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REPORT
TO
IOWA ELECTRIC LIGHT & POWER COMPANY
CEDAR RAPIDS, IOWA

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM
FOR THE
DUANE ARNOLD ENERGY CENTER
CEDAR RAPIDS, IOWA
Docket No. 50-331

ANNUAL REPORT - PART I
SUMMARY AND INTERPRETATION
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THE NUCLEAR REGULATORY COMMISSION

PREPARED AND SUBMITTED
BY
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PREFACE

The staff members of the Teledyne Isotopes Midwest Laboratory were responsible for the acquisition of data presented in this report. All environmental samples, with the exception of aquatic, were collected by personnel of DAEC. Aquatic samples were collected by University of Iowa Hygenic Laboratory personnel.

The report was prepared by L. G. Huebner, General Manager of the TIML. He was assisted in the report preparation by other staff members of the laboratory.

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1.0 INTRODUCTION

This report summarizes and interprets results of the Environmental Radiological Monitoring Program conducted by Teledyne Isotopes Midwest Laboratory at the Duane Arnold Energy Center, Cedar Rapids, Iowa, during the period January - December, 1985. This Program monitors the levels of radioactivity in the air, terrestrial, and aquatic environments in order to assess the impact of the Plant on its surroundings.

Tabulation of the individual analyses made during the year are included in Part II of this report.

Duane Arnold Energy Center (DAEC) is located in Linn County on the Cedar River, Iowa, and is operated by Iowa Electric Light & Power Company. Duane Arnold Nuclear Station is a 538 MWe boiling water reactor. Initial criticality was attained on 23 March 1974. The reactor reached 100% power on 12 August 1974. Commercial operation began on 1 February 1975.

2.0 SUMMARY

The Environmental Radiological Monitoring Program required by the U.S. Nuclear Regulatory Commission (NRC) Technical Specifications for the Duane Arnold Nuclear Generating Plant is described. Results for 1985 are summarized and discussed.

Program findings show background levels of radioactivity in the environmental samples collected in the vicinity of the Duane Arnold Energy Center. No effect on the environment due to the operation of the Duane Arnold Nuclear Plant is indicated.

3.0 ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM

3.1 Program Design and Data Interpretation

The purpose of the Environmental Radiological Monitoring Program at the Duane Arnold Energy Center (DAEC) is to assess the impact of the plant on its environment. For this purpose, samples are collected from the air, terrestrial, and aquatic environments and analyzed for radioactive content. In addition, ambient gamma radiation levels are monitored by thermoluminescent dosimeters (TLD's).

Sources of environmental radiation include the following:

- (1) Natural background radiation arising from cosmic rays and primordial radionuclides;
- (2) Fallout from atmospheric nuclear detonations;
- (3) Releases from nuclear power plants; and
- (4) Industrial and medical radioactive waste.

In interpreting the data, effects due to the DAEC operation must be distinguished from those due to other sources.

A major interpretive aid in assessment of these effects is the design of the monitoring program at the DAEC which is based on the indicator-control concept. Most types of samples are collected both at indicator locations (nearby, downwind, or downstream) and at control locations (distant, upwind, or upstream). A station effect would be indicated if the radiation level at an indicator location was significantly larger than that at the control location. The difference would have to be greater than could be accounted for by typical fluctuations in radiation levels arising from other sources.

An additional interpretive technique involves analyses for specific radionuclides present in the environmental samples collected from the DAEC site. The DAEC's monitoring program includes analyses for strontium-89, strontium-90, and iodine-131, which are fission products, and tritium, which is produced by cosmic rays, atmospheric nuclear detonations, and also by nuclear power plants. Most samples are also analyzed for gamma-

emitting isotopes with results for the following groups quantified: zirconium-95, cesium-137, and cerium-144. These three gamma-emitting isotopes were selected as radiological impact indicators because of the different characteristic proportions in which they appear in the fission product mix produced by a nuclear reactor and that produced by a nuclear detonation. Each of the three isotopes is produced in roughly equivalent amounts by a reactor: each constitutes about 10% of the total activity of fission products ten (10) days after reactor shutdown. On the other hand, ten (10) days after a nuclear explosion, the contributions of zirconium-95, cerium-144, and cesium-137 to the activity of the resulting debris are in the approximate ratio 4:1:0.03 (Eisenbud, 1963).

The other group quantified consists of niobium-95, ruthenium-103 and -106, cesium-134, barium-lanthanum-140, and cerium-141. These isotopes are released in small quantities by nuclear power plants, but to date their major source of injection into the general environment has been atmospheric nuclear testing. Nuclides of the next group, manganese-54, cobalt-58, and -60, and zinc-65, are activation products and arise from activation of corrosion products. They are typical components of nuclear power plant's effluents, but are not produced in significant quantities by nuclear detonations. Nuclides of the final group, beryllium-7, which is of cosmogenic origin, and potassium-40, a naturally-occurring isotope, were chosen as calibration monitors and should not be considered radiological impact indicators.

Characteristic properties of isotopes quantified in gamma-spectroscopic analyses are presented in Table 5.1. Other means of distinguishing sources of environmental radiation can be employed in interpreting the data. Current radiation levels can be compared with previous levels, including those measured before the Plant became operational. Results of the DAEC's Monitoring Program can be related to those obtained in other parts of the world. Finally, results can be related to events known to cause elevated levels of radiation in the environment, e.g., atmospheric nuclear detonations.

3.2 Program Description

The sampling and analysis schedule for the environmental radiological monitoring program at the DAEC is summarized in Table 5.2 and is briefly reviewed below. Table 5.3 defines the sampling location codes used in Table 5.2 and specifies for each location its type (indicator or control) and its distance, direction, and sector relative to the reactor site. The types of samples collected at each location and the frequency of collections are presented in Table 5.4 using codes defined in Table 5.5.

To monitor the air environment, airborne particulates are collected on membrane filters by continuous pumping at sixteen locations. Also, airborne iodine is collected by continuous pumping through charcoal filters at eight of these locations. Twelve of the sixteen locations are indicators and four are controls (D-1, D-2, D-12, and D-13). Filters are changed and counted weekly. Particulate filters are analyzed for gross beta activity. If gross beta activity exceeds 10 pCi/m³, gamma isotopic analysis is performed. Quarterly composites of airborne particulates from each location are analyzed for strontium-89, strontium-90, and gamma scanned on a germanium detector.

Charcoal filters are analyzed for I-131 on two composites: one from locations D-8, D-12, and D-14, and one from locations D-4, D-5, D-7, D-11, and D-15. If iodine-131 is detected, each cartridge is analyzed individually.

Ambient gamma radiation is monitored at sixteen (16) air sampling locations. In addition, gamma radiation is monitored at forty-seven (47) special locations: sixteen (16) in a circle within 0.5 mi radius of the DAEC stack; sixteen (16) in 22.5° sectors within 1 mi of the DAEC stack; and fifteen (15) in 22.5° sectors between 1 and 3 miles of the DAEC stack. The sensors are placed in quintuplicate at each location and are exchanged and analyzed monthly. Additionally, a second set of dosimeters is placed at the same locations and exchanged and analyzed annually.

Precipitation samples are collected monthly from one location and analyzed for gross beta and tritium.

Milk samples are collected monthly from nine locations during the non-grazing season, October through April, and weekly during the grazing season, May 1 through September 30. Two of the locations are control (D-102 and D-105) and the rest are indicators. During the non-grazing season, milk samples from all indicator and all control locations are composited separately, and analyzed for iodine-131. If the level of iodine-131 in any of the composites equals or exceeds 2.4 pCi/l, the milk is resampled from each location and analyzed individually for iodine-131. During the grazing season, milk from five locations within a five mile radius of the DAEC stack (D-63, D-93, D-94, D-101, and D-106) is analyzed individually for iodine-131. Milk from two locations within a ten mile radius of the DAEC stack (D-72 and D-96) and from two control locations (D-102 and D-105) are composited separately and also analyzed for iodine-131. If the level of iodine-131 in any of the composites equals or exceeds 2.4 pCi/l, the milk is resampled and analyzed individually for iodine-131. In addition, monthly composites of weekly collections from each location are analyzed for strontium-89, strontium-90, elemental calcium, and gamma-emitting isotopes.

For additional monitoring of the terrestrial environment, grain, hay, and broad leaf natural vegetation samples are collected annually from eleven locations: two controls (D-102 and D-105) and nine indicators (D-57, D-58, D-63, D-72, D-93, D-94, D-96, D-101, and D-106). Grain and hay are analyzed for gamma-emitting isotopes and broad leaf vegetation is analyzed for iodine-131. Meat and poultry are collected annually during or immediately following a grazing period from animals fed on crops grown within and outside ten miles of DAEC. The samples are analyzed for gamma-emitting isotopes. A wildlife sample is collected semi-annually within a five mile radius of DAEC and analyzed for gamma-emitting isotopes. Also, potable ground water is collected at least every two hours from a treated municipal water system (D-53), daily from the inlet to the municipal water treatment system (D-54), and monthly from five additional ground water locations (D-55, D-57, D-58, D-59, and D-60). The samples are composited into monthly and quarterly composites for each location. Gross beta analysis is performed on all monthly composites. If gross beta activity exceeds 10 pCi/l, gamma isotopic, strontium-89, and strontium-90 analyses are performed. Strontium-89, strontium-90 and tritium analyses are performed on all quarterly composites.

Soil samples are collected three times per year at two control locations (D-102 and D-105) and eleven indicator locations (D-15, D-16, D-57, D-58, D-63, D-72, D-93, D-94, D-96, D-101, and D-106). The samples are analyzed for strontium-90 and gamma-emitting isotopes.

Surface water is collected monthly from seven river and pond locations, two control (D-49 and D-73) and five indicator (D-50, D-51, D-52, D-99, and D-103). All monthly samples are analyzed for gross beta and gamma-emitting isotopes. If gross beta activity exceeds 10 pCi/l the samples are analyzed for strontium-89 and strontium-90. Tritium, strontium-89, and strontium-90 analyses are performed on quarterly composites from each location.

The aquatic environment is also monitored by upstream and downstream (D-49 and D-61) quarterly collections of aquatic biota (periphyton) and semi-annual collections of fish and river sediment. River sediment is also collected at the plant's intake and discharge (D-50 and D-51). Fish and aquatic biota are analyzed for gamma-emitting isotopes. River sediment is analyzed for strontium-90 and gamma-emitting isotopes.

3.3 Program Execution

The program was executed as described in the preceding section with the following exceptions:

- (1) TLD data for several locations was not available for some months because TLDs were stolen, destroyed by either animals or vandals, or lost in the field. The lost TLDs are listed below.

| <u>Location</u> | <u>Month Lost</u> |
|--|-------------------|
| D-27 | January |
| D-7, D-37 | March |
| D-46 | April |
| D-30 | May |
| D-7, D-9, D-11, D-14, D-42, D-44, D-45, D-48, D-83 | June |
| D-40 | October |
| D-33 | November |

- (2) No annual TLD data were available for Locations D-33, D-40, and D-91 because they were lost in the field.
- (3) No TLD data were available for Locations D-11 and D-36 because the chips were damaged and could not be analyzed.
- (4) No air particulate was available for analyses from Location D-8 for the collection period ending 05-02-85 because the filter paper was destroyed by equipment.
- (5) No well water was collected from Location D-59 in January or February, 1985 because the pump broke down.
- (6) No well water was collected from Location D-59 in November or December, 1985 because the pump was frozen.
- (7) No milk was collected from Location D-101 in February, March, or April, 1985 because the goat was dry.
- (8) No precipitation was collected in January or December 1985 because there was not enough to collect.

3.4 Laboratory Procedures

All strontium-89, strontium-90, and iodine-131 analyses in milk were made by using a sensitive radiochemical procedure which involves separation of the element of interest by use of an ion-exchange resin and subsequent beta counting.

All gamma-spectroscopic analyses were performed with high resolution germanium detectors. Levels of iodine-131 in natural vegetation were determined by germanium spectrometry. Levels of airborne iodine-131 in charcoal samples were measured by germanium spectrometry.

Tritium levels were determined by the liquid scintillation technique.

Analytical Procedures used by TIML are specified in detail elsewhere (Teledyne Isotopes Midwest Laboratory, 1985). Procedures are based on those prescribed by the National Center for Radiological Health of the U. S. Public Health Service (U. S. Public Health Service, 1967) and by the Health and Safety Laboratory of the U. S. Atomic Energy Commission (U. S. Atomic Energy Commission, 1972).

Details of TIML's QA Program are presented elsewhere (Teledyne Isotopes Midwest Laboratory, 1985). The TIML QA Program includes participation in the Interlaboratory Comparison (Crosscheck) Program. Results obtained in the crosscheck program are presented in Appendix A.

3.5 Program Modifications

Beginning in February, 1985, one surface water location (D-107) was added to the program. The sample was collected monthly from the sewage system onsite. The samples were analyzed for gross beta, tritium, strontium-89 and -90, and gamma-emitting isotopes.

4.0 RESULTS AND DISCUSSION

All of the scheduled collections and analyses were made except those listed in Table 5.6.

All results are summarized in Table 5.7 in a format recommended by the Nuclear Regulatory Commission in Regulatory Guide 4.8. For each type of analysis of each sampled medium, this table lists the mean and range of all indicator and control locations. The locations with the highest mean and range are also shown.

The tabulated results of all measurements made in 1985 are not included in this section, although references to these results will be made in the discussion. The complete tabulation of the 1985 results is contained in Part II of this report.

4.1 The Effect of Chinese Atmospheric Nuclear Detonation

There were no reported atmospheric nuclear tests in 1985. The last reported test was conducted by the People's Republic of China on 16 October 1980. The reported yield was in the 200 kiloton to 1 megaton range.

4.2 Program Findings

Results obtained show background levels of radioactivity in the environmental samples collected in 1985. The residual effect of previous nuclear tests was detected in some of the milk, vegetation, and soil samples (strontium-90 and cesium-137). No Plant effect was indicated.

Airborne Particulates

The average annual gross beta concentration in airborne particulates was identical at both indicator and control locations (0.024 pCi/m^3) and was about the same as in 1982 (0.026 pCi/m^3), 1983 (0.022 and 0.024 pCi/m^3 , respectively), and 1984 (0.025 and 0.026 pCi/m^3 , respectively). The highest averages for gross beta were for the month of December and the fourth quarter. The spring peak, which is usually observed in April-May (second quarter), was not evident in 1985.

This peak has been observed almost annually (1976, 1979, 1980, 1983 and 1984 were also exceptions) for many years (Wilson et al., 1969). The spring peak has been attributed to fallout of nuclides from the stratosphere (Gold et al., 1964).

Two pieces of evidence indicate conclusively that the elevated observed activity during the fourth quarter was not attributable to the Plant. In the first place, elevated activity of similar size occurred simultaneously at both the indicator and control locations. Secondly, a similar pattern was observed at other nuclear power plant locations in the Midwest.

Strontium-89 and -90 levels were below their respective LLDs in all samples.

Except for beryllium-7, which is produced continuously in the upper atmosphere by cosmic-ray interactions (Arnold and Al-Salih, 1955), all other gamma-emitting isotopes were below their respective LLD levels. None of the activities detected were attributable to the Plant operation.

Airborne Iodine

Airborne iodine-131 results were below the detection limits of 0.006 pCi/m³ for all indicator locations and below 0.01 pCi/m³ for all control locations.

Ambient Radiation (TLDs)

The mean monthly doses as measured by the monthly TLDs measured 5.1±1.2 mR/30 days at indicator locations and 4.8±1.1 mR/30 days at control locations. Annual TLDs, normalized to 30 days, yielded 4.7±1.0 mR/30 days and 4.9±0.9 mR/30 days for indicator and control locations, respectively. Since standard deviations were larger than the differences, the differences are not statistically significant. No plant effect was indicated.

Precipitation

Gross beta levels varied indicating the relationship between the level of activity and amount of rainfall, and ranged from 2.0 to 9.4 pCi/l. Tritium was below the LLD of 330 pCi/l in all samples. No plant effect was indicated.

Milk

Iodine-131 results were below the detection limit of 0.4 pCi/l in all samples.

Strontium-89 was below the LLD level of 10 pCi/l in all samples.

Strontium-90 activity was detected in all samples and was similar at both indicator locations (2.7 pCi/l) and control locations (2.1 pCi/l), ranging from 1.2 pCi/l to 6.2 pCi/l. The concentration and range were similar to those observed in 1980 through 1984. Strontium-90 levels in this range are attributable to worldwide fallout from previous atmospheric nuclear tests, and reflect the long half-life (28.64 years) of this isotope. Cesium-137 results were below the LLD level of 15 pCi/l in all samples. Cesium-137 is also a long-lived component (with a half-life of 30.24 years) of worldwide fallout and is found in the environment in trace amounts. The apparent absence of the effect of the latest nuclear test (October, 1980) on strontium-90 and cesium-137 results is consistent with the low initial production of these isotopes in nuclear explosions (Eisenbud, 1963). No other gamma-emitting isotopes, except potassium-40, were detected in any milk samples. This is consistent with the finding of the National Center for Radiological Health that most radiocontaminants in feed do not find their way into milk due to the selective metabolism of the cow. The common exceptions are radioisotopes of potassium, cesium, strontium, barium, and iodine (National Center for Radiological Health, 1968). Calcium was measured in all samples and ranged from 0.62 g/l to 1.25 g/l, averaging 0.85 g/l. The measured concentrations of calcium are in agreement with the published national values (National Center for Radiological Health, 1968).

In summary, the milk data for 1985 show no radiological effects of the Plant operation, but the presence of strontium-90 in milk samples does exhibit a long range residual effect of previous atmospheric nuclear tests.

Ground Water

Ground water samples were analyzed monthly for gross beta activity. The annual mean for gross beta measured 3.8 pCi/l. The location with the highest mean, 7.3 pCi/l, was D-58, Frantz Farm, 0.5 mi distant from DAEC. The levels were similar to those observed in 1980 through 1984. Tritium was below the LLD level of 330 pCi/l in all samples. Strontium-89 and strontium-90 levels were below their respective LLDs of 10 and 2 pCi/l, respectively. There was no indication of a plant effect.

Meat and Poultry

In meat and poultry, naturally-occurring potassium-40 was the only gamma-emitting isotope detected. All other gamma-emitting isotopes were below their respective LLD's. Thus, no plant effect was indicated.

Wildlife

In wildlife samples (squirrel and rabbit) collected near the site, the only gamma-emitting isotope detected was naturally-occurring potassium-40. The mean concentration was 4.45 pCi/g wet weight. No plant effect was indicated.

Vegetation

Iodine-131 results in broad leaf vegetation were below the LLD level of 0.041 pCi/g wet weight in all samples. In corn, strontium-90 was detected in three of ten samples and averaged 0.008 pCi/g wet weight. In hay, strontium-90 was detected in all samples and was slightly higher at indicator locations (0.21 pCi/g wet weight) than at control locations (0.17 pCi/g wet weight). In soybeans and oats, strontium-90 was also detected in all samples and was nearly identical at both indicator locations (0.016 pCi/g wet weight) and at control (0.017 pCi/g wet weight) locations. Presence of strontium-90 in hay, oats, and soybeans is attributable to the fallout from nuclear tests. No plant effect was indicated.

Except for potassium-40, which was observed in all samples, all other gamma-emitting isotopes were below detection limits in all samples. No Plant effect was indicated.

Soil

Strontium-90 was detected in thirty-six of thirty-nine samples and was nearly identical at both indicator and control locations (0.13 and 0.14 pCi/g dry weight, respectively).

The predominant gamma-emitting isotope detected was potassium-40. The measured concentration was nearly identical at both indicator and control locations (11.83 and 11.36 pCi/g dry weight, respectively).

Cesium-137 was detected in thirty of thirty-nine samples and the concentration was similar at both the indicator locations (0.37 pCi/g dry weight) and the control locations (0.39 pCi/g dry weight).

Presence of strontium-90 and cesium-137 in soil is attributable to the fallout from previous nuclear tests in the atmosphere. No plant effect was indicated.

Surface Water

Mean gross beta concentration was higher by about a factor of two at indicator locations (7.5 pCi/l) than at the control locations (3.6 pCi/l) and was due to high gross beta concentration in the waste discharge samples. The mean gross beta concentration in waste discharge samples was 23.6 pCi/l, while the mean concentration of the remaining indicator samples was 4.6 pCi/l, identical with the mean measured in 1984. The difference in concentration between indicator and control locations is not statistically significant. The levels were similar to those observed in 1980 through 1984.

Tritium was below the LLD level of 330 pCi/l in all samples. Strontium-89 and strontium-90 were below the LLD levels of 10 pCi/l and 2.0 pCi/l, respectively, in all samples. No gamma-emitting isotopes were detected in any of the samples analyzed. No plant effect on surface water was indicated.

Fish

All gamma-emitting isotopes, except naturally-occurring potassium-40, in edible portions were below detection limits. No plant effect on fish was indicated.

Periphyton

Periphyton samples were collected in April, May, August, and November. All gamma-emitting isotopes, except potassium-40, were below detection limits. No plant effect was indicated.

River Sediments

River sediments were collected in June and October and analyzed for strontium-90 and gamma-emitting isotopes. Strontium-90 results were below the LLD level of 0.015 pCi/g dry weight in all samples. All gamma-emitting isotopes, except potassium-40, were below detection limits in all samples. There was no indication of plant effect.

5.0 TABLES

Table 5.1 Characteristic properties of isotopes quantified in gamma-spectroscopic analyses.

| Designation | Comments | Isotope | Half-life ^a |
|-----------------------------------|---|---------|--------------------------|
| I. Naturally-occurring | | | |
| A. Cosmogenic | Produced by interaction of cosmic rays with atmosphere | Be-7 | 53.2 d |
| B. Terrestrial | Primordial | K-40 | 1.26 x 10 ⁹ y |
| II. Fission Products ^b | Nuclear detonations constitute the major environmental source | | |
| A. Short-lived | | I-131 | 8.04 d |
| | | Ba-140 | 12.8 d |
| B. Other than short-lived | | Nb-95 | 35.15 d |
| | | Zr-95 | 65 d |
| | | Ru-103 | 39.35 d |
| | | Ru-106 | 368.2 d |
| | | Cs-134 | 2.061 y |
| | | Cs-137 | 30.174 y |
| | | Ce-141 | 32.5 d |
| | | Ce-144 | 284.31 d |
| III. Activation Products | Typically found in nuclear power plant effluents | Mn-54 | 312.5 d |
| | | Co-58 | 70.78 d |
| | | Co-60 | 5.26 y |
| | | Zn-65 | 245 d |

^a Half-lives are taken from Appendix E of Environmental Quarterly, 1 January 1978, EML-334 (U. S. Department of Energy, 1978).

^b Includes fission-product daughters.

Table 5.2. Sample collection and analysis program, 1985.

| Medium | Locations | | Collection Type/ Frequency ^b | Analysis ^c |
|-----------------------|-----------|--|--|--|
| | No. | Codes ^a or Description | | |
| Airborne Particulates | 16 | D-1-16 | C/W | GB (GS if GB >10 pCi/m ³) GS, Sr-89,-90 |
| | 16 | D-1-16 | QC of above | |
| Airborne Iodine | 2 | Comp. (D-8,12,14) Comp. (D-4,5,7,11,15) | C/W | I-131 (Individual analysis if I-131 is detected) |
| Ambient Radiation | 63 | D-1,2,3,4,6-48 76-91 | C/M | Ambient gamma |
| | 63 | D-1,2,3,4,6-48 76-91 | C/A | Ambient gamma |
| Precipitation | 1 | Onsite | M | GB, H-3 |
| Milk | 2 | Comp. (D-63,72,93,94, 96,101,106) Comp. (D-102, 105) | Monthly (during non grazing season) | I-131 (Resample and analyze in- dividually if I-131 \geq 2.4 pCi/l) |
| | 5 | D-63,93,94,101,106 | Weekly (during grazing season) | I-131 |
| | 2 | Comp. (D-72,96) Comp. (D-102,105) | Weekly (during grazing season) | I-131 (Resample and analyze in- dividually for I-131 if I-131 >2.4 pCi/l) |
| | 9 | D-63,72,93,94,96,101, 102,105,106 | MC of weekly collections | GS, Sr-89,-90, Ca |

Table 5.2. Sample collection and analysis program, 1985 (continued)

| Medium | Locations | | Collection Type/ Frequency ^b | Analysis ^c |
|------------------|-----------|--|---|--|
| | No. | Codes ^a or Description | | |
| Ground Water | 1 | D-53 | G/H | GB (GS, Sr-89, -90 if GB >10 pCi/l) H-3, Sr-89, -90 GB (GS, Sr-89, -90 if GB >10 pCi/l) H-3, Sr-89, -90 |
| | 1 | D-54 | G/D | |
| | | | MC of above | |
| | 5 | D-55,57,58,59,60 | QC of above G/M | |
| Meat and Poultry | 5 | From animals fed on crops grown within 10 miles of DAEC and outside 10 miles | Annually during or immediately following grazing season | GS (On edible portions) |
| Wildlife | 1 | Inside 5 mile radius of plant | Semiannually | GS on flesh |
| Vegetation | 11 | D-57,58,63,72,93,94,96, 101,102,105,106 | Annually at harvest time One sample each, grain and broad leaf vegetation | GS and Sr-90 (On edible portion on grain samples) I-131 (broad leaf vegetation) |
| Soil | 13 | D-15,16,57,58,63,72, 93,94,96,101,102, 105,106 | 3 times per year | GS, Sr-90 |

Table 5.2. Sample collection and analysis program, 1985 (continued)

| Medium | Locations | | Collection Type/ Frequency ^b | Analysis ^c |
|-------------------------------|-----------|-----------------------------------|--|---|
| | No. | Codes ^a or Description | | |
| Surface Water | 8 | D-49-52,73,99,103,107 | G/M QC of above | GB, GS (Sr-89,-90 if GB > 10pCi/l) H-3, Sr-89,-90 |
| Fish | 2 | D-49,61 | 1 sample per 6 months (ESM) | GS (On edible portions) |
| Aquatic Biota (periphyton) | 2 | D-49,61 | Quarterly (as available) | GS |
| River Sediment | 4 | D-49,50,51,61 | ESM or SA | GS, Sr-90 |

^a Location codes are defined in Table 5.3. Control stations are indicated by a (C). All other stations are indicators.

^b Collection type is coded as follows: C/ = continuous, G/ = grab. Collection frequency is coded as follows: H = hourly, D = daily, W = weekly, M = monthly, Q = quarterly, SA = semi-annually, ESM = every six months.

^c Analysis type is coded as follows: GB = gross beta, GS = gamma spectroscopy, H-3 = tritium, Sr-89 = strontium-89, Sr-90 = strontium-90, I-131 = iodine 131. Analysis frequency is coded as follows: MC = monthly composite, QC = quarterly composite.

Table 5.3 Sampling locations, Duane Arnold Energy Center.

| Code | Type ^a | Sampling Location | | Distance and Direction from Site Stack |
|------|-------------------|-------------------|----------------------|--|
| | | Sampling Point | Location Description | |
| D-1 | C | 1 | Cedar Rapids | 11 mi @ 135° SE |
| D-2 | C | 2 | Marion | 11 mi @ 125° SE |
| D-3 | | 3 | Hiawatha | 7 mi @ 130° SE |
| D-4 | | 4 | Johnson | 3 mi @ 140° SE |
| D-5 | | 5 | Palo | 3 mi @ 200° SW |
| D-6 | | 6 | Center Point | 7 mi @ 0° N |
| D-7 | | 7 | Shellsburg | 6 mi @ 255° W |
| D-8 | | 8 | Urbana | 9 mi @ 345° NW |
| D-9 | | 9 | Route W26 | 7 mi @ 295° NW |
| D-10 | | 10 | Atkins | 8 mi @ 210° SW |
| D-11 | | 11 | Toddville | 4 mi @ 90° E |
| D-12 | C | 12 | Iowa City | 25 mi @ 160° S |
| D-13 | C | 13 | Alburnett | 8 mi @ 70° NE |
| D-14 | | 14 | Midway Substation | 7 mi @ 35° NE |
| D-15 | | 15 | On-site, Northwest | 0.5 mi @ 305° NW |
| D-16 | | 16 | On-site, South | 0.5 mi @ 190° S |
| D-17 | | 17 | | 0.5 mi N |
| D-18 | | 18 | | 0.5 mi NE |
| D-19 | | 19 | | 0.5 mi NE |
| D-20 | | 20 | | 0.5 mi NE |
| D-21 | | 21 | | 0.5 mi E |
| D-22 | | 22 | | 0.5 mi SE |
| D-23 | | 23 | | 0.5 mi SE |
| D-24 | | 24 | | 0.5 mi S |
| D-25 | | 25 | | 0.5 mi SW |
| D-26 | | 26 | | 0.5 mi SW |
| D-27 | | 27 | | 0.5 mi SW |
| D-28 | | 28 | | 0.5 mi SW |
| D-29 | | 29 | | 0.5 mi SW |
| D-30 | | 30 | | 0.5 mi W |
| D-31 | | 31 | | 0.5 mi NW |
| D-32 | | 32 | | 0.5 mi NW |
| D-33 | | 33 | | 3.0 mi N |
| D-34 | | 34 | | 3.0 mi NE |
| D-35 | | 35 | | 3.0 mi NE |
| D-36 | | 36 | | 3.0 mi NE |
| D-37 | | 37 | | 3.0 mi E |
| D-38 | | 38 | | 3.0 mi SE |
| D-39 | | 39 | | 3.0 mi SE |

Table 5.3 Sampling locations, Duane Arnold Energy Center (continued)

| Code | Type ^a | Sampling Location | | Distance and Direction from Site Stack |
|------|-------------------|-------------------|---|--|
| | | Sampling Point | Location Description | |
| D-40 | | 40 | | 3.0 mi SE |
| D-41 | | 41 | | 3.0 mi S |
| D-42 | | 42 | | 3.0 mi SW |
| D-43 | | 43 | | 1.0 mi SW |
| D-44 | | 44 | | 1.0 mi SW |
| D-45 | | 45 | | 1.0 mi SW |
| D-46 | | 46 | | 1.0 mi W |
| D-47 | | 47 | | 1.0 mi NW |
| D-48 | | 48 | | 1.0 mi NW |
| D-49 | C | 49 | Lewis access, upstream of DAEC | 4.0 mi NNW |
| D-50 | | 50 | Plant Intake | |
| D-51 | | 51 | Plant Discharge | |
| D-52 | | 52 | Cedar Rapids City Park | 7.5 mi SE |
| D-53 | | 53 | Treated Municipal Water | |
| D-54 | | 54 | Inlet to Municipal Water Treatment System | |
| D-55 | | 55 | On-site Well | |
| D-57 | | 57 | Bull Farm (Off-site well) | 1.0 mi WSW |
| D-58 | | 58 | Frantz Farm (Off-site well) | 0.5 mi WSW-SW |
| D-59 | | 59 | Frantz Cottage (Off-site well) | 0.5 mi WSW-SW |
| D-60 | | 60 | Comp Farm, (Off-site well) | 1.0 mi SSW |
| D-61 | | 61 | 0.5 mi downstream of plant discharge | |
| D-63 | | 63 | Andrews Farm, | 1.5 mi WNW |
| D-72 | | 72 | Van Note Farm | 2.0 mi SW |
| D-73 | C | 73 | Hansen Farm | Within 22.0 mi of site |
| D-76 | | 76 | | 0.5 mi NE |
| D-77 | | 77 | | 0.5 mi NE |
| D-78 | | 78 | | 0.5 mi NE |
| D-79 | | 79 | | 0.5 mi E |
| D-80 | | 80 | | 0.5 mi SE |
| D-81 | | 81 | | 0.5 mi SE |
| D-82 | | 82 | | 0.5 mi SE |
| D-83 | | 83 | | 0.5 mi S |
| D-84 | | 84 | | 0.5 mi SW |
| D-85 | | 85 | | 0.5 mi SW |
| D-86 | | 86 | | 0.5 mi SW |
| D-87 | | 87 | | 0.5 mi SW |
| D-88 | | 88 | | 0.5 mi W |
| D-89 | | 89 | | 0.5 mi W |

Table 5.3 Sampling locations, Duane Arnold Energy Center (continued)

| Code | Type ^a | Sampling Location | | |
|-------|-------------------|-------------------|----------------------|--|
| | | Sampling Point | Location Description | Distance and Direction from Site Stack |
| D-90 | | 90 | | 0.5 mi NW |
| D-91 | | 91 | | 0.5 mi N |
| D-93 | | 93 | Yarborough Farm | 2.8 mi from site, NW |
| D-94 | | 94 | Hines Farm | 2.7 mi NE |
| D-96 | | 96 | Keiper Farm | 7.5 mi SW |
| D-99 | | 99 | Pleasant Creek Park | 2.2 mi NW |
| D-101 | | 101 | Flecksing Farm | 4.0 mi NE |
| D-102 | C | 102 | McCardle Farm | 20.0 mi NW |
| D-103 | | 103 | Park Pond | 1.5 mi E |
| D-105 | C | 105 | Schulte Farm | 21.3 mi SW |
| D-106 | | 106 | Stallman Farm | 4.5 mi SE |
| D-107 | | 107 | Sewage System | Onsite |

^a "C" denotes control location. All other locations are indicators.

Table 5.4 Type and frequency of collection.

| Location | Location Type ^a | Weekly | Monthly | Quarterly | Semi-Annually | Annually |
|-----------------|----------------------------|--------|-----------------|-----------------|---------------|----------|
| D-1 | C | AP | TLD | | | TLD |
| D-2 | C | AP | TLD | | | TLD |
| D-3 | | AP | TLD | | | TLD |
| D-4 | | AP, AI | TLD | | | TLD |
| D-5 | | AP, AI | | | | |
| D-6 | | AP | TLD | | | TLD |
| D-7 | | AP, AI | TLD | | | TLD |
| D-8 | | AP, AI | TLD | | | TLD |
| D-9 | | AP | TLD | | | TLD |
| D-10 | | AP | TLD | | | TLD |
| D-11 | | AP, AI | TLD | | | TLD |
| D-12 | C | AP, AI | TLD | | | TLD |
| D-13 | C | AP | TLD | | | TLD |
| D-14 | | AP, AI | TLD | | | TLD |
| D-15 | | AP, AI | TLD | SO ^b | | TLD |
| D-16 | | AP | TLD | SO ^b | | TLD |
| D-17 | | | TLD | | | TLD |
| through D-48 | | | | | | |
| D-49 | C | | | SW | SL | F, BS |
| D-50 | | | | SW | | BS |
| D-51 | | | | SW | | BS |
| D-52 | | | | SW | | |
| D-53 | | | WW ^c | | | |
| D-54 | | | WW ^d | | | |
| D-55 | | | WW | | | |
| D-57 | | | WW | SO ^b | | Ge |
| D-58 | | | WW | SO ^b | | Ge |
| D-59 | | | WW | | | |
| D-60 | | | WW | | | |
| D-61 | | | | | SL | F, BS |
| D-63 | | | Mf | SO ^b | | Ge |
| D-72 | | | Mf | SO ^b | | Ge |
| D-73 | C | | | SW | | |
| D-76 | | | TLD | | | TLD |
| through D-91 | | | | | | |
| D-93 | | | Mf | SO ^b | | Ge |
| D-94 | | | Mf | SO ^b | | Ge, ME |
| D-96 | | | Mf | SO ^b | | Ge |
| D-99 | | | | SW | | |

Table 5.4 Type and frequency of collection (continued)

| Location | Location Type ^a | Weekly | Monthly | Quarterly | Semi-Annually | Annually |
|---------------------------------|----------------------------|--------|----------------|-----------------|---------------|---------------------|
| D-101 | | | M ^f | S ^{0b} | | G ^e |
| D-102 | C | | M ^f | S ^{0b} | | G ^e , ME |
| D-103 | | | SW | | | |
| D-105 | C | | M ^f | S ^{0b} | | G ^e |
| D-106 | | | M ^f | S ^{0b} | | G ^e |
| D-107 | | | SW | | | |
| On-site | | | | P | | |
| Inside 10 mile radius of Plant | | | | | WL | ME |
| Outside 10 mile radius of Plant | C | | | | | MW |

^a Control locations are indicated by a "C" in this column. All other locations are indicators.

