 | <0.4 | <5 |
| | | | Sr-90 | <0.6 | <1 |
| SPS-6963 | Milk | Apr 1989 | I-131 | <0.3 | <1 |
| | | | Cs-134 | <5.9 | <10 |
| | | | Cs-137 | <6.2 | <10 |
| SPW-7561 | Water | Apr 1989 | H-3 | <150 | <300 |
| SPW-7207 | Water | Jun 1989 | Ra-226 | <0.2 | <1 |
| | | | Ra-228 | <0.6 | <1 |
| SPS-7208 | Milk | Jun 1989 | Sr-89 | <0.6 | <5 |
| | | | Sr-90 | 2.1±0.5[a] | <1 |
| | | | I-131 | <0.3 | <1 |
| | | | Cs-134 | <6.4 | <10 |
| | | | Cs-137 | <7.2 | <10 |
| SPW-7558 | Water | Jun 1989 | Gr. alpha | <0.2 | <1 |
| | | | Gr. beta | <1.0 | <4 |
| SPS-7322 | Milk | Aug 1989 | Sr-89 | <1.4 | <5 |
| | | | Sr-90 | 4.8±1.0[a] | <1 |
| | | | I-131 | <0.2 | <1 |
| | | | Cs-134 | <6.9 | <10 |
| | | | Cs-137 | <8.2 | <10 |
| SPW-7559 | Water | Sep 1989 | Sr-89 | <2.0 | <5 |
| | | | Sr-90 | <0.7 | <1 |
| SPW-7560 | Water | Oct 1989 | I-131 | <0.1 | <1.0 |
| SPW-7562 | Water | Oct 1989 | H-3 | <140 | <300 |
| SPS-7605 | Milk | Nov 1989 | I-131 | <0.2 | <1 |
| | | | Cs-134 | <8.6 | <10 |
| | | | Cs-137 | <10 | <10 |
| SPW-7971 | Water | Dec 1989 | Gr. alpha | <0.4 | <1 |
| | | | Gr. beta | <0.8 | <4 |

[a] Low level (1-5 pCi/l) of Sr-90 concentration in milk is not unusual.

## ATTACHMENT B

## ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES[a]

| Analysis | Level | One Standard Deviation for Single Determination |
|---|---|---|
| Gamma Emitters | 5 to 100 pCi/liter or kg<br>>100 pCi/liter or kg | 5 pCi/liter<br>5% of known value |
| Strontium-89[b] | 5 to 50 pCi/liter or kg<br>>50 pCi/liter or kg | 5 pCi/liter<br>10% of known value |
| Strontium-90[b] | 2 to 30 pCi/liter or kg<br>>30 pCi/liter of kg | 3.0 pCi/liter<br>10% of known value |
| Potassium | >0.1 g/liter or kg | 5% of known value |
| Gross Alpha | <20 pCi/liter<br>>20 pCi/liter | 5 pCi/liter<br>25% of known value |
| Gross Beta | <100 pCi/liter<br>>100 pCi/liter | 5 pCi/liter<br>5% of known value |
| Tritium | <4,000 pCi/liter<br>>4,000 pCi/liter | 1s = (pCi/liter) = 169.85 x (known)$^{.0933}$<br>10% of known value |
| Radium-226, Radium-228 | <0.1 pCi/liter | 15% of known value |
| Plutonium | 0.1 pCi/liter, gram, or sample | 10% of known value |
| Iodine-131, Iodine-129[b] | <55 pCi/liter<br>>55 pCi/liter | 6 pCi/liter<br>10% of known value |
| Uranium-238, Nickel-63[b], Technetium-99[b] | <35 pCi/liter<br>>35 pCi/liter | 6 pCi/liter<br>15% of known value |
| Iron-55[b] | 50 to 100 pCi/liter | 10 pCi/liter<br>10% of known value |

[a] From EPA publication, "Environmental Radioactivity Laboratory Intercomparison Studies Program, Fiscal Year 1981-1982, EPA-600/4-81-004.

[b] TIML limit.

## ADDENDUM TO APPENDIX A

The following is an explanation of the reasons why certain samples were outside the control limit specified by the Environmental Protection Agency for the Interlaboratory Comparison Program starting January 1987.

| Lab Code | Analysis | TIML Result | EPA Control Limit | Explanation |
|---|---|---|---|---|
| STM-504 | Sr-89<br>Sr-90 | 57.0±4.3<br>32.0±1.0 | 60.3-77.7<br>32.4-37.6 | Milk had high fat content which made analyses difficult. Addition of errors to TIML result would put values within EPA control limits. EPA also had the same problem in analyzing its own sample. |
| STW-511 | Ra-228 | 8.1±1.4 | 4.6-8.0 | TIML results are usually within EPA control limits. Analysis of the next sample was within EPA control limits. No further action is planned. |
| STW-516 | Cr-51 | 80.3±17.5 | 61.3-78.7 | Results in the past have been within EPA control limits and TIML will monitor the situation in the future. |
| STF-524 | K | 1010.7±158.5 | 1123.5-1336.5 | Error in transferrance of data. Correct data was 1105±33. Results in the past have been within the limits and TIML will monitor the situation in the future. |
| STW-532 | I-131 | 9.0±2.0 | 6.2-8.8 | Sample recounted after 12 days. The average result was 8.8±1.7 (within EPA control limits). The sample was recounted in order to check the decay. Results in the past have been within the limits and TIML will continue to monitor the situation in the future. |
| STW-534 | Co-60 | 63.3±1.3 | 41.3-58.7 | High level of Co-60 was due to contamination of beaker. Beaker was discarded upon discovery of contamination and sample was recounted. Recount results were 53.2±3.6 and 50.9±2.4. |

## ADDENDUM TO APPENDIX A (continued)

| Lab Code | Analysis | TIML Result | EPA Control Limit | Explanation |
|---|---|---|---|---|
| STM-554 | Sr-90 | 51.0±2.0 | 54.8-65.2 | The cause of low result is not known and is under investigation. It should be noted that 63% of all participants failed this test. Also, the average for all participants was 54.0 pCi/l before the Grubb and 55.8 pCi/l after the Grubb. |
| STW-560 | Pu-239 | 5.8±1.1 | 3.5-4.9 | The cause of high results is not known (suspected contaminated standard) and is under investigation. New Pu-236 standard was obtained and will be used for the next test. |
| STW-568 | Ra-228 | 2.6±1.0 | 2.7-4.5 | The cause of low results is under investigation. New dilution was prepared and sample is being reanalyzed. Sample was used up during testing. Next EPA crosschecks with the control limits. |
| STM-570 | Sr-89<br>Sr-90 | 26.0±10.0<br>45.7±4.2 | 39.0±5.0<br>55.0±3.0 | The cause of low results is under investigation. New "spike" milk sample was prepared and being analyzed. Results of analysis: See Table A-3, sample QC-Mi-24. |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STM-554 | Milk | Oct 1988 | Sr-89 | 40.3±7.0 | 40.0±5.0 | 31.3-48.7 |
| | | | Sr-90 | 51.0±2.0 | 60.0±3.0 | 54.8-65.2 |
| | | | I-131 | 94.0±3.4 | 91.0±9.0 | 75.4-106.6 |
| | | | Cs-137 | 45.0±4.0 | 50.0±5.0 | 41.3-58.7 |
| | | | K | 1500±45 | 1600±80 | 1461-1739 |
| STU-555 | Urine | Nov 1988 | H-3 | 3030±209 | 3025±359 | 2403-3647 |
| STW-556 | Water | Nov 1988 | Gr. alpha | 9.0±3.5 | 9.0±5.0 | 0.3-17.7 |
| | | | Gr. beta | 9.7±1.2 | 9.0±5.0 | 0.3-17.7 |
| STW-557 | Water | Dec 1988 | I-131 | 108.7±3.0 | 115.0±12.0 | 94.2-135.8 |
| STW-559 | Water | Jan 1989 | Sr-89 | 40.0±8.7 | 40.0±5.0 | 31.3-48.7 |
| | | | Sr-90 | 24.3±3.1 | 25.0±1.5 | 22.4-27.6 |
| STW-560 | Water | Jan 1989 | Pu-239 | 5.8±1.1 | 4.2±0.4 | 3.5-4.9 |
| STW-561 | Water | Jan 1989 | Gr. alpha | 7.3±1.2 | 8.0±5.0 | 0.0-16.7 |
| | | | Gr. beta | 5.3±1.2 | 4.0±5.0 | 0.0-12.7 |
| STW-562 | Water | Feb 1989 | Cr-51 | 245±46 | 235±24 | 193.4-276.6 |
| | | | Co-60 | 10.0±2.0 | 10.0±5.0 | 1.3-18.7 |
| | | | Zn-65 | 170±10 | 159±16 | 139.2-186.7 |
| | | | Ru-106 | 181±7.6 | 178±18 | 146.8-209.2 |
| | | | Cs-134 | 9.7±3.0 | 10.0±5.0 | 1.3-18.7 |
| | | | Cs-137 | 11.7±1.2 | 10.0±5.0 | 1.3-18.7 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-563 | Water | Feb 1989 | I-131 | 109.0±4.0 | 106.0±11.0 | 86.9-125.1 |
| STW-564 | Water | Feb 1989 | H-3 | 2820±20 | 2754±356 | 2137-3371 |
| STW-565 | Water | Mar 1989 | Ra-226 | 4.2±0.3 | 4.9±0.7 | 3.7-6.1 |
| | | | Ra-228 | 1.9±1.0 | 1.7±0.3 | 1.2-2.2 |
| STW-566 | Water | Mar 1989 | U | 5.0±0.0 | 5.0±6.0 | 0.0-15.4 |
| STW-567 | AirFilter | Mar 1989 | Gr. alpha | 21.7±1.2 | 21.0±5.0 | 12.3-29.7 |
| | | | Gr. beta | 68.3±4.2 | 62.0±5.0 | 53.3-70.7 |
| | | | Sr-90 | 20.0±2.0 | 20.0±1.5 | 17.4-22.6 |
| | | | Cs-137 | 21.3±1.2 | 20.0±5.0 | 11.3-28.7 |
| STW-568 569 | Water (Blind) | Apr 1989 | | | | |
| | | Sample A | | | | |
| | | | Gr. alpha | 22.7±2.3 | 29.0±7.0 | 16.9-41.2 |
| | | | Ra-226 | 3.6±0.6 | 3.5±0.5 | 2.6-4.4 |
| | | | Ra-228 | 2.6±1.0 | 3.6±0.5 | 2.7-4.5 |
| | | | U | 3.0±0.0 | 3.0±6.0 | 0.0-13.4 |
| | | Sample B | Gr. beta | 52.3±6.1 | 57.0±5.0 | 43.3-65.7 |
| | | | Sr-89 | 9.3±5.4 | 8.0±5.0 | 0.0-16.7 |
| | | | Sr-90 | 7.0±0.0 | 8.0±1.5 | 5.4-10.6 |
| | | | Cs-134 | 21.0±5.2 | 20.0±5.0 | 11.3-28.7 |
| | | | Cs-137 | 23.0±2.0 | 20.0±5.0 | 11.3-28.7 |
| STM-570 | Milk | Apr 1989 | Sr-89 | 26.0±10.0 | 39.0±5.0 | 30.3-47.7 |
| | | | Sr-90 | 45.7±4.2 | 55.0±3.0 | 49.8-60.2 |
| | | | Cs-137 | 54.0±6.9 | 50.0±5.0 | 41.3-58.7 |
| | | | K-40 | 1521±208 | 1600±80 | 1461-1739 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | Control Limits |
|---|---|---|---|---|---|---|
| STW-571[g] | Water | May 1989 | Sr-89 | <0.7 | 6.0±5.0 | 0.0-14.7 |
| | | | Sr-90 | 5.0±1.0 | 6.0±1.5 | 3.4-8.6 |
| STW-572 | Water | May 1989 | Gr. alpha | 24.0±2.0 | 30.0±8.0 | 16.1-43.9 |
| | | | Gr. beta | 49.3±15.6 | 50.0±5.0 | 41.3-58.7 |
| STW-573 | Water | Jun 1989 | Ba-133 | 50.7±1.2 | 49.0±5.0. | 40.3-57.7 |
| | | | Co-60 | 31.3±2.3 | 31.0±5.0 | 22.3-39.7 |
| | | | Zn-65 | 167±10 | 165±17 | 135.6-194.4 |
| | | | Ru-106 | 123±9.2 | 128±13 | 105.5-150.5 |
| | | | Cs-134 | 40.3±1.2 | 39±5 | 30.3-47.7 |
| | | | Cs-137 | 22.3±1.2 | 20±5 | 11.3-28.7 |
| STW-574 | Water | Jun 1989 | H-3 | 4513±136 | 4503±450 | 3724-5282 |
| STW-575 | Water | Jul 1989 | Ra-226 | 16.8±3.1 | 17.7±2.7 | 13.0-22.4 |
| | | | Ra-228 | 13.8±3.7 | 18.3±2.7 | 13.6-23.0 |
| STW-576 | Water | Jul 1989 | U | 40.3±1.2 | 41.0±6.0 | 30.6-51.4 |
| STW-577 | Water | Aug 1989 | I-131 | 84.7±5.8 | 83.0±8.0 | 69.1-96.9 |
| STW-579 | Air Filter | Aug 1989 | Gr. alpha | 6.0±0.0 | 6.0±5.0 | 0.0-14.7 |
| | | | Cs-137 | 10.3±2.3 | 10.0±5.0 | 1.3-18.7 |
| STW-580 | Water | Sep 1989 | Sr-89 | 14.7±1.2 | 14.0±5.0 | 5.3-22.7 |
| | | | Sr-90 | 9.7±1.2 | 10.0±1.5 | 7.4-12.6 |
| STW-581 | Water | Sep 1989 | Gr. alpha | 5.0±0.0 | 4.0±5.0 | 0.0-12.7 |
| | | | Gr. Beta | 8.7±2.3 | 6.0±5.0 | 0.0-14.7 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l[b] TIML Result ±2σ[c] | EPA Result[d] 1s, N=1 | EPA Result[d] Control Limits |
|---|---|---|---|---|---|---|
| STW-583 | Water | Oct 1989 | Ba-133 | 60.3±10.0 | 59.0±6.0 | 48.6-69.4 |
| | | | Co-60 | 29.0±4.0 | 30.0±5.0 | 21.3-38.7 |
| | | | Zn-65 | 132.3±6.0 | 129.0±13.0 | 106.5-151.5 |
| | | | Ru-106 | 155.3±6.1 | 161.0±16.0 | 133.3-188.7 |
| | | | Cs-134 | 30.7±6.1 | 29.0±5.0 | 20.3-37.7 |
| | | | Cs-137 | 66.3±4.6 | 59.0±5.0 | 50.3-67.7 |
| STW-584 | Water | Oct 1989 | H-3 | 3407±150 | 3496±364 | 2866-4126 |
| STW-585 586 | Water (Blind) | Oct 1989 | | | | |
| | Sample A | | Gr. Alpha | 41.7±9.4 | 49.0±12.0 | 28.2-69.8 |
| | | | Ra-226 | 7.9±0.4 | 8.4±1.3 | 6.2-10.6 |
| | | | Ra-228 | 4.4±0.8 | 4.1±0.6 | 3.1-5.1 |
| | | | U | 12.0±0.0 | 12.0±6.0 | 1.6-22.4 |
| | Sample B | | Gr. Beta | 31.7±2.3 | 32.0±5.0 | 23.3-40.7 |
| | | | Sr-89 | 13.3±4.2 | 15.0±5.0 | 6.3-23.7 |
| | | | Sr-90 | 7.0±2.0 | 7.0±3.0 | 4.4-9.6 |
| | | | Cs-134 | 5.0±0.0 | 5.0±5.0 | 0.0-13.7 |
| | | | Cs-137 | 7.0±0.0 | 5.0±5.0 | 0.0-13.7 |
| STW-587 | Water | Nov 1989 | Ra-226 | 7.9±0.4 | 8.7±1.3 | 6.4-11.0 |
| | | | Ra-228 | 8.9±1.2 | 9.3±1.2 | 6.9-11.7 |
| STW-588 | Water | Nov 1989 | U | 15.0±0.0[g] | 15.0±6.0 | 4.6-25.4 |

[a] Results obtained by Teledyne Isotopes Midwest Laboratory as a participant in the environmental sample crosscheck program operated by the Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency (EPA), Las Vegas, Nevada.

[b] All results are in the pCi/l, except for elemental potassium (K) data in milk, which are in mg/l; air filter samples, which are in pCi/filter; and food, which is in mg/kg.

[c] Unless otherwise indicated, the TIML results are given as the mean ± 2 standard deviations for three determinations.

[d] USEPA results are presented as the known values and expected laboratory precision (1s, 1 determination) and control limits as defined by EPA.

[e] NA = Not analyzed.

[f] ND = No data. Not analyzed due to relocation of the lab.

[g] Sample was analyzed but the results not submitted to EPA because deadline was missed.

Table A-2. Crosscheck program results, thermoluminescent dosimeters (TLDs).

| Lab Code | TLD Type | Measurement | mR: Teledyne Result ±2σ[a] | mR: Known Value[c] | mR: Average ±2 σ[d] (all participants) |
|---|---|---|---|---|---|
| 2nd International Intercomparison[b] | | | | | |
| 115-2 | $CaF_2$:Mn Bulb | Field | 17.0±1.9 | 17.1 | 16.4±7.7 |
| | | Lab | 20.8±4.1 | 21.3 | 18.8±7.6 |
| 3rd International Intercomparison[e] | | | | | |
| 115-3 | $CaF_2$:Mn Bulb | Field | 30.7±3.2 | 34.9±4.8 | 31.5±3.0 |
| | | Lab | 89.6±6.4 | 91.7±14.6 | 86.2±24.0 |
| 4th International Intercomparison[f] | | | | | |
| 115-4 | $CaF_2$:Mn Bulb | Field | 14.1±1.1 | 14.1±1.4 | 16.0±9.0 |
| | | Lab (Low) | 9.3±1.3 | 12.2±2.4 | 12.0±7.6 |
| | | Lab (High) | 40.4±1.4 | 45.8±9.2 | 43.9±13.2 |
| 5th International Intercomparison[g] | | | | | |
| 115-5A | $CaF_2$:Mn Bulb | Field | 31.4±1.8 | 30.0±6.0 | 30.2±14.6 |
| | | Lab at beginning | 77.4±5.8 | 75.2±7.6 | 75.8±40.4 |
| | | Lab at end | 96.6±5.8 | 88.4±8.8 | 90.7±31.2 |

Table A-2. (Continued)

| Lab Code | TLD Type | Measurement | mR | | |
|---|---|---|---|---|---|
| | | | Teledyne Result ±2σ[a] | Known Value[c] | Average ±2σ[d] (all participants) |
| 115-5B | LiF-100 Chips | Field | 30.3±4.8 | 30.0±6.0 | 30.2±14.6 |
| | | Lab at beginning | 81.1±7.4 | 75.2±7.6 | 75.8±40.4 |
| | | Lab at the end | 85.4±11.7 | 88.4±8.8 | 90.7±31.2 |
| 7th International Intercomparison[h] | | | | | |
| 115-7A | LiF-100 Chips | Field | 75.4±2.6 | 75.8±6.0 | 75.1±29.8 |
| | | Lab (Co-60) | 80.0±3.5 | 79.9±4.0 | 77.9±27.6 |
| | | Lab (Cs-137) | 66.6±2.5 | 75.0±3.8 | 73.0±22.2 |
| 115-7B | $CaF_2$:Mn Bulbs | Field | 71.5±2.6 | 75.8±6.0 | 75.1±29.8 |
| | | Lab (Co-60) | 84.8±6.4 | 79.9±4.0 | 77.9±27.6 |
| | | Lab (Cs-137) | 78.8±1.6 | 75.0±3.8 | 73.0±22.2 |
| 115-7C | $CaSO_4$:Dy Cards | Field | 76.8±2.7 | 75.8±6.0 | 75.1±29.8 |
| | | Lab (Co-60) | 82.5±3.7 | 79.9±4.0 | 77.9±27.6 |
| | | Lab (Cs-137 | 79.0±3.2 | 75.0±3.8 | 73.0±22.2 |

Table A-2. (Continued)

| Lab Code | TLD Type | Measurement | mR: Teledyne Result ±2σ[a] | mR: Known Value[c] | mR: Average ±2σ[d] (all participants) |
|---|---|---|---|---|---|
| 8th International Intercomparison[b] | | | | | |
| 115-8A | LiF-100 Chips | Field Site 1 | 29.5±1.4 | 29.7±1.5 | 28.9±12.4 |
| | | Field Site 2 | 11.3±0.8 | 10.4±0.5 | 10.1±9.06 |
| | | Lab (Cs-137) | 13.7±0.9 | 17.2±0.9 | 16.2±6.8 |
| 115-8B | $CaF_2$:Mn Bulbs | Field Site 1 | 32.3±1.2 | 29.7±1.5 | 28.9±12.4 |
| | | Field Site 2 | 9.0±1.0 | 10.4±0.5 | 10.1±9.0 |
| | | Lab (Cs-137) | 15.8±0.9 | 17.2±0.9 | 16.2±6.8 |
| 115-8C | $CaSO_4$:Dy Cards | Field Site 1 | 32.3±0.7 | 29.7±1.5 | 28.9±12.4 |
| | | Field Site 2 | 10.6±0.6 | 10.4±0.5 | 10.1±9.0 |
| | | Lab (Cs-137 | 18.1±0.8 | 17.2±0.9 | 16.2±6.8 |
| Teledyne Testing[3] | | | | | |
| 89-1 | LiF-100 Chips | Lab | 21.0±0.4 | 22.4 | - |
| 89-2 | Teledyne $CaSO_4$:Dy Cards | Lab | 20.9±1.0 | 20.3 | - |

[a] Lab result given is the mean ±2 standard deviations of three determinations.
[b] Second International Intercomparison of Environmental Dosimeters conducted in April of 1976 by the Health and Safety Laboratory (GASL), New York, New York, and the School of Public Health of the University of Texas, Houston, Texas.
[c] Value determined by sponsor of the intercomparison using continously operated pressurized ion chamber.
[d] Mean ±2 standard deviations of results obtained by all laboratories participating in the program.

Table A-2. (continued)

| Lab Code | TLD Type | Measurement | mR: Teledyne Result $\pm 2\sigma$[a] | mR: Known Value[c] | mR: Average $\pm 2\sigma$[d] (all participants) |
|---|---|---|---|---|---|

Footnotes continued

[e] Third International Intercomparison of Environmental Dosimeters conducted in summer of 1977 by Oak Ridge National Laboratory and the School of Public Health of the University of Texas, Houston, Texas.

[f] Fourth International Intercomparison of Environmental Dosimeters conducted in summer of 1979 by the School of Public Health of the University of Texas, Houston, Texas.

[g] Fifth International Intercomparison of Environmental Dosimeter conducted in fall of 1980 at Idaho Falls, Idaho and sponsored by the School of Public Health of the University of Texas, Houston, Texas and Environmental Measurements Laboratory, New York, New York, U.S. Department of Energy.

[h] Seventh International Intercomparison of Environmental Dosimeters conducted in the spring and summer of 1984 at Las Vegas, Nevada, and sponsored by the U.S. Department of Energy, the U.S. Nuclear Regulatory Commission, and the U.S. Environmental Protection Agency.

[i] Eighth International Intercomparison of Environmental Dosimeters conducted in the fall and winter of 1985-1986 at New York, New York, and sponsored by the U.S. Department of Energy.

[j] Chips were submitted in September, 1989 and cards were submitted in November, 1989 to Teledyne Isotopes, Inc., Westwood, NJ for irradiation.

Table A-3. In-house spiked samples.

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-MI-6 | Milk | Feb. 1986 | Sr-89 | 6.0±1.9 | 6.4±3.0 | 8.7 |
| | | | Sr-90 | 14.2±1.7 | 12.9±2.0 | 5.2 |
| | | | I-131 | 34.2±3.8 | 35.2±3.5 | 10.4 |
| | | | Cs-134 | 32.0±1.8 | 27.3±5.0 | 8.7 |
| | | | Cs-137 | 35.8±2.1 | 35.0±5.0 | 8.7 |
| QC-W-14 | Water | Mar. 1986 | Sr-89 | 1.6±0.4 | 1.6±1.0 | 7.1 |
| | | | Sr-90 | 2.4±0.2 | 2.4±2.0 | 4.2 |
| QC-W-15 | Water | Apr. 1986 | I-131 | 44.9±2.4 | 41.5±7.0 | 10.6 |
| | | | Co-60 | 10.6±1.7 | 12.1±5.0 | 7.1[b] |
| | | | Cs-134 | 30.2±2.4 | 25.8±8.0 | 7.1[b] |
| | | | Cs-137 | 21.9±1.9 | 19.9±5.0 | 7.1[b] |
| QC-MI-7 | Milk | Apr. 1986 | I-131 | 39.7±3.3 | 41.5±7.0 | 10.4 |
| | | | Cs-134 | 28.7±2.8 | 25.8±8.0 | 8.7 |
| | | | Cs-137 | 21.2±2.8 | 19.9±5.0 | 8.7 |
| SPW-1 | Water | May 1986 | Gross alpha | 15.8±1.8 | 18.0±5.0 | 5[c] |
| QC-W-16 | Water | June 1986 | Gross alpha | 16.2±0.7 | 16.9±2.5 | 8.7 |
| | | | Gross beta | 38.4±3.5 | 30.2±5.0 | 8.7 |
| QC-MI-9 | Milk | June 1986 | Sr-89 | <1.0 | 0.0 | 7.1[b] |
| | | | Sr-90 | 12.6±1.8 | 13.3±3.0 | 4.2[b] |
| | | | I-131 | 38.9±7.0 | 34.8±7.0 | 10.4 |
| | | | Cs-134 | 33.0±3.4 | 36.1±5.0 | 8.7 |
| | | | Cs-137 | 38.5±2.8 | 39.0±5.0 | 8.7 |
| SPW-2 | Water | June 1986 | Gross alpha | 16.8±1.8 | 18.0±5.0 | 5[c] |
| SPW-3 | Water | June 1986 | Gross alpha | 17.7±0.8 | 18.0±5.0 | 5[c] |
| QC-W-18 | Water | Sep. 1986 | Cs-134 | 34.7±5.6 | 31.3±5.0 | 8.7 |
| | | | Cs-137 | 51.1±7.0 | 43.3±8.0 | 8.7 |
| QC-W-19 | Water | Sep. 1986 | Sr-89 | 13.6±4.1 | 15.6±3.5 | 7.1[b] |
| | | | Sr-90 | 6.4±1.6 | 6.2±2.0 | 4.2[b] |

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-W-21 | Water | Oct. 1986 | C -60 | 19.2±2.2 | 18.5±3.0 | 8.7 |
| | | | Cs-134 | 31.7±5.2 | 25.6±8.0 | 8.7 |
| | | | Cs-137 | 23.8±1.0 | 21.6±5.0 | 8.7 |
| QC-MI-11 | Milk | Oct 1986 | Sr-89 | 12.3±1.8 | 14.3±3.0 | 8.7 |
| QC-W-20 | Water | Nov. 1986 | H-3 | 3855±180 | 3960±350 | 520[b] |
| QC-W-22 | Water | Dec. 1986 | Gross alpha | 9.8±1.4 | 11.2±4.0 | 8.7 |
| | | | Gross beta | 21.7±2.0 | 23.8±5.0 | 8.7 |
| QC-W-23 | Water | Jan. 1987 | I-131 | 29.8±2.5 | 27.9±3.0 | 10.4 |
| QC-MI-12 | Milk | Jan. 1987 | I-131 | 36.5±1.3 | 32.6±5.0 | 10.4 |
| | | | Cs-137 | 32.6±4.2 | 27.4±8.0 | 8.7 |
| QC-MI-13 | Milk | Jan 1987 | Sr-89 | 10.4±2.1 | 12.2±4.0 | 8.7 |
| | | | Sr-90 | 14.6±1.6 | 12.6±3.0 | 5.2 |
| | | | I-131 | 49.5±1.2 | 54.9±8.0 | 10.4 |
| | | | Cs-134 | <1.6 | 0.0 | 8.7 |
| | | | Cs-137 | 33.3±0.6 | 27.4±8.0 | 8.7 |
| QC-W-24 | Water | Mar 1987 | Sr-89 | 24.7±3.6 | 25.9±5.0 | 8.7 |
| | | | Sr-90 | 23.9±3.8 | 22.8±8.0 | 5.2 |
| QC-W-25 | Water | Apr 1987 | I-131 | 28.0±1.9 | 29.3±5.0 | 10.6 |
| QC-MI-14 | Milk | Apr 1987 | I-131 | 25.0±2.2 | 23.9±5.0 | 10.4 |
| | | | Cs-134 | <2.1 | 0.0 | 8.7 |
| | | | Cs-137 | 34.2±2.0 | 27.2±7.0 | 8.7 |
| QC-W-26 | Water | Jun 1987 | H-3 | 3422±100 | 3362±300 | 520 |
| | | | Co-60 | 24.8±1.4 | 26.5±7.0 | 8.7 |
| | | | Cs-134 | <2.0 | 0.0 | 8.7 |
| | | | Cs-137 | 21.2±0.5 | 21.6±7.0 | 8.7 |
| QC-W-27 | Water | Jun 1987 | Gr. alpha | 8.5±1.9 | 10.1±4.0 | 8.7 |
| | | | Gr. beta | 22.6±1.9 | 21.2±5.0 | 8.7 |
| QC-W-28 | Water | Jun 1987 | Gr. alpha | 8.7±1.3 | 10.1±4.0 | 8.7 |
| | | | Gr. beta | 12.2±5.2 | 9.4±3.0 | 8.7 |

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-W-29 | Water | Jun 1987 | Gr. alpha | 16.4±1.3 | 18.9±5.0 | 8.7 |
| | | | Gr. beta | 15.9±4.0 | 11.8±4.0 | 8.7 |
| QC-MI-15 | Milk | Jul 1987 | Sr-90 | 19.4±1.6 | 18.8±3.5 | 5.2 |
| | | | I-131 | 43.5±0.7 | 45.3±7.0 | 10.4 |
| | | | Cs-134 | 17.9±2.2 | 16.0±5.3 | 8.7 |
| | | | Cs-137 | 25.4±1.8 | 22.7±5.0 | 8.7 |
| QC-W-30 | Water | Sep 1987 | Sr-89 | 17.5±3.0 | 14.3±5.0 | 8.7 |
| | | | Sr-90 | 18.4±2.2 | 17.5±2.2 | 5.2 |
| QC-W-31 | Water | Oct 1987 | H-3 | 2053±939 | 2059±306 | 520 |
| QC-W-32 | Water | Dec 1987 | Gr. alpha | 8.6±1.0 | 10.1±5.0 | 8.7 |
| | | | Gr. beta | 15.2±0.1 | 13.1±3.0 | 8.7 |
| QC-W-33 | Water | Dec 1987 | Gr. alpha | 7.7±1.4 | 10.1±5.0 | 8.7 |
| | | | Gr. beta | 10.9±1.0 | 7.9±3.0 | 8.7 |
| QC-W-34 | Water | Dec 1987 | Gr. alpha | 4.0±0.9 | 5.1±3.0 | 8.7 |
| | | | Gr. beta | 9.4±0.9 | 7.9±3.0 | 8.7 |
| QC-MI-16 | Milk | Feb 1988 | Sr-89 | 31.8±4.7 | 31.7±6.0 | 8.7 |
| | | | Sr-90 | 25.5±2.7 | 27.8±3.5 | 5.2 |
| | | | I-131 | 26.4±0.5 | 23.2±5.0 | 10.4 |
| | | | Cs-134 | 23.8±2.3 | 24.2±6.0 | 8.7 |
| | | | Cs-137 | 26.5±0.8 | 25.1±6.0 | 8.7 |
| QC-MI-17 | Milk | Feb 1988 | I-131 | 10.6±1.2 | 14.3±1.6 | 10.4 |
| QC-W-35 | Water | Feb 1988 | I-131 | 9.7±1.1 | 11.6±1.1 | 10.4 |
| QC-W-36 | Water | Feb 1988 | I-131 | 10.5±1.3 | 11.6±1.0 | 10.4 |
| QC-W-37 | Water | Mar 1988 | Sr-89 | 17.1±2.0 | 19.8±8.0 | 8.7 |
| | | | Sr-90 | 18.7±0.9 | 17.3±5.0 | 5.2 |
| QC-MI-18 | Milk | Mar 1988 | I-131 | 33.2±2.3 | 26.7±5.0 | 10.4 |
| | | | Cs-134 | 31.3±2.1 | 30.2±5.0 | 8.7 |
| | | | Cs-137 | 29.9±1.4 | 26.2±5.0 | 8.7 |

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-W-38 | Water | Apr 1988 | I-131 | 17.1±1.1 | 14.2±5.0 | 10.4 |
| QC-W-39 | Water | Apr 1988 | H-3 | 4439±31 | 4176±500 | 724 |
| QC-W-40 | Water | Apr 1988 | Co-60 | 23.7±0.5 | 26.1±4.0 | 8.7 |
| | | | Cs-134 | 25.4±2.6 | 29.2±4.5 | 8.7 |
| | | | Cs-137 | 26.6±2.3 | 26.2±4.0 | 8.7 |
| QC-W-41 | Water | Jun 1988 | Gr. alpha | 12.3±0.4 | 13.1±5.0 | 8.7 |
| | | | Gr. beta | 22.6±1.0 | 20.1±5.0 | 8.7 |
| QC-MI-19 | Milk | Jul 1988 | Sr-89 | 15.1±1.6 | 16.4±5.0 | 8.7 |
| | | | Sr-90 | 18.0±0.6 | 18.3±5.0 | 5.2 |
| | | | I-131 | 88.4±4.9 | 86.6±8.0 | 10.4 |
| | | | Cs-137 | 22.7±0.8 | 20.8±6.0 | 8.7 |
| QC-W-42 | Water | Sep 1988 | Sr-89 | 48.5±3.3 | 50.8±8.0 | 8.7 |
| | | | Sr-90 | 10.9±1.0 | 11.4±3.5 | 5.2 |
| QC-W-43 | Water | Oct 1988 | Co-60 | 20.9±3.2 | 21.4±3.5 | 8.7 |
| | | | Cs-134 | 38.7±1.6 | 38.0±6.0 | 8.7 |
| | | | Cs-137 | 19.0±2.4 | 21.0±3.5 | 8.7 |
| QC-W-44 | Water | Oct 1988 | I-131 | 22.2±0.6 | 23.3±3.5 | 10.4 |
| QC-W-45 | Water | Oct 1988 | H-3 | 4109±43 | 4153±500 | 724 |
| QC-MI-20 | Milk | Oct 1988 | I-131 | 59.8±0.9 | 60.6±9.0 | 10.4 |
| | | | Cs-134 | 49.6±1.8 | 48.6±7.5 | 8.7 |
| | | | Cs-137 | 25.8±4.6 | 24.7±4.0 | 8.7 |
| QC-W-46 | Water | Dec 1988 | Gr. alpha | 11.5±2.3 | 15.2±5.0 | 8.7 |
| | | | Gr. beta | 26.5±2.0 | 25.7±5.0 | 8.7 |
| QC-MI-21 | Milk | Jan 1989 | Sr-89 | 25.5±10.3 | 34.0±10.0 | 8.7 |
| | | | Sr-90 | 28.3±3.2 | 27.1±3.0 | 5.2 |
| | | | I-131 | 540±13 | 550±20 | 10.4 |
| | | | Cs-134 | 24.5±2.6 | 22.6±5.5 | 8.7 |
| | | | Cs-137 | 24.0±0.6 | 20.5±5.0 | 8.7 |

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
|---|---|---|---|---|---|---|
| QC-W-47 | Water | Mar 1989 | Sr-89 | 15.2±3.8 | 16.1±5.0 | 8.7 |
| | | | Sr-90 | 16.4±1.7 | 16.9±3.0 | 5.2 |
| QC-MI-22 | Milk | Apr 1989 | I-131 | 36.3±1.1 | 37.2±5.0 | 10.4 |
| | | | Cs-134 | 20.8±2.8 | 20.7±8.0 | 8.7 |
| | | | Cs-137 | 22.2±2.4 | 20.4±8.0 | 8.7 |
| QC-W-48 | Water | Apr 1989 | Co-60 | 23.5±2.0 | 25.1±8.0 | 8.7 |
| | | | Cs-134 | 24.2±1.1 | 25.9±8.0 | 8.7 |
| | | | Cs-137 | 23.6±1.2 | 23.0±8.0 | 8.7 |
| QC-W-49 | Water | Apr 1989 | I-131 | 37.2±3.7 | 37.2±5.0 | 10.4 |
| QC-W-50 | Water | Apr 1989 | H-3 | 3011±59 | 3089±500 | 724 |
| QC-W-51 | Water | Jun 1989 | Gr. alpha | 13.0±1.8 | 15.0±5.0 | 8.7 |
| | | | Gr. beta | 26.0±1.2 | 25.5±8.0 | 8.7 |
| QC-MI-23 | Milk | Jul 1989 | Sr-89 | 19.4±6.5 | 22.0±10.0 | 8.7 |
| | | | Sr-90 | 27.6±3.3 | 28.6±3.0 | 5.2 |
| | | | I-131 | 46.8±3.2 | 43.4±5.0 | 10.4 |
| | | | Cs-134 | 27.4±1.8 | 28.3±6.0 | 8.7 |
| | | | Cs-137 | 24.1±1.8 | 20.8±6.0 | 8.7 |
| QC-MI-24 | Milk | Aug 1989 | Sr-89 | 25.4±2.7 | 27.2±10.0 | 8.7 |
| | | | Sr-90 | 46.0±1.1 | 47.8±9.6 | 8.3 |
| QC-W-52 | Water | Sep 1989 | I-131 | 9.6±0.3 | 9.7±1.9 | 10.4 |
| QC-W-53 | Water | Sep 1989 | I-131 | 19.0±0.2 | 20.9±4.2 | 10.4 |
| QC-W-54 | Water | Sep 1989 | Sr-89 | 25.8±4.6 | 24.7±4.0 | 8.7 |
| | | | Sr-90 | 26.5±5.3 | 29.7±5.0 | 5.2 |

[a] n=3 unless noted otherwise.
[b] n=2.
[c] n=1.