^b Soil is collected three times per year.

^c Collected hourly and composited monthly and quarterly.

^d Collected daily and composited monthly and quarterly.

^e Vegetation (G) includes broad leaf vegetation and grain.

^f Monthly from October through April; weekly from May through September.

Table 5.5. Sample codes used in Table 5.4.

| Code | Description |
|------|-----------------------------------|
| AP | Airborne Particulates |
| AI | Airborne Iodine |
| TLD | Thermoluminescent Dosimeter |
| P | Precipitation |
| M | Milk |
| WW | Well Water |
| G | Vegetation (broad leaf and grain) |
| ME | Meat and Poultry |
| SO | Soil |
| SW | Surface Water |
| F | Fish |
| SL | Periphyton (aquatic biota) |
| BS | River Sediment |
| WL | Wildlife |

Table 5.6. Missed collections and analyses, Duane Arnold Energy Center, 1985.

| Sample | Analysis | Location | Collection Date or Period | Comments |
|---------------------|-----------------------|------------------------------------|---|--|
| TLD (Monthly) | Gamma | D-27,41 | January | Lost in the field. |
| | | D-7,37 | March | Lost in the field. |
| | | D-46 | April | Lost in the field. |
| | | D-30 | May | Lost in the field. |
| | | D-7,9,11,14, 42,44,45, 48,83 | June | Lost in the field. |
| | | D-40 | October | Lost in the field. |
| | | D-33 | November | |
| TLD (Annual) | | D-33,40,91 | January - December | Lost in the field. |
| | | D-11,36 | January - December | Chips damaged. |
| Air particulates | Gross beta | D-8 | 05-02-85 | Filter paper destroyed by equipment. |
| Well Water | Gross beta | D-59 | January February November December | Pump broke down. Pump broke down. Pump froze. Pump froze. |
| Milk | Used for composite | D-101 | 02-05-85 03-05-85 04-02-85 | Goat was dry. Goat was dry. Goat was dry. |
| Precipitation | Gross beta Tritium | Onsite | January | Not sufficient to collect. |
| | | | December | Not sufficient to collect. |

Table 5.7. Environmental Radiological Monitoring Program Summary.

Name of Facility Duane Arnold Energy Center Docket No. 50-331
 Location of Facility Linn, Iowa Reporting Period January - December, 1985
 (County, State)

| Sample Type (Units) | Type and Number of Analyses ^a | | LLD ^d | Indicator Locations Mean (F) ^c Range ^c | Location with Highest Annual Mean | | Control Locations Mean (F) Range | Number of Non-routine Results ^e |
|---|--|-------|--------------------|--|-----------------------------------|-----------------------------|----------------------------------|--|
| | | | | | Location ^d | mean (F) Range | | |
| Airborne Particulates (pCi/m ³) | GB | 831 | 0.005 ^f | 0.024 (619/624) (0.006-0.097) | D-6, Center Point 7 mi @ 0° N | 0.027 (52/52) (0.013-0.065) | 0.024 (207/207) (0.007-0.092) | 0 |
| | | | | | D-10, Atkins, 8 mi @ 210° SW | 0.027 (52/52) (0.012-0.097) | | |
| | Sr-89 | 64 | 0.005 | <LLD | - | - | <LLD | 0 |
| | Sr-90 | 64 | 0.002 | <LLD | - | - | <LLD | 0 |
| | GS | 64 | | | | | | |
| | Be-7 | | 0.033 | 0.076 (41/48) (0.040-0.200) | D-11, Toddville 4 mi @ 90° E | 0.114 (3/4) (0.064-0.200) | 0.065 (11/16) (0.042-0.095) | 0 |
| | Nb-95 | | 0.0031 | <LLD | - | - | <LLD | 0 |
| | Zr-95 | | 0.0051 | <LLD | - | - | <LLD | 0 |
| | Ru-103 | | 0.0030 | <LLD | - | - | <LLD | 0 |
| | Ru-106 | | 0.021 | <LLD | - | - | <LLD | 0 |
| | Cs-134 | | 0.0036 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 0.0075 | <LLD | - | - | <LLD | 0 |
| | Ce-141 | | 0.0033 | <LLD | - | - | <LLD | 0 |
| Ce-144 | | 0.094 | <LLD | - | - | <LLD | 0 | |
| Airborne Iodine (pCi/m ³) (D-4,5,7,11&15 composite) (D-8,12&14 composite) | I-131 | 104 | | | | | | |
| | | 52 | 0.006 | <LLD | - | - | <LLD | 0 |
| | | 52 | 0.01 | <LLD | - | - | <LLD | 0 |

Table 5.7. Environmental Radiological Monitoring Program Summary (continued)

Name of Facility Duane Arnold Energy Center Docket No. 50-331
 Location of Facility Linn, Iowa Reporting Period January - December, 1985
 (County, State)

| Sample Type (Units) | Type and Number of Analyses ^a | LLD ^b | Indicator Locations Mean (F) ^c Range ^c | Location with Highest Annual Mean | | Control Locations Mean (F) Range | Number of Non-routine Results ^e |
|---|--|--------------------------|--|---|--------------------------|----------------------------------|--|
| | | | | Location ^d | Mean (F) Range | | |
| TLD Monthly (mR/30 days) | Gamma 739 | 1 | 5.1 (691/691) (2.2-11.5) | D-90, 0.5 mi NW | 6.7 (12/12) (3.8-8.3) | 4.8 (48/48) (2.7-7.3) | 0 |
| TLD-Annual (mR/365 days) | Gamma 58 | 1 | 57.5 (54/54) (29.6-91.8) | D-6, Center Point 7.0 mi @ 0° N | 91.8 (1/1) - | 59.7 (4/4) (50.9-75.8) | 0 |
| TLD-Annual Normalized to 30 days (mR/30 days) | Gamma 58 | 1 | 4.7 (54/54) (2.4-7.5) | D-6, Center Point 7.0 mi @ 0° N | 7.5 (1/1) | 4.9 (4/4) (4.2-6.2) | 0 |
| Precipitation (pCi/l) | GB 10 | 1.1 | 5.4 (7/10) (2.0-9.4) | Onsite | 5.4 (7/10) (2.0-9.4) | None | 0 |
| | H-3 10 | 330 | <LLD | - | - | None | 0 |
| Milk (pCi/l) | I-131 161 | 0.49 | <LLD | - | - | <LLD | 0 |
| | Sr-89 45 | 10 | <LLD | - | - | <LLD | 0 |
| | Sr-90 45 | 0.5 | 2.7 (35/35) (1.2-6.2) | D-93, Yarborough Farm 2.8 mi NW of site | 5.5 (5/5) (5.0-6.2) | 2.1 (10/10) (1.4-2.9) | 0 |
| | GS 45 | | | | | | |
| | K-40 100 | 1420 (35/35) (1120-1920) | D-101, Flecksing Farm 4.0 mi NE | 1740 (5/5) (1640-1920) | 1320 (10/10) (1120-1390) | 0 | |
| | Cs-137 15 | <LLD | - | - | <LLD | 0 | |
| | Ba-La-140 15 | <LLD | - | - | <LLD | 0 | |
| (g/l) | Ca 45 | 0.1 | 0.84 (35/35) (0.62-1.22) | D-106, Stallman Farm 4.5 mi SE | 0.95 (5/5) (0.78-1.22) | 0.86 (10/10) (0.66-1.25) | 0 |
| Ground Water (pCi/l) (monthly) | Gross Beta 80 | 1.3 | 3.8 (55/80) (1.4-12.8) | D-58, Frantz Farm 0.5 mi | 7.3 (11/12) (2.0-12.4) | None | 0 |
| Ground Water (pCi/l) (quarterly comp.) | H-3 28 | 330 | <LLD | - | - | None | 0 |
| | Sr-89 28 | 10 | <LLD | - | - | None | 0 |
| | Sr-90 28 | 2 | <LLD | - | - | None | 0 |

Table 5.7. Environmental Radiological Monitoring Program Summary (continued)

Name of Facility Duane Arnold Energy Center Docket No. 50-331
 Location of Facility Linn, Iowa Reporting Period January - December, 1985
 (County, State)

| Sample Type (Units) | Type and Number of Analyses ^d | LLD ^b | Indicator Locations Mean (F) ^c Range ^c | Location with Highest Annual Mean | | Control Locations Mean (F) Range | Number of Non-routine Results ^e |
|-----------------------------------|--|------------------|--|-----------------------------------|----------------|----------------------------------|--|
| | | | | Location ^d | Mean (F) Range | | |
| Meat and Poultry (pCi/g wet) | GS 7 | | | | | | |
| | K-40 | 1.0 | 2.63 (3/3) (2.17-3.13) | D-94, Hines Farm 2.7 mi NE | 3.13 (1/1) - | 2.42 (4/4) (2.13-2.89) | 0 |
| | Mn-54 | 0.030 | <LLD | - | - | <LLD | 0 |
| | Co-58 | 0.031 | <LLD | - | - | <LLD | 0 |
| | Co-60 | 0.025 | <LLD | - | - | <LLD | 0 |
| | Cs-134 | 0.023 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | 0.023 | <LLD | - | - | <LLD | 0 |
| Other gammas | 0.14 | <LLD | - | - | <LLD | 0 | |
| Wildlife (pCi/g wet) | GS 2 | | | | | | |
| | K-40 | 1.0 | 4.45 (2/2) (3.25-5.64) | 4.5 mi SE of plant | 5.64 (1/1) - | None | 0 |
| | Mn-54 | 0.052 | <LLD | - | - | None | 0 |
| | Co-58 | 0.12 | <LLD | - | - | None | 0 |
| | Co-60 | 0.046 | <LLD | - | - | None | 0 |
| | Cs-134 | 0.045 | <LLD | - | - | None | 0 |
| | Cs-137 | 0.045 | <LLD | - | - | None | 0 |
| Other gammas | 0.57 | <LLD | - | - | None | 0 | |
| Broad Leaf Vegetation (pCi/g wet, | I-131 11 | 0.041 | <LLD | - | - | <LLD | 0 |

Table 5.7. Environmental Radiological Monitoring Program Summary (continued)

Name of Facility Duane Arnold Energy Center Docket No. 50-331
 Location of Facility Linn, Iowa Reporting Period January - December, 1985
 (County, State)

| Sample Type (Units) | Type and Number of Analyses ^a | | LLD ^b | Indicator Locations Mean (F) ^c Range ^c | Location with Highest Annual Mean | | Control Locations Mean (F) Range | Number of Non-routine Results ^e |
|---|--|------|------------------|--|-----------------------------------|----------------|----------------------------------|--|
| | | | | | Location ^d | Mean (F) Range | | |
| Vegetation - Corn (pCi/g wet) | Sr-90 | 10 | 0.002 | 0.008 (3/7) (0.002-0.014) | D-94, Hines Farm 2.7 mi NE | 0.014 (1/1) - | <LLD | 0 |
| | GS | 10 | | | | | | |
| | K-40 | | 0.5 | 2.73 (8/8) (2.44-3.42) | U-105, Schulte Farm 21.3 mi SSW | 3.87 (1/1) - | 3.24 (2/2) (2.61-3.87) | 0 |
| | Cs-134 | | 0.044 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 0.037 | <LLD | - | - | <LLD | 0 |
| Other gammas | | 0.34 | <LLD | - | - | <LLD | 0 | |
| Vegetation - Hay (pCi/g wet) | Sr-90 | 7 | 0.02 | 0.21 (6/6) (0.024-0.44) | D-106, Stallman Farm 4.5 mi SE | 0.44 (1/1) - | 0.17 (1/1) - | 0 |
| | GS | 7 | | | | | | |
| | K-40 | | 0.5 | 12.28 (6/6) (9.55-16.40) | U-105, Schulte Farm 21.3 mi SSW | 16.54 (1/1) - | 16.54 (1/1) - | 0 |
| | Cs-134 | | 0.077 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 0.081 | <LLD | - | - | <LLD | 0 |
| Other gammas | | 0.67 | <LLD | - | - | <LLD | 0 | |
| Vegetation - Soybeans, Oats (pCi/g wet) | Sr-90 | 11 | 0.006 | 0.016 (9/9) (0.008-0.027) | D-93, Yarborough Farm, 7.5 mi SW | 0.027 (1/1) - | 0.017 (2/2) (0.010-0.024) | 0 |
| | GS | 11 | | | | | | |
| | K-40 | | 0.5 | 6.65 (9/9) (3.19-12.80) | D-94, Hines Farm 2.7 mi NE | 12.80 (1/1) - | 7.71 (2/2) (2.48-12.93) | 0 |
| | Cs-134 | | 0.046 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 0.040 | <LLD | - | - | <LLD | 0 |
| Other gammas | | 0.32 | <LLD | - | - | <LLD | 0 | |

Table 5.7. Environmental Radiological Monitoring Program Summary (continued)

Name of Facility Duane Arnold Energy Center Docket No. 50-331
 Location of Facility Linn, Iowa Reporting Period January - December, 1985
 (County, State)

| Sample Type (Units) | Type and Number of Analyses ^a | | LLD ^b | Indicator Locations Mean (F) ^c Range ^c | Location with Highest Annual Mean | | Control Locations Mean (F) Range | Number of Non-routine Results ^e |
|-----------------------|--|------|------------------|--|-----------------------------------|------------------------------|----------------------------------|--|
| | | | | | Location ^d | Mean (F) Range | | |
| Soil (pCi/g dry) | Sr-90 | 39 | 0.03 | 0.13 (32/33) (0.03-0.26) | D-63, Andrews Farm 1.5 mi NW | 0.20 (3/3) (0.14-0.23) | 0.14 (6/6) (0.10-0.18) | 0 |
| | GS | 39 | | | | | | |
| | K-40 | | 0.5 | 11.83 (33/33) (7.72-17.07) | D-63, Andrews Farm 1.5 mi NW | 14.72 (3/3) (13.40-16.65) | 11.36 (6/6) (4.87-16.21) | 0 |
| | Mn-54 | | 0.15 | <LLD | - | - | <LLD | 0 |
| | Co-58,-60 | | 0.22 | <LLD | - | - | <LLD | 0 |
| | Zr-Nb-95 | | 0.24 | <LLD | - | - | <LLD | 0 |
| | Cs-134 | | 0.15 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | | 0.15 | 0.37 (24/33) (0.17-0.59) | D-63, Andrews Farm 1.5 mi NW | 0.51 (3/3) (0.46-0.56) | 0.39 (6/6) (0.31-0.47) | 0 |
| Other gammas | | 1.12 | <LLD | - | - | <LLD | 0 | |
| Surface Water (pCi/l) | GB | 95 | 1.0 | 7.5 (71/71) (2.2-37.6) | D-107, Onsite Sewage Effluent | 23.5 (11/11) (14.5-37.6) | 3.6 (23/24) (1.3-9.1) | 0 |
| | H-3 | 32 | 330 | <LLD | - | - | <LLD | 0 |
| | Sr-89 | 32 | 10 | <LLD | - | - | <LLD | 0 |
| | Sr-90 | 32 | 2.0 | <LLD | - | - | <LLD | 0 |
| | GS | 95 | | | | | | |
| | Mn-54 | | 15 | <LLD | - | - | <LLD | 0 |
| | Co-58,-60 | | 15 | <LLD | - | - | <LLD | 0 |
| | Zr-Nb-95 | | 15 | <LLD | - | - | <LLD | 0 |
| | Cs-134 | | 15 | <LLD | - | - | <LLD | 0 |
| Cs-137 | | 15 | <LLD | - | - | <LLD | 0 | |

Table 5.7. Environmental Radiological Monitoring Program Summary (continued)

Name of Facility Duane Arnold Energy Center Docket No. 50-331
 Location of Facility Linn, Iowa Reporting Period January - December, 1985
 (County, State)

| Sample Type (Units) | Type and Number of Analyses ^a | LLD ^b | Indicator Locations Mean (F) ^c Range ^c | Location with Highest Annual Mean | | Control Locations Mean (F) Range | Number of Non-routine Results ^e |
|-----------------------------------|--|------------------|--|---|---------------------------|----------------------------------|--|
| | | | | Location ^d | Mean (F) Range | | |
| Fish (Edible portion) (pCi/g wet) | GS 10 | | | | | | |
| | K-40 | 0.5 | 3.07 (5/5) (2.63-3.29) | D-49, 0.5 miles Upstream of Plant Discharge | 3.08 (5/5) (2.72-3.82) | 3.08 (5/5) (2.72-3.82) | 0 |
| | Mn-54 | 0.033 | <LLD | - | - | <LLD | 0 |
| | Co-58, -60 | 0.064 | <LLD | - | - | <LLD | 0 |
| | Cs-134, -137 | 0.036 | <LLD | - | - | <LLD | 0 |
| Other gammas | 0.20 | <LLD | <LLD | - | - | <LLD | 0 |
| Periphyton (pCi/g wet) | GS 8 | | | | | | |
| | K-40 | 1.3 | 5.00 (3/4) (4.13-5.81) | D-49, 0.5 mi Upstream of Plant Discharge | 7.65 (4/4) (1.37-18.3) | 7.65 (4/4) (1.37-18.3) | 0 |
| | Cs-134 | 0.13 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | 0.14 | <LLD | - | - | <LLD | 0 |
| | Other gammas | 1.13 | <LLD | <LLD | - | - | <LLD |
| River Sediments (pCi/g dry) | Sr-90 8 | 0.015 | <LLD | - | - | <LLD | 0 |
| | GS 8 | | | | | | |
| | K-40 | 1.0 | 9.64 (4/4) (7.36-12.00) | D-51, Downstream of Plant Discharge | 11.75 (2/2) (11.50-12.00) | 7.50 (4/4) (6.94-8.09) | 0 |
| | Mn-54 | 0.023 | <LLD | - | - | <LLD | 0 |
| | Co-58, -60 | 0.041 | <LLD | <LLD | - | - | <LLD |

Table 5.7. Environmental Radiological Monitoring Program Summary (continued)

Name of Facility Duane Arnold Energy Center Docket No. 50-331
 Location of Facility Linn, Iowa Reporting Period January - December, 1985
 (County, State)

| Sample Type (Units) | Type and Number of Analyses ^a | LLD ^b | Indicator Locations Mean (F) ^c Range ^c | Location with Highest Annual Mean | | Control Locations Mean (F) Range | Number of Non-routine Results ^e |
|---|--|------------------|--|-----------------------------------|----------------|----------------------------------|--|
| | | | | Location ^d | Mean (F) Range | | |
| River Sediments (pCi/g dry) (continued) | Cs-134 | 0.027 | <LLD | - | - | <LLD | 0 |
| | Cs-137 | 0.021 | <LLD | - | - | <LLD | 0 |
| | Other gammas | 0.18 | <LLD | - | - | <LLD | 0 |

^a GB = Gross beta; GS = Gamma scan.

^b LLD = Nominal lower limit of detection based on 4.66 sigma error for background sample.

^c Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

^d Locations are specified by: (1) name and code (Table 5.3); and (2) distance, direction, and sector relative to reactor site.

^e Nonroutine results are those which exceed ten times the control station value. If no control station value is available, the result is considered nonroutine if it exceeds ten times the preoperational value for the location.

^f Two (2) results have been excluded in the determination of LLD for gross beta. Higher than normal LLD (<0.014 and <0.023 pCi/M³) resulted from low volume due to pump malfunction.

^g One (1) result (<0.5 pCi/l) has been excluded in the determination of LLD for I-131 in milk. It resulted from a delay in counting.

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Appendix A

Interlaboratory Comparison Program Results

Appendix A

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 1982 through October 1985. 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, and 1981 through participation in the Second, Third, Fourth, and Fifth International Intercomparison of Environmental Dosimeters under the sponsorships listed in Table A-2.

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, 1982 through 1985.^a

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/lb | |
|----------|-------------|----------------|-------------|--------------------------------|------------------------------------|
| | | | | TIML Result $\pm 2\sigma^c$ | EPA Result $\pm 3\sigma, n=1^d$ |
| STW-270 | Water | Jan. 1982 | Sr-89 | 24.3 \pm 2.0 | 21.0 \pm 5.0 |
| | | | Sr-90 | 9.4 \pm 0.5 | 12.0 \pm 1.5 |
| STW-273 | Water | Jan. 1982 | I-131 | 8.6 \pm 0.6 | 8.4 \pm 1.5 |
| STW-275 | Water | Feb. 1982 | H-3 | 1580 \pm 147 | 1820 \pm 342 |
| STW-276 | Water | Feb. 1982 | Cr-51 | <61 | 0 |
| | | | Co-60 | 26.0 \pm 3.7 | 20 \pm 5 |
| | | | Zn-65 | <13 | 15 \pm 5 |
| | | | Ru-106 | <46 | 20 \pm 5 |
| | | | Cs-134 | 26.8 \pm 0.7 | 22 \pm 5 |
| | | | Cs-137 | 29.7 \pm 1.4 | 23 \pm 5 |
| STW-277 | Water | Mar. 1982 | Ra-226 | 11.9 \pm 1.9 | 11.6 \pm 1.7 |
| STW-278 | Water | Mar. 1982 | Gross alpha | 15.6 \pm 1.9 | 19 \pm 5 |
| | | | Gross beta | 19.2 \pm 0.4 | 19 \pm 5 |
| STW-280 | Water | Apr. 1982 | H-3 | 2690 \pm 80 | 2860 \pm 360 |
| STW-281 | Water | Apr. 1982 | Gross alpha | 75 \pm 7.9 | 85 \pm 21 |
| | | | Gross beta | 114.1 \pm 5.9 | 106 \pm 5.3 |
| | | | Sr-89 | 17.4 \pm 1.8 | 24 \pm 5 |
| | | | Sr-90 | 10.5 \pm 0.6 | 12 \pm 1.5 |
| | | | Ra-226 | 11.4 \pm 2.0 | 10.9 \pm 1.5 |
| | | | Co-60 | <4.6 | 0 |
| STW-284 | Water | May 1982 | Gross alpha | 31.5 \pm 6.5 | 27.5 \pm 7 |
| | | | Gross beta | 25.9 \pm 3.4 | 29 \pm 5 |
| STW-285 | Water | June 1982 | H-3 | 1970 \pm 1408 | 1830 \pm 340 |
| STW-286 | Water | June 1982 | Ra-226 | 12.6 \pm 1.5 | 13.4 \pm 3.5 |
| | | | Ra-228 | 11.1 \pm 2.5 | 8.7 \pm 2.3 |
| STW-287 | Water | June 1982 | I-131 | 6.5 \pm 0.3 | 4.4 \pm 0.7 |
| STW-290 | Water | Aug. 1982 | H-3 | 3210 \pm 140 | 2890 \pm 619 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l ^b | |
|----------|-------------|----------------|-------------|-------------------------------------|------------------------------------|
| | | | | TIML Result $\pm 2\sigma^c$ | EPA Result $\pm 3\sigma, n=1^d$ |
| STW-291 | Water | Aug. 1982 | I-131 | 94.6 \pm 2.5 | 87 \pm 15 |
| STW-292 | Water | Sept. 1982 | Sr-89 | 22.7 \pm 3.8 | 24.5 \pm 8.7 |
| | | | Sr-90 | 10.9 \pm 0.3 | 14.5 \pm 2.6 |
| STW-296 | Water | Oct. 1982 | Co-60 | 20.0 \pm 1.0 | 20 \pm 8.7 |
| | | | Zn-65 | 32.3 \pm 5.1 | 24 \pm 8.7 |
| | | | Cs-134 | 15.3 \pm 1.5 | 19.0 \pm 8.7 |
| | | | Cs-137 | 21.0 \pm 1.7 | 20.0 \pm 8.7 |
| STW-297 | Water | Oct. 1982 | H-3 | 2470 \pm 20 | 2560 \pm 612 |
| STW-298 | Water | Oct. 1982 | Gross alpha | 32 \pm 30 | 55 \pm 24 |
| | | | Gross beta | 81.7 \pm 6.1 | 81 \pm 8.7 |
| | | | Sr-89 | <2 | 0 |
| | | | Sr-90 | 14.1 \pm 0.9 | 17.2 \pm 2.6 |
| | | | Cs-134 | <2 | 1.8 \pm 8.7 |
| | | | Cs-137 | 22.7 \pm 0.6 | 20 \pm 8.7 |
| | | | Ra-226 | 13.6 \pm 0.3 | 12.5 \pm 3.2 |
| | | | Ra-228 | 3.9 \pm 1.0 | 3.6 \pm 0.9 |
| STW-301 | Water | Nov. 1982 | Gross alpha | 12.0 \pm 1.0 | 19.0 \pm 8.7 |
| | | | Gross beta | 34.0 \pm 2.7 | 24.0 \pm 8.7 |
| STW-302 | Water | Dec. 1982 | I-131 | 40.0 \pm 0.0 | 37.0 \pm 10 |
| STW-303 | Water | Dec. 1982 | H-3 | 1940 \pm 20 | 1990 \pm 345 |
| STW-304 | Water | Dec. 1982 | Ra-226 | 11.7 \pm 0.6 | 11.0 \pm 1.7 |
| | | | Ra-228 | <3 | 0 |
| STW-306 | Water | Jan. 1983 | Sr-89 | 20.0 \pm 8.7 | 29.2 \pm 5 |
| | | | Sr-90 | 21.7 \pm 8.4 | 17.2 \pm 1.5 |
| STW-307 | Water | Jan. 1983 | Gross alpha | 29.0 \pm 4.09 | 29.0 \pm 13 |
| | | | Gross beta | 29.3 \pm 0.6 | 31.0 \pm 8.7 |
| STM-309 | Milk | Feb. 1982 | Sr-89 | 35 \pm 2.0 | 37 \pm 8.7 |
| | | | Sr-90 | 13.7 \pm 0.6 | 18 \pm 2.6 |
| | | | I-131 | 55.7 \pm 3.2 | 55 \pm 10.4 |
| | | | Cs-137 | 29 \pm 1.0 | 26 \pm 8.7 |
| | | | Ba-140 | <27 | 0 |
| | | | K-40 | 1637 \pm 5.8 | 1512 \pm 131 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l ^b | |
|----------------------|-------------|----------------|--|--|---|
| | | | | TIML Result $\pm 2\sigma^c$ | EPA Result $\pm 3\sigma, n=1^d$ |
| STW-310 | Water | Feb. 1983 | H-3 | 2470 \pm 80 | 2560 \pm 612 |
| STW-311 | Water | March 1983 | Ra-226 Ra-228 | 11.9 \pm 1.3 <2.7 | 12.7 \pm 3.3 0 |
| STW-312 | Water | March 1983 | Gross alpha Gross beta | 31.6 \pm 4.59 27.0 \pm 2.0 | 31 \pm 13.4 28 \pm 8.7 |
| STW-313 | Water | April 1983 | H-3 | 3240 \pm 80 | 3330 \pm 627 |
| STW-316 | Water | May 1983 | Gross alpha Gross beta Sr-89 Sr-90 Ra-226 Co-60 Cs-134 Cs-137 | 94 \pm 7 133 \pm 5 19 \pm 1 12 \pm 1 7.9 \pm 0.4 30 \pm 2 27 \pm 2 29 \pm 1 | 64 \pm 19.9 149 \pm 12.4 24 \pm 8.7 13 \pm 2.6 8.5 \pm 2.25 30 \pm 8.7 33 \pm 8.7 27 \pm 8.7 |
| STW-317 | Water | May 1983 | Sr-89 Sr-90 | 59.7 \pm 2.1 33.7 \pm 1.5 | 57 \pm 8.7 38 \pm 3.3 |
| STW-318 ^f | Water | May 1983 | Gross alpha Gross beta | 12.8 \pm 1.5 49.4 \pm 3.9 | 11 \pm 8.7 57 \pm 8.7 |
| STM-320 | Milk | June 1983 | Sr-89 Sr-90 I-131 Cs-137 K-40 | 20 \pm 0 10 \pm 1 30 \pm 1 52 \pm 2 1553 \pm 57 | 25 \pm 8.7 16 \pm 2.6 30 \pm 10.4 47 \pm 8.7 1486 \pm 129 |
| STW-321 | Water | June 1983 | H-3 | 1470 \pm 89 | 1529 \pm 583 |
| STW-322 | Water | June 1983 | Ra-226 Ra-228 | 4.3 \pm 0.2 <2.5 | 4.8 \pm 1.24 0 |
| STW-323 | Water | July 1983 | Gross alpha Gross beta | 3 \pm 1 21 \pm 0 | 7 \pm 8.7 22 \pm 8.7 |
| STW-324 | Water | August 1983 | I-131 | 13.3 \pm 0.6 | 14 \pm 10.4 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l ^b | |
|----------|-------------|----------------|-------------|-------------------------------------|------------------------------------|
| | | | | TIML Result $\pm 2\sigma^c$ | EPA Result $\pm 3\sigma, n=1^d$ |
| STAF-326 | Air Filter | August 1983 | Gross beta | 42±2 | 36±8.7 |
| | | | Sr-90 | 14±2 | 10±2.6 |
| | | | Cs-137 | 19±1 | 15±8.7 |
| STW-328 | Water | Sept. 1983 | Gross alpha | 2.3±0.6 | 5±8.7 |
| | | | Gross beta | 10.7±1.2 | 9±8.7 |
| STW-329 | Water | Sept. 1983 | Ra-226 | 3.0±0.2 | 3.1±0.81 |
| | | | Ra-228 | 3.2±0.7 | 2.0±0.52 |
| STW-331 | Water | Oct. 1983 | H-3 | 1300±30 | 1210±570 |
| STW-335 | Water | Dec. 1983 | I-131 | 19.6±1.9 | 20±10.4 |
| STW-336 | Water | Dec. 1983 | H-3 | 2870±100 | 2389±608 |
| STAF-337 | Air Filter | Nov. 1983 | Gross alpha | 18.0±0.2 | 19±8.7 |
| | | | Gross beta | 58.6±1.2 | 50±8.7 |
| | | | Sr-90 | 10.9±0.1 | 15±2.6 |
| | | | Cs-137 | 30.1±2.5 | 20±8.7 |
| STW-339 | Water | Jan. 1984 | Sr-89 | 47.2±1.9 | 36±8.7 |
| | | | Sr-90 | 22.5±4.0 | 24±2.6 |
| STW-343 | Water | Feb. 1984 | H-3 | 2487±76 | 2383±607 |
| STM-347 | Milk | March 1984 | I-131 | 5.3±1.1 | 6±1.6 |
| STW-349 | Water | March 1984 | Ra-226 | 4.0±0.2 | 4.1±1.06 |
| | | | Ra-228 | 3.6±0.3 | 2.0±0.52 |
| STW-350 | Water | March 1984 | Gross alpha | 3.8±1.1 | 5±8.7 |
| | | | Gross beta | 24.2±2.0 | 20±8.7 |
| STW-354 | Water | April 1984 | H-3 | 3560±50 | 3508±630 |
| STW-355 | Water | April 1984 | Gross alpha | 21.0±4.1 | 35±15.2 |
| | | | Gross beta | 127.8±4.1 | 147±12.7 |
| | | | Sr-89 | 29.3±2.0 | 23±8.7 |
| | | | Sr-90 | 16.6±0.7 | 26±2.6 |
| | | | Ra-226 | 4.0±1.0 | 4.0±1.04 |
| | | | Co-60 | 32.3±1.4 | 30±8.7 |
| | | | Cs-134 | 33.6±3.1 | 30±8.7 |
| Cs-137 | 33.3±2.2 | 26±8.7 | | | |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l ^b | |
|----------|-------------|----------------|---|---|---|
| | | | | TIML Result $\pm 2\sigma^c$ | EPA Result $\pm 3\sigma, n=1^d$ |
| STW-358 | Water | May 1984 | Gross alpha Gross beta | 3.0 \pm 0.6 6.7 \pm 1.2 | 3 \pm 8.7 6 \pm 8.7 |
| STM-366 | Milk | June 1984 | Sr-89 Sr-90 I-131 Cs-137 K-40 | 21 \pm 3.1 13 \pm 2.0 46 \pm 5.3 38 \pm 4.0 1577 \pm 172 | 25 \pm 8.7 17 \pm 2.6 43 \pm 10.4 35 \pm 8.7 1496 \pm 130 |
| STW-368 | Water | July 1984 | Gross alpha Gross beta | 5.1 \pm 1.1 11.9 \pm 2.4 | 6 \pm 8.7 13 \pm 8.7 |
| STW-369 | Water | August 1984 | I-131 | 34.3 \pm 5.0 | 34.0 \pm 10.4 |
| STW-370 | Water | August 1984 | H-3 | 3003 \pm 253 | 2817 \pm 617 |
| STF-371 | Food | July 1984 | Sr-89 Sr-90 I-131 Cs-137 K-40 | 22.0 \pm 5.3 14.7 \pm 3.1 <172 24.0 \pm 5.3 2503 \pm 132 | 25.0 \pm 8.7 20.0 \pm 2.6 39.0 \pm 10.4 25.0 \pm 8.7 2605 \pm 226.0 |
| STAF-372 | Air Filter | August 1984 | Gross alpha Gross beta Sr-90 Cs-137 | 15.3 \pm 1.2 56.0 \pm 0.0 14.3 \pm 1.2 21.0 \pm 2.0 | 17 \pm 8.7 51 \pm 8.7 18 \pm 2.4 15 \pm 8.7 |
| STW-375 | Water | Sept. 1984 | Ra-226 Ra-228 | 5.1 \pm 0.4 2.2 \pm 0.1 | 4.9 \pm 1.27 2.3 \pm 0.60 |
| STW-377 | Water | Sept. 1984 | Gross alpha Gross beta | 3.3 \pm 1.2 12.7 \pm 2.3 | 5.0 \pm 8.7 16.0 \pm 8.7 |
| STW-379 | Water | Oct. 1984 | H-3 | 2860 \pm 312 | 2810 \pm 356 |
| STW-380 | Water | Oct. 1984 | Cr-51 Co-60 Zn-65 Ru-106 Cs-134 Cs-137 | <36 20.3 \pm 1.2 150 \pm 8.1 <30 31.3 \pm 7.0 26.7 \pm 1.2 | 40 \pm 8.7 20 \pm 8.7 147 \pm 8.7 47 \pm 8.7 31 \pm 8.7 24 \pm 8.7 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l ^b | | |
|----------|------------------|-----------------------|-------------|-------------------------------------|------------------------------------|----------|
| | | | | TIML Result ±2 ^c | EPA Result ±3, n=1 ^d | |
| STM-382 | Milk | Oct. 1984 | Sr-89 | 15.7±4.2 | 22±8.7 | |
| | | | Sr-90 | 12.7±1.2 | 16±2.6 | |
| | | | I-131 | 41.7±3.1 | 42±10.4 | |
| | | | Cs-137 | 31.3±6.1 | 32±8.7 | |
| | | | K-40 | 1447±65 | 1517±131 | |
| STW-384 | Water (Blind) | Oct. 1984 Sample A | Gross alpha | 9.7±1.2 | 14±8.7 | |
| | | | Ra-226 | 3.3±0.2 | 3.0±0.8 | |
| | | | Ra-228 | 3.4±1.6 | 2.1±0.5 | |
| | | | Uranium | NA ^e | 5±10.4 | |
| | | | Sample B | Gross beta | 48.3±5.0 | 64±8.7 |
| | | | | Sr-89 | 10.7±4.6 | 11±8.7 |
| | Sr-90 | 7.3±1.2 | | 12±2.6 | | |
| | Co-60 | 16.3±1.2 | | 14±8.7 | | |
| | Cs-134 | <2 | | 2±8.7 | | |
| | Cs-137 | 16.7±1.2 | | 14±8.7 | | |
| | STAF-387 | Air Filter | | Nov. 1984 | Gross alpha | 18.7±1.2 |
| | | | Gross beta | | 59.0±5.3 | 52±8.7 |
| | | | Sr-90 | | 18.3±1.2 | 21±2.6 |
| Cs-137 | | | 10.3±1.2 | | 10±8.7 | |
| STW-388 | Water | Dec. 1984 | I-131 | 28.0±2.0 | 36±10.4 | |
| STW-389 | Water | Dec. 1984 | H-3 | 3583±110 | 3182±624 | |
| STW-391 | Water | Dec. 1984 | Ra-226 | 8.4±1.7 | 8.6±2.2 | |
| | | | Ra-228 | 3.1±0.2 | 4.1±1.1 | |
| STW-392 | Water | Jan. 1985 | Sr-89 | <3.0 | 3.0±8.7 | |
| | | | Sr-90 | 27.3±5.2 | 30.0±2.6 | |
| STW-393 | Water | Jan. 1985 | Gross alpha | 3.3±1.2 | 5±8.7 | |
| | | | Gross beta | 17.3±3.0 | 15±8.7 | |
| STS-395 | Food | Jan. 1985 | Sr-89 | 25.3±6.4 | 34.0±5.0 | |
| | | | Sr-90 | 27.0±8.8 | 26.0±1.5 | |
| | | | I-131 | 38.0±2.0 | 35.0±6.0 | |
| | | | Cs-137 | 32.7±2.4 | 29.0±5.0 | |
| | | | K-40 | 1410±212 | 1382±120 | |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l ^b | | |
|----------|-------------|----------------|-------------------|-------------------------------------|------------------------------------|----------------|
| | | | | TIML Result $\pm 2\sigma^c$ | EPA Result $\pm 3\sigma, n=1^d$ | |
| STW-397 | Water | Feb. 1985 | Cr-51 | <29 | 48 \pm 8.7 | |
| | | | Co-60 | 21.3 \pm 3.0 | 20 \pm 8.7 | |
| | | | Zn-65 | 53.7 \pm 5.0 | 55 \pm 8.7 | |
| | | | Ru-106 | <23 | 25 \pm 8.7 | |
| | | | Cs-134 | 32.3 \pm 1.2 | 35 \pm 8.7 | |
| | | | Cs-137 | 25.3 \pm 3.0 | 25 \pm 8.7 | |
| STW-398 | Water | Feb. 1985 | H-3 | 3869 \pm 319 | 3796 \pm 634 | |
| STM-400 | Milk | March 1985 | I-131 | 7.3 \pm 2.4 | 9.0 \pm 0.9 | |
| STW-402 | Water | March 1985 | Ra-226 | 4.6 \pm 0.6 | 5.0 \pm 1.3 | |
| | | | Ra-228 | <0.8 | 9.0 \pm 2.3 | |
| | | | Reanalysis Ra-228 | 9.0 \pm 0.4 | | |
| STW-404 | Water | March 1985 | Gross alpha | 4.7 \pm 2.3 | 6 \pm 8.7 | |
| | | | Gross beta | 11.3 \pm 1.2 | 15 \pm 8.7 | |
| STAF-405 | Air Filter | March 1985 | Gross alpha | 9.3 \pm 1.0 | 10.0 \pm 8.7 | |
| | | | Gross beta | 42.0 \pm 1.1 | 36.0 \pm 8.7 | |
| | | | Sr-90 | 13.3 \pm 1.0 | 15.0 \pm 2.6 | |
| | | | Cs-137 | 6.3 \pm 1.0 | 6.0 \pm 8.7 | |
| STW-407 | Water | April 1985 | I-131 | 8.0 \pm 0.0 | 7.5 \pm 1.3 | |
| STW-408 | Water | April 1985 | H-3 | 3399 \pm 150 | 3559 \pm 630 | |
| STW-409 | Water | April 1985 | | | | |
| | | | (Blind) | | | |
| | | | Sample A | Gross alpha | 29.7 \pm 1.8 | 32.0 \pm 5.0 |
| | | | | Ra-226 | 4.4 \pm 0.2 | 4.1 \pm 0.6 |
| | | | | Ra-228 | NA ^e | 6.2 \pm 0.9 |
| | | | | Uranium | NA ^e | 7.0 \pm 6.0 |
| | | | Sample B | | | |
| | | | | Gross beta | 74.3 \pm 11.8 | 72.0 \pm 5.0 |
| | | | | Sr-89 | 12.3 \pm 7.6 | 10.0 \pm 5.0 |
| | | | | Sr-90 | 14.7 \pm 2.4 | 15.0 \pm 1.5 |
| | | | | Co-60 | 14.7 \pm 2.4 | 15.0 \pm 5.0 |
| | | | | Cs-134 | 12.0 \pm 2.0 | 15.0 \pm 5.0 |
| | | | | Cs-137 | 14.0 \pm 2.0 | 12.0 \pm 5.0 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l ^b | |
|----------|---------------|----------------|---|--|--|
| | | | | TIML Result ±2 ^c | EPA Result ±3, n=1 ^d |
| STW-413 | Water | May 1985 | Sr-89 Sr-90 | 36.0±12.4 14.3±4.2 | 39.0±5.0 15.0±1.5 |
| STW-414 | Water | May 1985 | Gross alpha Gross beta | 8.3±4.1 8.7±1.2 | 12.0±5.0 11.0±5.0 |
| STW-416 | Water | June 1985 | Cr-51 Co-60 Zn-65 Ru-106 Cs-134 Cs-137 | 44.7±6.0 14.3±1.2 50.3±7.0 55.3±5.8 32.7±1.2 22.7±2.4 | 44.0±5.0 14.0±5.0 47.0±5.0 62.0±5.0 35.0±5.0 20.0±5.0 |
| STW-418 | Water | June 1985 | H-3 | 2446±132 | 2416±351 |
| STM-421 | Milk | June 1985 | Sr-89 Sr-90 I-131 Cs-137 K-40 | 10.3±4.6 9.0±2.0 11.7±1.2 12.7±1.2 1512±62 | 11.0±8.7 11.0±2.6 11.0±10.4 11.0±8.7 1525±132 |
| STW-423 | Water | July 1985 | Gross alpha Gross beta | 5.0±0.0 5.0±2.0 | 11.0±8.7 8.0±8.7 |
| STW-425 | Water | August 1985 | I-131 | 25.7±3.0 | 33.0±10.4 |
| STW-426 | Water | August 1985 | H-3 | 4363±83 | 4480±776 |
| STAF-427 | Air Filter | August 1985 | Gross alpha Gross beta Sr-90 Cs-137 | 11.3±0.6 46.0±1.0 17.7±0.6 10.3±0.6 | 13.0±8.7 44.0±8.7 18.0±2.6 8.0±8.7 |
| STW-429 | Water | Sept. 1985 | Sr-89 Sr-90 | 15.7±0.6 7.0±0.0 | 20.0±8.7 7.0±2.6 |
| STW-430 | Water | Sept. 1985 | Ra-226 Ra-228 | 8.2±0.3 4.1±0.3 | 8.9±2.3 4.6±1.2 |
| STW-431 | Water | Sept. 1985 | Gross alpha Gross beta | 4.7±0.6 4.7±1.2 | 8.0±8.7 8.0±8.7 |

Table A-1. (continued)

| Lab Code | Sample Type | Date Collected | Analysis | Concentration in pCi/l ^b | |
|----------|-------------|----------------|----------|-------------------------------------|------------------------------------|
| | | | | TIML Result $\pm 2\sigma^c$ | EPA Result $\pm 3\sigma, n=1^d$ |
| STW-433 | Water | Oct. 1985 | Cr-51 | <13 | 21.0 \pm 8.7 |
| | | | Co-60 | 19.30.6 | 20.0 \pm 8.7 |
| | | | Zn-65 | 19.7 \pm 0.6 | 19.0 \pm 8.7 |
| | | | Ru-106 | <19 | 20.0 \pm 8.7 |
| | | | Cs-134 | 17.0 \pm 1.0 | 20.0 \pm 8.7 |
| | | | Cs-137 | 19.3 \pm 1.2 | 20.0 \pm 8.7 |
| STW-435 | Water | Oct. 1985 | H-3 | 1957 \pm 50 | 1974 \pm 598 |

^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 pCi/l, except for elemental potassium (K) data, which are in mg/l; air filter samples, which are in pCi/filter; and food, which is in pCi/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 \pm control limits of 3σ for $n = 1$.

^e NA = Not analyzed.

^f Analyzed but not reported to the EPA.

^g Results after calculations corrected (error in calculations when reported to EPA).

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

| Lab Code | TLD Type | Measurement | Teledyne Result $\pm 2\sigma^a$ | mR | |
|--|---------------------------|------------------------|---------------------------------|------------------------------|--|
| | | | | Known Value | Average $\pm 2\sigma^d$ (all participants) |
| <u>2nd International Intercomparison^b</u> | | | | | |
| 115-2 ^b | CaF ₂ :Mn Bulb | Gamma-Field | 17.0 \pm 1.9 | 17.1 ^c | 16.4 \pm 7.7 |
| | | Gamma-Lab | 20.8 \pm 4.1 | 21.3 ^c | 18.8 \pm 7.6 |
| <u>3rd International Intercomparison^e</u> | | | | | |
| 115-3 ^e | CaF ₂ :Mn Bulb | Gamma-Field | 30.7 \pm 3.2 | 34.9 \pm 4.8 ^f | 31.5 \pm 3.0 |
| | | Gamma-Lab | 89.6 \pm 6.4 | 91.7 \pm 14.6 ^f | 86.2 \pm 24.0 |
| <u>4th International Intercomparison^g</u> | | | | | |
| 115-49 | CaF ₂ :Mn Bulb | Gamma-Field | 14.1 \pm 1.1 | 14.1 \pm 1.4 ^f | 16.0 \pm 9.0 |
| | | Gamma-Lab (Low) | 9.3 \pm 1.3 | 12.2 \pm 2.4 ^f | 12.0 \pm 7.6 |
| | | Gamma-Lab (High) | 40.4 \pm 1.4 | 45.8 \pm 9.2 ^f | 43.9 \pm 13.2 |
| <u>5th International Intercomparison^h</u> | | | | | |
| 115-5A ^h | CaF ₂ :Mn Bulb | Gamma-Field | 31.4 \pm 1.8 | 30.0 \pm 6.0 ⁱ | 30.2 \pm 14.6 |
| | | Gamma-Lab at beginning | 77.4 \pm 5.8 | 75.2 \pm 7.6 ⁱ | 75.8 \pm 40.4 |
| | | Gamma-Lab at the end | 96.6 \pm 5.8 | 88.4 \pm 8.8 ⁱ | 90.7 \pm 31.2 |

Table A-2. (Continued)

| Lab Code | TLD Type | Measurement | mR | | |
|---------------------|---------------|------------------------|---------------------------------|-----------------------------|--|
| | | | Teledyne Result $\pm 2\sigma^a$ | Known Value | Average $\pm 2\sigma^d$ (all participants) |
| 115-5B ^h | LiF-100 Chips | Gamma-Field | 30.3 \pm 4.8 | 30.0 \pm 6 ⁱ | 30.2 \pm 14.6 |
| | | Gamma-Lab at beginning | 81.1 \pm 7.4 | 75.2 \pm 7.6 ⁱ | 75.8 \pm 40.4 |
| | | Gamma-Lab at the end | 85.4 \pm 11.7 | 88.4 \pm 8.8 ⁱ | 90.7 \pm 31.2 |

^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 continuously operated pressurized ion chamber.

^d Mean ± 2 standard deviations of results obtained by all laboratories participating in the program.

^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 Value ± 2 standard deviations as determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.

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

^h 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.

ⁱ Value determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.

Appendix B
Data Reporting Conventions

Data Reporting Conventions

1.0. All activities are decay corrected to collection time.

2.0. Single Measurements

Each single measurement is reported as follows:

$$x \pm s$$

where x = value of the measurement;

s = 2σ counting uncertainty (corresponding to the 95% confidence level).

In cases where the activity is found to be below the lower limit of detection L it is reported as

$$<L$$

where L = is the lower limit of detection based on 4.66σ uncertainty for a background sample.

3.0. Duplicate Analyses

3.1. Individual results: $x_1 \pm s_1$
 $x_2 \pm s_2$

Reported result: $x \pm s$

where $x = (1/2)(x_1 + x_2)$

$$s = \sqrt{s_1^2 + s_2^2}$$

3.2. Individual results: $<L_1$

$<L_2$

Reported result: $<L$

where L = lower of L_1 and L_2

3.3. Individual results: $x \pm s$

$<L$

Reported result: $x \pm s$ if $x \geq L$;

$<L$ otherwise

4.0. Computation of Averages and Standard Deviations

4.1 Averages and standard deviations listed in the tables are computed from all of the individual measurements over the period averaged; for example, an annual standard deviation would not be the average of quarterly standard deviations. The average \bar{x} and standard deviation(s) of a set of n numbers x_1, x_2, \dots, x_n are defined as follows:

$$\bar{x} = \frac{1}{n} \sum x$$

$$s = \sqrt{\frac{\sum (x-\bar{x})^2}{n-1}}$$

- 4.2 Values below the highest lower limit of detection are not included in the average.
- 4.3 If all of the values in the averaging group are less than the highest LLD, the highest LLD is reported.
- 4.4 If all but one of the values are less than the highest LLD, the single value x and associated two sigma error is reported.
- 4.5. In rounding off, the following rules are followed:
- 4.5.1. If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.443 is rounded off to 11.44.
- 4.5.2 If the figure following those to be retained is greater than 5, the figure is dropped, and the last retained figure is raised by 1. As an example, 11.446 is rounded off to 11.45.
- 4.5.3. If the figure following those to be retained is 5, and if there are no figures other than zeros beyond the five, the figure 5 is dropped, and the last-place figure retained is increased by one if it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44, while 11.425 is rounded off to 11.42.

Appendix C

Maximum Permissible Concentrations
of Radioactivity in Air and Water
Above Background in Unrestricted Areas

Table C-1. Maximum permissible concentrations of radioactivity in air and water above natural background in unrestricted areas.^a

| Air | | | Water | |
|-------------------------|------|--------------------|---------------------------|---------------------------|
| Gross alpha | 3 | pCi/m ³ | Strontium-89 | 3,000 pCi/l |
| Gross beta | 100 | pCi/m ³ | Strontium-90 | 300 pCi/l |
| Iodine-131 ^b | 0.14 | pCi/m ³ | Cesium-137 | 20,000 pCi/l |
| | | | Barium-140 | 20,000 pCi/l |
| | | | Iodine-131 | 300 pCi/l |
| | | | Potassium-40 ^c | 3,000 pCi/l |
| | | | Gross alpha | 30 pCi/l |
| | | | Gross beta | 100 pCi/l |
| | | | Tritium | 3 x 10 ⁶ pCi/l |

^a Taken from Code of Federal Regulations Title 10, Part 20, Table II and appropriate footnotes. Concentrations may be averaged over a period not greater than one year.

^b From 10 CFR 20 but adjusted by a factor of 700 to reduce the dose resulting from the air-grass-cow-milk-child pathway.

^c A natural radionuclide.



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REPORT

TO

IOWA ELECTRIC LIGHT AND POWER
CEDAR RAPIDS, IOWA

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM
FOR THE
DUANE ARNOLD ENERGY CENTER
CEDAR RAPIDS, IOWA

Docket No. 50-331

ANNUAL REPORT - PART II
DATA TABULATIONS AND ANALYSES
JANUARY - DECEMBER 1985

PREPARED AND SUBMITTED
BY
TELEDYNE ISOTOPES MIDWEST LABORATORY
PROJECT NO. 8001

Approved by:

A handwritten signature in cursive script, appearing to read "L. G. Huebner", written over a horizontal line.

L. G. Huebner
General Manager

14 February 1986

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1.0 INTRODUCTION

The following constitutes a Supplement to the Annual Report for the Radiological Environmental Monitoring Program conducted at the Duane Arnold Energy Center, Cedar Rapids, Iowa. Results of completed analyses are presented in the attached tables.

For information regarding sampling locations, type and frequency of collection, and sample codes, please see Tables 5.3 - 5.5 of Part I.

2.0 LISTING OF MISSED SAMPLES

| Sample Type | Location | Expected Collection Date | Reason |
|-----------------|----------|--------------------------|--------------------------------------|
| Precipitation | -- | January, 1985 | Not enough precipitation to collect. |
| TLDs | D-27 | January, 1985 | Missing in field. |
| | D-41 | January, 1985 | Missing in field. |
| Ground Water | D-59 | 01-28-85 02-25-85 | Pump broken. |
| Milk | D-101 | 02-05-85 | Goat was dry. |
| Milk | D-101 | 03-05-85 | Goat was dry. |
| TLDs | D-7 | March, 1985 | Missing in field. |
| | D-37 | March, 1985 | Missing in field. |
| Milk | D-101 | 04-02-85 | Goat was dry. |
| TLDs | D-46 | April, 1985 | Missing in field. |
| Air Particulate | D-8 | 05-02-85 | Filter paper destroyed by equipment. |
| TLDs | D-30 | May, 1985 | Missing in field. |
| TLDs | D-7 | June, 1985 | Missing in field. |
| | D-9 | June, 1985 | Missing in field. |
| | D-11 | June, 1985 | Missing in field. |
| | D-14 | June, 1985 | Missing in field. |
| | D-42 | June, 1985 | Missing in field. |
| | D-44 | June, 1985 | Missing in field. |
| | D-45 | June, 1985 | Missing in field. |
| | D-48 | June, 1985 | Missing in field. |
| | D-83 | June, 1985 | Missing in field. |
| TLDs | D-40 | Oct., 1985 | Missing in field. |
| TLDs | D-33 | Nov., 1985 | Missing in field. |
| Ground Water | D-59 | 11-25-85 12-31-85 | Pump frozen. |
| Precipitation | -- | December, 1985 | Not enough precipitation to collect. |
| TLDs | D-33 | Annual 1985 | Missing in field. |
| | D-40 | Annual 1985 | Missing in field. |
| | D-91 | Annual 1985 | Missing in field. |

3.0 DATA TABLES

Data tables are presented on the following pages.

Table 1. Airborne particulates collected at Location D-1, (Cedar Rapids), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 390 ^a | 0.027±0.003 | 07-11-85 | 329 ^d | 0.037±0.004 |
| 01-19-85 | 297 | 0.019±0.003 | 07-18-85 | 284 | 0.040±0.004 |
| 01-24-85 | 195 ^b | 0.025±0.004 | 07-25-85 | 285 | 0.026±0.004 |
| 01-31-85 | 298 | 0.023±0.003 | 08-01-85 | 286 | 0.025±0.004 |
| 02-07-85 | 291 | 0.045±0.004 | 08-08-85 | 284 | 0.036±0.004 |
| 02-14-85 | 286 | 0.054±0.005 | 08-15-85 | 286 | 0.028±0.004 |
| 02-21-85 | 283 | 0.017±0.003 | 08-22-85 | 285 | 0.021±0.003 |
| 02-28-85 | 287 | 0.020±0.004 | 08-29-85 | 285 | 0.028±0.004 |
| 03-07-85 | 280 | 0.016±0.003 | 09-05-85 | 287 | 0.034±0.004 |
| 03-14-85 | 285 | 0.025±0.004 | 09-12-85 | 286 | 0.020±0.004 |
| 03-21-85 | 294 | 0.014±0.003 | 09-19-85 | 286 | 0.014±0.003 |
| 03-28-85 | 294 | <u>0.020±0.004</u> | 09-26-85 | 285 | 0.024±0.004 |
| | | | 10-03-85 | 284 | <u>0.023±0.004</u> |
| 1st Qtr. mean ± s.d. | | 0.025±0.012 | 3rd Qtr. mean ± s.d. | | 0.027±0.008 |
| 04-04-85 | 290 | 0.018±0.003 | 10-10-85 | 285 | 0.028±0.004 |
| 04-11-85 | 285 | 0.017±0.003 | 10-17-85 | 286 | 0.019±0.003 |
| 04-18-85 | 286 | 0.022±0.004 | 10-24-85 | 287 | 0.028±0.004 |
| 04-25-85 | 285 | 0.025±0.004 | 10-31-85 | 284 | 0.020±0.004 |
| 05-02-85 | 284 | 0.023±0.004 | 11-07-85 | 285 | 0.017±0.003 |
| 05-09-85 | 286 | 0.028±0.004 | 11-14-85 | 285 | 0.016±0.003 |
| 05-16-85 | 285 | 0.019±0.004 | 11-21-85 | 286 | 0.033±0.004 |
| 05-23-85 | 285 | 0.025±0.004 | 11-27-85 | 245 ^c | 0.051±0.005 |
| 05-30-85 | 285 | 0.020±0.003 | 12-05-85 | 327 ^d | 0.040±0.004 |
| 06-06-85 | 286 | 0.015±0.003 | 12-12-85 | 286 | 0.052±0.005 |
| 06-13-85 | 285 | 0.022±0.003 | 12-19-85 | 287 | 0.038±0.004 |
| 06-20-85 | 285 | 0.020±0.004 | 12-26-85 | 285 | 0.028±0.004 |
| 06-27-85 | 286 | 0.030±0.004 | 01-02-86 | 285 | <u>0.019±0.004</u> |
| 07-03-85 | 246 ^c | <u>0.025±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.022±0.004 | 4th Qtr. mean ± s.d. | | 0.030±0.012 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 2. Airborne particulates collected at Location D-2, (Marion), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 368 ^a | 0.026±0.003 | 07-11-85 | 328 ^d | 0.022±0.003 |
| 01-19-85 | 284 | 0.035±0.004 | 07-18-85 | 284 | 0.027±0.004 |
| 01-24-85 | 203 ^b | 0.032±0.005 | 07-25-85 | 285 | 0.026±0.004 |
| 01-31-85 | 286 | 0.027±0.004 | 08-01-85 | 287 | 0.028±0.004 |
| 02-07-85 | 286 | 0.049±0.005 | 08-08-85 | 285 | 0.030±0.004 |
| 02-14-85 | 284 | 0.054±0.005 | 08-15-85 | 286 | 0.025±0.004 |
| 02-21-85 | 285 | 0.024±0.004 | 08-22-85 | 285 | 0.022±0.004 |
| 02-28-85 | 285 | 0.022±0.004 | 08-29-85 | 284 | 0.014±0.003 |
| 03-07-85 | 285 | 0.020±0.004 | 09-05-85 | 36 ^e | 0.053±0.022 |
| 03-14-85 | 285 | 0.025±0.004 | 09-12-85 | 81 ^f | 0.016±0.010 |
| 03-21-85 | 285 | 0.020±0.004 | 09-19-85 | 285 | 0.012±0.003 |
| 03-28-85 | 286 | <u>0.023±0.004</u> | 09-26-85 | 285 | 0.020±0.004 |
| | | | 10-03-85 | 284 | <u>0.016±0.003</u> |
| 1st Qtr. mean ± s.d. | | 0.030±0.011 | 3rd Qtr. mean ± s.d. | | 0.024±0.010 |
| 04-04-85 | 286 | 0.016±0.003 | 10-10-85 | 285 | 0.022±0.003 |
| 04-11-85 | 285 | 0.021±0.003 | 10-17-85 | 285 | 0.014±0.003 |
| 04-18-85 | 281 | 0.021±0.003 | 10-24-85 | 303 | 0.014±0.003 |
| 04-25-85 | 292 | 0.014±0.003 | 10-31-85 | 301 | 0.020±0.003 |
| 05-02-85 | 277 | 0.013±0.003 | 11-07-85 | 286 | 0.017±0.004 |
| 05-09-85 | 293 | 0.021±0.004 | 11-14-85 | 292 | 0.014±0.003 |
| 05-16-85 | 290 | 0.013±0.003 | 11-21-85 | 297 | 0.036±0.004 |
| 05-23-85 | 294 | 0.017±0.003 | 11-27-85 | 256 ^c | 0.053±0.005 |
| 05-30-85 | 295 | 0.021±0.003 | 12-05-85 | 339 ^d | 0.037±0.004 |
| 06-06-85 | 294 | 0.014±0.003 | 12-12-85 | 298 | 0.040±0.004 |
| 06-13-85 | 293 | 0.018±0.003 | 12-19-85 | 295 | 0.042±0.004 |
| 06-20-85 | 293 | 0.013±0.002 | 12-26-85 | 299 | 0.032±0.004 |
| 06-27-85 | 300 | 0.018±0.002 | 01-02-86 | 286 | <u>0.023±0.004</u> |
| 07-03-85 | 250 ^c | <u>0.022±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.017±0.003 | 4th Qtr. mean ± s.d. | | 0.028±0.013 |

^a Pump ran for nine days.

^b Pump ran for five days.

^c Pump ran for six days.

^d Pump ran for eight days.

^e Pump down due to vandalism; ran for 21 hours.

^f Pump down due to vandalism; ran for 47.5 hours.

Table 3. Airborne particulates collected at Location D-3, (Hiawatha), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 368 ^a | 0.029±0.003 | 07-11-85 | 327 ^e | 0.029±0.003 |
| 01-19-85 | 283 | 0.041±0.004 | 07-18-85 | 284 | 0.032±0.004 |
| 01-24-85 | 204 ^b | 0.024±0.005 | 07-25-85 | 296 | 0.020±0.003 |
| 01-31-85 | 286 | 0.026±0.004 | 08-01-85 | 288 | 0.020±0.004 |
| 02-07-85 | 286 | 0.010±0.003 | 08-08-85 | 295 | 0.028±0.004 |
| 02-14-85 | 283 | 0.052±0.004 | 08-15-85 | 288 | 0.022±0.003 |
| 02-21-85 | 297 | 0.018±0.003 | 08-22-85 | 288 | 0.022±0.004 |
| 02-28-85 | 295 | 0.020±0.004 | 08-29-85 | 285 | 0.026±0.004 |
| 03-07-85 | 285 | 0.018±0.003 | 09-05-85 | 285 | 0.030±0.004 |
| 03-14-85 | 284 | 0.028±0.004 | 09-12-85 | 286 | 0.017±0.004 |
| 03-21-85 | 285 | 0.017±0.003 | 09-19-85 | 284 | 0.012±0.003 |
| 03-28-85 | 134 ^c | <u>0.042±0.008</u> | 09-26-85 | 284 | 0.024±0.004 |
| | | | 10-03-85 | 286 | <u>0.018±0.003</u> |
| 1st Qtr. ± s.d. | | 0.027±0.012 | 3rd Qtr. mean ± s.d. | | 0.023±0.006 |
| 04-04-85 | 287 | 0.017±0.003 | 10-10-85 | 290 | 0.022±0.003 |
| 04-11-85 | 286 | 0.020±0.003 | 10-17-85 | 297 | 0.019±0.003 |
| 04-18-85 | 285 | 0.023±0.004 | 10-24-85 | 302 | 0.026±0.004 |
| 04-25-85 | 302 | 0.021±0.004 | 10-31-85 | 296 | 0.022±0.004 |
| 05-02-85 | 284 | 0.022±0.004 | 11-07-85 | 287 | 0.017±0.003 |
| 05-09-85 | 297 | 0.023±0.004 | 11-14-85 | 292 | 0.016±0.003 |
| 05-16-85 | 297 | 0.019±0.004 | 11-21-85 | 292 | 0.032±0.004 |
| 05-23-85 | 300 | 0.015±0.003 | 11-28-85 | 251 ^d | 0.042±0.005 |
| 05-30-85 | 298 | 0.022±0.003 | 12-05-85 | 180 ^f | 0.014±0.004 |
| 06-06-85 | 297 | 0.012±0.003 | 12-12-85 | 244 ^d | 0.060±0.006 |
| 06-13-85 | 299 | 0.017±0.003 | 12-19-85 | 287 | 0.035±0.004 |
| 06-20-85 | 298 | 0.015±0.003 | 12-26-85 | 285 | 0.028±0.004 |
| 06-27-85 | 296 | 0.025±0.004 | 01-02-86 | 284 | <u>0.019±0.004</u> |
| 07-03-85 | 254 ^d | <u>0.021±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.019±0.004 | 4th Qtr. mean ± s.d. | | 0.027±0.013 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Low volume due to power failure.
^d Pump ran for six days.
^e Pump ran for eight days.
^f Due to pump failure, pump ran 136 hours.

Table 4. Airborne particulates collected at Location D-4, (Johnson), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 368 ^a | 0.032±0.003 | 07-11-85 | 328 ^d | 0.020±0.003 |
| 01-19-85 | 283 | 0.034±0.004 | 07-18-85 | 284 | 0.026±0.004 |
| 01-24-85 | 204 ^b | 0.024±0.005 | 07-25-85 | 286 | 0.015±0.003 |
| 01-31-85 | 286 | 0.028±0.004 | 08-01-85 | 285 | 0.016±0.004 |
| 02-07-85 | 285 | 0.053±0.005 | 08-08-85 | 285 | 0.021±0.004 |
| 02-14-85 | 285 | 0.054±0.005 | 08-15-85 | 286 | 0.026±0.004 |
| 02-21-85 | 286 | 0.029±0.004 | 08-22-85 | 285 | 0.019±0.003 |
| 02-28-85 | 285 | 0.024±0.004 | 08-29-85 | 285 | 0.031±0.004 |
| 03-07-85 | 285 | 0.016±0.003 | 09-05-85 | 287 | 0.031±0.004 |
| 03-14-85 | 285 | 0.027±0.004 | 09-12-85 | 285 | 0.018±0.004 |
| 03-21-85 | 285 | 0.019±0.004 | 09-19-85 | 286 | 0.012±0.003 |
| 03-28-85 | 286 | <u>0.022±0.004</u> | 09-26-85 | 285 | 0.024±0.004 |
| | | | 10-03-85 | 285 | <u>0.020±0.003</u> |
| 1st Qtr. ± s.d. | | 0.030±0.012 | 3rd Qtr. mean ± s.d. | | 0.021±0.006 |
| 04-04-85 | 285 | 0.016±0.003 | 10-10-85 | 284 | 0.026±0.004 |
| 04-11-85 | 286 | 0.019±0.003 | 10-17-85 | 285 | 0.019±0.003 |
| 04-18-85 | 286 | 0.018±0.003 | 10-24-85 | 286 | 0.029±0.004 |
| 04-25-85 | 286 | 0.022±0.004 | 10-31-85 | 286 | 0.019±0.004 |
| 05-02-85 | 285 | 0.020±0.004 | 11-07-85 | 285 | 0.023±0.004 |
| 05-09-85 | 284 | 0.016±0.004 | 11-14-85 | 285 | 0.011±0.003 |
| 05-16-85 | 285 | 0.015±0.003 | 11-21-85 | 286 | 0.035±0.004 |
| 05-23-85 | 286 | 0.013±0.003 | 11-27-85 | 245 ^c | 0.053±0.005 |
| 05-30-85 | 286 | 0.022±0.003 | 12-05-85 | 326 ^d | 0.026±0.003 |
| 06-06-85 | 285 | 0.012±0.003 | 12-12-85 | 286 | 0.076±0.006 |
| 06-13-85 | 286 | 0.015±0.003 | 12-19-85 | 287 | 0.024±0.004 |
| 06-20-85 | 285 | 0.009±0.003 | 12-26-85 | 285 | 0.022±0.003 |
| 06-27-85 | 286 | 0.017±0.003 | 01-02-86 | 284 | <u>0.017±0.004</u> |
| 07-03-85 | 246 ^c | <u>0.012±0.003</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.016±0.004 | 4th Qtr. mean ± s.d. | | 0.029±0.017 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 5. Airborne particulates collected at Location D-5, (Palo), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 368 ^a | 0.027±0.003 | 07-11-85 | 326 ^e | 0.026±0.003 |
| 01-19-85 | 285 | 0.004±0.002 | 07-18-85 | 284 | 0.033±0.004 |
| 01-24-85 | 203 ^b | 0.006±0.004 | 07-25-85 | 286 | 0.023±0.004 |
| 01-31-85 | 286 | 0.025±0.004 | 08-01-85 | 285 | 0.022±0.004 |
| 02-07-85 | 285 | 0.042±0.004 | 08-08-85 | 284 | 0.023±0.004 |
| 02-14-85 | 285 | 0.054±0.005 | 08-15-85 | 285 | 0.022±0.003 |
| 02-21-85 | 286 | 0.023±0.004 | 08-22-85 | 285 | 0.018±0.003 |
| 02-28-85 | 285 | 0.021±0.004 | 08-29-85 | 286 | 0.029±0.004 |
| 03-07-85 | 286 | 0.019±0.003 | 09-05-85 | 285 | 0.024±0.004 |
| 03-14-85 | 285 | 0.026±0.004 | 09-12-85 | 286 | 0.018±0.004 |
| 03-21-85 | 285 | 0.014±0.003 | 09-19-85 | 285 | 0.012±0.003 |
| 03-28-85 | 240 ^c | 0.023±0.004 | 09-26-85 | 285 | 0.024±0.004 |
| | | | 10-03-85 | 285 | 0.014±0.003 |
| 1st Qtr. mean ± s.d. | | 0.024±0.014 | 3rd Qtr. mean ± s.d. | | 0.022±0.006 |
| 04-04-85 | 285 | 0.017±0.003 | 10-10-85 | 286 | 0.025±0.004 |
| 04-11-85 | 285 | 0.018±0.003 | 10-17-85 | 285 | 0.014±0.003 |
| 04-18-85 | 287 | 0.020±0.004 | 10-24-85 | 286 | 0.024±0.004 |
| 04-25-85 | 284 | 0.023±0.004 | 10-31-85 | 288 | 0.016±0.003 |
| 05-02-85 | 284 | 0.021±0.004 | 11-07-85 | 285 | 0.020±0.004 |
| 05-09-85 | 285 | 0.023±0.004 | 11-14-85 | 285 | 0.017±0.003 |
| 05-16-85 | 285 | 0.015±0.004 | 11-21-85 | 286 | 0.037±0.004 |
| 05-23-85 | 286 | 0.009±0.003 | 11-27-85 | 245 ^d | 0.055±0.005 |
| 05-30-85 | 285 | 0.027±0.004 | 12-05-85 | 326 ^e | 0.034±0.004 |
| 06-06-85 | 286 | 0.015±0.003 | 12-12-85 | 286 | 0.093±0.006 |
| 06-13-85 | 285 | 0.017±0.003 | 12-20-85 | 327 ^e | 0.035±0.004 |
| 06-20-85 | 285 | 0.016±0.003 | 12-26-85 | 245 ^d | 0.030±0.004 |
| 06-27-85 | 285 | 0.018±0.004 | 01-02-86 | 285 | 0.023±0.004 |
| 07-03-85 | 246 ^d | 0.017±0.004 | | | |
| 2nd Qtr. mean ± s.d. | | 0.018±0.004 | 4th Qtr. mean ± s.d. | | 0.032±0.021 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Low volume due to pump failure.
^d Pump ran for six days.
^e Pump ran for eight days.