Table A-3. In-house spiked samples (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l | | |
|---|---|---|---|---|---|---|
| | | | | TIML Result n=3 | Known Activity | Expected Precision 1s, n=3[a] |
| QC-MI-25 | Milk | Oct 1989 | I-131 | 70.0±3.3 | 73.5±20.0 | 10.4 |
| | | | Cs-134 | 22.1±2.6 | 22.6±8.0 | 8.7 |
| | | | Cs-137 | 29.4±1.5 | 27.5±8.0 | 8.7 |
| QC-W-55 | Water | Oct 1989 | I-131 | 33.3±1.3 | 35.3±10.0 | 10.4 |
| QC-W-56 | Water | Oct 1989 | Co-60 | 15.2±0.9 | 17.4±5.0 | 8.7 |
| | | | Cs-134 | 22.1±4.4 | 18.9±8.0 | 8.7 |
| | | | Cs-137 | 27.2±1.2 | 22.9±8.0 | 8.7 |
| QC-W-57 | Water | Oct 1989 | H-3 | 3334±22 | 3379±500 | 724 |
| QC-W-58 | Water | Nov 1989 | Sr-89 | 10.9±1.4[d] | 11.1±1.0[d] | 8.7 |
| | | | Sr-90 | 10.4±1.0[d] | 10.3±1.0[d] | 5.2 |
| QC-W-59 | Water | Nov 1989 | Sr-89 | 101.0±5.0[d] | 104.1±10.5[d] | 17.5 |
| | | | Sr-90 | 98.0±3.0[d] | 95.0±10.0[d] | 17.0 |
| QC-W-60 | Water | Dec 1989 | Gr. alpha | 10.8±1.1 | 10.6±4.0 | 8.7 |
| | | | Gr. beta | 11.6±0.5 | 11.4±4.0 | 8.7 |

[a] n=3 unless noted otherwise.
[b] n=2.
[c] n=1.
[d] Concentration in pCi/ml

Table A-4. In-house "blank" samples.

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Concentration in pCi/l Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| BL-1 | D.I. Water | Nov. 1985 | Gross alpha | <0.1 | <1 |
| | | | Gross beta | <0.4 | <4 |
| BL-2 | D.I. Water | Nov. 1985 | Cs-137 (gamma) | <1.9 | <10 |
| BL-3 | D.I. Water | Nov. 1985 | Sr-89 | <0.5 | <5 |
| | | | Sr-90 | <0.6 | <1 |
| BL-5 | D.I. Water | Nov. 1985 | Ra-226 | <0.4 | <1 |
| | | | Ra-228 | <0.4 | <1 |
| SPW-2265 | D.I. Water | Apr. 1985 | Gross alpha | <0.6 | <1 |
| | | | Gross beta | <2.2 | <4 |
| | | | Sr-89 | <0.2 | <5 |
| | | | Sr-90 | <0.4 | <1 |
| | | | I-131 | <0.2 | <1 |
| | | | Cs-137 (gamma) | <7.4 | <10 |
| BL-6 | D.I. Water | Apr. 1986 | Gross alpha | <0.4 | <1 |
| BL-7 | D.I. Water | Apr. 1986 | Gross alpha | <0.4 | <1 |
| BL-8 | D.I. Water | June 1986 | Gross alpha | <0.4 | <1 |
| BL-9 | D.I. Water | June 1986 | Gross alpha | <0.3 | <1 |
| SPW-3185 | D.I. Water | Jan 1987 | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <0.9 | <1 |
| SPS-3292 | Milk | Jan 1987 | I-131 | <0.1 | <1 |
| | | | Cs-134 | <6.2 | <10 |
| | | | Cs-137 | <6.4 | <10 |
| SPW-3554 | D.I. Water | Feb 1987 | H-3 | <180 | <300 |
| | | | Gross beta | <2.6 | <4 |
| SPS-3555 | Milk | Feb 1987 | Sr-89 | <0.6 | <5 |
| | | | Sr-90 | 1.9±0.4[a] | <1 |
| SPS-3731 | Milk | Mar 1987 | Cs-134 | <2.2 | <10 |
| | | | Cs-137 | <2.5 | <10 |

[a] Low level (1 - 5 pCi/l) of Sr-90 concentration in milk is not unusual.

Table A-4. In-house "blank" samples (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Concentration in pCi/l Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| SPS-3732 | D.I. Water | Mar 1987 | Sr-89 | <0.9 | <5 |
| | | | Sr-90 | <0.8 | <1 |
| | | | I-131 | <0.3 | <1 |
| | | | Co-60 | <2.3 | <10 |
| | | | Cs-134 | <2.2 | <10 |
| | | | Cs-137 | <2.4 | <10 |
| | | | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <1.0 | <1 |
| | | | Np-237 | <0.04 | <1 |
| | | | Th-230 | <0.05 | <0.1 |
| | | | Th-232 | <0.02 | <0.1 |
| | | | U-234 | <0.05 | <0.1 |
| | | | U-235 | <0.03 | <0.1 |
| | | | U-238 | <0.03 | <0.1 |
| SPS-4023 | Milk | May 1987 | I-131 | <0.1 | <1 |
| SPS-4203 | D.I. Water | May 1987 | Gross alpha | <0.7 | <1 |
| | | | Gross beta | <1.7 | <4 |
| SPS-4204 | Milk | May 1987 | Sr-89 | <0.5 | <5 |
| | | | Sr-90 | 2.4±0.6[a] | <1 |
| SPS-4390 | Milk | Jun 1987 | Cs-134 | <4.7 | <10 |
| | | | Cs-137 | <5.2 | <10 |
| SPS-4391 | D.I. Water | Jun 1987 | Sr-89 | <0.4 | <5 |
| | | | Sr-90 | <0.4 | <1 |
| | | | I-121 | <0.1 | <1 |
| | | | Co-60 | <3.8 | <10 |
| | | | Cs-137 | <5.7 | <10 |
| | | | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <0.9 | <1 |
| SPW-4627 | D.I. Water | Aug 1987 | Gross alpha | <0.6 | <1 |
| | | | Gross beta | <1.4 | <4 |
| | | | Tritium | <150 | |
| SPS-4528 | Milk | Aug 1987 | Sr-89 | <0.6 | <5 |
| | | | Sr-90 | 2.4±0.6[a] | <1 |
| SPS-4847 | Milk | Sep 1987 | Cs-134 | <4.4 | <10 |
| | | | Cs-137 | <5.3 | <10 |

[a] Low level (1 - 5 pCi/l) of Sr-90 concentration in milk is not unusual.

Table A-4. In-house "blank" samples (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Concentration in pCi/l Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| SPS-4848 | D.I. Water | Sep 1987 | I-131 | <0.2 | <1 |
| SPW-4849 | D.I. Water | Sep 1987 | Co-60 | <4.1 | <10 |
| | | | Cs-134 | <4.8 | <10 |
| | | | Cs-137 | <4.0 | <10 |
| | | | Sr-89 | <0.7 | <5 |
| | | | Sr-90 | <0.7 | <1 |
| SPW-4850 | D.I. Water | Sep 1987 | Th-228 | <0.04 | <1 |
| | | | Th-232 | <0.8 | <1 |
| | | | U-234 | <0.03 | <1 |
| | | | U-235 | <0.03 | <1 |
| | | | U-238 | <0.02 | <1 |
| | | | Am-241 | <0.06 | <1 |
| | | | Cm-242 | <0.04 | <1 |
| | | | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <1.0 | <2 |
| SPW-4859 | D.I. Water | Oct 1987 | Fe-55 | <0.5 | <1 |
| SPS-5348 | Milk | Dec 1987 | Cs-134 | <2.3 | <10 |
| | | | Cs-137 | <2.5 | <10 |
| SPW-5384 | D.I. Water | Dec 1987 | Co-60 | <2.8 | <10 |
| | | | Cs-134 | <2.6 | <10 |
| | | | Cs-137 | <2.8 | <10 |
| | | | I-131 | <0.2 | <1 |
| | | | Ra-226 | <0.1 | <1 |
| | | | Ra-228 | <1.2 | <2 |
| | | | Sr-89 | <0.5 | <1 |
| | | | Sr-90 | <0.4 | <1 |
| SPW-5385 | D.I. Water | Nov 1987 | Gr. alpha | <0.4 | <1 |
| | | | Gr. beta | <2.2 | <4 |
| | | | Fe-55 | <0.3 | <1 |
| SPS-5386 | Milk | Jan 1988 | I-131 | <0.1 | <1 |
| SPW-5448 | "Dead" Water | Jan 1988 | H-3 | <177 | <300 |

Table A-4. In-house "blank" samples (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l | |
|---|---|---|---|---|---|
| | | | | Results (4.66[illegible] ) | Acceptance Criteria (4.66[illegible] ) |
| SPS-5615 | Milk | Mar 1988 | Cs-134 | <2.4 | <10 |
| | | | Cs-137 | <2.5 | <10 |
| | | | I-131 | <0.3 | <1 |
| | | | Sr-89 | <0.4 | <5 |
| | | | Sr-90 | 2.4±0.5[a] | <1 |
| SPS-5650 | D.I. Water | Mar 1988 | Th-228 | <0.3 | <1 |
| | | | Th-230 | <0.04 | <1 |
| | | | Th-232 | <0.05 | <1 |
| | | | U-234 | <0.03 | <1 |
| | | | U-235 | <0.03 | <1 |
| | | | U-238 | <0.03 | <1 |
| | | | Am-241 | <0.06 | <1 |
| | | | Cm-242 | <0.01 | <1 |
| | | | Pu-238 | <0.08 | <1 |
| | | | Pu-240 | <0.02 | <1 |
| SPS-6090 | Milk | Jul 1988 | Sr-89 | <0.5 | <1 |
| | | | Sr-90 | 1.8±0.5[a] | <1 |
| | | | I-131 | <0.4 | <1 |
| | | | Cs-137 | <0.4 | <10 |
| SPW-6209 | Water | Jul 1988 | Fe-55 | <0.8 | <1 |
| SPW-6292 | Water | Sep 1988 | Sr-89 | <0.7 | <1 |
| | | | Sr-90 | <0.7 | <1 |
| SPS-6477 | Milk | Oct 1988 | I-131 | <0.2 | <1 |
| | | | Cs-134 | <6.1 | <10 |
| | | | Cs-137 | <5.9 | <10 |
| SPW-6478 | Water | Oct 1988 | I-131 | <0.2 | <1 |
| SPW-6479 | Water | Oct 1988 | Co-60 | <5.7 | <10 |
| | | | Cs-134 | <3.7 | <10 |
| | | | Cs-137 | <4.3 | <10 |
| SPW-6480 | Water | Oct 1988 | H-3 | <170 | <300 |
| SPW-6625 | Water | Dec 1988 | Gr. alpha | <0.7 | <1 |
| | | | Gr. beta | <1.9 | <4 |

[a] Low level (1 - 5 pCi/l) of Sr-90 concentration in milk is not unusual.

Table A-4. In-house "blank" samples (continued).

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l Results (4.66σ) | Concentration in pCi/l Acceptance Criteria (4.66σ) |
|---|---|---|---|---|---|
| SPS-6723 | Milk | Jan 1989 | Sr-89 | <0.6 | <5 |
| | | | Sr-90 | 1.9±0.5[a] | <1 |
| | | | I-131 | <0.2 | <1 |
| | | | Cs-134 | <4.3 | <10 |
| | | | Cs-137 | <4.4 | <10 |
| SPW-6877 | Water | Mar 1989 | Sr-89 | <0.4 | <5 |
| | | | Sr-90 | <0.6 | <1 |
| SPS-6963 | Milk | Apr 1989 | I-131 | <0.3 | <1 |
| | | | Cs-134 | <5.9 | <10 |
| | | | Cs-137 | <6.2 | <10 |
| SPW-7561 | Water | Apr 1989 | H-3 | <150 | <300 |
| SPW-7207 | Water | Jun 1989 | Ra-226 | <0.2 | <1 |
| | | | Ra-228 | <0.6 | <1 |
| SPS-7208 | Milk | Jun 1989 | Sr-89 | <0.6 | <5 |
| | | | Sr-90 | 2.1±0.5[a] | <1 |
| | | | I-131 | <0.3 | <1 |
| | | | Cs-134 | <6.4 | <10 |
| | | | Cs-137 | <7.2 | <10 |
| SPW-7558 | Water | Jun 1989 | Gr. alpha | <0.2 | <1 |
| | | | Gr. beta | <1.0 | <4 |
| SPS-7322 | Milk | Aug 1989 | Sr-89 | <1.4 | <5 |
| | | | Sr-90 | 4.8±1.0[a] | <1 |
| | | | I-131 | <0.2 | <1 |
| | | | Cs-134 | <6.9 | <10 |
| | | | Cs-137 | <8.2 | <10 |
| SPW-7559 | Water | Sep 1989 | Sr-89 | <2.0 | <5 |
| | | | Sr-90 | <0.7 | <1 |
| SPW-7560 | Water | Oct 1989 | I-131 | <0.1 | <1.0 |
| SPW-7562 | Water | Oct 1989 | H-3 | <140 | <300 |
| SPS-7605 | Milk | Nov 1989 | I-131 | <0.2 | <1 |
| | | | Cs-134 | <8.6 | <10 |
| | | | Cs-137 | <10 | <10 |
| SPW-7971 | Water | Dec 1989 | Gr. alpha | <0.4 | <1 |
| | | | Gr. beta | <0.8 | <4 |

[a] Low level (1-5 pCi/l) of Sr-90 concentration in milk is not unusual.

## ATTACHMENT B

### ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES[a]

| Analysis | Level | One Standard Deviation for Single Determination |
|---|---|---|
| Gamma Emitters | 5 to 100 pCi/liter or kg<br>>100 pCi/liter or kg | 5 pCi/liter<br>5% of known value |
| Strontium-89[b] | 5 to 50 pCi/liter or kg<br>>50 pCi/liter or kg | 5 pCi/liter<br>10% of known value |
| Strontium-90[b] | 2 to 30 pCi/liter or kg<br>>30 pCi/liter of kg | 3.0 pCi/liter<br>10% of known value |
| Potassium | >0.1 g/liter or kg | 5% of known value |
| Gross Alpha | <20 pCi/liter<br>>20 pCi/liter | 5 pCi/liter<br>25% of known value |
| Gross Beta | <100 pCi/liter<br>>100 pCi/liter | 5 pCi/liter<br>5% of known value |
| Tritium | <4,000 pCi/liter<br><br>>4,000 pCi/liter | 1s = (pCi/liter) = 169.85 x (known)·0933<br>10% of known value |
| Radium-226, Radium-228 | <0.1 pCi/liter | 15% of known value |
| Plutonium | 0.1 pCi/liter, gram, or sample | 10% of known value |
| Iodine-131, Iodine-129[b] | <55 pCi/liter<br>>55 pCi/liter | 6 pCi/liter<br>10% of known value |
| Uranium-238, Nickel-63[b], Technetium-99[b] | <35 pCi/liter<br>>35 pCi/liter | 6 pCi/liter<br>15% of known value |
| Iron-55[b] | 50 to 100 pCi/liter | 10 pCi/liter<br>10% of known value |

[a] From EPA publication, "Environmental Radioactivity Laboratory Intercomparison Studies Program, Fiscal Year 1981-1982, EPA-600/4-81-004.

[b] TIML limit.

## ADDENDUM TO APPENDIX A

The following is an explanation of the reasons why certain samples were outside the control limit specified by the Environmental Protection Agency for the Interlaboratory Comparison Program starting January 1987.

| Lab Code | Analysis | TIML Result | EPA Control Limit | Explanation |
|---|---|---|---|---|
| STM-504 | Sr-89<br>Sr-90 | 57.0±4.3<br>32.0±1.0 | 60.3-77.7<br>32.4-37.6 | Milk had high fat content which made analyses difficult. Addition of errors to TIML result would put values within EPA control limits. EPA also had the same problem in analyzing its own sample. |
| STW-511 | Ra-228 | 8.1±1.4 | 4.6-8.0 | TIML results are usually within EPA control limits. Analysis of the next sample was within EPA control limits. No further action is planned. |
| STW-516 | Cr-51 | 80.3±17.5 | 61.3-78.7 | Results in the past have been within EPA control limits and TIML will monitor the situation in the future. |
| STF-524 | K | 1010.7±158.5 | 1123.5-1336.5 | Error in transferrance of data. Correct data was 1105±33. Results in the past have been within the limits and TIML will monitor the situation in the future. |
| STW-532 | I-131 | 9.0±2.0 | 6.2-8.8 | Sample recounted after 12 days. The average result was 8.8±1.7 (within EPA control limits). The sample was recounted in order to check the decay. Results in the past have been within the limits and TIML will continue to monitor the situation in the future. |
| STW-534 | Co-60 | 63.3±1.3 | 41.3-58.7 | High level of Co-60 was due to contamination of beaker. Beaker was discarded upon discovery of contamination and sample was recounted. Recount results were 53.2±3.6 and 50.9±2.4. |

## ADDENDUM TO APPENDIX A (continued)

| Lab Code | Analysis | TIML Result | EPA Control Limit | Explanation |
|---|---|---|---|---|
| STM-554 | Sr-90 | 51.0±2.0 | 54.8-65.2 | The cause of low result is not known and is under investigation. It should be noted that 63% of all participants failed this test. Also, the average for all participants was 54.0 pCi/l before the Grubb and 55.8 pCi/l after the Grubb. |
| STW-560 | Pu-239 | 5.8±1.1 | 3.5-4.9 | The cause of high results is not known (suspected contaminated standard) and is under investigation. New Pu-236 standard was obtained and will be used for the next test. |
| STW-568 | Ra-228 | 2.6±1.0 | 2.7-4.5 | The cause of low results is under investigation. New dilution was prepared and sample is being reanalyzed. Sample was used up during testing. Next EPA crosschecks with the control limits. |
| STM-570 | Sr-89<br>Sr-90 | 26.0±10.0<br>45.7±4.2 | 39.0±5.0<br>55.0±3.0 | The cause of low results is under investigation. New "spike" milk sample was prepared and being analyzed. Results of analysis: See Table A-3, sample QC-Mi-24. |

# APPENDIX IV

## REVISIONS TO THE ODCM RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SINCE 1986

REVISIONS TO THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
BYRON STATION

| DATE (ODCM Revision) | SAMPLE TYPE | MONITORING LOCATION | | COMMENTS |
|---|---|---|---|---|
| '86 (11A) | Airborne | All | Revision | Established monitoring locations identification numbers. |
| | | All | Addition | Sr-89 and 90 analysis on a quarterly composite. |
| | | BY-22 | Revision | CECo Real Estate was retitled to CECo Property. |
| | Ground/Well Water | All | Addition | Gross beta, Sr-89, and 90 analyses, quarterly. |
| | | BY-14 | Revision | CECo Real Estate was retitled to CECo Property. |
| | | BY-18 | Revision | Station's Onsite Well was changed to the McCoy Farmstead Well, 1.25 mi SW. |
| | Surface Water | All | Addition | Gross beta analysis weekly and Sr-89, 90 analyses on a quarterly composite. |
| | | BY-13 | Revision | Oregon Pool of Rock River, Upstream of Intake, 4.3 mi, SSW was changed to Rock River, Upstream of Intake, 2.6 mi, WNW. |
| | Cooling Water | All | Addition | Gross beta analysis weekly. Gamma isotopic, tritium, Sr-89 and 90 analyses on a composite, monthly. |
| | | BY-10 | Revision | Byron Intake Pipe/River, at the station. Initially, this monitoring location was considered surface water exposure pathway. |
| | | BY-11 | Revision | Byron Discharge Pipe/River, at the station. Initially, this monitoring location was considered surface water exposure pathway. |
| | Sediments | All | Addition | Gross beta analysis three times a year, not semiannually. |
| | | BY-13 | Revision | Oregon Pool of Rock River, Upstream of Intake, 4.3 mi, SSW was changed to Rock River, Upstream of Intake, 2.6 mi, WNW. |
| | Precipitation | All | Addition | Gross beta analysis monthly. Gamma isotopic, tritium, Sr-89 and 90 analyses on a quarterly composite at all the milk monitoring locations. |

REVISIONS TO THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
BYRON STATION Cont'd

| DATE (ODCM Revision) | SAMPLE TYPE | MONITORING LOCATION | | COMMENTS |
|---|---|---|---|---|
| '86 (11A) Cont'd | Aquatic Plants | All | Addition | Gamma isotopic and gross beta analyses, three times a year. |
| | | BY-12 | Addition | Oregon Pool of Rock River, Downstream of Discharge, 4.5 mi SSW. |
| | | BY-13 | Addition | Rock River, Upstream of Intake, 2.6 mi WNW. |
| | Fish/Invertebrates | All | Addition | Gross beta, Sr-89 and Sr-90 analysis three times a year. |
| | | BY-13 | Revision | Oregon Pool of Rock River, Upstream of Intake, 4.3 mi, SSW was changed to Rock River, Upstream of Intake, 2.6 mi, WNW. |
| | Milk | All | Addition | Sr-89, 90 analysis biweekly when milch animals are on pasture, monthly at other times. |
| | | BY-15 | Revision | Groenhagen/Oltmann Farm, 2.0 mi S was changed to J.A. Reeverts Pine Hill Dairy, 3.2 mi ESE. |
| | | BY-16 | Revision | Ashelford Farm, 2.7 mi W was changed to Kenneth Durien Farm, 3.3 mi SE. |
| | | BY-20 | Revision | Meyers Farm, 5.0 mi SE was changed to Ed Seabold Farm, 2.5 mi NE. |
| | Cattle Feed/Grass | All | Addition | Gamma isotopic, gross beta, Sr-89 and 90 analyses quarterly at all the milk monitoring locations. |
| | Vegetables | All | Deletion | Collection frequency is annually and the following ODCM statement is deleted: "If harvest occurs more than once a year, sampling shall be performed during each discrete harvest. If harvest occurs continuously, sampling shall be monthly. Attention shall be paid to including samples of tuberous and root food products." |
| | | BY-19-1,2 | Addition | Gamma isotopic, gross beta, Sr-89 and 90 analyses annually. I-131 analysis on leafy vegetables annually. Both locations are Oregon Vegetable Stands, 5.1 mi SSW. |

REVISIONS TO THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
BYRON STATION Cont'd

| DATE (ODCM Revision) | SAMPLE TYPE | MONITORING LOCATION | | COMMENTS |
|---|---|---|---|---|
| '87 (11B) | All | All | Addition | Listed distances from the center of the station in kilometers and listed sectors. |
| | Airborne | All | Deletion | Sr-89 and 90 analysis |
| | | BY-21 | Revision | Onsite, W, was retitled to BY Nearsite, N. |
| | | BY-22 | Revision | CECo Property, W, was retitled to BY Nearsite, ESE. |
| | | BY-23 | Revision | Onsite, S, was retitled to BY Nearsite, S. |
| | | BY-24 | Revision | The Meteorological Tower was retitled to BY Nearsite, SW. |
| | Direct Radiation | All | Addition | The station code, BY, proceeds the identification number. |
| | Ground/Well Water | All | Deletion | Sr-89 and 90 analysis |
| | | All | Revision | Collection to occur biweekly, not quarterly. |
| | | All | Addition | Analysis frequency is clarified the following ODCM statement: "I-131 analysis to occur biweekly when dose rate calculations from water consumption exceeds >1 mrem/yr." |
| | | BY-14 | Revision | CECo Property was retitled Offsite Well. |
| | | BY-18 | Addition | McGoy Farm Well is identified as CECo owned. |
| | Surface Water | All | Deletion | Gross beta, Sr-89 and 90 analyses |
| | Cooling Water | All | Deletion | |
| | Sediments | All | Deletion | Gross beta analysis. |
| | | All | Revision | Collection frequency was changed to semiannually, not three times a year. |
| | Precipitation | All | Deletion | |
| | Aquatic Plants | All | Deletion | |
| | Milk | All | Deletion | Sr-89 and 90 analysis |
| | Cattlefeed and Grass | All | Deletion | |
| | Vegetables | All | Deletion | Gross beta, I-131, Sr-89 and 90 analyses annually. |
| | Food Products | | Addition | Analysis frequency is clarified with the following ODCM statement: "Gamma isotopic and I-131 analyses shall occur at two different offsite monitoring locations and a location that is 15-30 km from the station having the highest predicted annual average ground level D/Q if milk sampling is not performed." |

# APPENDIX V

## ADDENDA

BYRON NUCLEAR POWER STATION
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
JANUARY TO JUNE 1989

ADDENDUM

A. The following is the breakdown for the continuous releases for gaseous effluents:

1st quarter: Xe-133 19.8 Curies
Xe-135 0.077 Curies

TOTAL = 19.88 Curies

2nd quarter: No continuous releases

B. The following data is the estimated composition of Byron's solid waste streams:

1. Dry Active Waste (DAW)

| | |
|---|---|
| C-14 | 7.7% |
| Mn-54 | 4.0% |
| Fe-55 | 46.6% |
| Co-58 | 12.2% |
| Co-60 | 12.0% |
| Cs-134 | 3.3% |
| Cs-137 | 5.8% |
| Ni-63 | 8.4% |

2. Primary Resin

| | |
|---|---|
| Mn-54 | 1.54% |
| Co-58 | 60.9% |
| Co-60 | 4.3% |
| Cs-134 | 8.7% |
| Cs-137 | 7.5% |
| H-3 | 0.6% |
| C-14 | 1.2% |
| Fe-55 | 14.3% |
| Ni-63 | 0.9% |
| Sr-90 | 0.02% |
| Tc-99 | 0.03% |
| I-129 | 0.001% |
| Pu-239 | 0.001% |
| Pu-238 | 0.001% |
| Am-241 | 0.001% |
| CM-244 | 0.001% |
| Pu-241 | 0.005% |

3. Radwaste Resin

| | |
|---|---|
| Mn-54 | 2.7% |
| Co-58 | 30.6% |
| Co-60 | 6.8% |
| Cs-134 | 17.8% |
| Cs-137 | 24.3% |
| H-3 | 9.0% |
| C-14 | 0.45% |
| Fe-55 | 6.8% |
| Tc-99 | 0.05% |
| I-129 | 0.1% |
| Pu-239 | 0.01% |
| Pu-238 | 0.01% |
| Am-241 | 0.04% |
| Cm-244 | 0.04% |
| Ni-63 | 1.3% |

C. Per Technical Specifications 3.3.3.9 and 3.3.3.10, the following is a summary of effluent monitoring instrumentation inoperable for a period of time greater than specified in the Technical Specification:

1. Unit 1 Reactor Containment Fan Cooler Essential Service Water Outlet Monitor was inoperable for greater than 30 days. The extended period of inoperability was due to a faulty sample pump.

D. During this period, there were no major changes to the liquid, gaseous, or solid radwaste treatment systems. There were no major changes to the Process Control Program (PCP). Byron Station continues to utilize the services of Westinghouse-Hittman for dewatering and solidification services.

E. Error Analysis

The following is an estimate of the errors associated with effluent monitoring and analysis. The estimate is calculated using the square root of the sum of the squares methodology.

1. Gaseous Effluents

| | |
|---|---|
| Sampling error | = 1 to 3.5% |
| Calibration error | = 10% |
| Counting Statistics error | = 5% |
| Vent Stack flowrates error | = 1.5% |
| Total error | = 11 - 12% |

2. Liquid Effluents

| | |
|---|---|
| Sampling error | = 1% |
| Calibration error | = 10% |
| Sample volume error | = 1% |
| Discharged volume error | = 2% |
| Total error | = 10% |

F. Meteorological and environmental impact information is reported in the Station Annual Radiological Environmental Operating Report as required by Technical Specification 6.9.1.6.

BYRON NUCLEAR POWER STATION
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
JULY TO DECEMBER 1989

ADDENDUM

A. The following is the breakdown for the continuous releases for gaseous effluents:

3rd quarter: No continuous releases.

4th quarter: Xe-133 36.1 Curies

B. The following data is the estimated composition of Byron's solid waste streams:

1. Dry Active Waste (DAW)

| | |
|---|---|
| C-14 | 4.3% |
| Mn-54 | 1.5% |
| Fe-55 | 60.6% |
| Co-58 | 13.3% |
| Co-60 | 15.5% |
| Cs-134 | 1.3% |
| Cs-137 | 1.4% |
| Ni-63 | 2.06% |
| Sr-90 | 0.038% |
| Tc-99 | 0.005% |
| I-129 | 0.0001% |

2. Primary Resin

| | |
|---|---|
| Mn-54 | 20.79% |
| Co-58 | 11.14% |
| Co-60 | 9.28% |
| Cs-134 | 7.05% |
| Cs-137 | 15.22% |
| H-3 | 1.15% |
| C-14 | 2.49% |
| Fe-55 | 30.80% |
| Ni-63 | 1.97% |
| Sr-90 | 0.048% |
| Tc-99 | 0.052% |
| I-129 | 0.001% |
| Pu-239 | 0.0004% |
| Pu-238 | 0.0003% |
| Am-241 | 0.0002% |
| CM-244 | 0.0002% |
| Pu-241 | 0.012% |

3. Radwaste Resin

| | |
|---|---|
| Mn-54 | 7.1% |
| Co-58 | 51.95% |
| Co-60 | 9.97% |
| Cs-134 | 9.90% |
| Cs-137 | 9.01% |
| H-3 | 0.022% |
| C-14 | 0.419% |
| Fe-55 | 9.69% |
| Tc-99 | 1.89% |
| I-129 | 0.004% |
| Pu-239 | 0.004% |
| Pu-238 | 0.002% |
| Am-241 | 0.005% |
| Cm-244 | 0.014% |
| Ni-63 | 0.016% |

C. Per Technical Specifications 3.3.3.9 and 3.3.3.10, there were no effluent monitoring instrumentation inoperable for a period of time greater than specified in the Technical Specification.

D. During this period, there were three changes to the liquid, gaseous, or solid radwaste treatment systems. There were no major changes to the Process Control Program (PCP). Byron Station continues to utilize the services of Westinghouse-Hittman for dewatering and solidification services. The three radwaste treatment systems changes are as follows:

Radwaste Changes For 89

1) MOD 0-87-116: Installed bypass line around the Spent Resin Storage Tank to allow transferring a low activity bed for disposal and holding a high activity bed in the SRST.

(2308z/45)

2) MOD 0-88-012: Installed separate control switches for the WX monitor inlet valves. This allows both valves to be open at the same time and reduces radwaste processing time by half.

3) MOD 0-89-034: Converted from dry cleaners to wet wash. This prevents the production of a mixed hazardous waste (Freon).

E. Error Analysis

The following is an estimate of the errors associated with effluent monitoring and analysis. The estimate is calculated using the square root of the sum of the squares methodology.

1. Gaseous Effluents

| | | |
|---|---|---|
| Sampling error | = | 1 to 3.5% |
| Calibration error | = | 10% |
| Counting Statistics error | = | 5% |
| Vent Stack flowrates error | = | 1.5% |
| Total error | = | 11 - 12% |

2. Liquid Effluents

| | | |
|---|---|---|
| Sampling error | = | 1% |
| Calibration error | = | 10% |
| Sample volume error | = | 1% |
| Discharged volume error | = | 2% |
| Total error | = | 10% |

3. Waste Resin

| | | |
|---|---|---|
| Sampling error | = | 5% |
| Counting Statistics error | = | 7% |
| Weight error | = | 1% |
| Volume error | = | 5% |
| Total error | = | 10% |

4. DAW

| | | |
|---|---|---|
| Counting Statistics error | = | 7% |
| Calibration error | = | 10% |
| Weight error | = | 2% |
| Total error | = | 12.4% |

F. Meteorological and environmental impact information is reported in the Station Annual Radiological Environmental Operating Report as required by Technical Specification 6.9.1.6.

G. No limits were exceeded in liquid hold up tanks as stated in Technical Specifications 3.11.1.4 or in waste gas decay tanks as stated in Technical Specifications 3.11.2.6.

(2308z/45)

H. There were no irradiated fuel shipments during this period.

I. Lower Limits of Detection are defined in Technical Specifications Table 4.11-1 for liquid and Table 4.11-2 for gaseous waste. The Lower Limits of Detection are as follows:

1. Liquid Waste

   a. Principal Gamma Emitters $5X10^{-7}$ µCi/ml
   b. I-131 $1X10^{-6}$ µCi/ml
   c. Dissolved and Entrained Gases (Gamma Emitters) $1X10^{-5}$ µCi/Ml
   d. $H_3$ $1X10^{-5}$ µCi/ml
   e. Gross Alpha $1\Delta10^{-7}$ µCi/ml
   f. Sr 89-90 $5X10^{-8}$ µCi/ml
   g. Fe 55 $1X10^{-6}$ µCi/ml

2. Gaseous Waste

   a. Waste Gas Decay Tanks and Containment Purge

      1. Principal Gamma Emitters $1X10^{-4}$ µCi/ml
      2. $H_3$ $1X10^{-4}$ µCi/ml

   b. Auxiliary Building Vent Stack Grab

      1. Principal Gamma $1X10^{-4}$ µCi/ml
      2. $H_3$ $1X10^{-7}$ µCi/ml

   c. Auxiliary Building Vent Stack Continuous

      1. I-131 $1X10^{-12}$ µCi/ml
      2. I-133 $1X10^{-10}$ µCi/ml
      3. Principal Gamma Emitter $1X10^{-11}$ µCi/ml
      4. Sr 89-90 $1X10^{-11}$ µCi/ml
      5. Noble Gas Gross Beta or Gamma $1X10^{-6}$ µCi/ml

# APPENDIX VI

## 1989 REMP SAMPLE RESULTS

TELEDYNE ISOTOPES

MIDWEST LABORATORY

700 LANDWEHR ROAD

NORTHBROOK, ILLINOIS 60062-2310

(708) 564-0700 FAX (708) 564-4517

# FINAL PROGRESS REPORT
TO
COMMONWEALTH EDISON COMPANY

# RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)
FOR
BYRON NUCLEAR POWER STATION
BYRON, ILLINOIS

PREPARED AND SUBMITTED
BY
TELEDYNE ISOTOPES MIDWEST LABORATORY

Reporting Period: January - December, 1989

Reviewed and
Approved by: L. G. Huebner Date 3-19-90

L. G. Huebner
General Manager

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BYRON

LIST OF TABLES

## 1.0 INTRODUCTION

The following constitutes the final Progress Report for the Environmental Radiological Monitoring Program conducted at the Byron Nuclear Power Station, Byron, Illinois. Results of completed analyses are presented in the attached tables. Missing entries indicate analyses that are not completed and the results will appear in subsequent reports.