Table 6. Airborne particulates collected at Location D-6, (Center Point), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 369 ^a | 0.027±0.003 | 07-11-85 | 327 ^e | 0.031±0.004 |
| 01-19-85 | 282 | 0.037±0.004 | 07-18-85 | 285 | 0.039±0.004 |
| 01-24-85 | 204 ^b | 0.024±0.005 | 07-25-85 | 286 | 0.024±0.004 |
| 01-31-85 | 286 | 0.027±0.004 | 08-01-85 | 286 | 0.022±0.004 |
| 02-07-85 | 259 | 0.047±0.005 | 08-08-85 | 285 | 0.034±0.004 |
| 02-14-85 | 297 | 0.049±0.005 | 08-15-85 | 285 | 0.024±0.004 |
| 02-21-85 | 286 | 0.019±0.004 | 08-22-85 | 285 | 0.022±0.003 |
| 02-28-85 | 283 | 0.018±0.004 | 08-29-85 | 286 | 0.027±0.004 |
| 03-07-85 | 275 | 0.013±0.003 | 09-05-85 | 287 | 0.033±0.004 |
| 03-14-85 | 285 | 0.023±0.004 | 09-12-85 | 285 | 0.021±0.004 |
| 03-21-85 | 293 | 0.015±0.003 | 09-19-85 | 286 | 0.015±0.003 |
| 03-28-85 | 294 | <u>0.016±0.003</u> | 09-26-85 | 285 | 0.027±0.004 |
| | | | 10-03-85 | 284 | <u>0.021±0.004</u> |
| 1st Qtr. ± s.d. | | 0.026±0.012 | 3rd Qtr. mean ± s.d. | | 0.026±0.006 |
| 04-04-85 | 291 | 0.014±0.003 | 10-10-85 | 287 | 0.026±0.004 |
| 04-11-85 | 283 | 0.018±0.003 | 10-17-85 | 285 | 0.017±0.003 |
| 04-18-85 | 292 | 0.027±0.004 | 10-24-85 | 286 | 0.028±0.004 |
| 04-25-85 | 282 | 0.020±0.004 | 10-31-85 | 287 | 0.017±0.003 |
| 05-02-85 | 284 | 0.018±0.004 | 11-07-85 | 285 | 0.020±0.004 |
| 05-09-85 | 282 | 0.025±0.004 | 11-14-85 | 285 | 0.016±0.003 |
| 05-16-85 | 282 | 0.016±0.004 | 11-21-85 | 286 | 0.047±0.005 |
| 05-23-85 | 284 | 0.014±0.003 | 11-27-85 | 245 ^f | 0.065±0.006 |
| 05-30-85 | 281 | 0.033±0.004 | 12-05-85 | 317 ^e | 0.054±0.005 |
| 06-06-85 | 280 | 0.018±0.003 | 12-12-85 | 286 | 0.060±0.005 |
| 06-13-85 | 275 | 0.023±0.004 | 12-19-85 | 287 | 0.043±0.004 |
| 06-20-85 | 276 | 0.019±0.004 | 12-26-85 | 284 | 0.036±0.004 |
| 06-27-85 | 163 ^c | 0.022±0.006 | 01-02-86 | 285 | <u>0.022±0.004</u> |
| 07-03-85 | 74 ^d | <u>0.033±0.010</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.021±0.006 | 4th Qtr. mean ± s.d. | | 0.035±0.017 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump burned out; ran for 91.8 hours.
^d Electricity shut off.
^e Pump ran for eight days.
^f Pump ran for six days.

Table 7. Airborne particulates collected at Location D-7, (Shellsburg), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 369 ^a | 0.020±0.003 | 07-11-85 | 326 ^d | 0.020±0.003 |
| 01-19-85 | 283 | 0.045±0.004 | 07-18-85 | 284 | 0.032±0.004 |
| 01-24-85 | 203 ^b | 0.020±0.004 | 07-25-85 | 286 | <0.005 |
| 01-31-85 | 286 | 0.024±0.004 | 08-01-85 | 285 | 0.014±0.003 |
| 02-07-85 | 285 | 0.039±0.004 | 08-08-85 | 285 | 0.022±0.004 |
| 02-14-85 | 285 | 0.051±0.005 | 08-15-85 | 285 | 0.012±0.003 |
| 02-21-85 | 286 | 0.022±0.004 | 08-22-85 | 285 | 0.007±0.002 |
| 02-28-85 | 284 | 0.020±0.004 | 08-29-85 | 286 | 0.025±0.004 |
| 03-07-85 | 286 | 0.019±0.003 | 09-05-85 | 285 | 0.013±0.003 |
| 03-14-85 | 285 | 0.026±0.004 | 09-12-85 | 286 | 0.012±0.003 |
| 03-21-85 | 285 | 0.006±0.003 | 09-19-85 | 285 | 0.013±0.003 |
| 03-28-85 | 286 | <u>0.015±0.003</u> | 09-26-85 | 285 | 0.021±0.004 |
| | | | 10-03-85 | 285 | <u>0.010±0.003</u> |
| 1st Qtr. mean ± s.d. | | 0.026±0.013 | 3rd Qtr. mean ± s.d. | | 0.017±0.007 |
| 04-04-85 | 285 | 0.014±0.003 | 10-10-85 | 286 | 0.014±0.003 |
| 04-11-85 | 285 | 0.012±0.003 | 10-17-85 | 285 | 0.013±0.003 |
| 04-18-85 | 287 | 0.009±0.003 | 10-24-85 | 286 | 0.022±0.004 |
| 04-25-85 | 284 | 0.017±0.003 | 10-31-85 | 287 | 0.006±0.003 |
| 05-02-85 | 285 | <0.005 | 11-07-85 | 284 | 0.007±0.003 |
| 05-09-85 | 285 | <0.005 | 11-14-85 | 285 | 0.017±0.003 |
| 05-16-85 | 285 | 0.016±0.004 | 11-21-85 | 286 | 0.034±0.004 |
| 05-23-85 | 285 | 0.006±0.003 | 11-27-85 | 245 ^c | 0.038±0.005 |
| 05-30-85 | 285 | 0.032±0.004 | 12-05-85 | 326 ^d | 0.054±0.004 |
| 06-06-85 | 286 | 0.018±0.003 | 12-12-85 | 286 | 0.028±0.004 |
| 06-13-85 | 285 | 0.014±0.003 | 12-20-85 | 327 ^d | 0.053±0.004 |
| 06-20-85 | 285 | 0.018±0.003 | 12-26-85 | 245 ^c | 0.041±0.004 |
| 06-27-85 | 286 | 0.023±0.004 | 01-02-86 | 285 | <u>0.023±0.004</u> |
| 07-03-85 | 246 ^c | <u>0.017±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.017±0.008 | 4th Qtr. mean ± s.d. | | 0.027±0.016 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 8. Airborne particulates collected at Location D-8, (Urbana), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 369 ^a | 0.026±0.003 | 07-11-85 | 327 ^d | 0.022±0.003 |
| 01-19-85 | 283 | 0.010±0.003 | 07-18-85 | 285 | 0.023±0.004 |
| 01-24-85 | 204 ^b | 0.012±0.004 | 07-25-85 | 286 | 0.012±0.003 |
| 01-31-85 | 286 | 0.026±0.004 | 08-01-85 | 285 | 0.017±0.004 |
| 02-07-85 | 285 | 0.036±0.004 | 08-08-85 | 285 | 0.029±0.004 |
| 02-14-85 | 285 | 0.052±0.005 | 08-15-85 | 286 | 0.025±0.004 |
| 02-21-85 | 286 | 0.030±0.004 | 08-22-85 | 285 | 0.018±0.003 |
| 02-28-85 | 285 | 0.021±0.004 | 08-29-85 | 286 | 0.033±0.004 |
| 03-07-85 | 286 | 0.017±0.003 | 09-05-85 | 287 | 0.031±0.004 |
| 03-14-85 | 285 | 0.029±0.004 | 09-12-85 | 285 | 0.017±0.004 |
| 03-21-85 | 285 | 0.014±0.003 | 09-19-85 | 286 | 0.013±0.003 |
| 03-28-85 | 286 | <u>0.023±0.004</u> | 09-26-85 | 285 | 0.021±0.004 |
| | | | 10-03-85 | 284 | <u>0.017±0.003</u> |
| 1st Qtr. mean ± s.d. | | 0.025±0.012 | 3rd Qtr. mean ± s.d. | | 0.021±0.007 |
| 04-04-85 | 285 | 0.015±0.003 | 10-10-85 | 287 | 0.026±0.004 |
| 04-11-85 | 285 | 0.020±0.003 | 10-17-85 | 285 | 0.016±0.003 |
| 04-18-85 | 287 | 0.025±0.004 | 10-24-85 | 286 | 0.028±0.004 |
| 04-25-85 | 284 | 0.020±0.004 | 10-31-85 | 287 | 0.016±0.003 |
| 05-02-85 | 285 | 0.017±0.004 | 11-07-85 | 285 | 0.018±0.004 |
| 05-09-85 | 285 | 0.019±0.004 | 11-14-85 | 285 | 0.017±0.003 |
| 05-16-85 | 285 | 0.014±0.003 | 11-21-85 | 286 | 0.033±0.004 |
| 05-23-85 | 285 | 0.016±0.003 | 11-27-85 | 245 ^c | 0.048±0.005 |
| 05-30-85 | 285 | 0.017±0.003 | 12-05-85 | 326 ^d | 0.018±0.003 |
| 06-06-85 | 286 | 0.013±0.003 | 12-12-85 | 285 | 0.087±0.006 |
| 06-13-85 | 285 | 0.015±0.003 | 12-19-85 | 288 | 0.008±0.003 |
| 06-20-85 | 285 | 0.014±0.003 | 12-26-85 | 284 | 0.008±0.003 |
| 06-27-85 | 286 | 0.016±0.003 | 01-02-86 | 285 | <u>0.010±0.003</u> |
| 07-03-85 | 246 ^c | <u>0.017±0.003</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.017±0.003 | 4th Qtr. mean ± s.d. | | 0.026±0.022 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 9. Airborne particulates collected at Location D-9, (Route W26), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 369 ^a | 0.028±0.003 | 07-11-85 | 325 ^d | 0.024±0.003 |
| 01-19-85 | 283 | 0.033±0.004 | 07-18-85 | 285 | 0.028±0.004 |
| 01-24-85 | 204 ^b | 0.028±0.005 | 07-25-85 | 286 | 0.024±0.004 |
| 01-31-85 | 298 | 0.024±0.004 | 08-01-85 | 285 | 0.020±0.004 |
| 02-07-85 | 300 | 0.037±0.004 | 08-08-85 | 285 | 0.025±0.004 |
| 02-14-85 | 297 | 0.016±0.003 | 08-15-85 | 285 | 0.023±0.003 |
| 02-21-85 | 300 | 0.019±0.003 | 08-22-85 | 285 | 0.019±0.003 |
| 02-28-85 | 298 | 0.016±0.003 | 08-29-85 | 286 | 0.028±0.004 |
| 03-07-85 | 286 | 0.012±0.003 | 09-05-85 | 285 | 0.029±0.004 |
| 03-14-85 | 286 | 0.018±0.003 | 09-12-85 | 286 | 0.019±0.004 |
| 03-21-85 | 290 | 0.013±0.003 | 09-19-85 | 286 | 0.014±0.003 |
| 03-28-85 | 286 | 0.017±0.004 | 09-26-85 | 285 | 0.024±0.004 |
| | | | 10-03-85 | 285 | 0.017±0.003 |
| 1st Qtr. mean ± s.d. | | 0.022±0.008 | 3rd Qtr. mean ± s.d. | | 0.023±0.004 |
| 04-04-85 | 294 | 0.015±0.003 | 10-10-85 | 286 | 0.026±0.004 |
| 04-11-85 | 285 | 0.017±0.003 | 10-17-85 | 285 | 0.014±0.003 |
| 04-18-85 | 287 | 0.020±0.004 | 10-24-85 | 292 | 0.020±0.004 |
| 04-25-85 | 285 | 0.016±0.003 | 10-31-85 | 304 | 0.018±0.003 |
| 05-02-85 | 285 | 0.011±0.003 | 11-07-85 | 288 | 0.020±0.004 |
| 05-09-85 | 285 | 0.017±0.004 | 11-14-85 | 267 | 0.009±0.003 |
| 05-16-85 | 285 | 0.014±0.003 | 11-21-85 | 290 | 0.032±0.004 |
| 05-23-85 | 285 | 0.010±0.003 | 11-27-85 | 262 ^c | 0.051±0.005 |
| 05-30-85 | 285 | 0.021±0.003 | 12-05-85 | 349 ^d | 0.045±0.004 |
| 06-06-85 | 286 | 0.012±0.003 | 12-12-85 | 299 | 0.085±0.006 |
| 06-13-85 | 285 | 0.016±0.003 | 12-20-85 | 337 ^d | 0.027±0.003 |
| 06-20-85 | 285 | 0.019±0.004 | 12-26-85 | 254 ^c | 0.034±0.004 |
| 06-27-85 | 286 | 0.023±0.004 | 01-02-86 | 297 | 0.018±0.003 |
| 07-03-85 | 246 ^c | 0.014±0.003 | | | |
| 2nd Qtr. mean ± s.d. | | 0.016±0.004 | 4th Qtr. mean ± s.d. | | 0.031±0.020 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 10. Airborne particulates collected at Location D-10, (Atkins), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 368 ^a | 0.027±0.003 | 07-11-85 | 330 ^d | 0.018±0.003 |
| 01-19-85 | 284 | 0.036±0.004 | 07-18-85 | 284 | 0.031±0.004 |
| 01-24-85 | 207 ^b | 0.029±0.005 | 07-25-85 | 289 | 0.023±0.004 |
| 01-31-85 | 284 | 0.027±0.004 | 08-01-85 | 293 | 0.022±0.004 |
| 02-07-85 | 287 | 0.048±0.005 | 08-08-85 | 289 | 0.026±0.004 |
| 02-14-85 | 283 | 0.059±0.005 | 08-15-85 | 285 | 0.022±0.003 |
| 02-21-85 | 286 | 0.019±0.004 | 08-22-85 | 291 | 0.024±0.004 |
| 02-28-85 | 286 | 0.018±0.004 | 08-29-85 | 286 | 0.026±0.004 |
| 03-07-85 | 284 | 0.013±0.003 | 09-05-85 | 282 | 0.028±0.004 |
| 03-14-85 | 285 | 0.027±0.004 | 09-12-85 | 281 | 0.024±0.004 |
| 03-21-85 | 286 | 0.014±0.003 | 09-19-85 | 289 | 0.012±0.003 |
| 03-28-85 | 287 | <u>0.019±0.004</u> | 09-26-85 | 286 | 0.028±0.004 |
| | | | 10-03-85 | 286 | <u>0.014±0.003</u> |
| 1st Qtr. mean ± s.d. | | 0.028±0.014 | 3rd Qtr. mean ± s.d. | | 0.023±0.006 |
| 04-04-85 | 285 | 0.014±0.003 | 10-10-85 | 286 | 0.024±0.004 |
| 04-11-85 | 284 | 0.016±0.003 | 10-17-85 | 285 | 0.017±0.003 |
| 04-18-85 | 286 | 0.024±0.004 | 10-24-85 | 287 | 0.032±0.004 |
| 04-25-85 | 286 | 0.021±0.004 | 10-31-85 | 288 | 0.016±0.003 |
| 05-02-85 | 285 | 0.016±0.004 | 11-07-85 | 285 | 0.019±0.004 |
| 05-09-85 | 283 | 0.024±0.004 | 11-14-85 | 285 | 0.016±0.003 |
| 05-16-85 | 288 | 0.019±0.004 | 11-21-85 | 286 | 0.036±0.004 |
| 05-23-85 | 292 | 0.015±0.003 | 11-27-85 | 245 ^c | 0.061±0.006 |
| 05-30-85 | 291 | 0.027±0.004 | 12-05-85 | 305 ^d | 0.055±0.005 |
| 06-06-85 | 291 | 0.016±0.003 | 12-12-85 | 285 | 0.097±0.006 |
| 06-13-85 | 286 | 0.019±0.003 | 12-20-85 | 316 ^d | 0.041±0.004 |
| 06-20-85 | 286 | 0.025±0.004 | 12-26-85 | 252 ^c | 0.036±0.004 |
| 06-27-85 | 292 | 0.022±0.004 | 01-02-86 | 286 | <u>0.023±0.004</u> |
| 07-03-85 | 248 ^c | <u>0.021±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.020±0.004 | 4th Qtr. mean ± s.d. | | 0.036±0.023 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 11. Airborne particulates collected at Location D-11, (Toddville), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 371 ^a | 0.029±0.003 | 07-11-85 | 328 ^e | 0.027±0.003 |
| 01-19-85 | 287 | 0.030±0.004 | 07-18-85 | 284 | 0.030±0.004 |
| 01-24-85 | 204 ^b | 0.025±0.005 | 07-25-85 | 286 | 0.020±0.003 |
| 01-31-85 | 288 | 0.029±0.004 | 08-01-85 | 286 | 0.020±0.004 |
| 02-07-85 | 273 | 0.042±0.005 | 08-08-85 | 285 | 0.034±0.004 |
| 02-14-85 | 288 | 0.054±0.005 | 08-15-85 | 286 | 0.023±0.003 |
| 02-21-85 | 281 | 0.018±0.004 | 08-22-85 | 81 ^f | <0.014 |
| 02-28-85 | 280 | 0.017±0.004 | 08-29-85 | 273 | 0.032±0.004 |
| 03-07-85 | 273 | 0.012±0.003 | 09-05-85 | 287 | 0.028±0.004 |
| 03-14-85 | 283 | 0.018±0.003 | 09-12-85 | 282 | 0.023±0.004 |
| 03-21-85 | 292 | 0.017±0.003 | 09-09-85 | 278 | 0.012±0.003 |
| 03-28-85 | 285 | <u>0.021±0.004</u> | 09-26-85 | 293 | 0.026±0.004 |
| | | | 10-03-85 | 276 | <u>0.018±0.003</u> |
| 1st Qtr. mean ± s.d. | | 0.026±0.012 | 3rd Qtr. mean ± s.d. | | 0.024±0.006 |
| 04-04-85 | 273 | 0.013±0.003 | 10-10-85 | 269 | 0.020±0.003 |
| 04-11-85 | 286 | 0.019±0.003 | 10-17-85 | 274 | 0.016±0.003 |
| 04-18-85 | 286 | 0.025±0.004 | 10-24-85 | 273 | 0.027±0.004 |
| 04-25-85 | 284 | 0.024±0.003 | 10-31-85 | 288 | 0.018±0.003 |
| 05-02-85 | 285 | 0.016±0.004 | 11-07-85 | 276 | 0.022±0.004 |
| 05-09-85 | 285 | 0.017±0.004 | 11-14-85 | 285 | 0.012±0.003 |
| 05-16-85 | 285 | 0.021±0.004 | 11-21-85 | 286 | 0.041±0.004 |
| 05-23-85 | 286 | 0.014±0.003 | 11-27-85 | 245 ^d | 0.043±0.005 |
| 05-30-85 | 268 | 0.025±0.004 | 12-05-85 | 326 ^e | 0.050±0.004 |
| 06-06-85 | 242 ^d | 0.017±0.004 | 12-12-85 | 286 | 0.037±0.004 |
| 06-13-85 | 285 | 0.018±0.003 | 12-19-85 | 287 | 0.037±0.004 |
| 06-20-85 | 285 | 0.016±0.003 | 12-26-85 | 284 | 0.031±0.004 |
| 06-27-85 | 286 | 0.025±0.004 | 01-02-86 | 285 | <u>0.015±0.003</u> |
| 07-03-85 | 246 ^d | <u>0.019±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.019±0.004 | 4th Qtr. mean ± s.d. | | 0.028±0.012 |

^a Pump ran for nine days.

^b Pump ran for five days.

^c Pump was broken, resulting in a delay in starting. Pump started 05-31-85 and ran for six days.

^d Pump ran for six days.

^e Pump ran for eight days.

^f Low volume and elevated LLD due to blown fuse; pump ran for 47.4 hours only.

Table 12. Airborne particulates collected at Location D-12, (Iowa City), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 368 ^a | 0.027±0.003 | 07-11-85 | 328 ^e | 0.028±0.003 |
| 01-19-85 | 284 | 0.032±0.004 | 07-18-85 | 285 | 0.029±0.004 |
| 01-24-85 | 205 ^b | 0.024±0.005 | 07-25-85 | 285 | 0.020±0.004 |
| 01-31-85 | 286 | 0.022±0.003 | 08-01-85 | 285 | 0.022±0.004 |
| 02-07-85 | 287 | 0.035±0.004 | 08-08-85 | 284 | 0.031±0.004 |
| 02-14-85 | 285 | 0.045±0.004 | 08-15-85 | 286 | 0.023±0.003 |
| 02-21-85 | 287 | 0.021±0.004 | 08-22-85 | 285 | 0.022±0.004 |
| 02-28-85 | 285 | 0.014±0.003 | 08-29-85 | 285 | 0.028±0.004 |
| 03-07-85 | 285 | 0.012±0.003 | 09-05-85 | 286 | 0.033±0.004 |
| 03-14-85 | 285 | 0.018±0.003 | 09-12-85 | 286 | 0.020±0.004 |
| 03-21-85 | 285 | 0.008±0.003 | 09-19-85 | 287 | 0.014±0.003 |
| 03-28-85 | 286 | <u>0.016±0.003</u> | 09-26-85 | 285 | 0.024±0.004 |
| | | | 10-03-85 | 284 | <u>0.019±0.003</u> |
| 1st Qtr. ± s.d. | | 0.023±0.011 | 3rd Qtr. mean ± s.d. | | 0.024±0.005 |
| 04-04-85 | 285 | 0.011±0.003 | 10-10-85 | 285 | 0.028±0.004 |
| 04-11-85 | 285 | 0.007±0.002 | 10-17-85 | 286 | 0.016±0.003 |
| 04-18-85 | 286 | 0.015±0.003 | 10-24-85 | 287 | 0.028±0.004 |
| 04-25-85 | 285 | 0.017±0.003 | 10-31-85 | 287 | 0.017±0.003 |
| 05-02-85 | ND ^c | ND ^c | 11-07-85 | 285 | 0.019±0.004 |
| 05-09-85 | 286 | 0.024±0.004 | 11-14-85 | 285 | 0.016±0.003 |
| 05-16-85 | 202 | 0.014±0.004 | 11-21-85 | 286 | 0.043±0.004 |
| 05-23-85 | 248 | 0.018±0.004 | 11-27-85 | 245 ^d | 0.042±0.005 |
| 05-30-85 | 285 | 0.023±0.003 | 12-05-85 | 327 ^e | 0.048±0.004 |
| 06-06-85 | 286 | 0.016±0.003 | 12-12-85 | 286 | 0.072±0.006 |
| 06-13-85 | 285 | 0.016±0.003 | 12-19-85 | 286 | 0.026±0.004 |
| 06-20-85 | 285 | 0.020±0.004 | 12-26-85 | 285 | 0.033±0.004 |
| 06-27-85 | 286 | 0.023±0.004 | 01-02-86 | 286 | <u>0.012±0.003</u> |
| 07-03-85 | 246 ^d | <u>0.021±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.017±0.005 | 4th Qtr. mean ± s.d. | | 0.031±0.017 |

^a Pump ran for nine days.

^b Pump ran for five days.

^c ND = No data; collector noted that filter paper was destroyed by equipment.

^d Pump ran for six days.

^e Pump ran for eight days.

Table 13. Airborne particulates collected at Location D-13, (Alburnett), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 545 ^a | 0.017±0.002 | 07-11-85 | 327 ^d | 0.028±0.003 |
| 01-19-85 | 278 | 0.032±0.004 | 07-18-85 | 285 | 0.033±0.004 |
| 01-24-85 | 198 ^b | 0.024±0.005 | 07-25-85 | 286 | 0.025±0.004 |
| 01-31-85 | 281 | 0.025±0.004 | 08-01-85 | 285 | 0.022±0.004 |
| 02-07-85 | 281 | 0.042±0.004 | 08-08-85 | 283 | 0.026±0.004 |
| 02-14-85 | 281 | 0.050±0.005 | 08-15-85 | 308 | 0.019±0.003 |
| 02-21-85 | 294 | 0.016±0.003 | 08-22-85 | 300 | 0.018±0.003 |
| 02-28-85 | 291 | 0.017±0.003 | 08-29-85 | 300 | 0.025±0.004 |
| 03-07-85 | 300 | 0.014±0.003 | 09-05-85 | 299 | 0.025±0.004 |
| 03-14-85 | 299 | 0.021±0.003 | 09-12-85 | 304 | 0.017±0.003 |
| 03-21-85 | 294 | 0.018±0.003 | 09-19-85 | 284 | 0.012±0.003 |
| 03-28-85 | 298 | <u>0.016±0.003</u> | 09-26-85 | 291 | 0.022±0.004 |
| | | | 10-03-85 | 292 | <u>0.020±0.003</u> |
| 1st Qtr. ± s.d. | | 0.024±0.011 | 3rd Qtr. mean ± s.d. | | 0.022±0.005 |
| 04-04-85 | 303 | 0.010±0.003 | 10-10-85 | 291 | 0.023±0.003 |
| 04-11-85 | 288 | 0.017±0.003 | 10-17-85 | 285 | 0.012±0.003 |
| 04-18-85 | 290 | 0.025±0.004 | 10-24-85 | 286 | 0.020±0.004 |
| 04-25-85 | 284 | 0.019±0.004 | 10-31-85 | 287 | 0.013±0.003 |
| 05-02-85 | 285 | 0.020±0.004 | 11-07-85 | 284 | 0.016±0.003 |
| 05-09-85 | 284 | 0.024±0.004 | 11-14-85 | 285 | 0.008±0.003 |
| 05-16-85 | 285 | 0.020±0.004 | 11-21-85 | 286 | 0.032±0.004 |
| 05-23-85 | 285 | 0.016±0.003 | 11-27-85 | 245 ^c | 0.042±0.005 |
| 05-30-85 | 285 | 0.021±0.003 | 12-05-85 | 326 ^d | 0.035±0.004 |
| 06-06-85 | 286 | 0.016±0.003 | 12-12-85 | 286 | 0.092±0.006 |
| 06-13-85 | 285 | 0.018±0.003 | 12-19-85 | 287 | 0.036±0.004 |
| 06-20-85 | 285 | 0.021±0.004 | 12-26-85 | 284 | 0.028±0.004 |
| 06-27-85 | 286 | 0.024±0.004 | 01-02-86 | 285 | <u>0.020±0.004</u> |
| 07-03-85 | 246 ^c | <u>0.019±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. | | 0.019±0.004 | 4th Qtr. mean ± s.d. | | 0.029±0.022 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 14. Airborne particulates collected at Location D-14, (Midway), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 368 ^a | 0.025±0.003 | 07-11-85 | 326 ^d | 0.033±0.004 |
| 01-19-85 | 283 | 0.031±0.004 | 07-18-85 | 284 | 0.031±0.004 |
| 01-24-85 | 204 ^b | 0.017±0.004 | 07-25-85 | 294 | 0.022±0.004 |
| 01-31-85 | 286 | 0.015±0.003 | 08-01-85 | 285 | 0.025±0.004 |
| 02-07-85 | 285 | 0.042±0.004 | 08-08-85 | 285 | 0.029±0.004 |
| 02-14-85 | 285 | 0.047±0.005 | 08-15-85 | 285 | 0.025±0.004 |
| 02-21-85 | 286 | 0.027±0.004 | 08-22-85 | 285 | 0.018±0.003 |
| 02-28-85 | 285 | 0.022±0.004 | 08-29-85 | 286 | 0.027±0.004 |
| 03-07-85 | 284 | 0.014±0.003 | 09-05-85 | 287 | 0.027±0.004 |
| 03-14-85 | 285 | 0.025±0.004 | 09-12-85 | 285 | 0.020±0.004 |
| 03-21-85 | 285 | 0.015±0.003 | 09-19-85 | 286 | 0.015±0.003 |
| 03-28-85 | 285 | 0.017±0.004 | 09-26-85 | 285 | 0.023±0.004 |
| | | | 10-03-85 | 284 | 0.016±0.003 |
| 1st Qtr. ± s.d. | | 0.025±0.011 | 3rd Qtr. mean ± s.d. | | 0.024±0.006 |
| 04-04-85 | 285 | 0.013±0.003 | 10-10-85 | 286 | 0.026±0.004 |
| 04-11-85 | 286 | 0.018±0.003 | 10-17-85 | 285 | 0.017±0.003 |
| 04-18-85 | 287 | 0.023±0.004 | 10-24-85 | 286 | 0.027±0.004 |
| 04-25-85 | 291 | 0.023±0.004 | 10-31-85 | 287 | 0.018±0.003 |
| 05-02-85 | 295 | 0.013±0.003 | 11-07-85 | 285 | 0.018±0.004 |
| 05-09-85 | 289 | 0.023±0.004 | 11-14-85 | 285 | 0.016±0.003 |
| 05-16-85 | 292 | 0.018±0.004 | 11-21-85 | 286 | 0.034±0.004 |
| 05-23-85 | 292 | 0.011±0.003 | 11-27-85 | 245 ^c | 0.043±0.005 |
| 05-30-85 | 294 | 0.014±0.003 | 12-05-85 | 326 ^d | 0.045±0.004 |
| 06-06-85 | 295 | 0.014±0.003 | 12-12-85 | 286 | 0.074±0.006 |
| 06-13-85 | 294 | 0.017±0.003 | 12-19-85 | 287 | 0.041±0.004 |
| 06-20-85 | 293 | 0.018±0.003 | 12-26-85 | 284 | 0.013±0.003 |
| 06-27-85 | 296 | 0.021±0.004 | 01-02-86 | 285 | 0.014±0.003 |
| 07-03-85 | 256 ^c | 0.015±0.003 | | | |
| 2nd Qtr. mean ± s.d. | | 0.017±0.004 | 4th Qtr. mean ± s.d. | | 0.030±0.018 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 15. Airborne particulates collected at Location D-15, (On-site), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------|--------------------------|----------------------------------|----------------------|--------------------------|----------------------------------|
| 01-12-85 | 364 ^a | 0.017±0.003 | 07-11-85 | 325 ^d | 0.028±0.003 |
| 01-19-85 | 284 | 0.026±0.004 | 07-18-85 | 285 | 0.032±0.004 |
| 01-24-85 | 204 ^b | 0.027±0.005 | 07-25-85 | 286 | 0.022±0.004 |
| 01-31-85 | 286 | 0.025±0.004 | 08-01-85 | 285 | 0.021±0.004 |
| 02-07-85 | 285 | 0.044±0.004 | 08-08-85 | 285 | 0.024±0.004 |
| 02-14-85 | 285 | 0.046±0.004 | 08-15-85 | 286 | 0.013±0.003 |
| 02-21-85 | 248 | 0.015±0.004 | 08-22-85 | 285 | 0.018±0.003 |
| 02-28-85 | 239 | 0.019±0.004 | 08-29-85 | 275 | 0.019±0.004 |
| 03-07-85 | 289 | 0.011±0.003 | 09-05-85 | 285 | 0.022±0.004 |
| 03-14-85 | 293 | 0.016±0.003 | 09-12-85 | 286 | 0.017±0.003 |
| 03-21-85 | 288 | 0.018±0.003 | 09-19-85 | 285 | 0.012±0.003 |
| 03-28-85 | 293 | 0.016±0.003 | 09-26-85 | 285 | 0.023±0.004 |
| | | | 10-03-85 | 285 | 0.014±0.003 |
| 1st Qtr. mean ± s.d. | | 0.023±0.011 | 3rd Qtr. mean ± s.d. | | 0.020±0.006 |
| 04-04-85 | 289 | 0.014±0.003 | 10-10-85 | 286 | 0.020±0.003 |
| 04-11-85 | 302 | 0.020±0.003 | 10-17-85 | 285 | 0.016±0.003 |
| 04-18-85 | 292 | 0.025±0.004 | 10-24-85 | 286 | 0.020±0.004 |
| 04-25-85 | 290 | 0.018±0.003 | 10-31-85 | 276 | 0.013±0.003 |
| 05-02-85 | 284 | 0.016±0.004 | 11-07-85 | 285 | 0.016±0.003 |
| 05-09-85 | 285 | 0.018±0.004 | 11-14-85 | 285 | 0.015±0.003 |
| 05-16-85 | 286 | 0.020±0.004 | 11-21-85 | 286 | 0.030±0.004 |
| 05-23-85 | 285 | 0.016±0.003 | 11-27-85 | 245 ^c | 0.053±0.005 |
| 05-30-85 | 285 | 0.024±0.004 | 12-05-85 | 326 ^d | 0.028±0.004 |
| 06-06-85 | 286 | 0.009±0.003 | 12-12-85 | 286 | 0.090±0.006 |
| 06-13-85 | 285 | 0.011±0.003 | 12-20-85 | 327 ^d | 0.032±0.004 |
| 06-20-85 | 285 | 0.019±0.004 | 12-26-85 | 245 ^c | 0.030±0.004 |
| 06-27-85 | 285 | 0.021±0.004 | 01-02-86 | 285 | 0.019±0.004 |
| 07-03-85 | 246 ^c | 0.014±0.003 | | | |
| 2nd Qtr. mean ± s.d. | | 0.018±0.004 | 4th Qtr. mean ± s.d. | | 0.029±0.021 |

- ^a Pump ran for nine days.
^b Pump ran for five days.
^c Pump ran for six days.
^d Pump ran for eight days.

Table 16. Airborne particulates collected at Location D-16, (Onsite), analysis for gross beta. Collection: Weekly.

| Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) | Date Collected | Volume (m ³) | Gross Beta (pCi/m ³) |
|----------------------------------|--------------------------|----------------------------------|----------------------------------|--------------------------|----------------------------------|
| 01-12-85 | 369 ^a | 0.029±0.003 | 07-11-85 | 326 ^e | 0.027±0.003 |
| 01-19-85 | 283 | 0.035±0.004 | 07-18-85 | 284 | 0.035±0.004 |
| 01-24-85 | 284 ^b | 0.025±0.005 | 07-25-85 | 288 | 0.018±0.003 |
| 01-31-85 | 286 | 0.026±0.004 | 08-01-85 | 291 | 0.018±0.004 |
| 02-07-85 | 285 | 0.036±0.004 | 08-08-85 | 294 | 0.032±0.004 |
| 02-14-85 | 285 | 0.050±0.005 | 08-15-85 | 300 | 0.022±0.003 |
| 02-21-85 | 286 | 0.027±0.004 | 08-22-85 | 294 | 0.020±0.003 |
| 02-28-85 | 269 | 0.025±0.004 | 08-29-85 | 290 | 0.027±0.004 |
| 03-07-85 | 285 | 0.016±0.003 | 09-05-85 | 289 | 0.028±0.004 |
| 03-14-85 | 285 | 0.022±0.004 | 09-12-85 | 292 | 0.021±0.004 |
| 03-21-85 | 285 | 0.017±0.003 | 09-19-85 | 282 | 0.017±0.004 |
| 03-28-85 | 286 | <u>0.019±0.004</u> | 09-26-85 | 294 | 0.028±0.004 |
| | | | 10-03-85 | 288 | <u>0.018±0.003</u> |
| 1st Qtr. mean ± s.d. 0.027±0.010 | | | 3rd Qtr. mean ± s.d. 0.024±0.006 | | |
| 04-04-85 | 285 | 0.017±0.003 | 10-10-85 | 288 | 0.020±0.003 |
| 04-11-85 | 272 | 0.017±0.003 | 10-17-85 | 285 | 0.016±0.003 |
| 04-18-85 | 77 ^c | 0.030±0.010 | 10-24-85 | 286 | 0.027±0.004 |
| 04-25-85 | 277 | 0.028±0.004 | 10-31-85 | 60 ^f | <0.023 |
| 05-02-85 | 284 | 0.017±0.004 | 11-07-85 | 285 | 0.016±0.003 |
| 05-09-85 | 290 | 0.023±0.004 | 11-14-85 | 285 | 0.010±0.003 |
| 05-16-85 | 260 | 0.014±0.004 | 11-21-85 | 286 | 0.035±0.004 |
| 05-23-85 | 290 | 0.014±0.003 | 11-27-85 | 245 ^d | 0.053±0.005 |
| 05-30-85 | 292 | 0.017±0.003 | 12-05-85 | 326 ^e | 0.042±0.004 |
| 06-06-85 | 292 | 0.014±0.003 | 12-12-85 | 286 | 0.062±0.005 |
| 06-13-85 | 290 | 0.021±0.003 | 12-20-85 | 327 ^e | 0.040±0.004 |
| 06-20-85 | 302 | 0.016±0.003 | 12-26-85 | 245 ^d | 0.027±0.004 |
| 06-27-85 | 291 | 0.026±0.004 | 01-02-86 | 285 | <u>0.019±0.004</u> |
| 07-03-85 | 247 ^d | <u>0.018±0.004</u> | | | |
| 2nd Qtr. mean ± s.d. 0.019±0.005 | | | 4th Qtr. mean ± s.d. 0.031±0.016 | | |

^a Pump ran for nine days.

^b Pump ran for five days.

^c Pump ran for 45.2 hours due to electrical maintenance.

^d Pump ran for six days.

^e Pump ran for eight days.

^f Low volume and elevated LLD due to pump malfunction. Pump ran for 35.1 hours.

Table 17. Airborne particulate samples, quarterly composites of weekly samples, analysis for strontium-89, strontium-90, and gamma emitting isotopes.

| Location | Isotope | Sample Description and Activity (pCi/m ³) | | | |
|--------------------------|--------------------------|---|-------------|---------------|-------------|
| | | 1st Qtr. | 2nd Qtr. | 3rd Qtr. | 4th Qtr. |
| <u>D-1</u> | Lab Code | DAP-1199 | DAP-1326 | DAP-1500 | DAP-1648 |
| | Volume (m ³) | 3580 | 3959 | 3468 | 3713 |
| | Sr-89 | <0.0024 | <0.0007 | <0.0008 | <0.0004 |
| | Sr-90 | <0.0007 | <0.0002 | 0.0010±0.0003 | <0.0004 |
| | Be-7 | <0.015 | <0.014 | <0.017 | 0.051±0.011 |
| | Nb-95 | <0.0024 | <0.0021 | <0.0029 | <0.0013 |
| | Zr-95 | <0.0040 | <0.0038 | <0.0051 | <0.0021 |
| | Ru-103 | <0.0024 | <0.0021 | <0.0021 | <0.0010 |
| | Ru-106 | <0.014 | <0.015 | <0.021 | <0.0081 |
| | Cs-134 | <0.0014 | <0.0015 | <0.0036 | <0.0010 |
| | Cs-137 | <0.0013 | <0.0019 | <0.0022 | <0.0010 |
| | Ce-141 | <0.0021 | <0.0018 | <0.0028 | <0.0011 |
| | Ce-144 | <0.0049 | <0.0053 | <0.0090 | <0.0034 |
| | <u>D-2</u> | Lab Code | DAP-1200 | DAP-1327 | DAP-1501 |
| Volume (m ³) | | 3422 | 4023 | 3011 | 3822 |
| Sr-89 | | <0.0028 | <0.0008 | <0.0008 | <0.0004 |
| Sr-90 | | <0.0007 | <0.0003 | <0.0004 | <0.0004 |
| Be-7 | | 0.060±0.012 | 0.078±0.015 | <0.014 | 0.058±0.009 |
| Nb-95 | | <0.0019 | <0.0018 | <0.0024 | <0.0015 |
| Zr-95 | | <0.0027 | <0.0033 | <0.0029 | <0.0023 |
| Ru-103 | | <0.0013 | <0.0018 | <0.0019 | <0.0012 |
| Ru-106 | | <0.0082 | <0.011 | <0.014 | <0.0086 |
| Cs-134 | | <0.00094 | <0.0012 | <0.0023 | <0.0010 |
| Cs-137 | | <0.0010 | <0.0013 | <0.0017 | <0.0010 |
| Ce-141 | | <0.0015 | <0.0016 | <0.0024 | <0.0004 |
| Ce-144 | | <0.0035 | <0.0045 | <0.0074 | <0.0046 |

Table 17. (continued)

| Location | Isotope | Sample Description and Activity (pCi/m ³) | | | |
|--------------------------|--------------------------|---|---------------|--------------|-------------|
| | | 1st Qtr. | 2nd Qtr. | 3rd Qtr. | 4th Qtr. |
| <u>D-3</u> | Lab Code | DAP-1201 | DAP-1328 | DAP-1502 | DAP-1650 |
| | Volume (m ³) | 3290 | 3967 | 3490 | 3587 |
| | Sr-89 | <0.002 | <0.0007 | <0.0006 | <0.0004 |
| | Sr-90 | 0.0006±0.0003 | 0.0003±0.0001 | <0.0003 | <0.0004 |
| | Be-7 | <0.016 | 0.10±0.016 | 0.083±0.015 | 0.061±0.008 |
| | Nb-95 | <0.0026 | <0.0021 | <0.0020 | <0.0020 |
| | Zr-95 | <0.0032 | <0.0032 | <0.0035 | <0.0027 |
| | Ru-103 | <0.0022 | <0.0017 | <0.0018 | <0.0018 |
| | Ru-106 | <0.014 | <0.018 | <0.013 | <0.014 |
| | Cs-134 | <0.0013 | <0.0012 | <0.0019 | <0.0018 |
| | Cs-137 | <0.0013 | <0.0012 | <0.0017 | <0.0020 |
| | Ce-141 | <0.0021 | <0.0014 | <0.0020 | <0.0025 |
| | Ce-144 | <0.0050 | <0.0046 | <0.0065 | <0.0074 |
| | <u>D-4</u> | Lab Code | DAP-1202 | DAP-1329 | DAP-1503 |
| Volume (m ³) | | 3423 | 3957 | 3467 | 3710 |
| Sr-89 | | <0.0022 | <0.0006 | <0.0002 | <0.0004 |
| Sr-90 | | 0.0004±0.0002 | 0.0002±0.0001 | <0.0004 | <0.0004 |
| Be-7 | | 0.058±0.013 | 0.062±0.013 | 0.085±0.0069 | 0.076±0.011 |
| Nb-95 | | <0.0024 | <0.0020 | <0.0012 | <0.0014 |
| Zr-95 | | <0.0029 | <0.0023 | <0.0019 | <0.0025 |
| Ru-103 | | <0.0015 | <0.0016 | <0.00091 | <0.0021 |
| Ru-106 | | <0.0092 | <0.0094 | <0.0094 | <0.017 |
| Cs-134 | | <0.0011 | <0.0011 | <0.0012 | <0.0012 |
| Cs-137 | | <0.00090 | <0.0014 | <0.0010 | <0.0016 |
| Ce-141 | | <0.0014 | <0.0014 | <0.00086 | <0.0014 |
| Ce-144 | | <0.0035 | <0.0039 | <0.0028 | <0.0054 |

Table 17. (continued)

| Location | Isotope | Sample Description and Activity (pCi/m ³) | | | |
|--------------------------|--------------------------|---|--------------|---------------|-------------|
| | | 1st Qtr. | 2nd Qtr. | 3rd Qtr. | 4th Qtr. |
| <u>D-5</u> | Lab Code | DAP-1203 | DAP-1330 | DAP-1504 | DAP-1652 |
| | Volume (m ³) | 3379 | 3953 | 3462 | 3715 |
| | Sr-89 | <0.0047 | <0.0007 | <0.0007 | <0.0005 |
| | Sr-90 | 0.0018±0.0005 | <0.0002 | <0.0004 | <0.0005 |
| | Be-7 | 0.076±0.015 | 0.099±0.013 | 0.063±0.013 | 0.066±0.010 |
| | Nb-95 | <0.0025 | <0.0015 | <0.0023 | <0.0016 |
| | Zr-95 | <0.0035 | <0.0020 | <0.0029 | <0.0021 |
| | Ru-103 | <0.0022 | <0.0018 | <0.0019 | <0.0014 |
| | Ru-106 | <0.013 | <0.014 | <0.014 | <0.013 |
| | Cs-134 | <0.0013 | <0.0018 | <0.0016 | <0.0013 |
| | Cs-137 | <0.0012 | <0.0013 | <0.0016 | <0.00092 |
| | Ce-141 | <0.0019 | <0.0021 | <0.0021 | <0.0023 |
| | Ce-144 | <0.0048 | <0.0062 | <0.0058 | <0.0067 |
| | <u>D-6</u> | Lab Code | DAP-1204 | DAP-1331 | DAP-1505 |
| Volume (m ³) | | 3413 | 3629 | 3468 | 3705 |
| Sr-89 | | <0.0045 | <0.0009 | <0.0008 | <0.0005 |
| Sr-90 | | 0.0013±0.0005 | <0.0003 | 0.0007±0.0003 | <0.0005 |
| Be-7 | | 0.040±0.010 | 0.076±0.0091 | 0.081±0.013 | 0.071±0.012 |
| Nb-95 | | <0.0016 | <0.0018 | <0.0025 | <0.0019 |
| Zr-95 | | <0.0026 | <0.0028 | <0.0034 | <0.0028 |
| Ru-103 | | <0.0013 | <0.0013 | <0.0022 | <0.0016 |
| Ru-106 | | <0.0092 | <0.011 | <0.013 | <0.011 |
| Cs-134 | | <0.0010 | <0.0017 | <0.0019 | <0.0012 |
| Cs-137 | | <0.00095 | <0.0015 | <0.0020 | <0.0014 |
| Ce-141 | | <0.0015 | <0.0011 | <0.0027 | <0.0018 |
| Ce-144 | | <0.0033 | <0.0030 | <0.0094 | <0.0057 |

Table 17. (continued)

| Location | Isotope | Sample Description and Activity (pCi/m ³) | | | |
|--------------------------|--------------------------|---|--------------|--------------|-------------|
| | | 1st Qtr. | 2nd Qtr. | 3rd Qtr. | 4th Qtr. |
| <u>D-7</u> | Lab Code | DAP-1205 | DAP-1332 | DAP-1506 | DAP-1654 |
| | Volume (m ³) | 3423 | 3954 | 3463 | 3713 |
| | Sr-89 | <0.0038 | <0.0006 | <0.0007 | <0.0004 |
| | Sr-90 | <0.0011 | <0.0002 | <0.0004 | <0.0004 |
| | Be-7 | <0.015 | 0.074±0.0082 | 0.044±0.0064 | 0.055±0.010 |
| | Nb-95 | <0.0024 | <0.0017 | <0.0014 | <0.0021 |
| | Zr-95 | <0.0037 | <0.0033 | <0.0030 | <0.0032 |
| | Ru-103 | <0.0021 | <0.0015 | <0.0014 | <0.0020 |
| | Ru-106 | <0.013 | <0.015 | <0.012 | <0.013 |
| | Cs-134 | <0.0014 | <0.0017 | <0.0014 | <0.0020 |
| | Cs-137 | <0.0014 | <0.0015 | <0.0017 | <0.0024 |
| | Ce-141 | <0.0021 | <0.0016 | <0.0011 | <0.0019 |
| | Ce-144 | <0.0050 | <0.0036 | <0.0024 | <0.0060 |
| | <u>D-8</u> | Lab Code | DAP-1206 | DAP-1333 | DAP-1507 |
| Volume (m ³) | | 3425 | 3954 | 3468 | 3714 |
| Sr-89 | | <0.0021 | <0.0008 | <0.0007 | <0.0004 |
| Sr-90 | | <0.0012 | <0.0003 | <0.0004 | <0.0003 |
| Be-7 | | 0.060±0.012 | 0.078±0.010 | 0.070±0.013 | <0.033 |
| Nb-95 | | <0.0020 | <0.0016 | <0.0020 | <0.0017 |
| Zr-95 | | <0.0027 | <0.0022 | <0.0034 | <0.0035 |
| Ru-103 | | <0.0013 | <0.0017 | <0.0017 | <0.0023 |
| Ru-106 | | <0.0098 | <0.011 | <0.012 | <0.014 |
| Cs-134 | | <0.00088 | <0.0012 | <0.0018 | <0.0017 |
| Cs-137 | | <0.00096 | <0.0012 | <0.0014 | <0.0018 |
| Ce-141 | | <0.0016 | <0.0021 | <0.0022 | <0.0014 |
| Ce-144 | | <0.0036 | <0.0055 | <0.0063 | <0.0061 |

Table 17. (continued)

| Location | Isotope | Sample Description and Activity (pCi/m ³) | | | |
|--------------------------|--------------------------|---|--------------|--------------|-------------|
| | | 1st Qtr. | 2nd Qtr. | 3rd Qtr. | 4th Qtr. |
| <u>D-9</u> | Lab Code | DAP-1207 | DAP-1334 | DAP-1508 | DAP-1656 |
| | Volume (m ³) | 3497 | 3964 | 3464 | 3841 |
| | Sr-89 | <0.0032 | <0.0014 | <0.0006 | <0.0004 |
| | Sr-90 | <0.0004 | <0.0005 | <0.0003 | <0.0004 |
| | Be-7 | 0.052±0.014 | 0.078±0.0078 | 0.090±0.013 | 0.073±0.011 |
| | Nb-95 | <0.0023 | <0.0012 | <0.0022 | <0.0013 |
| | Zr-95 | <0.0032 | <0.0024 | <0.0032 | <0.0030 |
| | Ru-103 | <0.0020 | <0.0012 | <0.0022 | <0.0020 |
| | Ru-106 | <0.011 | <0.010 | <0.012 | <0.014 |
| | Cs-134 | <0.0012 | <0.00095 | <0.0018 | <0.0017 |
| | Cs-137 | <0.0014 | <0.0014 | <0.0016 | <0.0010 |
| | Ce-141 | <0.0021 | <0.0010 | <0.0027 | <0.0027 |
| | Ce-144 | <0.0053 | <0.0028 | <0.0080 | <0.0086 |
| | <u>D-10</u> | Lab Code | DAP-1208 | DAP-1335 | DAP-1509 |
| Volume (m ³) | | 3427 | 3983 | 3467 | 3691 |
| Sr-89 | | <0.0027 | <0.0011 | <0.0007 | <0.0006 |
| Sr-90 | | <0.0003 | <0.0004 | <0.0004 | <0.0005 |
| Be-7 | | 0.053±0.012 | 0.10±0.019 | 0.080±0.0093 | <0.014 |
| Nb-95 | | <0.0019 | <0.0024 | <0.0020 | <0.0019 |
| Zr-95 | | <0.0022 | <0.0038 | <0.0043 | <0.0036 |
| Ru-103 | | <0.0014 | <0.0021 | <0.0019 | <0.0018 |
| Ru-106 | | <0.0076 | <0.0099 | <0.017 | <0.011 |
| Cs-134 | | <0.00093 | <0.0012 | <0.0011 | <0.0015 |
| Cs-137 | | <0.0010 | <0.0016 | <0.0025 | <0.0014 |
| Ce-141 | | <0.0015 | <0.0018 | <0.0012 | <0.0022 |
| Ce-144 | | <0.0034 | <0.0053 | <0.0032 | <0.0066 |

Table 17. (continued)

| Location | Isotope | Sample Description and Activity (pCi/m ³) | | | |
|--------------------------|--------------------------|---|--------------|-------------|--------------|
| | | 1st Qtr. | 2nd Qtr. | 3rd Qtr. | 4th Qtr. |
| <u>D-11</u> | Lab Code | DAP-1209 | DAP-1336 | DAP-1510 | DAP-1658 |
| | Volume (m ³) | 3405 | 3882 | 3249 | 3664 |
| | Sr-89 | <0.0015 | <0.0012 | <0.0006 | <0.0003 |
| | Sr-90 | <0.0011 | <0.0004 | <0.0003 | <0.0004 |
| | Be-7 | 0.064±0.013 | 0.20±0.014 | <0.014 | 0.078±0.0009 |
| | Nb-95 | <0.0026 | <0.0014 | <0.0022 | <0.0018 |
| | Zr-95 | <0.0025 | <0.0033 | <0.0037 | <0.0033 |
| | Ru-103 | <0.0014 | <0.0019 | <0.0017 | <0.0018 |
| | Ru-106 | <0.0093 | <0.013 | <0.014 | <0.015 |
| | Cs-134 | <0.00088 | <0.0020 | <0.0018 | <0.0017 |
| | Cs-137 | <0.0011 | <0.0012 | <0.0017 | <0.0015 |
| | Ce-141 | <0.0016 | <0.0033 | <0.0021 | <0.0018 |
| | Ce-144 | <0.0036 | <0.0078 | <0.0069 | <0.0054 |
| | <u>D-12</u> | Lab Code | DAP-1210 | DAP-1337 | DAP-1511 |
| Volume (m ³) | | 3428 | 3550 | 3467 | 3716 |
| Sr-89 | | <0.0018 | <0.0014 | <0.0009 | <0.0004 |
| Sr-90 | | <0.0009 | <0.0005 | <0.0004 | <0.0005 |
| Be-7 | | <0.020 | 0.077±0.0095 | 0.084±0.012 | 0.060±0.013 |
| Nb-95 | | <0.0031 | <0.0020 | <0.0022 | <0.0023 |
| Zr-95 | | <0.0049 | <0.0026 | <0.0030 | <0.0031 |
| Ru-103 | | <0.0030 | <0.0014 | <0.0015 | <0.0015 |
| Ru-106 | | <0.0015 | <0.012 | <0.0098 | <0.015 |
| Cs-134 | | <0.0019 | <0.0014 | <0.0015 | <0.0015 |
| Cs-137 | | <0.0019 | <0.0012 | <0.0014 | <0.0015 |
| Ce-141 | | <0.0028 | <0.0014 | <0.0030 | <0.0020 |
| Ce-144 | | <0.0063 | <0.0034 | <0.0076 | <0.0063 |

Table 17. (continued)

| Location | Isotope | Sample Description and Activity (pCi/m ³) | | | |
|-------------|--------------------------|---|-------------|--------------|-------------|
| | | 1st Qtr. | 2nd Qtr. | 3rd Qtr. | 4th Qtr. |
| <u>D-13</u> | Lab Code | DAP-1211 | DAP-1338 | DAP-1512 | DAP-1660 |
| | Volume (m ³) | 3640 | 3750 | 3552 | 3717 |
| | Sr-89 | <0.0025 | <0.0011 | <0.0006 | <0.0004 |
| | Sr-90 | <0.0007 | <0.0005 | <0.0004 | <0.0004 |
| | Be-7 | 0.042±0.0094 | 0.095±0.018 | 0.071±0.0069 | 0.066±0.010 |
| | Nb-95 | <0.0015 | <0.0026 | <0.0016 | <0.0010 |
| | Zr-95 | <0.0019 | <0.0032 | <0.0025 | <0.0020 |
| | Ru-103 | <0.0012 | <0.0022 | <0.0012 | <0.0018 |
| | Ru-106 | <0.0074 | <0.013 | <0.013 | <0.010 |
| | Cs-134 | <0.00080 | <0.0016 | <0.0013 | <0.0014 |
| | Cs-137 | <0.00078 | <0.0016 | <0.0018 | <0.0012 |
| | Ce-141 | <0.0012 | <0.0020 | <0.0012 | <0.0011 |
| | Ce-144 | <0.0029 | <0.0054 | <0.0034 | <0.0042 |
| <u>D-14</u> | Lab Code | DAP-1212 | DAP-1339 | DAP-1513 | DAP-1661 |
| | Volume (m ³) | 3421 | 3750 | 3188 | 3713 |
| | Sr-89 | <0.0030 | <0.0010 | <0.0008 | <0.0004 |
| | Sr-90 | <0.0006 | <0.0004 | <0.0004 | <0.0004 |
| | Be-7 | <0.015 | 0.13±0.011 | 0.085±0.0093 | 0.058±0.009 |
| | Nb-95 | <0.0024 | <0.0016 | <0.0014 | <0.0010 |
| | Zr-95 | <0.0029 | <0.0026 | <0.0022 | <0.0011 |
| | Ru-103 | <0.0020 | <0.0022 | <0.0010 | <0.0018 |
| | Ru-106 | <0.012 | <0.013 | <0.0080 | <0.0091 |
| | Cs-134 | <0.0012 | <0.0010 | <0.0011 | <0.0011 |
| | Cs-137 | <0.0013 | <0.0014 | <0.0011 | <0.0011 |
| | Ce-141 | <0.0019 | <0.0018 | <0.0014 | <0.0020 |
| | Ce-144 | <0.0048 | <0.0053 | <0.0043 | <0.0064 |

Table 17. (continued)

| Location | Isotope | Sample Description and Activity (pCi/m ³) | | | |
|--------------------------|--------------------------|---|--------------|-------------|-------------|
| | | 1st Qtr. | 2nd Qtr. | 3rd Qtr. | 4th Qtr. |
| <u>D-15</u> | Lab Code | DAP-1213 | DAP-1340 | DAP-1514 | DAP-1662 |
| | Volume (m ³) | 3358 | 3799 | 3453 | 3703 |
| | Sr-89 | <0.0024 | <0.0012 | <0.0006 | <0.0004 |
| | Sr-90 | <0.0015 | <0.0004 | <0.0004 | <0.0004 |
| | Be-7 | 0.063±0.015 | 0.071±0.0089 | 0.081±0.010 | 0.063±0.007 |
| | Nb-95 | <0.0027 | <0.0016 | <0.0018 | <0.0013 |
| | Zr-95 | <0.0034 | <0.0028 | <0.0021 | <0.0025 |
| | Ru-103 | <0.0019 | <0.0015 | <0.0016 | <0.0012 |
| | Ru-106 | <0.012 | <0.0010 | <0.012 | <0.010 |
| | Cs-134 | <0.0014 | <0.0015 | <0.0012 | <0.0012 |
| | Cs-137 | <0.0013 | <0.0016 | <0.0015 | <0.0012 |
| | Ce-141 | <0.0014 | <0.0014 | <0.0022 | <0.0012 |
| | Ce-144 | <0.0044 | <0.0032 | <0.0055 | <0.0040 |
| | <u>D-16</u> | Lab Code | DAP-1214 | DAP-1341 | DAP-1515 |
| Volume (m ³) | | 3488 | 3457 | 3524 | 3489 |
| Sr-89 | | <0.0040 | <0.0015 | <0.0007 | <0.0005 |
| Sr-90 | | 0.0015±0.0005 | <0.0006 | <0.0004 | <0.0006 |
| Be-7 | | 0.043±0.010 | 0.086±0.0082 | 0.070±0.006 | <0.0097 |
| Nb-95 | | <0.0018 | <0.0017 | <0.0010 | <0.0021 |
| Zr-95 | | <0.0021 | <0.0023 | <0.0018 | <0.0025 |
| Ru-103 | | <0.0012 | <0.0014 | <0.00085 | <0.0014 |
| Ru-106 | | <0.0078 | <0.010 | <0.0082 | <0.011 |
| Cs-134 | | <0.00074 | <0.0010 | <0.0010 | <0.0012 |
| Cs-137 | | <0.00092 | <0.0013 | <0.0010 | <0.0014 |
| Ce-141 | | <0.0015 | <0.0011 | <0.00080 | <0.0017 |
| Ce-144 | | <0.0031 | <0.0026 | <0.0024 | <0.0056 |

Table 18. Charcoal samples, weekly composites from indicator locations D-4, D-5, D-7, D-11, and D-15; analysis for iodine-131. Collection: Weekly.

| Date Collected | Volume (m ³) | I-131 Activity (pCi/m ³) | Date Collected | Volume (m ³) | I-131 Activity (pCi/m ³) |
|----------------|--------------------------|--------------------------------------|----------------|--------------------------|--------------------------------------|
| 01-12-85 | 1840 ^a | <0.006 | 07-03-85 | 1230 ^c | <0.006 |
| 01-19-85 | 1421 | <0.006 | 07-11-85 | 1632 ^d | <0.006 |
| 01-24-85 | 1018 ^b | <0.006 | 07-18-85 | 1421 | <0.006 |
| 01-31-85 | 1432 | <0.006 | 07-25-85 | 1430 | <0.006 |
| 02-07-85 | 1413 | <0.006 | 08-01-85 | 1426 | <0.006 |
| 02-14-85 | 1428 | <0.006 | 08-08-85 | 1424 | <0.006 |
| 02-21-85 | 1387 | <0.006 | 08-15-85 | 1428 | <0.006 |
| 02-28-85 | 1373 | <0.006 | 08-22-85 | 1221 ^e | <0.006 |
| 03-07-85 | 1419 | <0.006 | 08-29-85 | 1405 | <0.006 |
| 03-14-85 | 1431 | <0.006 | 09-05-85 | 1429 | <0.006 |
| 03-21-85 | 1435 | <0.006 | 09-12-85 | 1425 | <0.006 |
| 03-28-85 | 1390 | <0.006 | 09-19-85 | 1419 | <0.006 |
| 04-04-85 | 1417 | <0.006 | 09-26-85 | 1433 | <0.006 |
| 04-11-85 | 1444 | <0.006 | 10-03-85 | 1416 | <0.006 |
| 04-18-85 | 1438 | <0.006 | 10-10-85 | 1411 | <0.006 |
| 04-25-85 | 1428 | <0.006 | 10-17-85 | 1414 | <0.006 |
| 05-02-85 | 1423 | <0.006 | 10-24-85 | 1417 | <0.006 |
| 05-09-85 | 1424 | <0.006 | 10-31-85 | 1425 | <0.006 |
| 05-16-85 | 1426 | <0.006 | 11-07-85 | 1415 | <0.006 |
| 05-23-85 | 1428 | <0.006 | 11-14-85 | 1425 | <0.006 |
| 05-30-85 | 1409 | <0.006 | 11-21-85 | 1430 | <0.006 |
| 06-06-85 | 1385 | <0.006 | 11-27-85 | 1225 ^c | <0.006 |
| 06-13-85 | 1426 | <0.006 | 12-05-85 | 1630 ^d | <0.006 |
| 06-20-85 | 1425 | <0.006 | 12-12-85 | 1430 | <0.006 |
| 06-27-85 | 1428 | <0.006 | 12-20-85 | 1555 ^d | <0.006 |
| | | | 12-26-85 | 1304 ^c | <0.006 |
| | | | 01-02-86 | 1424 | <0.006 |

^a Pump ran for nine days.

^b Pump ran for five days.

^c Pump ran for six days.

^d Pump ran for eight days.

^e Low volume due to blown fuse at Location D-11; pump ran for 47.4 hours only.

Table 19. Charcoal samples, weekly composites from control locations D-8, D-12, and D-14; analysis for iodine-131. Collection: Weekly.

| Date Collected | Volume (m ³) | I-131 Activity (pCi/m ³) | Date Collected | Volume (m ³) | I-131 Activity (pCi/m ³) |
|----------------|--------------------------|--------------------------------------|----------------|--------------------------|--------------------------------------|
| 01-12-85 | 1105 ^a | <0.01 | 07-03-85 | 748 ^c | <0.01 |
| 01-19-85 | 850 | <0.01 | 07-11-85 | 981 ^d | <0.01 |
| 01-24-85 | 612 ^b | <0.01 | 07-18-85 | 854 | <0.01 |
| 01-31-85 | 858 | <0.01 | 07-25-85 | 865 | <0.01 |
| 02-07-85 | 857 | <0.01 | 08-01-85 | 855 | <0.01 |
| 02-14-85 | 855 | <0.01 | 08-08-85 | 854 | <0.01 |
| 02-21-85 | 859 | <0.01 | 08-15-85 | 857 | <0.01 |
| 02-28-85 | 855 | <0.01 | 08-22-85 | 855 | <0.01 |
| 03-07-85 | 851 | <0.01 | 08-29-85 | 857 | <0.01 |
| 03-14-85 | 855 | <0.01 | 09-05-85 | 860 | <0.01 |
| 03-21-85 | 855 | <0.01 | 09-12-85 | 856 | <0.01 |
| 03-28-85 | 857 | <0.01 | 09-19-85 | 859 | <0.01 |
| 04-04-85 | 855 | <0.01 | 09-26-85 | 855 | <0.01 |
| 04-11-85 | 856 | <0.01 | 10-03-85 | 852 | <0.01 |
| 04-18-85 | 860 | <0.01 | 10-10-85 | 858 | <0.01 |
| 04-25-85 | 860 | <0.01 | 10-17-85 | 856 | <0.01 |
| 05-02-85 | 901 | <0.01 | 10-24-85 | 859 | <0.01 |
| 05-09-85 | 860 | <0.01 | 10-31-85 | 861 | <0.01 |
| 05-16-85 | 779 | <0.01 | 11-07-85 | 855 | <0.01 |
| 05-23-85 | 864 | <0.01 | 11-14-85 | 855 | <0.01 |
| 05-30-85 | 825 | <0.01 | 11-21-85 | 858 | <0.01 |
| 06-06-85 | 867 | <0.01 | 11-27-85 | 735 ^c | <0.01 |
| 06-13-85 | 864 | <0.01 | 12-05-85 | 979 ^d | <0.01 |
| 06-20-85 | 863 | <0.01 | 12-12-85 | 857 | <0.01 |
| 06-27-85 | 868 | <0.01 | 12-19-85 | 861 | <0.01 |
| | | | 12-26-85 | 853 | <0.01 |
| | | | 01-02-86 | 856 | <0.01 |

- a Pump ran for nine days.
- b Pump ran for five days.
- c Pump ran for six days.
- d Pump ran for eight days.

Table 20. Ambient gamma radiation (TLD), monthly exposure.

| Location No. | Location Description | mR/30 days | | | | | |
|--------------|----------------------|----------------|----------------|-----------------|----------------|----------------|-----------------|
| | | January | February | March | April | May | June |
| D-1 | Cedar Rapids | 3.8±1.6 | 3.8±0.8 | 3.1±0.5 | 4.1±0.4 | 5.0±1.1 | 6.6±0.5 |
| D-2 | Marion | 5.3±0.8 | 6.9±1.4 | 4.2±0.6 | 5.3±0.7 | 4.0±0.7 | 7.3±0.6 |
| D-3 | Hiawatha | 4.1±1.1 | 5.5±1.0 | 4.4±0.6 | 5.4±0.8 | 2.9±0.8 | 6.2±0.3 |
| D-4 | Johnson | 3.5±1.4 | 4.3±0.7 | 4.1±0.7 | 5.8±0.7 | 4.8±1.9 | 5.9±0.3 |
| D-5 | Center Point | 4.7±1.0 | 5.0±1.3 | 4.4±0.6 | 7.0±0.7 | 3.1±0.7 | 6.5±0.7 |
| D-7 | Shellsberg | 6.0±1.5 | 6.9±0.8 | ND ^a | 6.6±1.0 | 3.3±0.7 | ND ^a |
| D-8 | Urbana | 4.3±1.6 | 6.2±0.9 | 5.1±0.6 | 6.8±0.6 | 5.0±0.7 | 9.0±2.5 |
| D-9 | Route W26 | 4.8±1.6 | 4.8±1.2 | 5.1±0.5 | 4.6±0.9 | 6.8±1.0 | ND ^a |
| D-10 | Atkins | 3.9±0.9 | 6.7±1.1 | 5.3±0.6 | 6.6±1.0 | 8.1±0.8 | 6.0±0.3 |
| D-11 | Toddville | 6.1±1.4 | 4.8±0.9 | 4.4±0.5 | 5.2±0.7 | 7.0±1.6 | ND ^a |
| D-12 | Univ. of Iowa | 4.8±1.6 | 6.6±1.1 | 5.2±0.6 | 6.1±1.2 | 5.7±3.7 | 5.0±0.4 |
| D-13 | Alburnett | 5.4±1.2 | 5.1±2.0 | 3.3±0.6 | 5.2±0.5 | 6.2±0.6 | 4.3±0.4 |
| D-14 | Midway | 7.1±1.3 | 5.6±0.9 | 5.4±0.5 | 5.8±1.0 | 3.8±0.4 | ND ^a |
| D-15 | On-Site | 6.1±0.9 | 5.2±0.9 | 4.3±0.5 | 5.2±0.8 | 3.5±0.8 | 6.7±1.1 |
| D-16 | On-Site | <u>4.9±1.1</u> | <u>6.6±0.9</u> | <u>4.8±0.6</u> | <u>6.0±0.8</u> | <u>6.8±0.5</u> | <u>3.7±0.7</u> |
| Mean ± s.d. | | 5.0±1.0 | 5.6±1.0 | 4.5±0.7 | 5.7±0.8 | 5.1±1.0 | 6.1±1.5 |

^a ND = No data; TLDs lost in the field.