Data obtained in the program are well within the ranges previously encountered in the program and to be expected in the environmental media sampled.

For all gamma isotopic analyses, spectrum is computer scanned from 80 to 2048 KeV. Specifically included are Mn-54, Co-58, Fe-59, Co-60, Zn-65, Zr-95, Nb-95, Ru-103, Ru-106, I-131, Ba-La-140, Cs-134, Cs-137, Ce-141, and Ce-144. Naturally occurring gamma-emitters, such as K-40 and Ra daughters, are frequently detected but not listed here. Data listed as "<" are at the 4.66 sigma level, others are 2 sigma. Cs-134 and Cs-137 are listed separately. All other gamma emitters are listed under "Other Gammas". Unless noted otherwise, the less than value ("<") reported under "Other Gammas" is for Co-60 and may be higher or lower for other radionuclides.

All concentrations, except gross beta, are decay corrected to the time of collection.

### Deviations from Scheduled Sampling and Corrective Actions Taken

All samples were collected within the scheduled period unless noted otherwise in the Listing of Missed Samples.

BYRON

## LISTING OF MISSED SAMPLES

| Sample Type | Location | Expected Collection Date | Reason |
|---|---|---|---|
| Well Water | BY-14 | 01-23-89 | No power to pump. |
| | BY-14 | 01-30-89 | No power to pump. |
| Milk | BY-20 | 01-02-89 | No sample available. |
| Surface Water | BY-09 | 01-02-89 | River frozen. |
| | BY-09 | 01-09-89 | River frozen. |
| | BY-09 | 01-16-89 | River frozen. |
| | BY-09 | 01-23-89 | River frozen. |
| | BY-12 | 01-02-89 | River frozen. |
| | BY-12 | 01-09-89 | River frozen. |
| | BY-12 | 01-16-89 | River frozen. |
| | BY-12 | 01-23-89 | River frozen. |
| | BY-13 | 01-02-89 | River frozen. |
| | BY-13 | 01-09-89 | River frozen. |
| | BY-13 | 01-16-89 | River frozen. |
| | BY-13 | 01-23-89 | River frozen. |
| Surface Water | BY-09 | 02-06-89 | River frozen. |
| | BY-09 | 02-13-89 | River frozen. |
| | BY-09 | 02-20-89 | River frozen. |
| | BY-09 | 02-27-89 | River frozen. |
| | BY-09 | 03-06-89 | River frozen. |
| | BY-12 | 02-06-89 | River frozen. |
| | BY-12 | 02-13-89 | River frozen. |
| | BY-12 | 02-20-89 | River frozen. |
| | BY-12 | 02-27-89 | River frozen. |
| | BY-12 | 03-06-89 | River frozen. |
| | BY-13 | 02-06-89 | River frozen. |
| | BY-13 | 02-13-89 | River frozen. |
| | BY-13 | 02-20-89 | River frozen. |
| | BY-13 | 02-27-89 | River frozen. |
| | BY-13 | 03-06-89 | River frozen. |
| | BY-09 | 12-26-89 | River frozen. |
| | BY-13 | 12-26-89 | River frozen. |

NOTE: Page 3 is intentionally left out.

Table 1. Airborne Particulates and Iodine-131[a]
Collection: Weekly
Units: $10^{-2}$ pCi/$m^3$

| Week Ending | Byron BY-01 Volume ($m^3$) | Byron BY-01 Gross Beta | Stillman Valley BY-02 (C) Volume ($m^3$) | Stillman Valley BY-02 (C) Gross Beta | Near Site E BY-03 Volume ($m^3$) | Near Site E BY-03 Gross Beta | Paynes Point BY-04 Volume ($m^3$) | Paynes Point BY-04 Gross Beta |
|---|---|---|---|---|---|---|---|---|
| 01-09-89 | 284 | 5.3±0.5 | 274 | 5.6±0.5 | 282 | 4.7±0.5 | 282 | 4.6±0.5 |
| 01-16-89 | 286 | 2.9±0.4 | 286 | <0.4[b] | 286 | 3.1±0.4 | 285 | 2.8±0.4 |
| 01-23-89 | 286 | 2.0±0.4 | 285 | 2.3±0.4 | 285 | 2.0±0.4 | 285 | 2.1±0.4 |
| 01-30-89 | 285 | 3.6±0.4 | 285 | 3.5±0.4 | 285 | 4.0±0.4 | 285 | 3.3±0.4 |
| 02-06-89 | 286 | 5.0±0.5 | 296 | 4.3±0.5 | 289 | 4.5±0.5 | 288 | 4.3±0.5 |
| 02-13-89 | 284 | 2.5±0.4 | 275 | 2.9±0.4 | 282 | 3.0±0.4 | 283 | 2.6±0.4 |
| 02-20-89 | 286 | 2.1±0.4 | 286 | 2.1±0.4 | 286 | 2.4±0.4 | 286 | 1.6±0.4 |
| 02-27-89 | 285 | 3.5±0.4 | 285 | 3.6±0.4 | 284 | 3.5±0.4 | 284 | 3.4±0.4 |
| 03-06-89 | 284 | 2.5±0.4 | 291 | 3.2±0.4 | 286 | 2.6±0.4 | 286 | 2.9±0.4 |
| 03-13-89 | 285 | 3.4±0.4 | 278 | 3.3±0.4 | 285 | 2.7±0.4 | 285 | 3.0±0.4 |
| 03-20-89 | 283 | 3.0±0.3 | 283 | 3.0±0.3 | 284 | 2.9±0.3 | 283 | 2.7±0.3 |
| 03-27-89 | 285 | 2.7±0.4 | 285 | 2.8±0.4 | 286 | 3.0±0.4 | 286 | 3.1±0.4 |
| 04-03-89 | 286 | 2.5±0.4 | 296 | 2.2±0.4 | 289 | 2.0±0.4 | 288 | 1.9±0.4 |
| 1st Qtr mean±s.d. | | 3.2±1.0 | | 3.2±1.0 | | 3.1±0.9 | | 2.9±0.9 |
| 04-10-89 | 284 | 1.8±0.4 | 274 | 1.7±0.4 | 283 | 1.5±0.4 | 283 | 1.6±0.4 |
| 04-17-89 | 285 | 3.4±0.4 | 285 | 3.5±0.5 | 283 | 3.5±0.5 | 283 | 3.3±0.4 |
| 04-24-89 | 285 | 2.2±0.4 | 285 | 1.8±0.4 | 285 | 2.0±0.4 | 285 | 2.2±0.4 |
| 05-01-89 | 288 | 1.8±0.4 | 294 | 2.0±0.4 | 288 | 2.4±0.4 | 288 | 1.8±0.4 |
| 05-08-89 | 285 | 1.1±0.4 | 278 | 1.5±0.4 | 285 | 1.4±0.4 | 285 | 1.4±0.4 |
| 05-15-89 | 284 | 1.2±0.3 | 284 | 1.6±0.3 | 284 | 1.6±0.3 | 284 | 1.0±0.3 |
| 05-22-89 | 285 | 2.8±0.3 | 278 | 3.1±0.3 | 284 | 2.9±0.3 | 284 | 2.3±0.3 |
| 05-29-89 | 289 | 1.6±0.3 | 286 | 2.3±0.3 | 290 | 2.1±0.3 | 288 | 1.6±0.3 |
| 06-05-89 | 280 | 2.0±0.2 | 281 | 2.4±0.2 | 274 | 2.0±0.2 | 280 | 1.8±0.2 |
| 06-12-89 | 283 | 1.4±0.3 | 286 | 2.1±0.4 | 290 | 1.6±0.3 | 283 | 1.4±0.3 |
| 06-19-89 | 289 | 2.3±0.4 | 295 | 1.8±0.4 | 290 | 1.7±0.4 | 290 | 1.7±0.4 |
| 06-26-89 | 288 | 2.6±0.4 | 287 | 2.3±0.4 | 287 | 2.0±0.3 | 287 | 2.4±0.4 |
| 07-03-89 | 288 | 2.0±0.3 | 290 | 2.1±0.3 | 290 | 1.9±0.3 | 289 | 1.9±0.3 |
| 2nd Qtr mean±s.d. | | 2.0±0.6 | | 2.2±0.6 | | 2.0±0.6 | | 1.9±0.6 |

[a] Iodine-131 concentrations are <0.07 pCi/$m^3$ unless noted otherwise.
[b] Filter paper very light.

Table 1. Airborne Particulates and Iodine-131[a] (continued)

| Week Ending | Byron BY-01 Volume ($m^3$) | Byron BY-01 Gross Beta | Stillman Valley BY-02 (C) Volume ($m^3$) | Stillman Valley BY-02 (C) Gross Beta | Near Site E BY-03 Volume ($m^3$) | Near Site E BY-03 Gross Beta | Paynes Point BY-04 Volume ($m^3$) | Paynes Point BY-04 Gross Beta |
|---|---|---|---|---|---|---|---|---|
| 07-10-89 | 284 | 3.1±0.3 | 272 | 2.9±0.3 | 281 | 1.4±0.2 | 272 | 2.8±0.3 |
| 07-17-89 | 285 | 2.0±0.2 | 292 | 1.8±0.2 | 284 | 2.1±0.2 | 285 | 2.0±0.2 |
| 07-24-89 | 284 | 1.9±0.2 | 278 | 1.9±0.2 | 284 | 2.0±0.2 | 284 | 1.9±0.2 |
| 07-31-89 | 286 | 1.4±0.3 | 286 | 1.6±0.3 | 286 | 1.3±0.3 | 286 | 1.4±0.3 |
| 08-07-89 | 288 | 2.0±0.3 | 298 | 1.8±0.3 | 290 | 1.9±0.3 | 290 | 1.8±0.3 |
| 08-14-89 | 281 | 2.2±0.3 | 272 | 3.0±0.4 | 279 | 2.6±0.4 | 279 | 2.4±0.3 |
| 08-21-89 | 286 | 2.2±0.3 | 292 | 2.5±0.3 | 286 | 2.4±0.3 | 286 | 2.2±0.3 |
| 08-28-89 | 293 | 1.7±0.3 | 288 | 1.8±0.3 | 294 | 2.4±0.4 | 294 | 1.6±0.3 |
| 09-04-89 | 279 | 1.3±0.3 | 286 | 1.8±0.3 | 280 | 1.2±0.3 | 280 | 1.5±0.3 |
| 09-11-89 | 285 | 1.6±0.3 | 277 | 1.8±0.4 | 284 | 1.2±0.3 | 284 | 1.4±0.3 |
| 09-18-89 | 285 | 1.5±0.3 | 285 | 1.8±0.3 | 285 | 2.1±0.3 | 285 | 1.6±0.3 |
| 09-25-89 | 286 | 2.3±0.3 | 277 | 2.9±0.4 | 284 | 2.9±0.4 | 283 | 2.4±0.3 |
| 10-02-89 | 288 | 2.9±0.4 | 297 | 3.0±0.4 | 290 | 3.4±0.4 | 290 | 3.0±0.4 |
| 3rd Qtr mean±s.d. | | 2.0±0.5 | | 2.2±0.6 | | 2.1±0.7 | | 2.0±0.5 |
| 10-09-89 | 285 | 1.9±0.3 | 274 | 1.9±0.3 | 283 | 2.5±0.3 | 283 | 1.7±0.3 |
| 10-16-89 | 282 | 2.9±0.4 | 290 | 3.9±0.4 | 281 | 3.5±0.4 | 281 | 3.5±0.4 |
| 10-23-89 | 286 | 2.0±0.3 | 281 | 2.4±0.3 | 286 | 2.0±0.3 | 286 | 1.8±0.3 |
| 10-30-89 | 288 | 3.8±0.4 | 287 | 4.0±0.4 | 288 | 1.8±0.3 | 288 | 4.2±0.4 |
| 11-06-89 | 287 | 2.0±0.3 | 294 | 2.3±0.3 | 287 | 1.1±0.3 | 287 | 2.4±0.3 |
| 11-13-89 | 284 | 1.5±0.3 | 277 | 1.5±0.3 | 283 | 0.8±0.3 | 283 | 1.6±0.3 |
| 11-20-89 | 287 | 2.7±0.4 | 286 | 3.0±0.4 | 286 | 1.6±0.3 | 288 | 3.0±0.4 |
| 11-27-89 | 285 | 3.4±0.4 | 285 | 2.9±0.4 | 284 | 2.1±0.3 | 284 | 3.0±0.4 |
| 12-04-89 | 285 | 2.8±0.4 | 291 | 2.8±0.4 | 286 | 3.0±0.4 | 286 | 3.2±0.4 |
| 12-11-89 | 288 | 2.7±0.4 | 280 | 2.8±0.4 | 287 | 3.0±0.4 | 287 | 3.0±0.4 |
| 12-18-89 | 282 | 4.3±0.4 | 283 | 4.4±0.4 | 283 | 4.8±0.4 | 283 | 4.2±0.4 |
| 12-26-89 | 329 | 3.6±0.4 | 329 | 3.4±0.4 | 329 | 3.8±0.4 | 329 | 3.6±0.4 |
| 01-02-90 | 285 | 1.9±0.3 | 296 | 2.4±0.3 | 288 | 2.0±0.3 | 288 | 2.4±0.3 |
| 4th Qtr mean±s.d. | | 2.7±0.8 | | 2.9±0.8 | | 2.5±1.1 | | 2.9±0.9 |

[a] Iodine-131 concentrations are <0.07 $pCi/m^3$ unless noted otherwise.

Table 2. Airborne Particulates and Iodine-131[a]
Collection: Weekly
Units: $10^{-2}$ pCi/$m^3$

| Week Ending | Near Site S BY-05 Volume ($m^3$) | Near Site S BY-05 Gross Beta | Oregon BY-06 Volume ($m^3$) | Oregon BY-06 Gross Beta | Mt. Morris BY-07 (C) Volume ($m^3$) | Mt. Morris BY-07 (C) Gross Beta | Leaf River BY-08 (C) Volume ($m^3$) | Leaf River BY-08 (C) Gross Beta |
|---|---|---|---|---|---|---|---|---|
| 01-09-89 | 282 | 5.5±0.5 | 284 | 5.6±0.5 | 284 | 5.3±0.5 | 284 | 5.3±0.5 |
| 01-16-89 | 286 | 3.3±0.4 | 286 | 3.1±0.4 | 286 | 3.1±0.4 | 286 | 3.0±0.4 |
| 01-23-89 | 285 | 2.2±0.4 | 285 | 2.4±0.4 | 285 | 2.2±0.4 | 285 | 2.4±0.4 |
| 01-30-89 | 285 | 3.5±0.4 | 285 | 3.7±0.4 | 285 | 3.0±0.4 | 285 | 3.4±0.4 |
| 02-06-89 | 287 | 4.6±0.5 | 286 | 4.4±0.5 | 286 | 4.2±0.5 | 286 | 4.7±0.5 |
| 02-13-89 | 284 | 3.6±0.5 | 285 | 3.0±0.4 | 285 | 2.4±0.4 | 285 | 2.7±0.4 |
| 02-20-89 | 286 | 2.3±0.4 | 286 | 2.4±0.4 | 286 | 2.8±0.4 | 286 | 1.5±0.4 |
| 02-27-89 | 284 | 3.8±0.5 | 285 | 3.0±0.4 | 285 | 3.4±0.4 | 285 | 3.2±0.4 |
| 03-06-89 | 286 | 3.0±0.4 | 286 | 3.6±0.4 | 286 | 3.0±0.4 | 284 | 3.5±0.4 |
| 03-13-89 | 285 | 3.8±0.5 | 285 | 3.1±0.4 | 285 | 3.5±0.4 | 285 | 2.8±0.4 |
| 03-20-89 | 283 | 2.9±0.3 | 283 | 2.9±0.3 | 285 | 2.3±0.3 | 284 | 2.5±0.3 |
| 03-27-89 | 285 | 2.9±0.4 | 285 | 2.4±0.4 | 286 | 2.7±0.4 | 286 | 2.4±0.4 |
| 04-03-89 | 288 | 1.9±0.4 | 285 | 2.4±0.4 | 285 | 1.9±0.4 | 285 | 2.2±0.4 |
| 1st Qtr mean±s.d. | | 3.3±1.0 | | 3.2±0.9 | | 3.1±0.9 | | 3.0±1.0 |
| 04-10-89 | 282 | 1.4±0.4 | 284 | 2.1±0.4 | 284 | 1.4±0.4 | 284 | 1.8±0.4 |
| 04-17-89 | 285 | 3.4±0.4 | 285 | 4.2±0.5 | 285 | 3.2±0.4 | 285 | 3.1±0.4 |
| 04-24-89 | 285 | 2.5±0.4 | 285 | 2.8±0.4 | 285 | 1.6±0.4 | 285 | 2.1±0.4 |
| 05-01-89 | 288 | 2.5±0.4 | 287 | 2.3±0.4 | 286 | 1.9±0.4 | 286 | 1.9±0.4 |
| 05-08-89 | 284 | 1.4±0.4 | 285 | 1.5±0.4 | 286 | 1.0±0.4 | 286 | 1.2±0.4 |
| 05-15-89 | 285 | 1.8±0.3 | 284 | 2.0±0.4 | 283 | 1.7±0.3 | 283 | 1.5±0.3 |
| 05-22-89 | 284 | 2.6±0.3 | 284 | 3.2±0.3 | 286 | 2.6±0.3 | 286 | 2.7±0.3 |
| 05-29-89 | 287 | 1.9±0.3 | 286 | 2.0±0.3 | 288 | 1.7±0.3 | 288 | 2.0±0.3 |
| 06-05-89 | 280 | 2.1±0.2 | 281 | 2.4±0.2 | 282 | 2.2±0.2 | 282 | 2.2±0.2 |
| 06-12-89 | 283 | 1.7±0.3 | 283 | 1.7±0.3 | 283 | 1.8±0.3 | 283 | 1.6±0.3 |
| 06-19-89 | 290 | 1.5±0.4 | 289 | 1.8±0.4 | 289 | 1.6±0.4 | 289 | 1.6±0.4 |
| 06-26-89 | 287 | 2.4±0.4 | 287 | 2.6±0.4 | 288 | 2.2±0.4 | 288 | 2.2±0.4 |
| 07-03-89 | 289 | 1.9±0.3 | 288 | 2.1±0.3 | 286 | 1.6±0.3 | 286 | 1.8±0.3 |
| 2nd Qtr meaan±s.d. | | 2.1±0.6 | | 2.4±0.7 | | 1.9±0.6 | | 2.0±0.5 |

[a] Iodine-131 concentrations are <0.07 pCi/$m^3$ unless noted otherwise.