Table 20. (continued)

| Location | mR/30 days | | | | | | Mean \pm s.d. |
|-----------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| | July | August | September | October | November | December | |
| D-1 | 4.5 \pm 1.4 | 5.6 \pm 0.6 | 4.4 \pm 0.4 | 4.9 \pm 0.2 | 4.2 \pm 0.3 | 2.8 \pm 0.4 | 4.4 \pm 1.0 |
| D-2 | 4.5 \pm 1.6 | 6.1 \pm 0.9 | 4.5 \pm 2.1 | 5.4 \pm 0.2 | 4.5 \pm 0.5 | 3.4 \pm 0.4 | 5.1 \pm 1.2 |
| D-3 | 4.9 \pm 1.4 | 6.6 \pm 0.9 | 4.5 \pm 0.3 | 5.3 \pm 0.4 | 4.1 \pm 0.3 | 3.2 \pm 0.5 | 4.8 \pm 1.1 |
| D-4 | 4.8 \pm 1.5 | 6.5 \pm 0.9 | 4.8 \pm 0.3 | 5.4 \pm 0.3 | 4.6 \pm 0.3 | 3.4 \pm 0.4 | 4.8 \pm 0.9 |
| D-6 | 4.3 \pm 1.4 | 5.9 \pm 0.8 | 4.7 \pm 0.4 | 4.8 \pm 0.2 | 4.2 \pm 0.3 | 3.1 \pm 0.5 | 4.8 \pm 1.2 |
| D-7 | 4.1 \pm 1.4 | 5.9 \pm 0.9 | 5.4 \pm 0.4 | 6.0 \pm 0.2 | 4.8 \pm 0.3 | 3.6 \pm 0.6 | 5.3 \pm 1.3 |
| D-8 | 4.0 \pm 1.6 | 5.6 \pm 1.2 | 5.8 \pm 0.7 | 6.0 \pm 0.2 | 5.3 \pm 0.3 | 3.5 \pm 0.4 | 5.6 \pm 1.4 |
| D-9 | 4.5 \pm 1.5 | 6.0 \pm 1.0 | 6.8 \pm 0.7 | 6.9 \pm 0.2 | 5.5 \pm 0.2 | 3.7 \pm 0.5 | 5.4 \pm 1.1 |
| D-10 | 5.6 \pm 1.4 | 7.4 \pm 1.0 | 6.2 \pm 0.3 | 6.2 \pm 0.3 | 5.6 \pm 0.3 | 3.7 \pm 0.4 | 5.9 \pm 1.3 |
| D-11 | 4.2 \pm 1.4 | 5.7 \pm 0.8 | 4.8 \pm 0.4 | 5.4 \pm 0.3 | 4.5 \pm 0.3 | 2.7 \pm 0.5 | 5.0 \pm 1.1 |
| D-12 | 4.2 \pm 1.4 | 5.6 \pm 0.7 | 4.3 \pm 0.4 | 5.0 \pm 0.3 | 4.4 \pm 0.4 | 3.0 \pm 0.5 | 5.0 \pm 1.0 |
| D-13 | 5.3 \pm 1.5 | 6.5 \pm 1.2 | 4.6 \pm 0.3 | 5.2 \pm 0.5 | 4.4 \pm 0.3 | 2.7 \pm 0.5 | 4.8 \pm 1.1 |
| D-14 | 3.9 \pm 1.4 | 5.7 \pm 0.9 | 5.4 \pm 0.4 | 6.4 \pm 0.4 | 5.1 \pm 0.6 | 4.3 \pm 0.7 | 5.3 \pm 1.0 |
| D-15 | 4.2 \pm 1.4 | 5.8 \pm 0.8 | 5.7 \pm 0.3 | 5.4 \pm 0.2 | 5.9 \pm 0.4 | 3.1 \pm 0.4 | 5.1 \pm 1.1 |
| D-16 | <u>6.3\pm1.5</u> | <u>8.1\pm1.0</u> | <u>6.1\pm0.5</u> | <u>6.0\pm0.3</u> | <u>5.5\pm0.4</u> | <u>3.5\pm0.5</u> | <u>5.7\pm1.3</u> |
| Mean \pm s.d. | 4.6 \pm 0.7 | 6.2 \pm 0.7 | 5.2 \pm 0.8 | 5.6 \pm 0.6 | 4.8 \pm 0.6 | 3.3 \pm 0.4 | 5.1 \pm 1.2 |

Table 20. (continued)

| Location No. | Location Description | mR/30 days | | | | | |
|--------------|----------------------|-----------------|----------------|----------------|----------------|-----------------|----------------|
| | | January | February | March | April | May | June |
| D-17 | 0.5 mi N | 5.3±1.2 | 5.8±0.8 | 4.9±0.5 | 5.6±3.2 | 5.9±1.1 | 7.7±1.6 |
| D-18 | 0.5 mi NNE | 4.6±1.5 | 6.7±1.0 | 4.6±0.6 | 6.6±0.8 | 4.6±0.5 | 6.2±0.3 |
| D-19 | 0.5 mi NE | 5.6±1.1 | 5.6±3.0 | 4.8±0.6 | 6.0±0.6 | 5.6±1.9 | 5.5±0.4 |
| D-20 | 0.5 mi ENE | 4.9±1.1 | 6.6±1.8 | 4.7±0.6 | 5.9±1.5 | 3.5±0.6 | 5.0±0.4 |
| D-21 | 0.5 mi E | 5.3±1.2 | 4.7±2.3 | 4.7±0.6 | 7.0±0.6 | 2.9±1.0 | 3.2±0.3 |
| D-22 | 0.5 mi ESE | 4.8±1.4 | 5.6±1.4 | 4.6±0.6 | 5.6±0.8 | 2.5±0.5 | 6.7±0.8 |
| D-23 | 0.5 mi SE | 5.3±1.6 | 4.8±0.7 | 4.7±0.5 | 5.0±1.9 | 4.0±0.6 | 4.5±0.5 |
| D-24 | 0.5 mi SSE | 5.2±1.4 | 5.1±0.9 | 4.7±0.5 | 4.2±0.8 | 3.5±0.6 | 5.5±0.7 |
| D-25 | 0.5 mi S | 4.7±1.3 | 5.8±1.2 | 5.1±0.6 | 3.1±0.9 | 2.6±0.6 | 4.6±0.6 |
| D-26 | 0.5 mi SSW | 5.2±1.1 | 6.5±1.3 | 4.8±0.5 | 6.6±1.0 | 4.2±0.9 | 3.3±0.4 |
| D-27 | 0.5 mi SW | ND ^a | 5.4±2.4 | 5.0±0.5 | 6.3±0.9 | 4.6±1.4 | 7.1±0.8 |
| D-28 | 0.5 mi WSW | 5.3±1.2 | 5.1±1.1 | 5.0±0.5 | 6.3±0.7 | 5.4±1.7 | 6.5±1.0 |
| D-29 | 0.5 mi W | 5.0±1.7 | 6.0±1.3 | 5.8±0.6 | 4.4±0.9 | 4.0±0.9 | 5.2±0.7 |
| D-30 | 0.5 mi WNW | 5.6±1.6 | 6.4±1.0 | 5.4±0.5 | 7.1±0.8 | ND ^a | 7.9±0.7 |
| D-31 | 0.5 mi NW | 5.2±1.0 | 3.0±1.1 | 6.2±0.5 | 6.8±1.0 | 5.0±1.0 | 8.0±1.7 |
| D-32 | 0.5 mi NNW | <u>6.1±1.0</u> | <u>6.4±1.6</u> | <u>6.1±0.4</u> | <u>7.6±1.0</u> | <u>5.4±0.6</u> | <u>5.0±0.6</u> |
| Mean ± s.d. | | 5.2±0.4 | 5.6±0.9 | 5.1±0.5 | 5.9±1.2 | 4.2±1.1 | 5.7±1.5 |

^a ND = No data; TLDs lost in the field.

Table 20. (continued)

| Location | mR/30 days | | | | | | Mean \pm s.d. |
|-----------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| | July | August | September | October | November | December | |
| D-17 | 5.7 \pm 1.6 | 7.6 \pm 1.0 | 7.0 \pm 0.4 | 7.3 \pm 0.5 | 6.3 \pm 0.3 | 4.2 \pm 0.4 | 6.1 \pm 1.1 |
| D-18 | 4.2 \pm 1.6 | 5.5 \pm 1.2 | 6.0 \pm 0.4 | 6.0 \pm 0.2 | 5.5 \pm 0.3 | 3.8 \pm 0.4 | 5.4 \pm 1.0 |
| D-19 | 4.4 \pm 1.5 | 6.1 \pm 0.9 | 5.5 \pm 0.4 | 6.1 \pm 0.5 | 5.0 \pm 0.3 | 3.3 \pm 0.4 | 5.3 \pm 0.8 |
| D-20 | 4.2 \pm 1.4 | 5.7 \pm 0.8 | 6.3 \pm 0.7 | 6.0 \pm 0.2 | 5.5 \pm 0.3 | 3.6 \pm 0.4 | 5.2 \pm 1.0 |
| D-21 | 3.7 \pm 1.5 | 5.2 \pm 1.1 | 6.0 \pm 0.6 | 6.0 \pm 0.4 | 5.3 \pm 0.4 | 3.7 \pm 0.7 | 4.8 \pm 1.2 |
| D-22 | 4.4 \pm 1.5 | 6.0 \pm 0.8 | 5.2 \pm 0.7 | 5.6 \pm 0.3 | 4.8 \pm 0.3 | 3.5 \pm 0.6 | 4.9 \pm 1.1 |
| D-23 | 3.8 \pm 1.4 | 5.2 \pm 0.8 | 5.2 \pm 0.3 | 5.5 \pm 0.3 | 4.7 \pm 0.2 | 3.2 \pm 0.5 | 4.7 \pm 0.8 |
| D-24 | 4.1 \pm 1.6 | 5.5 \pm 0.9 | 5.7 \pm 0.4 | 5.5 \pm 0.3 | 5.5 \pm 0.4 | 3.0 \pm 0.4 | 4.8 \pm 0.9 |
| D-25 | 3.4 \pm 1.5 | 4.7 \pm 1.0 | 9.3 \pm 0.7 | 5.4 \pm 0.2 | 5.4 \pm 0.3 | 3.4 \pm 0.7 | 4.8 \pm 1.8 |
| D-26 | 3.8 \pm 1.5 | 5.2 \pm 0.9 | 5.0 \pm 0.4 | 6.0 \pm 0.2 | 4.8 \pm 0.3 | 3.6 \pm 0.5 | 4.9 \pm 1.1 |
| D-27 | 3.5 \pm 1.4 | 4.9 \pm 0.7 | 4.9 \pm 0.4 | 5.7 \pm 0.2 | 5.1 \pm 0.2 | 3.5 \pm 0.5 | 5.1 \pm 1.1 |
| D-28 | 4.0 \pm 1.4 | 5.6 \pm 0.6 | 6.4 \pm 0.3 | 7.3 \pm 0.6 | 6.6 \pm 0.6 | 4.3 \pm 0.5 | 5.6 \pm 1.0 |
| D-29 | 4.2 \pm 1.4 | 5.8 \pm 0.9 | 6.4 \pm 0.3 | 7.4 \pm 0.4 | 6.0 \pm 0.3 | 5.2 \pm 0.7 | 5.4 \pm 1.0 |
| D-30 | 4.8 \pm 1.4 | 6.0 \pm 0.9 | 6.7 \pm 0.4 | 7.8 \pm 0.3 | 6.9 \pm 0.3 | 4.5 \pm 0.4 | 6.3 \pm 1.1 |
| D-31 | 5.3 \pm 1.4 | 6.9 \pm 0.9 | 7.4 \pm 0.3 | 7.3 \pm 0.3 | 6.9 \pm 0.3 | 4.2 \pm 0.4 | 6.0 \pm 1.5 |
| D-32 | <u>4.6\pm1.6</u> | <u>6.4\pm1.2</u> | <u>7.4\pm0.7</u> | <u>7.2\pm0.2</u> | <u>6.5\pm0.4</u> | <u>4.5\pm0.4</u> | <u>6.1\pm1.0</u> |
| Mean \pm s.d. | 4.3 \pm 0.6 | 5.8 \pm 0.7 | 6.3 \pm 1.1 | 6.4 \pm 0.8 | 5.7 \pm 0.8 | 3.8 \pm 0.6 | 5.3 \pm 1.2 |

Table 20. (continued)

| Location No. | Location Description | mR/30 days | | | | | |
|--------------|----------------------|-----------------|----------------|-----------------|-----------------|----------------|-----------------|
| | | January | February | March | April | May | June |
| D-33 | 3.0 mi N | 7.1±1.0 | 6.3±0.8 | 4.1±0.5 | 5.4±0.9 | 5.6±0.7 | 11.5±0.5 |
| D-34 | 3.0 mi NE | 3.7±1.4 | 5.9±1.2 | 4.8±0.4 | 3.2±0.5 | 2.9±1.1 | 6.8±0.4 |
| D-35 | 3.0 mi NE | 5.4±1.8 | 4.9±1.7 | 4.3±0.5 | 2.5±1.2 | 3.8±0.7 | 7.3±0.5 |
| D-36 | 3.0 mi NE | 6.5±1.5 | 4.1±0.9 | 4.9±0.5 | 4.8±0.9 | 4.0±0.9 | 3.7±0.5 |
| D-37 | 3.0 mi E | 3.0±1.1 | 6.2±1.5 | ND ^a | 3.9±1.6 | 4.6±0.8 | 9.2±2.2 |
| D-38 | 3.0 mi SE | 3.8±1.6 | 6.6±3.0 | 5.6±0.5 | 5.4±4.6 | 4.7±0.4 | 9.6±1.0 |
| D-39 | 3.0 mi SE | 6.3±1.1 | 5.4±1.8 | 6.2±0.7 | 4.0±3.0 | 4.0±0.5 | 8.7±1.8 |
| D-40 | 3.0 mi SE | 5.6±1.5 | 6.2±2.1 | 5.6±0.4 | 3.5±0.4 | 2.6±0.6 | 6.7±0.3 |
| D-41 | 3.0 mi S | ND ^a | 5.9±1.2 | 5.6±0.4 | 3.3±0.4 | 5.1±0.7 | 7.9±0.4 |
| D-42 | 3.0 mi SW | 5.1±1.4 | 6.8±1.0 | 4.6±0.4 | 6.2±0.6 | 6.1±0.8 | ND ^a |
| D-43 | 3.0 mi SW | 5.4±1.4 | 4.7±2.2 | 3.4±0.6 | 3.9±0.4 | 5.0±1.8 | 5.8±0.5 |
| D-44 | 1.0 mi SW | 6.3±1.4 | 3.5±2.0 | 5.8±0.5 | 4.4±1.1 | 3.2±1.9 | ND ^a |
| D-45 | 1.0 mi SW | 6.3±1.9 | 6.5±1.0 | 5.9±0.6 | 2.9±1.4 | 2.5±0.6 | ND ^a |
| D-46 | 1.0 mi W | 4.7±1.6 | 5.5±2.6 | 5.9±0.5 | ND ^a | 4.6±0.6 | 4.8±0.9 |
| D-47 | 1.0 mi NW | 6.0±1.5 | 5.4±0.9 | 6.4±0.5 | 6.8±0.7 | 4.3±0.5 | 6.0±0.3 |
| D-48 | 1.0 mi NW | <u>6.0±1.6</u> | <u>6.7±1.1</u> | <u>6.6±0.5</u> | <u>2.4±0.6</u> | <u>4.4±0.8</u> | ND ^a |
| Mean ± s.d. | | 5.4±1.2 | 5.7±1.0 | 5.3±0.9 | 4.2±1.3 | 4.2±1.0 | 7.3±2.2 |

^a ND = No data; TLDs lost in the field.

Table 20. (continued)

| Location | mR/30 days | | | | | | Mean \pm s.d. |
|-----------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| | July | August | September | October | November | December | |
| D-33 | 3.9 \pm 1.4 | 5.4 \pm 0.8 | 5.0 \pm 1.3 | 5.2 \pm 0.3 | ND ^a | 2.8 \pm 0.5 | 5.7 \pm 2.3 |
| D-34 | 3.2 \pm 1.4 | 4.5 \pm 0.7 | 4.8 \pm 1.1 | 4.7 \pm 0.3 | 5.0 \pm 0.4 | 2.6 \pm 0.6 | 4.3 \pm 1.3 |
| D-35 | 3.2 \pm 1.5 | 4.1 \pm 1.0 | 4.7 \pm 0.4 | 5.7 \pm 0.4 | 4.5 \pm 0.5 | 3.0 \pm 0.5 | 4.4 \pm 1.3 |
| D-36 | 4.0 \pm 1.4 | 5.2 \pm 0.9 | 5.9 \pm 0.5 | 6.8 \pm 0.4 | 6.1 \pm 0.4 | 3.9 \pm 0.5 | 5.0 \pm 1.1 |
| D-37 | 5.7 \pm 1.4 | 7.7 \pm 0.9 | 7.0 \pm 0.9 | 7.5 \pm 0.3 | 6.8 \pm 0.7 | 4.8 \pm 0.3 | 6.0 \pm 1.8 |
| D-38 | 6.2 \pm 1.4 | 7.6 \pm 0.9 | 6.5 \pm 0.5 | 7.1 \pm 0.3 | 5.7 \pm 0.4 | 3.8 \pm 0.4 | 6.0 \pm 1.6 |
| D-39 | 4.8 \pm 1.5 | 6.2 \pm 0.9 | 6.2 \pm 0.5 | 6.9 \pm 0.4 | 5.5 \pm 0.5 | 4.0 \pm 0.5 | 5.7 \pm 1.4 |
| D-40 | 4.8 \pm 1.4 | 6.6 \pm 0.7 | 5.1 \pm 0.6 | ND ^a | 5.0 \pm 0.4 | 3.2 \pm 0.5 | 5.0 \pm 1.4 |
| D-41 | 4.6 \pm 1.4 | 6.2 \pm 0.8 | 5.6 \pm 0.4 | 6.5 \pm 0.5 | 5.5 \pm 0.4 | 3.7 \pm 0.4 | 5.4 \pm 1.3 |
| D-42 | 4.5 \pm 1.4 | 6.1 \pm 0.8 | 5.2 \pm 0.4 | 5.7 \pm 0.6 | 4.8 \pm 0.4 | 3.3 \pm 0.5 | 5.3 \pm 1.0 |
| D-43 | 3.9 \pm 1.4 | 5.4 \pm 0.7 | 5.6 \pm 0.4 | 5.8 \pm 0.6 | 5.3 \pm 0.6 | 3.0 \pm 0.4 | 4.8 \pm 1.0 |
| D-44 | 4.1 \pm 1.5 | 5.6 \pm 1.0 | 7.2 \pm 0.6 | 7.2 \pm 0.3 | 7.2 \pm 0.5 | 4.3 \pm 0.5 | 5.3 \pm 1.5 |
| D-45 | 4.5 \pm 1.6 | 6.2 \pm 0.9 | 7.3 \pm 0.8 | 7.5 \pm 0.2 | 6.8 \pm 0.4 | 4.4 \pm 0.4 | 5.5 \pm 1.7 |
| D-46 | 5.1 \pm 1.6 | 6.8 \pm 1.3 | 7.3 \pm 0.3 | 7.3 \pm 0.6 | 7.7 \pm 0.8 | 3.9 \pm 0.5 | 5.8 \pm 1.3 |
| D-47 | 5.9 \pm 1.4 | 7.6 \pm 0.8 | 7.4 \pm 0.3 | 7.4 \pm 0.3 | 7.0 \pm 0.3 | 4.3 \pm 0.4 | 6.2 \pm 1.1 |
| D-48 | <u>6.4\pm1.4</u> | <u>8.4\pm0.7</u> | <u>7.4\pm0.4</u> | <u>7.0\pm0.4</u> | <u>7.3\pm0.8</u> | <u>4.4\pm0.5</u> | <u>6.1\pm1.7</u> |
| Mean \pm s.d. | 4.5 \pm 1.0 | 6.2 \pm 1.2 | 6.1 \pm 1.0 | 6.6 \pm 0.9 | 6.0 \pm 1.0 | 3.7 \pm 0.7 | 5.0 \pm 1.2 |

^a ND = No data; TLD missing in field.

Table 20. (continued)

| Location No. | Location Description | mR/30 days | | | | | |
|--------------|----------------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| | | January | February | March | April | May | June |
| D-76 | 0.5 mi NE | 5.7±1.2 | 6.6±1.2 | 6.3±0.5 | 2.8±0.5 | 2.5±0.4 | 3.8±0.3 |
| D-77 | 0.5 mi NE | 4.8±1.7 | 3.4±0.9 | 4.5±0.4 | 2.6±0.9 | 3.4±1.8 | 5.2±0.4 |
| D-78 | 0.5 mi NE | 5.0±1.6 | 5.1±0.8 | 6.1±0.7 | 3.7±0.4 | 2.9±1.5 | 3.7±0.3 |
| D-79 | 0.5 mi E | 4.7±1.6 | 5.8±1.2 | 5.1±0.7 | 3.3±0.7 | 2.8±1.4 | 5.4±0.4 |
| D-80 | 0.5 mi SE | 5.8±1.6 | 5.0±1.7 | 4.6±0.4 | 2.7±1.4 | 3.6±0.7 | 4.6±0.5 |
| D-81 | 0.5 mi SE | 4.4±1.4 | 6.4±1.8 | 5.8±0.4 | 6.0±3.5 | 2.2±1.1 | 7.7±0.3 |
| D-82 | 0.5 mi SE | 5.1±1.3 | 6.3±1.2 | 3.4±0.4 | 3.7±2.8 | 2.4±0.7 | 7.6±1.2 |
| D-83 | 0.5 mi S | 5.4±1.7 | 4.4±1.0 | 4.7±0.4 | 3.5±1.9 | 3.8±0.4 | ND ^a |
| D-84 | 0.5 mi SW | 5.8±1.1 | 4.4±2.8 | 5.1±0.6 | 3.4±0.7 | 4.3±0.5 | 6.6±0.7 |
| D-85 | 0.5 mi SW | 5.8±1.4 | 4.7±0.9 | 4.7±0.4 | 4.2±2.1 | 3.5±1.1 | 6.7±0.4 |
| D-86 | 0.5 mi SW | 5.3±1.6 | 6.1±2.1 | 4.8±0.4 | 3.1±0.7 | 6.2±1.2 | 7.8±0.4 |
| D-87 | 0.5 mi SW | 6.7±1.7 | 4.9±0.7 | 5.3±0.4 | 5.4±0.8 | 5.0±0.6 | 7.2±0.6 |
| D-88 | 0.5 mi W | 5.8±1.2 | 5.1±1.1 | 5.3±0.4 | 6.5±0.7 | 4.0±1.3 | 7.7±2.2 |
| D-89 | 0.5 mi W | 5.2±1.9 | 6.4±2.2 | 6.3±0.5 | 4.5±0.5 | 5.4±1.0 | 5.1±0.3 |
| D-90 | 0.5 mi NW | 6.3±1.6 | 7.0±0.8 | 6.3±0.4 | 3.8±0.5 | 7.1±0.5 | 7.7±0.4 |
| D-91 | 0.5 mi N | <u>5.7±1.5</u> | <u>6.5±1.3</u> | <u>6.2±0.6</u> | <u>4.4±2.6</u> | <u>3.4±1.2</u> | <u>7.7±1.7</u> |
| Mean ± s.d. | | 5.5±0.6 | 5.5±1.0 | 5.3±0.8 | 4.0±1.2 | 3.9±1.4 | 6.3±1.5 |

^a ND = No data; TLDs lost in the field.

Table 20. (continued)

| Location | mR/30 days | | | | | | Mean \pm s.d. |
|-----------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| | July | August | September | October | November | December | |
| D-76 | 5.6 \pm 1.4 | 7.0 \pm 1.1 | 7.4 \pm 0.5 | 6.6 \pm 0.4 | 6.7 \pm 0.3 | 4.4 \pm 0.5 | 5.4 \pm 1.7 |
| D-77 | 4.1 \pm 1.7 | 6.0 \pm 1.0 | 6.2 \pm 0.5 | 5.8 \pm 0.2 | 5.7 \pm 0.2 | 3.8 \pm 0.6 | 4.6 \pm 1.2 |
| D-78 | 3.7 \pm 1.6 | 5.2 \pm 1.2 | 7.7 \pm 2.2 | 6.5 \pm 0.5 | 5.8 \pm 0.2 | 4.2 \pm 0.4 | 5.0 \pm 1.4 |
| D-79 | 3.9 \pm 1.5 | 5.4 \pm 0.8 | 5.8 \pm 0.4 | 6.5 \pm 0.7 | 5.3 \pm 0.3 | 3.8 \pm 0.4 | 4.8 \pm 1.1 |
| D-80 | 3.8 \pm 1.5 | 5.2 \pm 0.8 | 5.1 \pm 0.4 | 6.0 \pm 0.2 | 5.9 \pm 0.5 | 3.7 \pm 0.4 | 4.7 \pm 1.1 |
| D-81 | 5.8 \pm 1.5 | 7.6 \pm 0.9 | 5.1 \pm 0.6 | 5.8 \pm 0.3 | 4.9 \pm 0.5 | 3.3 \pm 0.4 | 5.4 \pm 1.6 |
| D-82 | 5.6 \pm 1.4 | 7.3 \pm 1.0 | 5.2 \pm 0.5 | 4.9 \pm 0.2 | 5.2 \pm 0.6 | 3.1 \pm 0.4 | 5.0 \pm 1.0 |
| D-83 | 5.3 \pm 1.4 | 6.2 \pm 1.2 | 5.4 \pm 0.4 | 5.0 \pm 0.4 | 5.4 \pm 0.4 | 2.6 \pm 0.6 | 4.7 \pm 1.0 |
| D-84 | 3.8 \pm 1.6 | 5.3 \pm 1.2 | 5.2 \pm 0.4 | 5.9 \pm 0.5 | 5.1 \pm 0.3 | 3.4 \pm 0.4 | 4.8 \pm 1.1 |
| D-85 | 5.0 \pm 1.4 | 6.6 \pm 0.8 | 5.8 \pm 0.4 | 5.5 \pm 0.2 | 5.6 \pm 0.3 | 3.6 \pm 0.4 | 5.1 \pm 1.1 |
| D-86 | 5.7 \pm 1.6 | 6.4 \pm 1.0 | 6.8 \pm 0.6 | 6.2 \pm 0.2 | 6.6 \pm 0.3 | 4.4 \pm 0.5 | 5.8 \pm 1.2 |
| D-87 | 4.7 \pm 1.6 | 6.3 \pm 0.9 | 6.3 \pm 0.4 | 6.6 \pm 0.2 | 6.3 \pm 0.3 | 4.3 \pm 0.4 | 5.8 \pm 0.9 |
| D-88 | 3.3 \pm 1.3 | 5.2 \pm 1.1 | 6.5 \pm 0.4 | 6.8 \pm 0.3 | 6.6 \pm 0.4 | 3.9 \pm 0.4 | 5.6 \pm 1.3 |
| D-89 | 6.1 \pm 1.4 | 8.3 \pm 0.9 | 7.6 \pm 0.3 | 7.3 \pm 0.2 | 7.6 \pm 0.6 | 4.4 \pm 0.5 | 6.2 \pm 1.3 |
| D-90 | 6.2 \pm 1.5 | 8.3 \pm 0.8 | 7.7 \pm 0.6 | 7.7 \pm 0.4 | 7.7 \pm 0.5 | 4.9 \pm 0.5 | 6.7 \pm 1.3 |
| D-91 | <u>5.7\pm1.6</u> | <u>8.0\pm1.1</u> | <u>5.9\pm1.2</u> | <u>5.7\pm0.4</u> | <u>5.9\pm0.6</u> | <u>3.6\pm0.5</u> | <u>5.7\pm1.4</u> |
| Mean \pm s.d. | 4.9 \pm 1.0 | 6.5 \pm 1.1 | 6.2 \pm 1.0 | 6.2 \pm 0.8 | 6.0 \pm 0.8 | 3.8 \pm 0.6 | 5.3 \pm 1.4 |

Table 21. Ambient gamma radiation (TLD), annual exposure, 1985.

| Location | mR/365 days | Normalized to 30 Days | Location | mR/365 days | Normalized to 30 Days |
|-------------|------------------------|-----------------------|-------------|------------------------------|-----------------------|
| D-1 | 58.0±3.9 | 4.8±0.3 | D-33 | ND ^a | -- |
| D-2 | 50.9±2.3 | 4.2±0.2 | D-34 | 60.7±3.6 | 5.0±0.3 |
| D-3 | 41.0±6.1 | 3.4±0.5 | D-35 | 75.6±4.4 | 6.2±0.4 |
| D-4 | 36.6±1.6 | 3.0±0.1 | D-36 | ND ^b | -- |
| D-6 | 91.8±5.6 ^C | 7.5±0.5 | D-37 | 63.5±4.1 | 5.2±0.3 |
| D-7 | 50.4±2.5 | 4.1±0.2 | D-38 | 67.3±1.1 | 5.5±0.1 |
| D-8 | 56.8±3.2 | 4.7±0.3 | D-39 | 52.0±1.4 | 4.3±0.1 |
| D-9 | 49.6±3.1 | 4.1±0.3 | D-40 | ND ^a | -- |
| D-10 | 50.0±6.8 | 4.1±0.6 | D-41 | 64.2±1.9 | 5.3±0.2 |
| D-11 | ND ^b | -- | D-42 | 46.9±2.6 | 3.8±0.2 |
| D-12 | 75.8±17.2 ^C | 6.2±1.4 | D-43 | 52.1±2.2 | 4.3±0.2 |
| D-13 | 54.0±2.8 | 4.4±0.2 | D-44 | 58.2±3.7 | 4.8±0.3 |
| D-14 | 67.0±2.7 | 5.5±0.2 | D-45 | 56.4±2.4 | 4.6±0.2 |
| D-15 | 54.7±3.1 | 4.5±0.2 | D-46 | 64.2±14.8 ^C | 5.3±1.2 |
| D-16 | <u>50.7±3.5</u> | <u>4.2±0.3</u> | D-47 | 63.5±5.0 | 5.6±0.4 |
| | | | D-48 | <u>69.6±13.5^C</u> | <u>5.7±1.1</u> |
| Mean ± s.d. | 56.2±14.0 | 4.6±1.1 | Mean ± s.d. | 61.5±8.1 | 5.0±0.7 |
| D-17 | 66.6±1.2 | 5.5±0.1 | D-76 | 50.8±2.0 | 4.2±0.2 |
| D-18 | 62.0±2.8 | 5.1±0.2 | D-77 | 80.5±11.8 ^C | 6.6±1.0 |
| D-19 | 41.9±2.4 | 3.4±0.2 | D-78 | 56.1±3.3 | 4.6±0.3 |
| D-20 | 78.7±5.2 ^C | 6.5±0.4 | D-79 | 47.1±7.7 | 3.9±0.6 |
| D-21 | 46.2±1.4 | 3.8±0.1 | D-80 | 29.6±1.8 ^d | 2.4±0.2 |
| D-22 | 55.8±12.1 ^C | 4.6±1.0 | D-81 | 52.2±6.2 | 4.3±0.5 |
| D-23 | 52.4±14.6 ^C | 4.3±1.2 | D-82 | 31.4±8.6 ^d | 2.6±0.7 |
| D-24 | 55.7±3.4 | 4.6±0.3 | D-83 | 39.0±2.5 | 3.2±0.2 |
| D-25 | 37.0±4.4 ^d | 3.1±0.4 | D-84 | 59.3±15.1 ^C | 4.1±1.2 |
| D-26 | 63.6±4.5 ^C | 5.2±0.4 | D-85 | 46.5±3.3 ^d | 3.8±0.3 |
| D-27 | 51.7±15.8 ^C | 4.2±1.3 | D-86 | 46.4±2.4 ^d | 3.8±0.2 |
| D-28 | 57.0±1.9 | 4.7±0.2 | D-87 | 51.6±2.9 | 4.2±0.2 |
| D-29 | 69.6±5.7 | 5.7±0.5 | D-88 | 62.1±22.6 ^C | 5.1±1.9 |
| D-30 | 81.7±3.4 | 6.7±0.3 | D-89 | 65.1±13.0 ^C | 5.4±1.1 |
| D-31 | 80.2±2.7 | 6.6±0.2 | D-90 | 73.4±1.6 | 6.0±0.1 |
| D-32 | <u>66.8±3.3</u> | <u>5.5±0.3</u> | D-91 | <u>ND^a</u> | <u>--</u> |
| Mean ± s.d. | 60.4±13.3 | 5.0±1.1 | Mean ± s.d. | 52.7±14.1 | 4.3±1.2 |

^a ND = No data; TLDs lost in the field.
^b ND = No data; chips damaged.
^c Chips slightly damaged.
^d Chips very dirty; washed with trichloroethylene.

Table 22. Milk samples collected during the non-grazing season, analysis for Iodine-131. Collection: Monthly, October through April.

| Location and Date Collected | Lab Code | Activity (pCi/l) I-131 |
|------------------------------|-----------|---------------------------|
| <u>Indicator</u> | | |
| <u>Composite^a</u> | | |
| 01-02-85 | DMI-17 | <0.4 |
| 02-05-85 | 121C | <0.4 |
| 03-05-85 | 197C | <0.4 |
| 04-02-85 | 288C | <0.4 |
| 10-01-85 | 1530 | <0.4 |
| 11-05-85 | 1741 | <0.4 |
| 12-04-85 | 1823 | <0.4 |
| <u>Control</u> | | |
| <u>Composite^b</u> | | |
| 01-02-85 | DMI-18,19 | <0.4 |
| 02-05-85 | 122 | <0.4 |
| 03-05-85 | 198 | <0.4 |
| 04-02-85 | 289 | <0.4 |
| 10-01-85 | 1531 | <0.4 |
| 11-05-85 | 1742 | <0.4 |
| 12-04-85 | 1824 | <0.4 |

^a Composite of samples from locations D-63, D-72, D-93, D-94, D-96, D-101, and D-106.

^b Composite of samples from locations D-102 and D-105.

^c Location D-101 omitted from composite. Goat was dry.

Table 23. Milk samples collected during the grazing season, analysis for Iodine-131.
Collection: Weekly, May through September.

| Date Collected | Activity (pCi/l) | | | | | Indicator ^a | Control ^b |
|----------------|------------------|------|------|-------|-------|------------------------|----------------------|
| | D-63 | D-93 | D-94 | D-101 | D-106 | | |
| 05-07-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 05-14-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.5 ^c |
| 05-21-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 05-28-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 06-04-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 06-11-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 06-18-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 06-25-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 07-01-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 07-09-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 07-16-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 07-23-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 07-30-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 08-06-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 08-13-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 08-20-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 08-27-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 09-03-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 09-10-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 09-17-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| 09-24-85 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |

^a Composites of samples from Locations D-72 and D-96.

^b Composites of samples from locations D-102 and D-105.

^c Higher LLD due to delay in counting.

Table 24. Milk samples collected during the grazing season, analysis for gamma-emitting isotopes.
Collection: Monthly composites of weekly samples, May - September.

| Location and Date Collected | Lab Code | Activity (pCi/l) | | |
|--------------------------------|-------------|------------------|---------------|------------------------|
| | | K-40 | Cs-137 | Ba-La-140 ^a |
| <u>Indicator</u> | | | | |
| <u>D-63</u> | | | | |
| May, 1985 | DMI-553 | 1290±140 | <15 | <15 ^a |
| June, 1985 | 810 | 1400±90 | <15 | <15 |
| July, 1985 | 1069 | 1310±160 | <15 | <15 |
| August, 1985 | 1286 | 1320±170 | <15 | <15 |
| September, 1985 | 1583 | <u>1290±120</u> | <u><15</u> | <u><15</u> |
| Annual Mean ± s.d. | | 1320±40 | <15 | <15 |
| | | | | |
| <u>D-72</u> | | | | |
| May, 1985 | DMI-554 | 1250±150 | <15 | <15 ^a |
| June, 1985 | 811 | 1220±120 | <15 | <15 |
| July, 1985 | 1070 | 1250±140 | <15 | <15 |
| August, 1985 | 1287 | 1450±140 | <15 | <15 |
| September, 1985 | 1584,5 | <u>1280±90</u> | <u><15</u> | <u><15</u> |
| Annual Mean ± s.d. | | 1290±90 | <15 | <15 |
| | | | | |
| <u>D-93</u> | | | | |
| May, 1985 | DMI-555,6 | 1820±160 | <15 | <15 ^a |
| June, 1985 | 812 | 1680±140 | <15 | <15 |
| July, 1985 | 1071 | 1740±160 | <15 | <15 |
| August, 1985 | 1288 | 1570±160 | <15 | <15 |
| September, 1985 | 1586 | <u>1660±160</u> | <u><15</u> | <u><15</u> |
| Annual Mean ± s.d. | | 1690±90 | <15 | <15 |

^a Ba-La-140 minimum sensitivity is at time of counting.

Table 24. (continued)

| Location and Date Collected | Lab Code | Activity (pCi/l) | | |
|--------------------------------|-------------|------------------|---------------|------------------------|
| | | K-40 | Cs-137 | Ba-La-140 ^a |
| <u>D-94</u> | | | | |
| May, 1985 | DMI-557 | 1300±170 | <15 | <15 ^a |
| June, 1985 | 813 | 1370±130 | <15 | <15 |
| July, 1985 | 1072 | 1130±150 | <15 | <15 |
| August, 1985 | 1289 | 1120±120 | <15 | <15 |
| September, 1985 | 1587 | <u>1560±140</u> | <u><15</u> | <u><15</u> |
| Annual Mean ± s.d. | | 1300±180 | <15 | <15 |
| <u>D-96</u> | | | | |
| May, 1985 | DMI-558 | 1210±160 | <15 | <15 ^a |
| June, 1985 | 814 | 1310±120 | <15 | <15 |
| July, 1985 | 1073,4 | 1370±110 | <15 | <15 |
| August, 1985 | 1290 | 1390±180 | <15 | <15 |
| September, 1985 | 1588 | <u>1290±110</u> | <u><15</u> | <u><15</u> |
| Annual Mean ± s.d. | | 1310±70 | <15 | <15 |
| <u>D-101</u> | | | | |
| May, 1985 | DMI-559 | 1730±110 | <15 | <15 ^a |
| June, 1985 | 815 | 1700±170 | <15 | <15 |
| July, 1985 | 1075 | 1700±170 | <15 | <15 |
| August, 1985 | 1291,2 | 1640±120 | <15 | <15 |
| September, 1985 | 1589 | <u>1920±60</u> | <u><15</u> | <u><15</u> |
| Annual Mean ± s.d. | | 1740±110 | <15 | <15 |

^a Ba-La-140 minimum sensitivity is at time of counting.