Table 2. Airborne Particulates and Iodine-131[a] (continued)

| Week Ending | Near Site S BY-05 Volume ($m^3$) | Near Site S BY-05 Gross Beta | Oregon BY-06 Volume ($m^3$) | Oregon BY-06 Gross Beta | Mt. Morris BY-07 (C) Volume ($m^3$) | Mt. Morris BY-07 (C) Gross Beta | Leaf River BY-08 (C) Volume ($m^3$) | Leaf River BY-08 (C) Gross Beta |
|---|---|---|---|---|---|---|---|---|
| 07-10-89 | 282 | 2.7±0.3 | 272 | 3.0±0.3 | 284 | 2.6±0.3 | 284 | 2.6±0.3 |
| 07-17-89 | 285 | 1.9±0.2 | 284 | 2.2±0.2 | 285 | 1.9±0.2 | 285 | 1.9±0.2 |
| 07-24-89 | 284 | 2.2±0.2 | 285 | 2.2±0.2 | 285 | 1.8±0.2 | 285 | 1.6±0.2 |
| 07-31-89 | 286 | 1.6±0.3 | 286 | 1.4±0.3 | 286 | 1.5±0.3 | 286 | 1.1±0.3 |
| 08-07-89 | 290 | 2.3±0.4 | 286 | 1.6±0.3 | 280 | 1.8±0.3 | 288 | 1.6±0.3 |
| 08-14-89 | 281 | 2.6±0.4 | 283 | 2.7±0.4 | 283 | 2.7±0.4 | 283 | 2.7±0.4 |
| 08-21-89 | 286 | 2.7±0.3 | 286 | 2.2±0.3 | 286 | 2.2±0.3 | 286 | 1.9±0.3 |
| 08-28-89 | 294 | 2.2±0.3 | 294 | 2.0±0.3 | 294[b] | 1.7±0.3 | 293 | 1.7±0.3 |
| 09-04-89 | 279 | 1.8±0.3 | 279 | 1.8±0.3 | 279 | 0.7±0.3 | 279 | 1.6±0.3 |
| 09-11-89 | 284 | 2.6±0.4 | 286 | 1.8±0.3 | 286 | 1.6±0.3 | 285 | 1.7±0.3 |
| 09-18-89 | 285 | 2.3±0.3 | 284 | 2.4±0.3 | 285 | 2.4±0.3 | 285 | 2.3±0.3 |
| 09-25-89 | 283 | 2.5±0.3 | 286 | 3.1±0.4 | 286 | 2.6±0.3 | 285 | 3.0±0.4 |
| 10-02-89 | 290 | 2.8±0.4 | 286 | 3.0±0.4 | 294 | 2.7±0.4 | 293 | 3.4±0.4 |
| 3rd Qtr mean±s.d. | | 2.3±0.4 | | 2.3±0.6 | | 2.1±0.6 | | 2.1±0.7 |
| 10-09-89 | 283 | 1.7±0.3 | 286 | 1.8±0.3 | 286 | 1.7±0.3 | 285 | 2.2±0.3 |
| 10-16-89 | 282 | 3.7±0.4 | 283 | 3.9±0.4 | 283 | 2.9±0.4 | 284 | 3.6±0.4 |
| 10-23-89 | 286 | 0.7±0.2 | 286 | 2.3±0.3 | 286 | 1.9±0.3 | 286 | 2.3±0.3 |
| 10-30-89 | 288 | 4.7±0.4 | 289 | 4.3±0.4 | 287 | 4.0±0.4 | 287 | 3.9±0.4 |
| 11-06-89 | 287 | 2.4±0.3 | 285 | 1.9±0.3 | 287 | 1.6±0.3 | 286 | 2.5±0.4 |
| 11-13-89 | 283 | 1.9±0.3 | 285 | 1.4±0.3 | 285 | 1.4±0.3 | 285 | 1.7±0.3 |
| 11-20-89 | 287 | 3.3±0.4 | 287 | 3.2±0.4 | 286 | 2.6±0.4 | 286 | 3.0±0.4 |
| 11-27-89 | 285 | 3.3±0.4 | 285 | 3.2±0.4 | 285 | 2.8±0.4 | 285 | 3.5±0.4 |
| 12-04-89 | 285 | 3.6±0.4 | 284 | 3.3±0.4 | 284 | 3.1±0.4 | 284 | 2.7±0.4 |
| 12-11-89 | 287 | 2.4±0.4 | 288 | 3.1±0.4 | 288 | 3.1±0.4 | 288 | 2.6±0.4 |
| 12-18-89 | 283 | 4.5±0.4 | 283 | 4.7±0.4 | 283 | 4.1±0.4 | 283 | 4.2±0.4 |
| 12-26-89 | 329 | 3.4±0.4 | 329 | 4.4±0.4 | 329 | 4.0±0.4 | 329 | 4.5±0.4 |
| 01-02-90 | 296 | 2.5±0.3 | 284 | 2.3±0.3 | 284 | 2.1±0.3 | 284 | 2.4±0.3 |
| 4th Qtr mean±s.d. | | 2.9±1.1 | | 3.1±1.1 | | 2.7±0.9 | | 3.0±0.9 |

[a] Iodine-131 concentrations are <0.07 $pCi/m^3$ unless noted otherwise.
[b] Timer out of order, volume is assumed.

Table 3. Airborne Particulates and Iodine-131[a]
Collection: Weekly
Units: $10^{-2}$ pCi/$m^3$

| Week Ending | BY-21 Volume ($m^3$) | BY-21 Gross Beta | BY-22 Volume ($m^3$) | BY-22 Gross Beta | BY-23 Volume ($m^3$) | BY-23 Gross Beta | BY-24 Volume ($m^3$) | BY-24 Gross Beta |
|---|---|---|---|---|---|---|---|---|
| 01-09-89 | 284 | 5.7±0.5 | 284 | 4.3±0.5 | 284 | 1.2±0.3 | 284 | 6.6±0.5 |
| 01-16-89 | 286 | 3.5±0.4 | 286 | 3.4±0.4 | 286 | 3.6±0.4 | 286 | 3.2±0.4 |
| 01-23-89 | 285 | 2.9±0.4 | 285 | 2.4±0.4 | 286 | 3.1±0.4 | 286 | 2.7±0.4 |
| 01-30-89 | 285 | 3.6±0.4 | 285 | 4.0±0.4 | 285 | 4.2±0.4 | 285 | 4.0±0.4 |
| 02-06-89 | 287 | 4.9±0.5 | 287 | 5.5±0.5 | 287 | 5.4±0.5 | 287 | 5.0±0.5 |
| 02-13-89 | 284 | 2.6±0.4 | 284 | 2.8±0.4 | 284 | 4.2±0.5 | 284 | 3.2±0.4 |
| 02-20-89 | 286 | 2.2±0.4 | 286 | 2.0±0.4 | 286 | 2.7±0.4 | 286 | 2.3±0.4 |
| 02-27-89 | 285 | 3.2±0.4 | 285 | 3.7±0.5 | 285 | 3.6±0.4 | 284 | 3.5±0.4 |
| 03-06-89 | 287 | 3.5±0.4 | 286 | 3.1±0.4 | 286 | 3.3±0.4 | 286 | 3.1±0.4 |
| 03-13-89 | 285 | 4.0±0.5 | 285 | 3.2±0.4 | 285 | 3.0±0.4 | 285 | 3.5±0.4 |
| 03-20-89 | 285 | 3.1±0.3 | 283 | 3.0±0.3 | 283 | 3.0±0.3 | 283 | 3.0±0.3 |
| 03-27-89 | 286 | 2.7±0.4 | 286 | 3.4±0.4 | 286 | 3.0±0.4 | 285 | 3.3±0.4 |
| 04-03-89 | 287 | 2.2±0.4 | 286 | 2.1±0.4 | 287 | 2.4±0.4 | 287 | 2.5±0.4 |
| 1st Qtr mean±s.d. | | 3.4±1.0 | | 3.3±1.0 | | 3.3±1.0 | | 3.5±1.1 |
| 04-10-89 | 284 | 1.3±0.3 | 284 | 1.4±0.4 | 283 | 1.5±0.4 | 283 | 1.7±0.4 |
| 04-17-89 | 285 | 4.1±0.5 | 285 | 3.4±0.4 | 285 | 4.1±0.5 | 285 | 3.4±0.4 |
| 04-24-89 | 285 | 2.1±0.4 | 285 | 2.6±0.4 | 285 | 2.4±0.4 | 285 | 2.5±0.4 |
| 05-01-89 | 288 | 2.4±0.4 | 288 | 2.1±0.4 | 288 | 2.4±0.4 | 288 | 2.2±0.4 |
| 05-08-89 | 285 | 0.8±0.4 | 285 | 0.6±0.4 | 285 | 0.5±0.4 | 285 | <0.6 |
| 05-15-89 | 283 | 1.6±0.3 | 283 | 1.5±0.3 | 284 | 1.6±0.3 | 284 | 1.5±0.3 |
| 05-22-89 | 285 | 2.7±0.3 | 285 | 2.7±0.3 | 285 | 2.4±0.3 | 285 | 2.7±0.3 |
| 05-29-89 | 288 | 2.0±0.3 | 286 | 2.0±0.3 | 287 | 2.3±0.3 | 272 | 2.4±0.4 |
| 06-05-89 | 282 | 2.4±0.2 | 187 | 3.5±0.4 | 282 | 2.3±0.2 | 280 | 2.6±0.3 |
| 06-12-89 | 283 | 1.9±0.3 | 283 | 2.1±0.4 | 283 | 1.7±0.3 | 283 | 2.0±0.3 |
| 06-19-89 | 289 | 1.8±0.4 | 289 | 1.7±0.4 | 289 | 1.9±0.4 | 290 | 1.9±0.4 |
| 06-26-89 | 287 | 2.4±0.4 | 288 | 2.2±0.4 | 287 | 2.5±0.4 | 287 | 2.8±0.4 |
| 07-03-89 | 288 | 1.1±0.3 | 288 | 1.8±0.3 | 288 | 2.2±0.3 | 288 | 2.3±0.3 |
| 2nd Qtr mean±s.d. | | 2.0±0.8 | | 2.1±0.8 | | 2.1±0.8 | | 2.3±0.5 |

[a] Iodine-131 concentrations are <0.07 pCi/$m^3$ unless noted otherwise.

Table 3. Airborne Particulates and Iodine-131[a] (continued)

| Week Ending | BY-21 Volume ($m^3$) | BY-21 Gross Beta | BY-22 Volume ($m^3$) | BY-22 Gross Beta | BY-23 Volume ($m^3$) | BY-23 Gross Beta | BY-24 Volume ($m^3$) | BY-24 Gross Beta |
|---|---|---|---|---|---|---|---|---|
| 07-10-89 | 283 | 3.8±0.3 | 283 | 3.0±0.3 | 283 | 2.8±0.3 | 283 | 2.7±0.3 |
| 07-17-89 | 285 | 2.0±0.2 | 285 | 2.1±0.2 | 285 | 2.0±0.2 | 285 | 1.9±0.2 |
| 07-24-89 | 284 | 2.1±0.2 | 284 | 2.0±0.2 | 284 | 2.1±0.2 | 284 | 2.1±0.2 |
| 07-31-89 | 286 | 1.8±0.4 | 286 | 1.8±0.4 | 286 | 1.6±0.3 | 286 | 1.9±0.4 |
| 08-07-89 | 272 | 2.0±0.4 | 272 | 2.1±0.4 | 289 | 1.9±0.3 | 284 | 1.7±0.3 |
| 08-14-89 | 281 | 3.5±0.4 | 281 | 3.1±0.4 | 280 | 3.1±0.4 | 280 | 3.1±0.4 |
| 08-21-89 | 286 | 3.2±0.3 | 286 | 2.6±0.3 | 286 | 2.4±0.3 | 287 | 2.7±0.3 |
| 08-28-89 | 294 | 2.4±0.4 | 294 | 1.7±0.3 | 294 | 1.9±0.3 | 294 | 1.9±0.3 |
| 09-04-89 | 278 | 1.9±0.3 | 279 | 1.8±0.3 | 279 | 1.8±0.3 | 279 | 2.0±0.3 |
| 09-11-89 | 285 | 2.0±0.4 | 285 | 2.0±0.4 | 285 | 1.8±0.3 | 285 | 2.1±0.4 |
| 09-18-89 | 284 | 2.0±0.3 | 285 | 1.8±0.3 | 285 | 1.9±0.3 | 285 | 2.6±0.4 |
| 09-25-89 | 284 | 3.0±0.4 | 283 | 2.9±0.4 | 283 | 2.6±0.3 | 283 | 2.6±0.3 |
| 10-02-89 | 284 | 2.4±0.4 | 293 | 0.6±0.3 | 285 | 2.7±0.4 | 285 | 4.1±0.5 |
| 3rd Qtr mean±s.d. | | 2.5±0.7 | | 2.1±0.7 | | 2.2±0.5 | | 2.4±0.7 |
| 10-09-89 | 284 | 2.1±0.3 | 284 | 2.5±0.3 | 284 | 1.6±0.3 | 284 | 2.0±0.3 |
| 10-16-89 | 281 | 3.9±0.4 | 282 | 4.0±0.4 | 282 | 3.8±0.4 | 282 | 3.6±0.4 |
| 10-23-89 | 286 | 2.3±0.3 | 286 | 2.2±0.3 | 286 | 2.2±0.3 | 286 | 2.2±0.3 |
| 10-30-89 | 288 | 4.4±0.4 | 288 | 4.2±0.4 | 288 | 4.4±0.4 | 288 | 4.8±0.4 |
| 11-06-89 | 287 | 2.6±0.4 | 287 | 2.3±0.3 | 287 | 2.4±0.3 | 287 | 3.1±0.4 |
| 11-13-89 | 283 | 1.9±0.3 | 283 | 2.0±0.3 | 283 | 2.0±0.3 | 283 | 2.1±0.4 |
| 11-20-89 | 287 | 3.2±0.4 | 287 | 3.7±0.4 | 287 | 2.9±0.4 | 287 | 3.5±0.4 |
| 11-27-89 | 282 | 1.2±0.3 | 284 | 3.0±0.4 | 284[b] | <0.04 | 285 | 3.1±0.4 |
| 12-04-89 | 285 | 3.3±0.4 | 285 | 3.3±0.4 | 285 | 3.1±0.4 | 285 | 3.0±0.4 |
| 12-11-89 | 288 | 3.3±0.4 | 287 | 3.2±0.4 | 287 | 2.3±0.4 | 287 | 3.5±0.4 |
| 12-18-89 | 282 | 4.7±0.4 | 282 | 3.6±0.4 | 283 | 4.7±0.4 | 283 | 5.1±0.4 |
| 12-26-89 | 328 | 4.1±0.4 | 328 | 4.5±0.4 | 328 | 4.2±0.4 | 329 | 4.0±0.4 |
| 01-02-90 | 285 | 2.7±0.4 | 286 | 2.4±0.3 | 286 | 2.7±0.4 | 286 | 2.3±0.3 |
| 4th Qtr mean±s.d. | | 3.1±1.0 | | 3.1±0.8 | | 3.0±1.0 | | 3.2±1.0 |

[a] Iodine-131 concentrations are <0.07 $pCi/m^3$ unless noted otherwise.
[b] filter paper very light, probably due to improper seating of filter in housing.

Table 4. Airborne Particulates
Collection: Quarterly composites of weekly collections
Units: pCi/$m^3$

| Location | Lab Code | Volume ($m^3$) | Cs-134 | Cs-137 | Other Gammas[a] |
|---|---|---|---|---|---|
| | | 1st Quarter 1989 | | | |
| BY-01 | BYAP-1459 | 3705 | <0.01 | <0.01 | <0.01 |
| BY-02 | 1460 | 3705 | <0.01 | <0.01 | <0.01 |
| BY-03 | 1461 | 3709 | <0.01 | <0.01 | <0.01 |
| BY-04 | 1462 | 3706 | <0.01 | <0.01 | <0.01 |
| BY-05 | 1463 | 3706 | <0.01 | <0.01 | <0.01 |
| BY-06 | 1464 | 3706 | <0.01 | <0.01 | <0.01 |
| BY-07 | 1465 | 3709 | <0.01 | <0.01 | <0.01 |
| BY-08 | 1466 | 3706 | <0.01 | <0.01 | <0.01 |
| BY-21 | 1467 | 3712 | <0.01 | <0.01 | <0.01 |
| BY-22 | 1468 | 3708 | <0.01 | <0.01 | <0.01 |
| BY-23 | 1469 | 3710 | <0.01 | <0.01 | <0.01 |
| BY-24 | 1470 | 3708 | <0.01 | <0.01 | <0.01 |
| | | 2nd Quarter 1989 | | | |
| BY-01 | BYAP-1568 | 3713 | <0.01 | <0.01 | <0.01 |
| BY-02 | 1569 | 3703 | <0.01 | <0.01 | <0.01 |
| BY-03 | 1570 | 3713 | <0.01 | <0.01 | <0.01 |
| BY-04 | 1571 | 3709 | <0.01 | <0.01 | <0.01 |
| BY-05 | 1572 | 3709 | <0.01 | <0.01 | <0.01 |
| BY-06 | 1573 | 3708 | <0.01 | <0.01 | <0.01 |
| BY-07 | 1574 | 3711 | <0.01 | <0.01 | <0.01 |
| BY-08 | 1575 | 3711 | <0.01 | <0.01 | <0.01 |
| BY-21 | 1576 | 3712 | <0.01 | <0.01 | <0.01 |
| BY-22 | 1577 | 3616 | <0.01 | <0.01 | <0.01 |
| BY-23 | 1578 | 3711 | <0.01 | <0.01 | <0.01 |
| BY-24 | 1579 | 3695 | <0.01 | <0.01 | <0.01 |

[a] See Introduction.

Table 4. Airborne Particulates
Collection: Quarterly composites of weekly collections
Units: pCi/$m^3$

| Location | Lab Code | Volume ($m^3$) | | Cs-134 | Cs-137 | Other Gammas[a] |
|---|---|---|---|---|---|---|
| | | 3rd Quarter 1988 | | | | |
| BY-01 | BYAP-1672 | 3710 | NA | <0.01 | <0.01 | <0.01 |
| BY-02 | 1673 | 3700 | | <0.01 | <0.01 | <0.01 |
| BY-03 | 1674 | 3707 | | <0.01 | <0.01 | <0.01 |
| BY-04 | 1675 | 3698 | | <0.01 | <0.01 | <0.01 |
| BY-05 | 1676 | 3709 | | <0.01 | <0.01 | <0.01 |
| BY-06 | 1677 | 3697 | | <0.01 | <0.01 | <0.01 |
| BY-07 | 1678 | 3713 | | <0.01 | <0.01 | <0.01 |
| BY-08 | 1679 | 3717 | | <0.01 | <0.01 | <0.01 |
| BY-21 | 1680 | 3686 | | <0.01 | <0.01 | <0.01 |
| BY-22 | 1681 | 3696 | | <0.01 | <0.01 | <0.01 |
| BY-23 | 1682 | 3704 | | <0.01 | <0.01 | <0.01 |
| BY-24 | 1683 | 3700 | | <0.01 | <0.01 | <0.01 |
| | | 4th Quarter 1988 | | | | |
| BY-01 | BYAP-1779 | 3753 | | <0.01 | <0.01 | <0.01 |
| BY-02 | 1780 | 3753 | | <0.01 | <0.01 | <0.01 |
| BY-03 | 1781 | 3751 | | <0.01 | <0.01 | <0.01 |
| BY-04 | 1782 | 3753 | | <0.01 | <0.01 | <0.01 |
| BY-05 | 1783 | 3761 | | <0.01 | <0.01 | <0.01 |
| BY-06 | 1784 | 3754 | | <0.01 | <0.01 | <0.01 |
| BY-07 | 1785 | 3753 | | <0.01 | <0.01 | <0.01 |
| BY-08 | 1786 | 3752 | | <0.01 | <0.01 | <0.01 |
| BY-21 | 1787 | 3746 | | <0.01 | <0.01 | <0.01 |
| BY-22 | 1788 | 3749 | | <0.01 | <0.01 | <0.01 |
| BY-23 | 1789 | 3750 | | <0.01 | <0.01 | <0.01 |
| BY-24 | 1790 | 3752 | | <0.01 | <0.01 | <0.01 |

[a] See Introduction.

Table 5. Gamma Radiation, as Measured by Thermoluminescent Dosimeters (TLDs)

STANDARD RADIOLOGICAL MONITORING PROGRAM

| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|---|---|---|---|---|
| Date Placed: | 01-02-89 | 04-03-89 | 07-03-89 | 10-02-89 |
| Date Removed: | 04-03-89 | 07-03-89 | 10-02-89 | 01-02-90 |
| Days in the Field: | 91 | 91 | 91 | 91 |
| Location | Average mR/Qtr. | | | |
| **Offsite Indicator Locations** | | | | |
| BY-01 Byron | 13.5±0.9 | 12.6±0.9 | 12.6±1.3 | 13.0±0.8 |
| BY-03 - Nearsite East | 12.3±0.9 | 16.6±1.2 | 16.0±0.9 | 15.9±0.9 |
| BY-04 - Paynes Point | 11.9±0.9 | 16.8±1.3 | 14.8±0.9 | 16.2±0.8 |
| BY-05 - Nearsite South | 13.9±0.8 | 19.0±1.3 | 17.0±0.9 | 17.6±1.3 |
| BY-06 - Oregon | 12.1±1.0 | 14.8±1.5 | 13.9±1.0 | 13.6±0.8 |
| Mean ± s.d. | 12.7±0.9 | 16.0±2.4 | 14.9±1.7 | 15.3±1.9 |
| **Onsite Indicator Locations** | | | | |
| BY-21 - Onsite North | 9.6±1.0 | 11.0±0.8 | 11.4±0.9 | 11.5±0.7 |
| BY-22 - Onsite ESE | 15.3±1.2 | 18.8±0.8 | 18.0±1.1 | 18.5±1.1 |
| BY-23 - Onsite South | 14.0±1.3 | 17.5±0.8 | 16.7±1.4 | 16.9±0.9 |
| BY-24 - Met. Tower | 12.3±1.2 | 16.8±1.0 | 15.8±1.4 | 16.7±0.9 |
| Mean ± s.d. | 12.8±2.5 | 16.0±3.4 | 15.5±2.9 | 15.9±3.0 |
| **Background Locations** | | | | |
| BY-02 - Stillman Valley | 10.9±0.9 | 13.3±0.8 | 13.3±1.0 | 14.0±0.8 |
| BY-07 - Mt. Morris | 11.6±0.8 | 15.8±1.0 | 14.4±1.1 | 15.6±0.8 |
| BY-08 - Leaf River | 12.0±0.9 | 14.6±1.1 | 14.4±1.3 | 14.1±0.7 |
| Mean ±s.d. | 11.5±0.6 | 14.6±1.2 | 14.0±0.6 | 14.6±0.9 |

Table 5. Gamma Radiation, as Measured by TLDs (continued)

SPECIAL PROGRAM

Inner Ring, Near Site Boundary, Indicator Locations

| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|---|---|---|---|---|
| Date Placed: | 01-02-89 | 04-03-89 | 07-03-89 | 10-02-89 |
| Date Removed: | 04-03-89 | 07-03-89 | 10-02-89 | 01-02-90 |
| Days in the Field: | 91 | 91 | 91 | 91 |
| Location | Average mR/Qtr. | | | |
| BY-101-1 | 13.2±1.3 | 17.9±0.8 | 17.2±1.6 | 17.4±0.7 |
| BY-101-2 | 15.9±0.9 | 18.6±0.8 | 16.8±0.8 | 18.0±0.7 |
| BY-102-1 | 13.9±1.0 | 19.1±0.8 | 17.1±1.1 | 19.4±1.3 |
| BY-102-2 | 15.8±1.0 | 18.2±1.0 | 17.5±1.0 | 17.8±0.8 |
| BY-103-1 | 12.6±0.9 | 17.1±0.8 | 15.6±1.2 | 16.5±0.9 |
| BY-103-2 | 14.1±0.9 | 17.4±0.8 | 15.3±0.8 | 16.4±0.6 |
| BY-104-1 | 13.4±0.9 | 18.2±0.8 | 16.3±0.8 | 18.3±1.2 |
| BY-104-2 | 15.0±1.0 | 17.6±0.8 | 16.5±1.1 | 17.6±0.7 |
| BY-105-1 | 14.4±0.9 | 18.7±0.9 | 17.3±0.8 | 18.3±0.7 |
| BY-105-2 | 15.3±0.9 | 17.9±0.8 | 16.5±1.0 | 17.8±0.9 |
| BY-106-1 | 13.3±0.9 | 18.2±0.8 | 16.9±0.9 | 17.6±0.7 |
| BY-106-2 | 14.1±1.1 | 16.8±1.0 | 15.0±0.9 | 16.3±0.8 |
| BY-107-1 | 14.4±1.2 | 21.1±1.1 | 17.4±1.0 | 19.8±0.9 |
| BY-107-2 | 16.4±0.9 | 18.6±1.1 | 17.6±0.9 | 18.0±0.9 |
| BY-108-1 | 14.9±0.9 | 19.4±0.8 | 18.0±1.0 | 18.5±0.7 |
| BY-108-2 | 13.0±0.9 | 14.4±0.9 | 14.3±0.9 | 14.9±0.8 |
| BY-109-1 | 12.8±0.8 | 17.4±1.0 | 15.9±0.9 | 17.2±0.7 |
| BY-109-2 | 14.6±1.1 | 14.7±1.0 | 16.1±1.0 | 16.8±1.0 |
| BY-110-1 | 15.0±0.8 | 16.9±0.9 | 14.8±1.0 | 16.3±0.7 |
| BY-110-2 | 14.4±1.2 | 15.4±1.1 | 16.1±1.0 | 15.4±0.9 |
| BY-111-1 | 16.0±1.1 | 18.3±0.8 | 16.0±0.7 | 17.6±0.7 |
| BY-111-2 | 15.7±1.1 | 16.3±0.9 | 17.0±0.9 | 16.1±0.8 |
| BY-112-1 | 14.6±1.0 | 17.5±0.9 | 15.8±1.0 | 16.8±0.6 |
| BY-112-2 | 14.2±0.9 | 15.5±1.0 | 16.0±0.8 | 15.3±0.8 |
| BY-113-1 | 13.9±0.9 | 16.8±1.1 | 15.1±0.9 | 16.4±0.7 |
| BY-113-2 | 12.8±0.9 | 13.6±0.9 | 13.9±0.8 | 14.5±1.0 |
| BY-114-1 | 11.6±0.8 | 13.8±1.1 | 12.7±0.8 | 14.0±1.0 |
| BY-114-2 | 14.1±0.9 | 16.3±0.9 | 15.7±0.9 | 15.9±0.7 |
| BY-115-1 | 14.3±1.0 | 16.3±1.2 | 15.3±1.0 | 16.2±1.0 |
| BY-115-2 | 13.8±1.0 | 15.6±1.2 | 14.0±1.0 | 15.4±0.8 |
| BY-116-1 | 12.3±0.9 | 14.0±0.9 | 15.3±1.2 | 14.1±0.7 |
| BY-116-2 | 14.9±1.1 | 15.8±1.1 | 15.4±1.0 | 15.6±1.3 |
| Mean ± s.d. | 14.2±1.1 | 17.0±1.8 | 16.0±1.2 | 16.8±1.4 |

Table 5. Gamma Radiation, as Measured by TLDs (continued)

SPECIAL PROGRAM

Outer Ring, Near 5 Mile Radius, Indicator Locations

| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|---|---|---|---|---|
| Date Placed: | 01-02-89 | 04-03-89 | 07-03-89 | 10-02-89 |
| Date Removed: | 04-03-89 | 07-03-89 | 10-02-89 | 01-02-90 |
| Days in the Field: | 91 | 91 | 91 | 91 |
| Location | | | Average mR/Qtr. | |
| BY-201-1 | 13.1±1.1 | 16.6±1.1 | 14.0±1.4 | 16.5±0.8 |
| BY-201-2 | 16.2±1.0 | 18.4±0.9 | 17.8±1.0 | 17.9±0.7 |
| BY-202-1 | 13.4±0.9 | 15.6±0.9 | 14.0±0.8 | 15.3±0.8 |
| BY-202-2 | 15.1±0.8 | 16.8±1.3 | 16.7±1.2 | 17.5±0.8 |
| BY-203-1 | 10.8±0.9 | 11.7±1.0 | 11.6±0.7 | 12.5±0.9 |
| BY-203-2 | 14.7±1.5 | 16.1±1.0 | 15.7±1.3 | 16.2±0.9 |
| BY-204-1 | 11.2±0.8 | 13.0±0.9 | 12.6±0.8 | 13.5±0.7 |
| BY-204-2 | 15.4±0.9 | 18.4±0.8 | 17.0±0.8 | 17.5±0.8 |
| BY-205-1 | 15.6±0.9 | 18.2±1.6 | 17.2±1.1 | 17.3±0.9 |
| BY-205-2 | 14.6±1.0 | 16.8±0.9 | 15.6±0.9 | 16.5±1.0 |
| BY-206-1 | 16.6±1.2 | 18.5±1.0 | 17.6±1.0 | 17.9±0.8 |
| BY-206-2 | 15.8±0.9 | 17.5±0.9 | 17.1±0.8 | 16.9±0.8 |
| BY-207-1 | 15.7±0.9 | 19.0±0.9 | 17.8±1.1 | 18.7±0.9 |
| BY-207-2 | 15.1±0.8 | 17.4±1.0 | 16.2±0.8 | 16.4±1.0 |
| BY-208-1 | 17.4±0.9 | 20.5±0.9 | 19.9±0.8 | 19.4±0.9 |
| BY-208-2 | 15.8±1.0 | 17.5±0.9 | 16.8±0.8 | 17.2±0.8 |
| BY-209-1 | 17.5±1.5 | 19.5±1.9 | 19.0±1.2 | 18.7±1.4 |
| BY-209-2 | 13.0±1.0 | 15.1±0.9 | 14.6±0.9 | 14.7±0.8 |
| BY-210-1 | 15.1±0.8 | 19.2±0.8 | 17.5±1.0 | 18.2±1.0 |
| BY-210-2 | 15.2±1.1 | 16.8±1.1 | 17.0±0.8 | 17.1±1.0 |
| BY-211-1 | 15.3±0.8 | 16.4±0.9 | 16.6±1.1 | 17.1±1.1 |
| BY-211-2 | 15.6±1.7 | 19.0±1.1 | 17.8±1.3 | 18.6±0.9 |
| BY-212-1 | 15.6±0.8 | 18.3±0.8 | 17.5±0.9 | 18.2±1.5 |
| BY-212-2 | 14.7±0.9 | 20.4±1.0 | 17.7±0.9 | 19.5±1.0 |
| BY-213-1 | 15.6±0.8 | 16.7±1.1 | 17.4±0.9 | 16.5±0.9 |
| BY-213-2 | 15.2±1.0 | 19.7±1.1 | 18.1±0.9 | 19.0±0.7 |
| BY-214-1 | 14.5±1.0 | 16.0±1.0 | 16.2±1.0 | 16.1±0.9 |
| BY-214-2 | 15.0±1.4 | 17.8±0.8 | 16.9±0.8 | 17.8±0.8 |
| BY-215-1 | 15.8±1.0 | 17.6±0.8 | 17.1±0.9 | 17.7±0.8 |
| BY-215-2 | 14.1±0.9 | 18.7±1.1 | 16.9±0.9 | 18.1±0.7 |
| BY-216-1 | 17.1±1.0 | 17.8±1.0 | 18.3±1.6 | 17.4±1.0 |
| BY-216-2 | 16.5±1.1 | 19.6±0.9 | 18.1±1.2 | 18.5±0.8 |
| Mean ± s.d. | 15.1±1.5 | 17.5±1.9 | 16.7±1.7 | 17.2±1.6 |

BYRON

Table 5. Gamma Radiation, as Measured by TLDs (continued)

| RESTRICTED AREA MONITORING PROGRAM | | | |
|---|---|---|---|
| | | 3rd Quarter | 4th Quarter |
| Date Placed: | | 07-03-89 | 10-02-89 |
| Date Removed: | | 10-02-89 | 01-02-90 |
| Days in the Field: | | 91 | 91 |
| Location | | Average mR/Qtr. | |
| B-1 | Security Gatehouse (Parking Lot) | 14.5±0.8 | 16.8±1.4 |

Table 6. Milk
Collection: Monthly; semimonthly during grazing season (May-October)
Units: pCi/l

| Collection Date | Lab Code | I-131 | Cs-134 | Cs-137 | Other Gammas[a] |
|---|---|---|---|---|---|
| | | Warren Danakas Farm BY-15 | | | |
| 01-02-89 | BYMI-2968 | <0.5 | <5 | <5 | <10 |
| 02-06-89 | 3072 | <0.5 | <5 | <5 | <10 |
| 03-06-89 | 3139,40 | <0.5 | <5 | <5 | <10 |
| 04-03-89 | 3214 | <0.5 | <5 | <5 | <10 |
| 05-01-89 | 3288 | <0.5 | <5 | <5 | <10 |
| 05-15-89 | 3365 | <0.5 | <5 | <5 | <10 |
| 06-05-89 | 3465 | <0.5 | <5 | <5 | <10 |
| 06-19-89 | 3544 | <0.5 | <5 | <5 | <10 |
| 07-03-89 | 3609 | <0.5 | <5 | <5 | <10 |
| 07-17-89 | 3676 | <0.5 | <5 | <5 | <10 |
| 08-07-89 | 3792 | <0.5 | <5 | <5 | <10 |
| 08-21-89 | 3870 | <0.5 | <5 | <5 | <10 |
| 09-04-89 | 3933 | <0.5 | <5 | <5 | <10 |
| 09-18-89 | 4017 | <0.5 | <5 | <5 | <10 |
| 10-02-98 | 4083 | <0.5 | <5 | <5 | <10 |
| 10-16-89 | 4146,7 | <0.5 | <5 | <5 | <10 |
| 11-06-89 | 4233 | <0.5 | <5 | <5 | <10 |
| 12-04-89 | 4298 | <0.5 | <5 | <5 | <10 |
| | | Bill Leupkes Farm BY-25 | | | |
| 01-02-89 | BYMI-2970 | <0.5 | <5 | <5 | <10 |
| 02-06-89 | 3074 | <0.5 | <5 | <5 | <10 |
| 03-06-89 | 3143 | <0.5 | <5 | <5 | <10 |
| 04-03-89 | 3217 | <0.5 | <5 | <5 | <10 |
| 05-01-89 | 3292 | <0.5 | <5 | <5 | <10 |
| 05-15-89 | 3368 | <0.5 | <5 | <5 | <10 |
| 06-05-89 | 3468 | <0.5 | <5 | <5 | <10 |
| 06-19-89 | 3547 | <0.5 | <5 | <5 | <10 |
| 07-03-89 | 3611 | <0.5 | <5 | <5 | <10 |
| 07-17-89 | 3679 | <0.5 | <5 | <5 | <10 |
| 08-07-89 | 3796 | <0.5 | <5 | <5 | <10 |
| 08-21-89 | 3873 | <0.5 | <5 | <5 | <10 |
| 09-04-89 | 3937 | <0.5 | <5 | <5 | <10 |
| 09-18-89 | 4020 | <0.5 | <5 | <5 | <10 |
| 10-02-89 | 4086,7 | <0.5 | <5 | <5 | <10 |
| 10-16-89 | 4150 | <0.5 | <5 | <5 | <10 |
| 11-06-89 | 4236,7 | <0.5 | <5 | <5 | <10 |
| 12-04-89 | 4301 | <0.5 | <5 | <5 | <10 |

[a] See Introduction.