Table 24. (continued)

| Location and Date Collected | Lab Code | Activity (pCi/l) | | |
|--------------------------------|-------------|------------------|--------|------------------------|
| | | K-40 | Cs-137 | Ba-La-140 ^a |
| <u>D-106</u> | | | | |
| May, 1985 | DMI-562 | 1230±80 | <15 | <15 ^a |
| June, 1985 | 818 | 1330±160 | <15 | <15 |
| July, 1985 | 1078 | 1230±80 | <15 | <15 |
| August, 1985 | 1295 | 1360±40 | <15 | <15 |
| September, 1985 | 1592 | <u>1140±110</u> | <15 | <15 |
| Annual Mean ± s.d. | | 1260±90 | <15 | <15 |
| <u>Control</u> | | | | |
| <u>D-102</u> | | | | |
| May, 1985 | DMI-560 | 1360±180 | <15 | <15 ^a |
| June, 1985 | 816 | 1360±60 | <15 | <15 |
| July, 1985 | 1076 | 1310±150 | <15 | <15 |
| August, 1985 | 1293 | 1320±30 | <15 | <15 |
| September, 1985 | 1590 | <u>1120±90</u> | <15 | <15 |
| Annual Mean ± s.d. | | 1290±100 | <15 | <15 |
| <u>D-105</u> | | | | |
| May, 1985 | DMI-561 | 1370±200 | <15 | <15 ^a |
| June, 1985 | 817 | 1390±130 | <15 | <15 |
| July, 1985 | 1077 | 1280±140 | <15 | <15 |
| August, 1985 | 1294 | 1390±170 | <15 | <15 |
| September, 1985 | 1591 | <u>1250±130</u> | <15 | <15 |
| Annual Mean ± s.d. | | 1340±70 | <15 | <15 |

^a Ba-La-140 minimum sensitivity is at time of counting.

Table 25. Milk samples collected during the grazing season, analysis for strontium-89, strontium-90, and elemental calcium.
Collection: Monthly composites, May through September.

| Location and Date Collected | Lab Code | Calcium g/l | Activity (pCi/l) | |
|-----------------------------|-----------|-------------|------------------|----------------|
| | | | Sr-89 | Sr-90 |
| <u>Indicator</u> | | | | |
| <u>D-63</u> | | | | |
| May, 1985 | DMI-553 | 0.84 | <10 | 2.2±0.7 |
| June, 1985 | 810 | 1.07 | <10 | 2.0±0.5 |
| July, 1985 | 1069 | 0.71 | <10 | 1.9±0.6 |
| August, 1985 | 1286 | 0.70 | <10 | 2.2±0.5 |
| September, 1985 | 1583 | <u>0.92</u> | <u><10</u> | <u>1.6±0.4</u> |
| Annual Mean ± s.d. | | 0.85 | <10 | 2.0±0.2 |
| | | | | |
| <u>D-72</u> | | | | |
| May, 1985 | DMI-554 | 1.00 | <10 | 1.6±0.6 |
| June, 1985 | 811 | 1.00 | <10 | 2.3±0.6 |
| July, 1985 | 1070 | 0.78 | <10 | 1.7±0.5 |
| August, 1985 | 1287 | 0.68 | <10 | 1.8±0.6 |
| September, 1985 | 1584,5 | <u>0.73</u> | <u><10</u> | <u>1.6±0.3</u> |
| Annual Mean ± s.d. | | 0.84 | <10 | 1.8±0.3 |
| | | | | |
| <u>D-93</u> | | | | |
| May, 1985 | DMI-555,6 | 0.74 | <10 | 5.2±0.6 |
| June, 1985 | 812 | 0.84 | <10 | 5.0±0.8 |
| July, 1985 | 1071 | 0.76 | <10 | 5.3±0.8 |
| August, 1985 | 1288 | 0.85 | <10 | 5.6±0.8 |
| September, 1985 | 1586 | <u>0.68</u> | <u><10</u> | <u>6.2±1.0</u> |
| Annual Mean ± s.d. | | 0.77 | <10 | 5.5±0.5 |

Table 25. (continued)

| Location and Date Collected | Lab Code | Calcium g/l | Activity (pCi/l) | |
|--------------------------------|-------------|----------------|------------------|----------------|
| | | | Sr-89 | Sr-90 |
| <u>D-94</u> | | | | |
| May, 1985 | DMI-557 | 0.76 | <10 | 3.0±0.7 |
| June, 1985 | 813 | 1.18 | <10 | 3.3±0.7 |
| July, 1985 | 1072 | 0.76 | <10 | 3.9±0.8 |
| August, 1985 | 1289 | 0.65 | <10 | 2.3±0.6 |
| September, 1985 | 1587 | <u>0.72</u> | <u><10</u> | <u>3.6±0.7</u> |
| Annual Mean ± s.d. | | 0.81 | <10 | 3.2±0.6 |
| <u>D-96</u> | | | | |
| May, 1985 | DMI-558 | 0.88 | <10 | 2.0±0.6 |
| June, 1985 | 814 | 1.15 | <10 | 2.5±0.6 |
| July, 1985 | 1073,4 | 0.76 | <10 | 2.2±0.4 |
| August, 1985 | 1290 | 0.68 | <10 | 1.2±0.5 |
| September, 1985 | 1588 | <u>0.79</u> | <u><10</u> | <u>1.4±0.5</u> |
| Annual Mean ± s.d. | | 0.85 | <10 | 1.9±0.5 |
| <u>D-101</u> | | | | |
| May, 1985 | DMI-559 | 1.20 | <10 | 2.7±0.6 |
| June, 1985 | 815 | 0.80 | <10 | 2.8±0.8 |
| July, 1985 | 1075 | 0.76 | <10 | 2.1±0.5 |
| August, 1985 | 1291,2 | 0.62 | <10 | 1.8±0.4 |
| September, 1985 | 1589 | <u>0.83</u> | <u><10</u> | <u>2.1±0.5</u> |
| Annual Mean ± s.d. | | 0.84 | <10 | 2.3±0.4 |

Table 25. (continued)

| Location and Date Collected | Lab Code | Calcium g/l | Activity (pCi/l) | |
|--------------------------------|-------------|----------------|------------------|---------|
| | | | Sr-89 | Sr-90 |
| <u>D-106</u> | | | | |
| May, 1985 | DMI-562 | 1.00 | <10 | 1.8±0.6 |
| June, 1985 | 818 | 1.22 | <10 | 2.2±0.6 |
| July, 1985 | 1078 | 0.78 | <10 | 1.9±0.5 |
| August, 1985 | 1295 | 0.87 | <10 | 3.9±0.7 |
| September, 1985 | 1592 | 0.90 | <10 | 2.4±0.6 |
| Annual Mean ± s.d. | | 0.95 | <10 | 2.4±0.8 |
| <u>Control</u> | | | | |
| <u>D-102</u> | | | | |
| May, 1985 | DMI-560 | 0.82 | <10 | 2.0±0.5 |
| June, 1985 | 816 | 1.25 | <10 | 2.1±0.7 |
| July, 1985 | 1076 | 0.74 | <10 | 1.8±0.5 |
| August, 1985 | 1293 | 0.66 | <10 | 1.4±0.5 |
| September, 1985 | 1590 | 0.76 | <10 | 1.8±0.5 |
| Annual Mean ± s.d. | | 0.85 | <10 | 1.8±0.3 |
| <u>D-105</u> | | | | |
| May, 1985 | DMI-561 | 1.08 | <10 | 2.2±0.5 |
| June, 1985 | 817 | 0.83 | <10 | 2.9±0.7 |
| July, 1985 | 1077 | 0.73 | <10 | 2.3±0.5 |
| August, 1985 | 1294 | 0.83 | <10 | 2.3±0.6 |
| September, 1985 | 1591 | 0.87 | <10 | 2.2±0.6 |
| Annual Mean ± s.d. | | 0.87 | <10 | 2.4±0.3 |

Table 26. Ground water samples, analysis for gross beta. Collection: Monthly.

| Location and Date Collected | Lab Code | Gross Beta (pCi/l) | Location and Date Collected | Lab Code | Gross Beta (pCi/l) |
|-----------------------------|----------|--------------------|------------------------------------|-----------|----------------------|
| <u>D-53</u> | | | <u>D-54</u> | | |
| Treated Municipal Water | | | Inlet to Municipal Water Treatment | | |
| 01-85 | DWW-360 | 2.2±0.6 | 01-85 | DWW-361,2 | 2.8±0.8 |
| 02-85 | 754 | 2.0±0.6 | 02-85 | 755,6 | 3.0±0.5 ^a |
| 03-85 | 1174 | 2.2±0.5 | 03-85 | 1175 | 3.4±1.3 |
| 04-85 | 1552 | 1.9±0.5 | 04-85 | 1553 | 3.2±1.0 |
| 05-85 | 2017 | 2.2±0.5 | 05-85 | 2018 | 3.2±1.0 |
| 06-85 | 2310 | 2.4±0.6 | 06-85 | 2311 | 1.9±0.7 |
| 07-85 | 2908 | 2.2±0.6 | 07-85 | 2909 | 3.0±1.0 |
| 08-85 | 3431 | 2.5±0.6 | 08-85 | 3432 | 2.5±1.0 |
| 09-85 | 3612 | 2.5±0.5 | 09-85 | 3613 | 3.1±1.0 |
| 10-85 | 4085 | 3.1±0.6 | 10-85 | 4086 | 3.8±1.1 |
| 11-85 | 4387 | 2.6±0.4 | 11-85 | 4388 | 3.5±0.7 |
| 12-85 | 4918 | <u>2.6±0.6</u> | 12-85 | 4919 | <u>3.0±0.7</u> |
| Annual Mean ± s.d. | | 2.4±0.3 | | | 3.0±0.5 |
| <u>D-55</u> | | | <u>D-57</u> | | |
| On-Site Well | | | Bull | | |
| 01-28-85 | DWW-363 | <1.1 | 01-28-85 | DWW-364 | 2.5±0.9 |
| 02-25-85 | 615 | <1.1 | 02-25-85 | 616 | 1.9±0.8 |
| 03-26-85 | 1176 | <1.3 | 03-26-85 | 1177 | 2.4±1.0 |
| 04-29-85 | 1554 | <1.1 | 04-29-85 | 1555 | 1.1±0.7 |
| 05-29-85 | 1880 | <0.8 | 05-29-85 | 1881 | 1.9±0.7 |
| 06-24-85 | 2241 | <0.8 | 06-24-85 | 2242,3 | 1.5±0.4 |
| 07-31-85 | 2910 | <0.9 | 07-31-85 | 2911 | 1.1±0.6 |
| 08-26-85 | 3115 | <0.6 | 08-26-85 | 3116 | 1.6±0.5 |
| 09-27-85 | 3614,5 | <0.9 | 09-27-85 | 3616 | 1.6±0.7 |
| 10-30-85 | 4080 | <1.3 | 10-30-85 | 4081 | 2.2±0.8 |
| 11-25-85 | 4383 | <0.6 | 11-25-85 | 4384 | 1.1±0.5 |
| 12-31-85 | 4920 | <u><0.6</u> | 12-31-85 | 4921 | <u><0.9</u> |
| Annual Mean ± s.d. | | <1.3 | | | 1.7±0.5 |

^a Sample was recounted due to equipment malfunction.

Table 26. (continued)

| Location and Date Collected | Lab Code | Gross Beta (pCi/l) | Location and Date Collected | Lab Code | Gross Beta (pCi/l) |
|-----------------------------|-------------------|-----------------------|-----------------------------|-----------------------|-----------------------|
| <u>D-58</u> | | | <u>D-59</u> | | |
| Frantz Farm | | | Frantz Cottage | | |
| 01-28-85 | DWW-360 | 8.8±1.2 | 01-28-85 | ND ^a | ND ^a |
| 02-25-85 | 617 | 10.3±1.2 ^c | 02-25-85 | ND ^a | ND ^a |
| 03-26-85 | 1178 ^b | 3.4±0.6 | 03-26-85 | DWW-1179 ^b | 12.8±1.0 ^d |
| 04-29-85 | 1556 ^b | 12.4±1.0 ^e | 04-29-85 | 1557 ^b | 3.8±0.9 |
| 05-29-85 | 1882 | 7.6±1.1 | 05-29-85 | 1883 | 4.0±0.9 |
| 06-24-85 | 2244 | 8.2±1.2 | 06-24-85 | 2245 | 3.9±0.6 |
| 07-31-85 | 2912 | 6.8±1.1 | 07-31-85 | 2913 | 3.6±0.9 |
| 08-26-85 | 3117 | 8.1±0.8 | 08-26-85 | 3118 | 4.1±0.6 |
| 09-27-85 | 3617 | <1.2 | 09-27-85 | 3618 | 7.5±1.1 |
| 10-30-85 | 4082 | 8.6±1.2 | 10-28-85 | 4083 | 4.3±1.0 |
| 11-25-85 | 4385 | 3.9±0.6 | 11-25-85 | ND ^f | ND ^f |
| 12-31-85 | 4922 | 2.0±0.8 | 12-31-85 | ND ^f | ND ^f |
| Annual Mean ± s.d. | | 7.3±3.1 | | | 5.5±3.2 |
| | | | | | |
| <u>D-60</u> | | | | | |
| Comp Farm | | | | | |
| 01-28-85 | DWW-366 | 1.1±0.5 | | | |
| 02-25-85 | 618 | 1.4±0.6 | | | |
| 03-26-85 | 1180 | <1.1 | | | |
| 04-29-85 | 1558 | <1.0 | | | |
| 05-29-85 | 1884 | 1.0±0.4 | | | |
| 06-24-85 | 2246 | 0.8±0.5 | | | |
| 07-31-85 | 2914 | 2.1±0.6 | | | |
| 08-26-85 | 3119 | 1.4±0.3 | | | |
| 09-27-85 | 3619 | 2.7±0.6 | | | |
| 10-30-85 | 4084 | <0.8 | | | |
| 11-25-85 | 4386 | 0.9±0.3 | | | |
| 12-31-85 | 4923 | <0.6 | | | |
| Annual Mean ± s.d. | | 1.4±0.6 | | | |

^a ND = No data; sample not received because the pump was broken.

^b Samples were reanalyzed to confirm result. Entry is an average of the two results.

^c Sample was not gamma scanned because it was used up in a previous analysis.

^d Samples were analyzed for gamma isotopic in accordance with specifications. LLDs: Mn-54: <36; Cs-134: <29; Cs-137: <27; Co-58: <147; Co-60: <26, K-40 (by flame photometry): 5.87. Elevated LLDs due to low sample volume (60 ml).

^e Sample was analyzed for gamma isotopic in accordance with specifications. LLDs: Mn-54: <7; Cs-134: <5; Cs-137: <5; Co-58: <20; Co-60: <6; K-40 (by flame photometry): 5.34.

^f ND = No data; pump was frozen.

Table 27. Ground water samples, quarterly composites of monthly samples, analysis for strontium-89, strontium-90, and tritium.

| Location and Date Collected | Lab Code | Activity (pCi/l) | | |
|---------------------------------------|-------------|------------------|-------|------|
| | | Sr-89 | Sr-90 | H-3 |
| <u>D-53</u> | | | | |
| Treated Municipal Water | | | | |
| 1st Q, 1985 | DWW-944 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2532,3 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3668 | <10 | <2 | <330 |
| 4th Q, 1985 | 4809 | <10 | <2 | <330 |
| Annual Mean ± s.d. | | <10 | <2 | <330 |
| <u>D-54</u> | | | | |
| Inlet to Municipal Water Treatment | | | | |
| 1st Q, 1985 | DWW-945 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2534 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3669 | <10 | <2 | <330 |
| 4th Q, 1985 | 4810 | <10 | <2 | <330 |
| Annual Mean ± s.d. | | <10 | <2 | <330 |
| <u>D-55</u> | | | | |
| On-site Well | | | | |
| 1st Q, 1985 | DWW-946 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2535 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3670,1 | <10 | <2 | <330 |
| 4th Q, 1985 | 4811,2 | <10 | <2 | <330 |
| Annual Mean ± s.d. | | <10 | <2 | <330 |
| <u>D-57</u> | | | | |
| Bull Farm | | | | |
| 1st Q, 1985 | DWW-947 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2536 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3672 | <10 | <2 | <330 |
| 4th Q, 1985 | 4813 | <10 | <2 | <330 |
| Annual Mean ± s.d. | | <10 | <2 | <330 |

Table 27. (continued)

| Location and Date Collected | Lab Code | Activity (pCi/l) | | |
|--------------------------------|-------------|------------------|-------|------|
| | | Sr-89 | Sr-90 | H-3 |
| <u>D-58</u> | | | | |
| Frantz Farm | | | | |
| 1st Q, 1985 | DWW-948 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2537 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3673 | <10 | <2 | <330 |
| 4th Q, 1985 | 4814 | <10 | <2 | <330 |
| Annual Mean \pm s.d. | | <10 | <2 | <330 |
| <u>D-59</u> | | | | |
| Frantz Cottage | | | | |
| 1st Q, 1985 | DWW-949,50 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2538 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3674 | <10 | <2 | <330 |
| 4th Q, 1985 | 4815 | <10 | <2 | <330 |
| Annual Mean \pm s.d. | | <10 | <2 | <330 |
| <u>D-60</u> | | | | |
| Comp Farm | | | | |
| 1st Q, 1985 | DWW-951 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2539 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3675 | <10 | <2 | <330 |
| 4th Q, 1985 | 4816 | <10 | <2 | <330 |
| Annual Mean \pm s.d. | | <10 | <2 | <330 |

Table 28. Vegetation samples (broad leaf), analysis for iodine-131.
Collection: Annually.

| Location | Sample Type | Date Collected | Lab Code | Activity (pCi/g wet) I-131 |
|------------------|-------------|----------------|-----------|-------------------------------|
| <u>Indicator</u> | | | | |
| D-57 | Cabbage | 07-23-85 | DVe-651 | <0.011 |
| D-58 | Cabbage | 07-23-85 | DVe-652 | <0.019 |
| D-63 | Cabbage | 07-23-85 | DVe-653 | <0.019 |
| D-72 | Cabbage | 07-23-85 | DVe-654 | <0.013 |
| D-93 | Lettuce | 07-23-85 | DVe-655,6 | <0.012 |
| D-94 | Lettuce | 07-23-85 | DVe-657 | <0.016 |
| D-96 | Cabbage | 07-23-85 | DVe-658 | <0.017 |
| D-101 | Cabbage | 07-23-85 | DVe-659 | <0.015 |
| D-106 | Cabbage | 07-23-85 | DVe-662 | <0.013 |
| <u>Control</u> | | | | |
| D-102 | Cabbage | 07-23-85 | DVe-660 | <0.041 |
| D-105 | Cabbage | 07-23-85 | DVe-661 | <0.009 |

Table 29. Vegetation samples analysis for strontium-90 and gamma-emitting isotopes. Collection: Annually.

| Sample Description and Activity (pCi/g wet) | | | | |
|---|-------------|---------------|-------------|---------------|
| | Indicator | | | |
| Location | D-57 | D-63 | D-63 | D-72 |
| Date Collected | 07-23-85 | 09-03-85 | 09-03-85 | 09-03-85 |
| Type | Oats | Hay | Oats | Hay |
| Lab Code | DVE-650 | DVE-752 | DVE-759,60 | DVE-753 |
| Sr-90 | 0.012±0.004 | 0.055±0.006 | 0.012±0.002 | 0.16±0.03 |
| K-40 | 3.92±0.52 | 12.70±1.25 | 3.88±0.17 | 13.90±1.14 |
| Mn-54 | <0.032 | <0.063 | <0.0098 | <0.090 |
| Co-58 | <0.035 | <0.072 | <0.0095 | <0.10 |
| Co-60 | <0.037 | <0.054 | <0.0094 | <0.077 |
| Nb-95 | <0.038 | <0.093 | <0.0092 | <0.12 |
| Zr-95 | <0.059 | <0.12 | <0.016 | <0.18 |
| Ru-103 | <0.027 | <0.072 | <0.0086 | <0.12 |
| Ru-106 | <0.26 | <0.50 | <0.077 | <0.67 |
| Cs-134 | <0.029 | <0.049 | <0.0084 | <0.076 |
| Cs-137 | <0.030 | <0.049 | <0.0092 | <0.081 |
| Ce-141 | <0.037 | <0.099 | <0.012 | <0.16 |
| Ce-144 | <0.15 | <0.27 | <0.048 | <0.40 |
| Location | D-93 | D-93 | D-94 | D-94 |
| Date Collected | 09-03-85 | 09-03-85 | 09-03-85 | 09-03-85 |
| Type | Hay | Oats | Hay | Oats |
| Lab Code | DVE-754 | DVE-761 | DVE-755 | DVE-762 |
| Sr-90 | 0.024±0.007 | 0.0086±0.0026 | 0.40±0.03 | 0.0080±0.0028 |
| K-40 | 9.55±0.94 | 4.00±0.11 | 11.20±1.01 | 3.19±0.17 |
| Mn-54 | <0.042 | <0.011 | <0.082 | <0.0063 |
| Co-58 | <0.048 | <0.012 | <0.093 | <0.0065 |
| Co-60 | <0.041 | <0.014 | <0.078 | <0.0065 |
| Nb-95 | <0.070 | <0.012 | <0.12 | <0.0063 |
| Zr-95 | <0.092 | <0.021 | <0.16 | <0.011 |
| Ru-103 | <0.061 | <0.0088 | <0.099 | <0.0052 |
| Ru-106 | <0.41 | <0.089 | <0.66 | <0.048 |
| Cs-134 | <0.038 | <0.013 | <0.077 | <0.0051 |
| Cs-137 | <0.042 | <0.012 | <0.074 | <0.0060 |
| Ce-141 | <0.12 | <0.0092 | <0.16 | <0.0067 |
| Ce-144 | <0.33 | <0.036 | <0.39 | <0.028 |

Table 29. (continued)

| Sample Description and Activity (pCi/g wet) | | | | |
|---|---------------|-------------|-------------|-----------|
| Location | D-96 | D-96 | D-96 | D-106 |
| Date Collected | 09-03-85 | 09-03-85 | 09-03-85 | 09-03-85 |
| Type | Hay | Oats | Oats | Hay |
| Lab Code | DVE-756 | DVE-763 | DVE-765 | DVE-758 |
| Sr-90 | 0.19±0.02 | 0.015±0.004 | 0.018±0.005 | 0.44±0.03 |
| K-40 | 16.40±1.36 | 3.59±0.093 | 3.68±0.19 | 9.94±0.70 |
| Mn-54 | <0.051 | <0.0075 | <0.019 | <0.068 |
| Co-58 | <0.054 | <0.0080 | <0.020 | <0.083 |
| Co-60 | <0.046 | <0.0082 | <0.022 | <0.058 |
| Nb-95 | <0.081 | <0.0074 | <0.022 | <0.10 |
| Zr-95 | <0.12 | <0.014 | <0.038 | <0.12 |
| Ru-103 | <0.072 | <0.0075 | <0.015 | <0.095 |
| Ru-106 | <0.42 | <0.067 | <0.16 | <0.45 |
| Cs-134 | <0.050 | <0.0091 | <0.020 | <0.069 |
| Cs-137 | <0.048 | <0.0085 | <0.022 | <0.067 |
| Ce-141 | <0.11 | <0.014 | <0.018 | <0.14 |
| Ce-144 | <0.32 | <0.064 | <0.071 | <0.35 |
| Location | D-57 | D-58 | D-63 | D-72 |
| Date Collected | 11-05-85 | 11-05-85 | 11-05-85 | 11-05-85 |
| Type | Corn | Corn | Corn | Corn |
| Lab Code | DVE-856 | DVE-857 | DVE-847 | DVE-848,9 |
| Sr-90 | 0.0066±0.0017 | <0.0017 | <0.0019 | <0.0020 |
| K-40 | 2.44±0.31 | 2.70±0.27 | 3.21±0.34 | 2.47±0.12 |
| Mn-54 | <0.034 | <0.025 | <0.027 | <0.0097 |
| Co-58 | <0.035 | <0.033 | <0.034 | <0.010 |
| Co-60 | <0.038 | <0.031 | <0.017 | <0.014 |
| Nb-95 | <0.044 | <0.032 | <0.031 | <0.010 |
| Zr-95 | <0.062 | <0.047 | <0.057 | <0.019 |
| Ru-103 | <0.038 | <0.029 | <0.036 | <0.011 |
| Ru-106 | <0.34 | <0.21 | <0.26 | <0.082 |
| Cs-134 | <0.035 | <0.023 | <0.044 | <0.010 |
| Cs-137 | <0.025 | <0.028 | <0.024 | <0.0099 |
| Ce-141 | <0.051 | <0.044 | <0.050 | <0.016 |
| Ce-144 | <0.22 | <0.17 | <0.034 | <0.064 |

Table 29. (continued)

| Sample Description and Activity (pCi/g wet) | | | | |
|---|---------------|-------------|---------------|-------------|
| Location | D-93 | D-93 | D-94 | D-94 |
| Date Collected | 11-05-85 | 11-05-85 | 11-05-85 | 11-05-85 |
| Type | Corn | Soybeans | Corn | Soybeans |
| Lab Code | DVE-850 | DVE-858 | DVE-851 | DVE-859,60 |
| Sr-90 | 0.0032±0.0014 | 0.027±0.007 | 0.014±0.003 | 0.022±0.008 |
| K-40 | 2.51±0.44 | 12.70±0.80 | 2.54±0.22 | 12.80±0.35 |
| Mn-54 | <0.031 | <0.038 | <0.024 | <0.032 |
| Co-58 | <0.029 | <0.036 | <0.023 | <0.034 |
| Co-60 | <0.030 | <0.038 | <0.023 | <0.033 |
| Nb-95 | <0.034 | <0.038 | <0.026 | <0.031 |
| Zr-95 | <0.052 | <0.064 | <0.037 | <0.054 |
| Ru-103 | <0.028 | <0.032 | <0.025 | <0.027 |
| Ru-106 | <0.28 | <0.26 | <0.21 | <0.028 |
| Cs-134 | <0.030 | <0.029 | <0.031 | <0.037 |
| Cs-137 | <0.031 | <0.031 | <0.027 | <0.030 |
| Ce-141 | <0.041 | <0.040 | <0.040 | <0.026 |
| Ce-144 | <0.16 | <0.15 | <0.15 | <0.010 |
| Location | D-96 | D-96 | D-106 | |
| Date Collected | 11-05-85 | 11-05-85 | 11-05-85 | |
| Type | Corn | Soybeans | Corn | |
| Lab Code | DVE-852 | DVE-861 | DVE-855 | |
| Sr-90 | <0.0010 | 0.022±0.007 | 0.0022±0.0013 | |
| K-40 | 2.52±0.13 | 12.08±0.54 | 3.42±0.29 | |
| Mn-54 | <0.014 | <0.044 | <0.032 | |
| Co-58 | <0.013 | <0.045 | <0.035 | |
| Co-60 | <0.010 | <0.045 | <0.036 | |
| Nb-95 | <0.014 | <0.043 | <0.037 | |
| Zr-95 | <0.023 | <0.064 | <0.055 | |
| Ru-103 | <0.016 | <0.031 | <0.025 | |
| Ru-106 | <0.11 | <0.32 | <0.28 | |
| Cs-134 | <0.013 | <0.046 | <0.037 | |
| Cs-137 | <0.014 | <0.039 | <0.030 | |
| Ce-141 | <0.028 | <0.032 | <0.028 | |
| Ce-144 | <0.11 | <0.12 | <0.11 | |

Table 29. (continued)

| Sample Description and Activity (pCi/g wet) | | | | |
|---|-------------|-------------|-----------|-----------|
| | Control | | | |
| Location | D-105 | D-105 | D-102 | D-105 |
| Date Collected | 09-03-85 | 09-03-85 | 11-05-85 | 11-05-85 |
| Type | Hay | Oats | Corn | Corn |
| Lab Code | DVE-757 | DVE-764 | DVE-853 | DVE-854 |
| Sr-90 | 0.17±0.01 | 0.010±0.004 | <0.0018 | <0.0019 |
| K-40 | 16.54±0.76 | 2.48±0.18 | 2.61±0.26 | 3.87±0.41 |
| Mn-54 | <0.065 | <0.019 | <0.014 | <0.037 |
| Co-58 | <0.088 | <0.019 | <0.014 | <0.045 |
| Co-60 | <0.072 | <0.022 | <0.016 | <0.048 |
| Nb-95 | <0.089 | <0.021 | <0.015 | <0.035 |
| Zr-95 | <0.14 | <0.032 | <0.026 | <0.066 |
| Ru-103 | <0.087 | <0.019 | <0.012 | <0.034 |
| Ru-106 | <0.46 | <0.15 | <0.11 | <0.30 |
| Cs-134 | <0.069 | <0.020 | <0.011 | <0.037 |
| Cs-137 | <0.064 | <0.022 | <0.012 | <0.037 |
| Ce-141 | <0.088 | <0.026 | <0.015 | <0.032 |
| Ce-144 | <0.21 | <0.11 | <0.053 | <0.12 |
| Location | D-105 | | | |
| Date Collected | 11-05-85 | | | |
| Type | Soybeans | | | |
| Lab Code | DVE-862 | | | |
| Sr-90 | 0.024±0.007 | | | |
| K-40 | 12.93±0.51 | | | |
| Mn-54 | <0.039 | | | |
| Co-58 | <0.036 | | | |
| Co-60 | <0.037 | | | |
| Nb-95 | <0.038 | | | |
| Zr-95 | <0.061 | | | |
| Ru-103 | <0.036 | | | |
| Ru-106 | <0.029 | | | |
| Cs-134 | <0.034 | | | |
| Cs-137 | <0.040 | | | |
| Ce-141 | <0.044 | | | |
| Ce-144 | <0.19 | | | |

Table 30. Meat and poultry samples, analysis of edible portion for gamma-emitting isotopes. Collection: Annually.

| Sample Description and Concentration (pCi/g wet) | | | | |
|--|--------------------------|-----------|---------------------------|-----------|
| Location | On Site | D-94 | D-102 | |
| Date Collected | 01-07-85 | 08-13-85 | 08-13-85 | |
| Type | Beef | Chicken | Chicken | |
| Lab Code | DMe-65 | DMe-68,69 | DMe-70 | |
| K-40 | 2.17±0.25 | 3.13±0.16 | 2.60±0.16 | |
| Mn-54 | <0.013 | <0.021 | <0.019 | |
| Co-58 | <0.018 | <0.029 | <0.028 | |
| Co-60 | <0.013 | <0.023 | <0.020 | |
| Nb-95 | <0.030 | <0.023 | <0.032 | |
| Zr-95 | <0.035 | <0.043 | <0.052 | |
| Ru-103 | <0.022 | <0.026 | <0.036 | |
| Ru-106 | <0.10 | <0.14 | <0.15 | |
| Cs-134 | <0.011 | <0.021 | <0.022 | |
| Cs-137 | <0.014 | <0.015 | <0.018 | |
| Ce-141 | <0.039 | <0.039 | <0.064 | |
| Ce-144 | <0.084 | <0.062 | <0.10 | |
| Location | Within 10 miles of Plant | | Outside 10 miles of Plant | |
| Date Collected | 09-20-85 | 09-17-85 | 09-24-85 | 09-13-85 |
| Type | Beef | Pork | Pork | Beef |
| Lab Code | DMe-76 | DMe-78 | DMe-75 | DMe-77 |
| K-40 | 2.15±0.15 | 2.89±0.29 | 2.13±0.31 | 2.49±0.08 |
| Mn-54 | <0.008 | <0.022 | <0.030 | <0.010 |
| Co-58 | <0.010 | <0.030 | <0.031 | <0.015 |
| Co-60 | <0.008 | <0.020 | <0.025 | <0.010 |
| Nb-95 | <0.016 | <0.048 | <0.051 | <0.016 |
| Zr-95 | <0.020 | <0.058 | <0.057 | <0.027 |
| Ru-103 | <0.013 | <0.038 | <0.039 | <0.022 |
| Ru-106 | <0.070 | <0.19 | <0.20 | <0.085 |
| Cs-134 | <0.006 | <0.019 | <0.023 | <0.011 |
| Cs-137 | <0.007 | <0.020 | <0.023 | <0.010 |
| Ce-141 | <0.027 | <0.070 | <0.062 | <0.042 |
| Ce-144 | <0.054 | <0.14 | <0.13 | <0.072 |

Table 31. Wildlife samples, analysis for gamma-emitting isotopes.
Collection: Annually.

| Sample Description and Activity (pCi/g wet) | | |
|---|-------------------------|-------------------------|
| Location | 4.5 miles SE of site | 3.5 miles NE of site |
| Date Collected | 05-14-85 | 08-13-85 |
| Type | Squirrel | Rabbit |
| Lab Code | DWL-37 | DWL-40 |
| K-40 | 5.64±0.60 | 3.25±0.17 |
| Mn-54 | <0.052 | <0.024 |
| Co-58 | <0.12 | <0.028 |
| Co-60 | <0.046 | <0.022 |
| Nb-95 | <0.34 | <0.023 |
| Zr-95 | <0.23 | <0.046 |
| Ru-103 | <0.26 | <0.021 |
| Ru-106 | <0.49 | <0.19 |
| Cs-134 | <0.045 | <0.027 |
| Cs-137 | <0.045 | <0.022 |
| Ce-141 | <0.57 | <0.020 |
| Ce-144 | <0.35 | <0.062 |

Table 32. Soil samples, analysis for strontium-90 and gamma-emitting isotopes. Collection: Tri-annually.

| Sample Description and Activity (pCi/g dry) | | | |
|---|-----------------------------|-----------------------------|-----------------------------|
| Location Date Collected Lab Code | Indicator | | |
| | D-15 05-08-85 DSO-333 | D-15 07-23-85 DSO-366 | D-15 09-18-85 DSO-398 |
| Sr-90 | 0.11±0.01 | <0.03 | 0.013±0.006 |
| K-40 | 13.10±0.68 | 11.77±0.85 | 9.49±0.36 |
| Mn-54 | <0.027 | <0.10 | <0.033 |
| Co-58 | <0.055 | <0.13 | <0.052 |
| Co-60 | <0.025 | <0.10 | <0.034 |
| Nb-95 | <0.14 | <0.15 | <0.061 |
| Zr-95 | <0.11 | <0.27 | <0.10 |
| Ru-103 | <0.082 | <0.16 | <0.055 |
| Ru-106 | <0.20 | <0.89 | <0.27 |
| Cs-134 | <0.034 | <0.10 | <0.041 |
| Cs-137 | 0.067±0.02 | <0.096 | <0.046 |
| Ce-141 | <0.18 | <0.28 | <0.10 |
| Ce-144 | <0.14 | <0.57 | <0.15 |
| | | | |
| Location Date Collected Lab Code | D-16 05-08-85 DSO-334 | D-16 07-23-85 DSO-367 | D-16 09-18-85 DSO-399 |
| Sr-90 | 0.12±0.02 | 0.04±0.01 | 0.03±0.01 |
| K-40 | 8.72±0.19 | 7.72±0.66 | 8.61±0.24 |
| Mn-54 | <0.020 | <0.071 | <0.023 |
| Co-58 | <0.035 | <0.080 | <0.039 |
| Co-60 | <0.015 | <0.062 | <0.024 |
| Nb-95 | <0.044 | <0.091 | <0.042 |
| Zr-95 | <0.072 | <0.15 | <0.066 |
| Ru-103 | <0.066 | <0.11 | <0.043 |
| Ru-106 | <0.16 | <0.53 | <0.19 |
| Cs-134 | <0.021 | <0.075 | <0.029 |
| Cs-137 | 0.35±0.01 | <0.092 | 0.075±0.01 |
| Ce-141 | <0.15 | <0.17 | <0.071 |
| Ce-144 | <0.12 | <0.36 | <0.10 |