Table 6. Milk (continued)

| Collection Date | Lab Code | I-131 | Cs-134 | Cs-137 | Other Gammas[a] |
|---|---|---|---|---|---|
| | | Whitten Holsteins BY-17 | | | |
| 01-02-89 | BYMI-2969 | <0.5 | <5 | <5 | <10 |
| 02-06-89 | 3073 | <0.5 | <5 | <5 | <10 |
| 03-06-89 | 3141 | <0.5 | <5 | <5 | <10 |
| 04-03-89 | 3215 | <0.5 | <5 | <5 | <10 |
| 05-01-89 | 3289 | <0.5 | <5 | <5 | <10 |
| 05-15-89 | 3366 | <0.5 | <5 | <5 | <10 |
| 06-05-89 | 3466 | <0.5 | <5 | <5 | <10 |
| 06-19-89 | 3545 | <0.5 | <5 | <5 | <10 |
| 07-10-89 | 3638 | <0.5 | <5 | <5 | <10 |
| 07-17-89 | 3677 | <0.5 | <5 | <5 | <10 |
| 08-07-89 | 3793 | <0.5 | <5 | <5 | <10 |
| 08-21-89 | 3871 | <0.5 | <5 | <5 | <10 |
| 09-04-89 | 3934,5 | <0.5 | <5 | <5 | <10 |
| 09-18-89 | 4018 | <0.5 | <5 | <5 | <10 |
| 10-02-89 | 4084 | <0.5 | <5 | <5 | <10 |
| 10-16-89 | 4148 | <0.5 | <5 | <5 | <10 |
| 11-06-89 | 4234 | <0.5 | <5 | <5 | <10 |
| 12-04-89 | 4299 | <0.5 | <5 | <5 | <10 |
| | | Kenneth Reeverts Farm BY-20[b] | | | |
| 01-02-89 | BYMI-NS[c] | -- | -- | -- | -- |
| 02-13-89 | 3100 | <0.5 | <5 | <5 | <10 |
| 03-06-89 | 3142 | <0.5 | <5 | <5 | <10 |
| 04-03-89 | 3216 | <0.5 | <5 | <5 | <10 |
| 05-01-89 | 3290,1 | <0.5 | <5 | <5 | <10 |
| 05-15-89 | 3367 | <0.5 | <5 | <5 | <10 |
| 06-05-89 | 3467 | <0.5 | <5 | <5 | <10 |
| 06-19-89 | 3546 | <0.5 | <5 | <5 | <10 |
| 07-03-89 | 3610 | <0.5 | <5 | <5 | <10 |
| 07-17-89 | 3678 | <0.5 | <5 | <5 | <10 |
| 08-07-89 | 3794,5 | <0.5 | <5 | <5 | <10 |
| 08-21-89 | 3872 | <0.5 | <5 | <5 | <10 |
| 09-04-89 | 3936 | <0.5 | <5 | <5 | <10 |
| 09-18-89 | 4019 | <0.5 | <5 | <5 | <10 |
| 10-02-89 | 4085 | <0.5 | <5 | <5 | <10 |
| 10-16-89 | 4149 | <0.5 | <5 | <5 | <10 |
| 11-06-89 | 4235 | <0.5 | <5 | <5 | <10 |
| 12-04-89 | 4300 | <0.5 | <5 | <5 | <10 |

[a] See Introduction.
[b] On February 13, 1989, Ed Seabold Farm was replaced by K. Reeverts Farm, 5674 German Church Road, Byron, IL.
[c] NS = No sample available.

Table 7. Fish, Edible Portions.
Collection: 3 times per year
Unit: pCi/g wet weight

| Collection Date | Lab Code | Type | Cs-134 | Cs-137 | Other Gammas[a] |
|---|---|---|---|---|---|
| | | Oregon Pool of Rock River BY-12 | | | |
| 05-08-89 | BYF-659 | Perch | <0.10 | <0.10 | <0.13 |
| 05-15-89 | 676 | Bass | <0.10 | <0.10 | <0.13 |
| 07-24-89 | 770 | Catfish | <0.10 | <0.10 | <0.13 |
| 07-31-89 | 777 | Carp | <0.10 | <0.10 | <0.13 |
| 10-16-89 | 863 | Catfish | <0.10 | <0.10 | <0.13 |
| 10-16-89 | 864 | Walleye | <0.10 | <0.10 | <0.13 |
| | | Upstream BY-13 | | | |
| 05-15-89 | BYF-677 | Carp | <0.10 | <0.10 | <0.13 |
| 05-15-89 | 678 | Catfish | <0.10 | <0.10 | <0.13 |
| 07-17-89 | 753 | Carp | <0.10 | <0.10 | <0.13 |
| 07-24-89 | 771 | Catfish | <0.10 | <0.10 | <0.13 |
| 10-30-89 | 902 | Carp | <0.10 | <0.10 | <0.13 |
| 11-06-89 | 907 | Catfish | <0.10 | <0.10 | <0.13 |

[a] See introduction.

Table 8. Vegetables
Collection: Annually
Units: pCi/g wet weight

| Collection Date | Lab Code | Type | I-131[a] | Cs-134 | Cs-137 | Gammas[b] | Other |
|---|---|---|---|---|---|---|---|
| | | **BY-19-1 966 East Weld Park Road** | | | | | |
| 08-07-89 | BYVe-689,90 | Cucumber | ---- | <0.1 | <0.1 | <0.2 | |
| 08-07-89 | 692 | Brussel Sprouts | ---- | <0.1 | <0.1 | <0.2 | |
| 08-07-89 | 693 | Zucchini | ---- | <0.1 | <0.1 | <0.2 | |
| 10-09-89 | 816 | Broccolli Leaves | 0.02 | <0.1 | <0.1 | <0.2 | |
| | | **BY-19-2 6993 North River Road** | | | | | |
| 08-07-89 | BYVe-695 | Cucumber | ---- | <0.1 | <0.1 | <0.2 | |
| 08-07-89 | 696 | Carrots | ---- | <0.1 | <0.1 | <0.2 | |
| 08-07-89 | 697 | Corn | ---- | <0.1 | <0.1 | <0.2 | |
| 08-07-89 | 698 | Beets | ---- | <0.1 | <0.1 | <0.2 | |
| 10-09-89 | 817 | Cabbage | 0.03 | <0.1 | <0.1 | <0.2 | |

[a] Analysis for I-131 required for green leafy vegetation only.
[b] See Introduction.

Table 9. Surface Water
Units: pCi/l

MONTHLY COMPOSITES OF WEEKLY COLLECTIONS

| Composite Period | Lab Code | Cs-134 | Cs-137 | Other Gammas[a] |
|---|---|---|---|---|
| | | Woodland Creek BY-09 | | |
| January, 89 | BYSW-319[b] | <10 | <10 | <15 |
| February, 89 | NS[c] | -- | -- | -- |
| March, 89 | 1282 | <10 | <10 | <15 |
| April, 89 | 1660 | <10 | <10 | <15 |
| May, 89 | 1862 | <10 | <10 | <15 |
| June, 89 | 2552 | <10 | <10 | <15 |
| July, 89 | 2884,5 | <10 | <10 | <15 |
| August, 89 | 3132 | <10 | <10 | <15 |
| September, 89 | 3677 | <10 | <10 | <15 |
| October, 89 | 4098 | <10 | <10 | <15 |
| November, 89 | 4290 | <10 | <10 | <15 |
| December, 89 | NS[b] | -- | -- | -- |
| | | Downstream BY-12 | | |
| January, 89 | BYSW-617[b] | <10 | <10 | <15 |
| February, 89 | NS[c] | -- | -- | -- |
| March, 89 | 1283 | <10 | <10 | <15 |
| April, 89 | 1661 | <10 | <10 | <15 |
| May, 89 | 1863 | <10 | <10 | <15 |
| June, 89 | 2553 | <10 | <10 | <15 |
| July, 89 | 2886 | <10 | <10 | <15 |
| August, 89 | 3133,4 | <10 | <10 | <15 |
| September, 89 | 3678 | <10 | <10 | <15 |
| October, 89 | 4099,100 | <10 | <10 | <15 |
| November, 89 | 4291,2 | <10 | <10 | <15 |
| December, 89 | 4729 | <10 | <10 | <15 |
| | | Upstream BY-13 | | |
| January, 89 | BYSW-321[b] | <10 | <10 | <15 |
| February, 89 | NS[c] | -- | -- | -- |
| March, 89 | 1284 | <10 | <10 | <15 |
| April, 89 | 1662 | <10 | <10 | <15 |
| May, 89 | 1868 | <10 | <10 | <15 |
| June, 89 | 2554 | <10 | <10 | <15 |
| July, 89 | 2887 | <10 | <10 | <15 |
| August, 89 | 3135 | <10 | <10 | <15 |
| September, 89 | 3679,80 | <10 | <10 | <15 |
| October, 89 | 4101 | <10 | <10 | <15 |
| November, 89 | 4293 | <10 | <10 | <15 |
| December, 89 | NS[b] | -- | -- | -- |

[a] See Introduction.
[b] Grab sample, collected 01-30-89.
[c] NS = No sample available. River frozen.

Table 9. Surface Water (continued)

| Composite Period | Lab Code | Concentration (pCi/l) Tritium |
|---|---|---|
| | QUARTERLY COMPOSITES OF WEEKLY COLLECTIONS | |
| | Woodland Creek BY-09 | |
| 1st Quarter, 1989 | BYSW-1086 | <200 |
| 2nd Quarter, 1989 | 2491 | <200 |
| 3rd Quarter, 1989 | 3614 | <200 |
| 4th Quarter, 1989 | 4724 | <200 |
| | Downstream BY-12 | |
| 1st Quarter, 1989 | BYSW-1087 | 596±105 |
| 2nd Quarter, 1989 | 2492 | 790±100 |
| 3rd Quarter, 1989 | 3615 | 532±113 |
| 4th Quarter, 1989 | 4725 | 1470±136 |
| | Upstream BY-13(C) | |
| 1st Quarter, 1989 | BYSW-1088 | <200 |
| 2nd Quarter, 1989 | 2493 | <200 |
| 3rd Quarter, 1989 | 3616 | <200 |
| 4th Quarter, 1989 | 4726 | <200 |

Table 10. Well Water
Units: pCi/l
Collection: Composite of semimonthly collections.

MONTHLY COMPOSITE OF SEMIMONTHLY COLLECTIONS

| Collection Date | BY-14 Lab Code | BY-14 Gross Beta | BY-14 Cs-134 | BY-14 Cs-137 | BY-14 Other Gammas | BY-18 Lab Code | BY-18 Gross Beta | BY-18 Cs-134 | BY-18 Cs-137 | BY-18 Other Gammas[a,d] |
|---|---|---|---|---|---|---|---|---|---|---|
| January, 89 | ND[b] | -- | -- | -- | -- | BYWW-572,3 | 1.3±0.6 | <10 | <10 | <15 |
| February, 89 | BYWW-748 | <1.7 | <10 | <10 | <15 | 749 | <1.8 | <10 | <10 | <15 |
| March, 89 | 1285 | <1.5 | <10 | <10 | <15 | 1286 | <1.6 | <10 | <10 | <15 |
| April, 89 | 1663 | 2.2±1.3 | <10 | <10 | <15 | 1664,5 | 1.8±1.3 | <10 | <10 | <15 |
| May, 89 | 1869 | <2.4 | <10 | <10 | <15 | 1870 | <2.3 | <10 | <10 | <15 |
| June, 89 | 2555,6 | <1.6 | <10 | <10 | <15 | 2557 | <1.7 | <10 | <10 | <15 |
| July, 89 | 2888 | <2.6 | <10 | <10 | <15 | 2889 | <2.3 | <10 | <10 | <15 |
| August, 89 | 3136 | <2.2 | <10 | <10 | <15 | 3137 | <2.3 | <10 | <10 | <15 |
| September, 89 | 3681 | <1.8 | <10 | <10 | <15 | 3682 | <1.6 | <10 | <10 | <15 |
| October, 89 | 3757[c] | <2.5 | <10 | <10 | <15 | 4102 | <2.5 | <10 | <10 | <15 |
| November, 89 | 4294 | <1.8 | <10 | <10 | <15 | 4295 | <1.6 | <10 | <10 | <15 |
| December, 89 | 4730 | <1.6 | <10 | <10 | <15 | 4731 | 2.2±1.1 | <10 | <10 | <15 |

[a] See Introduction.
[b] ND = No data. Sample not collected, pump out of order.
[c] Grab sample only; pump out of order first part of October.
[d] In monthly reports "other gammas" were reported as <20. The change to <15 was made to comply with Technical Specifications. Actual LLD's obtained for all samples were much lower than reported.

Table 10. Well Water
Units: pCi/l

| Collection Date | Lab Code | Tritium |
|---|---|---|
| | QUARTERLY GRAB SAMPLES | |
| | Off-Site Well BY-14 | |
| 1st Quarter, 89 | BYWW-1089 | <200 |
| 2nd Quarter, 89 | 2494 | <200 |
| 3rd Quarter, 89 | 3617 | 236±103 |
| 4th Quarter, 89 | 4727 | <200 |
| | McCoy Farmstead Well BY-18 | |
| 1st Quarter, 89 | BYWW-1090 | <200 |
| 2nd Quarter, 89 | 2495,6 | <200 |
| 3rd Quarter, 89 | 3618 | <200 |
| 4th Quarter, 89 | 4728 | <200 |

[a] See Introduction.

Table 11. Bottom Sediments
Collection: Semiannually
Units: pCi/g dry weight.

| Date Collected | Lab Code | Cs-134 | Cs-137 | Other Gammas[a] |
|---|---|---|---|---|
| | Oregon Pool of Rock River BY-12 | | | |
| 05-01-89 | BYBS-510,1 | <0.1 | <0.1 | <0.2 |
| 10-09-89 | BYBS-623 | <0.1 | <0.1 | <0.2 |
| | Upstream BY-13 | | | |
| 05-01-89 | BYBS-640 | <0.1 | <0.1 | <0.2 |
| 10-09-89 | BYBS-624 | <0.1 | <0.1 | <0.2 |

[a] See Introduction.

BYRON

# MILCH ANIMALS AND NEAREST RESIDENCES CENSUS

# BYRON DAIRY CENSUS 1989

A. Site Boundary to 2 mi.

None

B. 2 mi. to 5 mi.

1. Reeverts Dairy Farm (BY-20)
   5674 N. German Church Road
   Route 1
   Byron, Illinois

   2.1 miles @ 037'

   Milks 40 cows

2. Whitten Dairy Farm (BY-17)
   Didtown Road
   Route 1
   Byron, Illinois

   8.5 miles @ 250'

   Milks 40 cows

3. Warren Danakas (BY-15)
   5845 East Holcomb Road
   Route 1
   Oregon, Illinois

   3.3 miles @ 110'

   Milks 14 cows

4. Oltmann Dairy Farm; Richard Oltmann, owner
   1858 N. German Church Road
   Route 1
   Oregon, Illinois

   2.2 miles @ 180'

   Milks 15 cows

5. Bill Luepkes (BY-25)
   2887 Brick Road
   Route 1
   Oregon, Illinois

   3.7 miles @ 190'

   Milks 56 cows

6. Ashelford Dairy Farm
   4210 IL Route 2
   Route 3
   Oregon, Illinois

   2.6 miles @ 275'

   Milks 12 cows

7. CAM-DEE Farms, Gerald DeVries, owner
   5213 N. Town Hall Road
   Route 3
   Oregon, Illinois

   3.3 miles @ 290'

   Milks 35 cows

8. Duane Camling
   50 East Camling Road
   Route 3
   Oregon, Illinois

   3.2 miles @ 305'

   Milks 26 cows

C. Sampling Locations

BY-15 Warren Danakas
Milks 14 cows
Diet:

| | |
|---|---|
| May - October: | Pasture 5 acres. Pasture, hay, corn, oats, protein/mineral supplement. |
| November - April: | Feedlot 1 acre. Hay, corn, oats and protein/supplement. |

BYRON DAIRY CENSUS 1989 (continued)

BY-25 Bill Luepkes

Milks 56 cows
Diet:

| | |
|---|---|
| May - October: | Pasture feedlot 2 acres. Haylage, corn, hay, and protein/mineral supplement. |
| November - April: | Feedlot less than 2 acres. Haylage, hay, corn, silage, oats, and protein/mineral supplement. |

BY-17 Whitten Farm

Milks 40 cows
Diet:

| | |
|---|---|
| May - October: | Pasture feedlot 5 acres. Green chop, hay, haylage, mineral supplement. |
| November - April: | Feedlot 0.5 acres. Silage, haylage, corn, hay, mineral supplement. |

BY-20 Keeverts Dairy

Milks 40 cows
Diet:

| | |
|---|---|
| May - October: | Pasture 7 acres. Pasture, Haylage, hay, corn, protein/mineral supplement. |
| November - April: | Feedlot less than 2 acres. Hay, silage, corn, protein/mineral supplement. |

---

Census conducted by L. Coleman on August 21, 1989.

## NEAREST RESIDENCE CENSUS, 1989

Nearest residences of the Byron Station within a five (5) mile radius.

| | |
|---|---|
| N | 1.9 miles |
| NNE | 1.5 miles |
| NE | 0.9 miles |
| ENE | 1.3 miles |
| E | 1.2 miles |
| ESE | 1.6 miles |
| SE | 1.1 miles |
| SSE | 1.2 miles |
| S | 0.7 miles |
| SSW | 0.6 miles |
| SW | 0.9 miles |
| WSW | 1.7 miles |
| W | 2.0 miles |
| WNW | 0.8 miles |
| NW | 1.2 miles |
| NNW | 1.3 miles |

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Census conducted by L. Coleman on August 21, 1989.