Table 32. (continued)

| Sample Description and Activity (pCi/g dry) | | | |
|---|-----------------------------|-----------------------------|-----------------------------|
| Location Date Collected Lab Code | Indicator | | |
| | D-57 05-08-85 DSO-335 | D-57 07-23-85 DSO-368 | D-57 09-18-85 DSO-400 |
| Sr-90 | 0.12±0.02 | 0.11±0.02 | 0.12±0.02 |
| K-40 | 12.60±0.63 | 9.43±0.95 | 11.71±0.50 |
| Mn-54 | <0.026 | <0.098 | <0.046 |
| Co-58 | <0.057 | <0.13 | <0.064 |
| Co-60 | <0.021 | <0.093 | <0.043 |
| Nb-95 | <0.19 | <0.18 | <0.095 |
| Zr-95 | <0.12 | <0.27 | <0.15 |
| Ru-103 | <0.12 | <0.16 | <0.11 |
| Ru-106 | <0.22 | <0.83 | <0.40 |
| Cs-134 | <0.032 | <0.14 | <0.059 |
| Cs-137 | 0.25±0.02 | 0.32±0.06 | 0.41±0.04 |
| Ce-141 | <0.30 | <0.31 | <0.22 |
| Ce-144 | <0.19 | <0.59 | <0.36 |
| Location Date Collected Lab Code | D-58 05-08-85 DSO-336 | D-58 07-23-85 DSO-369 | D-58 09-18-85 DSO-401 |
| Sr-90 | 0.18±0.02 | 0.21±0.02 | 0.13±0.01 |
| K-40 | 11.20±0.50 | 14.10±1.34 | 11.80±0.46 |
| Mn-54 | <0.027 | <0.071 | <0.023 |
| Co-58 | <0.054 | <0.13 | <0.033 |
| Co-60 | <0.025 | <0.066 | <0.028 |
| Nb-95 | <0.15 | <0.26 | <0.064 |
| Zr-95 | <0.11 | <0.24 | <0.070 |
| Ru-103 | <0.091 | <0.20 | <0.049 |
| Ru-106 | <0.21 | <0.64 | <0.18 |
| Cs-134 | <0.031 | <0.090 | <0.028 |
| Cs-137 | 0.44±0.03 | 0.48±0.07 | 0.52±0.02 |
| Ce-141 | <0.20 | <0.35 | <0.098 |
| Ce-144 | <0.16 | <0.42 | <0.14 |

Table 32. (continued)

| Sample Description and Activity (pCi/g dry) | | | |
|---|------------|------------|------------|
| Location | Indicator | | |
| | D-63 | D-63 | D-63 |
| Date Collected | 05-21-85 | 07-23-85 | 09-17-85 |
| Lab Code | DSO-340 | DSO-370 | DSO-389 |
| Sr-90 | 0.23±0.02 | 0.22±0.03 | 0.14±0.02 |
| K-40 | 13.40±0.75 | 16.65±0.64 | 14.10±0.80 |
| Mn-54 | <0.029 | <0.081 | <0.048 |
| Co-58 | <0.056 | <0.11 | <0.071 |
| Co-60 | <0.024 | <0.069 | <0.059 |
| Nb-95 | <0.15 | <0.12 | <0.14 |
| Zr-95 | <0.11 | <0.20 | <0.14 |
| Ru-103 | <0.10 | <0.12 | <0.10 |
| Ru-106 | <0.24 | <0.54 | <0.40 |
| Cs-134 | <0.035 | <0.093 | <0.064 |
| Cs-137 | 0.52±0.03 | 0.46±0.04 | 0.56±0.05 |
| Ce-141 | <0.24 | <0.15 | <0.21 |
| Ce-144 | <0.19 | <0.25 | <0.30 |
| Location | D-72 | D-72 | D-72 |
| Date Collected | 05-08-85 | 07-23-85 | 09-18-85 |
| Lab Code | DSO-337 | DSO-371,2 | DSO-402 |
| Sr-90 | 0.08±0.01 | 0.15±0.02 | 0.10±0.01 |
| K-40 | 12.00±0.63 | 11.89±0.85 | 12.77±0.24 |
| Mn-54 | <0.024 | <0.084 | <0.025 |
| Co-58 | <0.053 | <0.11 | <0.035 |
| Co-60 | <0.022 | <0.081 | <0.021 |
| Nb-95 | <0.13 | <0.13 | <0.044 |
| Zr-95 | <0.10 | <0.24 | <0.068 |
| Ru-103 | <0.095 | <0.14 | <0.042 |
| Ru-106 | <0.20 | <0.79 | <0.19 |
| Cs-134 | <0.030 | <0.11 | <0.029 |
| Cs-137 | 0.22±0.02 | 0.23±0.04 | 0.23±0.01 |
| Ce-141 | <0.21 | <0.27 | <0.073 |
| Ce-144 | <0.18 | <0.55 | <0.11 |

Table 32. (continued)

| Sample Description and Activity (pCi/g dry) | | | |
|---|-----------|------------|------------|
| Location | Indicator | | |
| | D-93 | D-93 | D-93 |
| Date Collected | 05-21-85 | 07-23-85 | 09-17-85 |
| Lab Code | DSO-341 | DSO-373 | DSO-390 |
| Sr-90 | 0.03±0.01 | 0.13±0.02 | 0.12±0.02 |
| K-40 | 9.36±0.29 | 12.37±0.87 | 12.88±0.29 |
| Mn-54 | <0.025 | <0.101 | <0.031 |
| Co-58 | <0.051 | <0.14 | <0.041 |
| Co-60 | <0.023 | <0.084 | <0.025 |
| Nb-95 | <0.060 | <0.16 | <0.056 |
| Zr-95 | <0.10 | <0.27 | <0.089 |
| Ru-103 | <0.081 | <0.13 | <0.062 |
| Ru-106 | <0.21 | <0.75 | <0.23 |
| Cs-134 | <0.031 | <0.11 | <0.033 |
| Cs-137 | <0.023 | <0.11 | 0.28±0.02 |
| Ce-141 | <0.15 | <0.16 | <0.14 |
| Ce-144 | <0.11 | <0.33 | <0.22 |
| Location | D-94 | D-94 | D-94 |
| Date Collected | 05-21-85 | 07-23-85 | 09-17-85 |
| Lab Code | DSO-342 | DSO-374 | DSO-391 |
| Sr-90 | 0.02±0.01 | 0.12±0.02 | 0.11±0.02 |
| K-40 | 8.68±0.33 | 13.47±0.89 | 13.76±0.52 |
| Mn-54 | <0.033 | <0.11 | <0.054 |
| Co-58 | <0.050 | <0.14 | <0.077 |
| Co-60 | <0.029 | <0.092 | <0.051 |
| Nb-95 | <0.048 | <0.14 | <0.10 |
| Zr-95 | <0.089 | <0.29 | <0.16 |
| Ru-103 | <0.063 | <0.15 | <0.098 |
| Ru-106 | <0.27 | <0.87 | <0.14 |
| Cs-134 | <0.036 | <0.13 | <0.068 |
| Cs-137 | <0.031 | <0.15 | 0.28±0.03 |
| Ce-141 | <0.12 | <0.28 | <0.17 |
| Ce-144 | <0.19 | <0.59 | <0.25 |

Table 32. (continued)

| Sample Description and Activity (pCi/g dry) | | | |
|---|------------|------------|------------|
| Location | Indicator | | |
| | D-96 | D-96 | D-96 |
| Date Collected | 05-21-85 | 07-23-85 | 09-17-85 |
| Lab Code | DSO-343 | DSO-375 | DSO-392 |
| Sr-90 | 0.20±0.02 | 0.23±0.02 | 0.12±0.02 |
| K-40 | 12.85±0.28 | 17.07±1.04 | 14.20±0.69 |
| Mn-54 | <0.031 | <0.15 | <0.042 |
| Co-58 | <0.051 | <0.22 | <0.056 |
| Co-60 | <0.023 | <0.12 | <0.035 |
| Nb-95 | <0.074 | <0.24 | <0.12 |
| Zr-95 | <0.11 | <0.41 | <0.12 |
| Ru-103 | <0.096 | <0.24 | <0.084 |
| Ru-106 | <0.24 | <1.12 | <0.34 |
| Cs-134 | <0.039 | <0.15 | <0.053 |
| Cs-137 | 0.34±0.02 | 0.59±0.08 | 0.41±0.04 |
| Ce-141 | <0.24 | <0.43 | <0.17 |
| Ce-144 | <0.20 | <0.80 | <0.25 |
| Location | D-101 | D-101 | D-101 |
| Date Collected | 05-21-85 | 07-23-85 | 09-17-85 |
| Lab Code | DSO-344 | DSO-376 | DSO-393,4 |
| Sr-90 | 0.11±0.01 | 0.26±0.02 | 0.16±0.01 |
| K-40 | 9.87±0.48 | 12.60±0.39 | 10.26±0.46 |
| Mn-54 | <0.029 | <0.048 | <0.039 |
| Co-58 | <0.058 | <0.068 | <0.054 |
| Co-60 | <0.024 | <0.044 | <0.033 |
| Nb-95 | <0.15 | <0.078 | <0.075 |
| Zr-95 | <0.11 | <0.13 | <0.14 |
| Ru-103 | <0.092 | <0.070 | <0.10 |
| Ru-106 | <0.22 | <0.36 | <0.39 |
| Cs-134 | <0.034 | <0.050 | <0.058 |
| Cs-137 | 0.32±0.02 | 0.33±0.03 | 0.50±0.03 |
| Ce-141 | <0.21 | <0.093 | <0.21 |
| Ce-144 | <0.17 | <0.14 | <0.33 |

Table 32. (continued)

| Location | Sample Description and Activity (pCi/g dry) | | |
|----------------|---|------------|-----------|
| | Indicator | | |
| Date Collected | D-106 | D-106 | D-106 |
| Lab Code | 05-08-85 | 07-23-85 | 09-17-85 |
| | DSO-338,9 | DSO-379 | DSO-396 |
| Sr-90 | 0.11±0.01 | 0.15±0.02 | 0.06±0.01 |
| K-40 | 9.15±0.21 | 14.15±1.07 | 8.78±0.30 |
| Mn-54 | <0.022 | <0.12 | <0.026 |
| Co-58 | <0.041 | <0.15 | <0.042 |
| Co-60 | <0.021 | <0.093 | <0.024 |
| Nb-95 | <0.053 | <0.20 | <0.048 |
| Zr-95 | <0.079 | <0.30 | <0.084 |
| Ru-103 | <0.070 | <0.20 | <0.064 |
| Ru-106 | <0.16 | <1.03 | <0.23 |
| Cs-134 | <0.024 | <0.14 | <0.036 |
| Cs-137 | 0.23±0.01 | 0.32±0.06 | 0.17±0.02 |
| Ce-141 | <0.013 | <0.39 | <0.13 |
| Ce-144 | <0.10 | <0.65 | <0.20 |

Table 32. (continued)

| Sample Description and Activity (pCi/g dry) | | | |
|---|------------|------------|------------|
| | Control | | |
| Location | D-102 | D-102 | D-102 |
| Date Collected | 05-21-85 | 07-23-85 | 09-17-85 |
| Lab Code | DSO-345 | DSO-377 | DSO-395 |
| Sr-90 | 0.18±0.02 | 0.14±0.02 | 0.10±0.01 |
| K-40 | 11.45±0.47 | 4.87±0.58 | 9.54±0.36 |
| Mn-54 | <0.046 | <0.071 | <0.020 |
| Co-58 | <0.068 | <0.12 | <0.028 |
| Co-60 | <0.040 | <0.085 | <0.017 |
| Nb-95 | <0.093 | <0.13 | <0.052 |
| Zr-95 | <0.14 | <0.21 | <0.056 |
| Ru-103 | <0.10 | <0.17 | <0.040 |
| Ru-106 | <0.44 | <0.70 | <0.16 |
| Cs-134 | <0.059 | <0.095 | <0.024 |
| Cs-137 | 0.34±0.03 | 0.31±0.05 | 0.47±0.02 |
| Ce-141 | <0.23 | <0.30 | <0.084 |
| Ce-144 | <0.30 | <0.52 | <0.12 |
| Location | D-105 | D-105 | D-105 |
| Date Collected | 05-21-85 | 07-23-85 | 09-17-85 |
| Lab Code | DSO-346 | DSO-378 | DSO-397 |
| Sr-90 | 0.18±0.02 | 0.17±0.02 | 0.10±0.01 |
| K-40 | 12.06±0.52 | 16.21±0.64 | 14.00±0.83 |
| Mn-54 | <0.060 | <0.077 | <0.049 |
| Co-58 | <0.072 | <0.10 | <0.071 |
| Co-60 | <0.045 | <0.075 | <0.062 |
| Nb-95 | <0.11 | <0.12 | <0.14 |
| Zr-95 | <0.16 | <0.21 | <0.15 |
| Ru-103 | <0.11 | <0.11 | <0.10 |
| Ru-106 | <0.44 | <0.58 | <0.43 |
| Cs-134 | <0.063 | <0.092 | <0.068 |
| Cs-137 | 0.34±0.04 | 0.46±0.04 | 0.40±0.04 |
| Ce-141 | <0.24 | <0.15 | <0.21 |
| Ce-144 | <0.34 | <0.23 | <0.31 |

Table 33. Surface water samples, analysis for gross beta and gamma-emitting isotopes. Collection: Monthly.

| Location | Sample Description and Activity (pCi/l) | | | | |
|------------------|---|----------|----------|-----------------------|------------|
| Plant Intake | | | | | |
| <u>Indicator</u> | | | | | |
| <u>D-50</u> | Date Collected | 01-28-85 | 02-25-85 | 03-26-85 | 04-29-85 |
| | Lab Code | DSW-354 | DSW-607 | DSW-1182 | DSW-1560 |
| | Gross Beta | 5.1±0.8 | 4.2±0.7 | 5.6±0.8 | 5.4±0.8 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 05-29-85 | 06-24-85 | 07-31-85 | 08-26-85 |
| | Lab Code | DSW-1872 | DSW-2234 | DSW-2900 | DSW-1107 |
| | Gross Beta | 4.9±0.7 | 4.5±0.7 | 2.5±0.5 | 3.2±0.5 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 09-27-85 | 10-28-85 | 11-25-85 | 12-31-85 |
| | Lab Code | DSW-3605 | DSW-4072 | DSW-4375 | DSW-4925,6 |
| | Gross Beta | 3.4±0.7 | 3.0±0.7 | 10.9±2.4 ^a | 2.2±0.2 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |

^a Sample was reanalyzed to confirm result. Entry is an average of the two results. Sample was analyzed for Sr-89 and Sr-90 in accordance with specifications. Sr-89: <0.61 pCi/l; Sr-90: <0.49 pCi/l.

Table 33. (continued)

| Location | Sample Description and Activity (pCi/l) | | | | |
|------------------|---|----------|----------|------------|----------|
| Plant Discharge | | | | | |
| <u>Indicator</u> | | | | | |
| <u>D-51</u> | Date Collected | 01-28-85 | 02-25-85 | 03-26-85 | 04-29-85 |
| | Lab Code | DSW-355 | DSW-608 | DSW-1183,4 | DSW-1561 |
| | Gross Beta | 3.5±0.8 | 8.5±1.0 | 4.5±0.6 | 3.1±0.7 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 05-29-85 | 06-24-85 | 07-31-85 | 08-26-85 |
| | Lab Code | DSW-1873 | DSW-2235 | DSW-2901 | DSW-3108 |
| | Gross Beta | 3.2±0.6 | 3.0±0.6 | 2.9±0.5 | 6.2±1.7 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 09-27-85 | 10-28-85 | 11-25-85 | 12-31-85 |
| | Lab Code | DSW-3606 | DSW-4073 | DSW-4376 | DSW-4927 |
| | Gross Beta | 5.7±0.9 | 2.8±0.7 | 2.4±0.8 | 3.8±0.6 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |

Table 33. (continued)

| Location | Sample Description and Activity (pCi/l) | | | | |
|------------------------|---|----------|------------|----------|----------|
| Cedar Rapids City Park | | | | | |
| <u>Indicator</u> | | | | | |
| <u>D-52</u> | Date Collected | 01-28-85 | 02-25-85 | 03-26-85 | 04-29-85 |
| | Lab Code | DSW-356 | DSW-609,10 | DSW-1185 | DSW-1562 |
| | Gross Beta | 2.9±0.8 | 9.0±0.6 | 3.7±0.8 | 2.5±0.6 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 05-29-85 | 06-24-85 | 07-31-85 | 08-26-85 |
| | Lab Code | DSW-1873 | DSW-2236 | DSW-2902 | DSW-3109 |
| | Gross Beta | 2.9±0.6 | 3.4±0.7 | 2.8±0.6 | 2.4±0.4 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 09-27-85 | 10-28-85 | 11-25-85 | 12-31-85 |
| | Lab Code | DSW-3607 | DSW-4074 | DSW-4377 | DSW-4928 |
| | Gross Beta | 4.7±0.8 | 2.6±0.7 | 4.4±0.9 | 3.0±0.6 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |

Table 33. (continued)

| Location | Sample Description and Activity (pCi/l) | | | | |
|------------------|---|----------|------------|----------|------------|
| Pleasant Creek | | | | | |
| <u>Indicator</u> | | | | | |
| <u>D-99</u> | Date Collected | 01-28-85 | 02-25-85 | 03-26-85 | 04-29-85 |
| | Lab Code | DSW-358 | DSW-612 | DSW-1187 | DSW-1565 |
| | Gross Beta | 5.1±0.8 | 4.2±0.7 | 5.6±0.8 | 5.4±0.8 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 05-29-85 | 06-24-85 | 07-31-85 | 08-26-85 |
| | Lab Code | DSW-1876 | DSW-2238 | DSW-2904 | DSW-3111,2 |
| | Gross Beta | 4.9±0.7 | 5.4±0.8 | 5.1±0.5 | 5.1±0.4 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 09-27-85 | 10-30-85 | 11-25-85 | 12-31-85 |
| | Lab Code | DSW-3609 | DSW-4076,7 | DSW-4380 | DSW-4930 |
| | Gross Beta | 5.1±0.8 | 4.2±0.5 | 5.4±0.8 | 5.5±0.6 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |

Table 33. (continued)

| Location | Sample Description and Activity (pCi/l) | | | | |
|------------------|---|------------|----------|-----------------------|----------|
| Park Pond | | | | | |
| <u>Indicator</u> | | | | | |
| <u>D-103</u> | Date Collected | 01-28-85 | 02-25-85 | 03-26-85 | 04-29-85 |
| | Lab Code | DSW-359 | DSW-613 | DSW-1188 | DSW-1566 |
| | Gross Beta | 5.6±0.9 | 7.7±0.9 | 4.8±0.8 | 3.9±0.7 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 05-29-85 | 06-24-85 | 07-31-85 | 08-26-85 |
| | Lab Code | DSW-1877,8 | DSW-2239 | DSW-2905 | DSW-3113 |
| | Gross Beta | 3.7±0.5 | 5.9±0.7 | 4.3±0.5 | 4.4±0.5 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 09-27-85 | 10-30-85 | 11-25-85 | 12-31-85 |
| | Lab Code | DSW-3610 | DSW-4078 | DSW-4381 | DSW-4931 |
| | Gross Beta | 4.6±0.8 | 4.1±0.7 | 13.7±0.8 ^a | 2.9±0.6 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |

^a Sample was reanalyzed to confirm result. Entry is an average of the two results. Sample was analyzed for Sr-89 and Sr-90 in accordance with specifications. Sr-89: <0.57 pCi/l; Sr-90: 1.09±0.39 pCi/l.

Table 33. (continued)

| Location | Sample Description and Activity (pCi/l) | | | | |
|----------------|---|------------|----------|----------|----------|
| Lewis Access | | | | | |
| <u>Control</u> | | | | | |
| <u>D-49</u> | Date Collected | 01-28-85 | 02-25-85 | 03-26-85 | 04-29-85 |
| | Lab Code | DSW-353 | DSW-606 | DSW-1181 | DSW-1559 |
| | Gross Beta | 5.6±0.8 | 9.1±0.9 | 3.3±0.8 | 3.0±0.7 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 05-29-85 | 06-24-85 | 07-31-85 | 08-26-85 |
| | Lab Code | DSW-1871 | DSW-2233 | DSW-2899 | DSW-3106 |
| | Gross Beta | 3.7±0.5 | 4.2±0.7 | 2.3±0.5 | 2.5±0.4 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 09-27-85 | 10-30-85 | 11-25-85 | 12-31-85 |
| | Lab Code | DSW-3603,4 | DSW-4071 | DSW-4374 | DSW-4924 |
| | Gross Beta | 3.9±0.4 | 2.1±0.6 | 6.9±3.3 | 1.4±0.5 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |

Table 33. (continued)

| Location | Sample Description and Activity (pCi/l) | | | | |
|------------------|---|------------------|------------------|----------|----------|
| Waste Discharge | | | | | |
| <u>Indicator</u> | | | | | |
| <u>D-107</u> | Date Collected | 02-25-85 | 03-26-85 | 04-29-85 | 05-29-85 |
| | Lab Code | DSW-614 | DSW-1189 | DSW-1567 | DSW-1879 |
| | Gross Beta | 37.6±1.9 | 30.0±1.8 | 21.9±0.7 | 23.6±3.0 |
| | Sr-89 ^a | <37 ^b | <26 ^b | <10 | <10 |
| | Sr-90 | <2 | <2 | <2 | <2 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 06-24-85 | 07-31-85 | 08-26-85 | |
| | Lab Code | DSW-2240 | DSW-2906,7 | DSW-3114 | |
| | Gross Beta | 32.9±2.1 | 21.7±2.4 | 16.5±5.1 | |
| | Sr-89 | <10 | <10 | <10 | |
| | Sr-90 | <2 | <2 | <2 | |
| | Mn-54 | <15 | <15 | <15 | |
| | Co-58 | <15 | <15 | <15 | |
| | Co-60 | <15 | <15 | <15 | |
| | Nb-95 | <15 | <15 | <15 | |
| | Zr-95 | <15 | <15 | <15 | |
| | Cs-134 | <15 | <15 | <15 | |
| | Cs-137 | <15 | <15 | <15 | |
| | Date Collected | 09-27-85 | 10-30-85 | 11-25-85 | 12-31-85 |
| | Lab Code | DSW-3611 | DSW-4079 | DSW-4382 | DSW-4932 |
| | Gross Beta | 20.0±6.0 | 22.1±5.6 | 18.2±5.2 | 14.5±5.5 |
| | Sr-89 | <10 | <10 | <10 | <10 |
| | Sr-90 | <2 | <2 | <2 | <2 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |

^a Due to high results for gross beta, all samples from this location for 1985 were analyzed for Sr-89 and Sr-90.

^b High LLD due to low sample volume and long decay time. Analysis request was received in January, 1986.

Table 33. (continued)

| Location | | Sample Description and Activity (pCi/l) | | | |
|----------------|----------------|---|----------|------------|------------|
| Farm Pond | | | | | |
| <u>Control</u> | | | | | |
| <u>D-73</u> | Date Collected | 01-28-85 | 02-25-85 | 03-26-85 | 04-29-85 |
| | Lab Code | DSW-357 | DSW-611 | DSW-1186 | DSW-1563,4 |
| | Gross Beta | 1.9±0.7 | 6.5±0.8 | 3.5±0.6 | 4.1±0.5 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 05-29-85 | 06-24-85 | 07-31-85 | 08-26-85 |
| | Lab Code | DSW-1875 | DSW-2237 | DSW-2903 | DSW-3110 |
| | Gross Beta | 5.6±0.8 | 2.2±0.6 | 3.3±0.5 | 1.4±0.4 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |
| | Date Collected | 09-27-85 | 10-30-85 | 11-25-85 | 12-31-85 |
| | Lab Code | DSW-3608 | DSW-4075 | DSW-4378,9 | DSW-4929 |
| | Gross Beta | 3.1±0.7 | <1.0 | 1.3±0.7 | 1.7±0.6 |
| | Mn-54 | <15 | <15 | <15 | <15 |
| | Co-58 | <15 | <15 | <15 | <15 |
| | Co-60 | <15 | <15 | <15 | <15 |
| | Nb-95 | <15 | <15 | <15 | <15 |
| | Zr-95 | <15 | <15 | <15 | <15 |
| | Cs-134 | <15 | <15 | <15 | <15 |
| | Cs-137 | <15 | <15 | <15 | <15 |

Table 34. Surface water samples, quarterly composites of monthly samples, analysis for tritium, strontium-89, and strontium-90.

| Location and Period Collected | Lab Code | Activity (pCi/l) | | |
|----------------------------------|------------|------------------|-------|------|
| | | Sr-89 | Sr-90 | H-3 |
| <u>Indicator</u> | | | | |
| <u>D-50</u> | | | | |
| 1st Q, 1985 | DSW-937 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2525 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3661 | <10 | <2 | <330 |
| 4th Q, 1985 | 4802 | <10 | <2 | <330 |
| Annual Mean ± s.d. | | <10 | <2 | <330 |
| <u>D-51</u> | | | | |
| 1st Q, 1985 | DSW-938 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2526 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3662 | <10 | <2 | <330 |
| 4th Q, 1985 | 4803 | <10 | <2 | <330 |
| Annual Mean ± s.d. | | <10 | <2 | <330 |
| <u>D-52</u> | | | | |
| 1st Q, 1985 | DSW-939,40 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2527 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3663 | <10 | <2 | <330 |
| 4th Q, 1985 | 4804 | <10 | <2 | <330 |
| Annual Mean ± s.d. | | <10 | <2 | <330 |
| <u>D-99</u> | | | | |
| 1st Q, 1985 | DSW-942 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2529 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3665 | <10 | <2 | <330 |
| 4th Q, 1985 | 4806 | <10 | <2 | <330 |
| Annual Mean ± s.d. | | <10 | <2 | <330 |

Table 34. (continued)

| Location and Period Collected | Lab Code | Activity (pCi/l) | | |
|----------------------------------|----------|------------------|-------|------|
| | | Sr-89 | Sr-90 | H-3 |
| <u>Indicator</u> | | | | |
| <u>D-103</u> | | | | |
| 1st Q, 1985 | DSW-943A | <10 | <2 | <330 |
| 2nd Q, 1985 | 2530 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3666 | <10 | <2 | <330 |
| 4th Q, 1985 | 4807 | <10 | <2 | <330 |
| Annual Mean \pm s.d. | | <10 | <2 | <330 |
| <u>D-107</u> | | | | |
| 1st Q, 1985 | DSW-943B | <10 | <2 | <330 |
| 2nd Q, 1985 | 2531 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3667 | <10 | <2 | <330 |
| 4th Q, 1985 | 4808 | <10 | <2 | <330 |
| Annual Mean \pm s.d. | | <10 | <2 | <330 |
| <u>Control</u> | | | | |
| <u>D-49</u> | | | | |
| 1st Q, 1985 | DSW-936 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2524 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3659,60 | <10 | <2 | <330 |
| 4th Q, 1985 | 4800,1 | <10 | <2 | <330 |
| Annual Mean \pm s.d. | | <10 | <2 | <330 |
| <u>D-73</u> | | | | |
| 1st Q, 1985 | DSW-941 | <10 | <2 | <330 |
| 2nd Q, 1985 | 2528 | <10 | <2 | <330 |
| 3rd Q, 1985 | 3664 | <10 | <2 | <330 |
| 4th Q, 1985 | 4805 | <10 | <2 | <330 |
| Annual Mean \pm s.d. | | <10 | <2 | <330 |

Table 35. Fish samples, analysis of edible portion for gamma-emitting isotopes.
Collection: Semiannually.

| Sample Description and Activity (pCi/g wet) | | | |
|---|-----------------|-------------|-------------|
| | Indicator | | |
| | Downstream D-61 | | |
| Date Collected | 05-16-85 | 05-16-85 | 05-16-85 |
| Type | Carp | Catfish | Carp sucker |
| Lab Code | DF-552 | DF-555 | DF-557 |
| K-40 | 3.29±0.24 | 3.03±0.39 | 3.14±0.17 |
| Mn-54 | <0.030 | <0.033 | <0.021 |
| Co-58 | <0.058 | <0.064 | <0.041 |
| Co-60 | <0.033 | <0.027 | <0.017 |
| Nb-95 | <0.050 | <0.14 | <0.045 |
| Zr-95 | <0.11 | <0.12 | <0.074 |
| Ru-103 | <0.074 | <0.11 | <0.076 |
| Ru-106 | <0.20 | <0.23 | <0.18 |
| Cs-134 | <0.029 | <0.023 | <0.020 |
| Cs-137 | <0.025 | <0.026 | <0.018 |
| Ce-141 | <0.12 | <0.19 | <0.14 |
| Ce-144 | <0.092 | <0.15 | <0.12 |
| Date Collected | 10-31-85 | 10-31-85 | |
| Type | Carp | Carp sucker | |
| Lab Code | DF-736,7 | DF-738 | |
| K-40 | 3.28±0.19 | 2.63±0.36 | |
| Mn-54 | <0.025 | <0.024 | |
| Co-58 | <0.025 | <0.025 | |
| Co-60 | <0.032 | <0.024 | |
| Nb-95 | <0.024 | <0.025 | |
| Zr-95 | <0.048 | <0.048 | |
| Ru-103 | <0.016 | <0.020 | |
| Ru-106 | <0.19 | <0.18 | |
| Cs-134 | <0.027 | <0.022 | |
| Cs-137 | <0.020 | <0.024 | |
| Ce-141 | <0.020 | <0.031 | |
| Ce-144 | <0.085 | <0.12 | |

Table 35. (continued)

| Sample Description and Activity (pCi/g wet) | | | |
|---|-------------|-----------|-------------|
| <u>Control</u> | | | |
| Upstream D-49 | | | |
| Date Collected | 05-16-85 | 05-16-85 | 05-16-85 |
| Type | Carp | Catfish | Carp sucker |
| Lab Code | DF-553 | DF-554 | DF-556 |
| K-40 | 2.96±0.25 | 3.20±0.39 | 3.82±0.19 |
| Mn-54 | <0.024 | <0.031 | <0.020 |
| Co-58 | <0.058 | <0.061 | <0.034 |
| Co-60 | <0.024 | <0.028 | <0.023 |
| Nb-95 | <0.060 | <0.15 | <0.039 |
| Zr-95 | <0.10 | <0.11 | <0.070 |
| Ru-103 | <0.089 | <0.096 | <0.061 |
| Ru-106 | <0.24 | <0.23 | <0.16 |
| Cs-134 | <0.036 | <0.027 | <0.021 |
| Cs-137 | <0.024 | <0.024 | <0.017 |
| Ce-141 | <0.20 | <0.19 | <0.095 |
| Ce-144 | <0.16 | <0.15 | <0.070 |
| Date Collected | 10-31-85 | 10-31-85 | |
| Type | Carp sucker | Carp | |
| Lab Code | DF-734 | DF-735 | |
| K-40 | 2.72±0.19 | 2.72±0.21 | |
| Mn-54 | <0.016 | <0.017 | |
| Co-58 | <0.020 | <0.023 | |
| Co-60 | <0.020 | <0.021 | |
| Nb-95 | <0.021 | <0.021 | |
| Zr-95 | <0.032 | <0.036 | |
| Ru-103 | <0.018 | <0.021 | |
| Ru-106 | <0.16 | <0.18 | |
| Cs-134 | <0.022 | <0.020 | |
| Cs-137 | <0.021 | <0.020 | |
| Ce-141 | <0.025 | <0.027 | |
| Ce-144 | <0.097 | <0.12 | |

Table 36. Periphyton samples, analysis for gamma-emitting isotopes.
Collection: Quarterly.

| Sample Description and Activity (pCi/g wet) | | |
|---|-------------------------------|-----------|
| | <u>Indicator - downstream</u> | |
| Location | D-61 | D-61 |
| Date Collected | 04-08-85 | 05-29-85 |
| Lab Code | DB0-63 | DB0-70 |
| K-40 | <1.30 | 4.13±0.43 |
| Mn-54 | <0.11 | <0.094 |
| Co-58 | <0.12 | <0.16 |
| Co-60 | <0.14 | <0.082 |
| Nb-95 | <0.12 | <0.18 |
| Zr-95 | <0.21 | <0.29 |
| Ru-103 | <0.10 | <0.31 |
| Ru-106 | <0.89 | <0.79 |
| Cs-134 | <0.10 | <0.086 |
| Cs-137 | <0.11 | <0.080 |
| Ce-141 | <0.10 | <0.52 |
| Ce-144 | <0.36 | <0.43 |
| Location | D-61 | D-61 |
| Date Collected | 08-29-85 | 11-22-85 |
| Lab Code | DB0-80 | DB0-101 |
| K-40 | 5.05±0.39 | 5.81±0.53 |
| Mn-54 | <0.050 | <0.080 |
| Co-58 | <0.060 | <0.079 |
| Co-60 | <0.065 | <0.094 |
| Nb-95 | <0.066 | <0.088 |
| Zr-95 | <0.11 | <0.015 |
| Ru-103 | <0.065 | <0.093 |
| Ru-106 | <0.47 | <0.772 |
| Cs-134 | <0.058 | <0.085 |
| Cs-137 | <0.052 | <0.087 |
| Ce-141 | <0.057 | <0.12 |
| Ce-144 | <0.12 | <0.44 |

Table 36. (continued)

| Sample Description and Activity (pCi/g wet) | | |
|---|---------------------------|-----------|
| | <u>Control - upstream</u> | |
| Location | D-49 | D-49 |
| Date Collected | 04-08-85 | 05-29-85 |
| Lab Code | DBO-64 | DBO-71 |
| K-40 | 18.3±1.6 | 4.94±0.40 |
| Mn-54 | <0.14 | <0.058 |
| Co-58 | <0.15 | <0.088 |
| Co-60 | <0.17 | <0.071 |
| Nb-95 | <0.16 | <0.10 |
| Zr-95 | <0.27 | <0.17 |
| Ru-103 | <0.13 | <0.13 |
| Ru-106 | <1.13 | <0.43 |
| Cs-134 | <0.13 | <0.050 |
| Cs-137 | <0.14 | <0.050 |
| Ce-141 | <0.13 | <0.15 |
| Ce-144 | <0.46 | <0.12 |
| Location | D-49 | D-49 |
| Date Collected | 08-29-85 | 11-22-85 |
| Lab Code | DBO-81 | DBO-100 |
| K-40 | 1.37±0.35 | 5.97±0.29 |
| Mn-54 | <0.036 | <0.033 |
| Co-58 | <0.046 | <0.034 |
| Co-60 | <0.039 | <0.052 |
| Nb-95 | <0.064 | <0.036 |
| Zr-95 | <0.079 | <0.064 |
| Ru-103 | <0.046 | <0.030 |
| Ru-106 | <0.29 | <0.32 |
| Cs-134 | <0.031 | <0.039 |
| Cs-137 | <0.032 | <0.040 |
| Ce-141 | <0.046 | <0.024 |
| Ce-144 | <0.11 | <0.086 |

Table 37. Bottom sediment samples, analysis for strontium-90 and gamma-emitting isotopes. Collection: Semiannually.

| Sample Description and Activity (pCi/g dry) | | |
|---|------------------|------------|
| | <u>Indicator</u> | |
| Location | D-61 | D-61 |
| Date Collected | 06-06-85 | 10-31-85 |
| Lab Code | DBS-427 | DBS-528 |
| Sr-90 | <0.015 | <0.010 |
| K-40 | 7.72±0.63 | 7.36±0.44 |
| Mn-54 | <0.0048 | <0.020 |
| Co-58 | <0.0046 | <0.022 |
| Co-60 | <0.0053 | <0.021 |
| Nb-95 | <0.0050 | <0.026 |
| Zr-95 | <0.0086 | <0.038 |
| Ru-103 | <0.0035 | <0.021 |
| Ru-106 | <0.036 | <0.16 |
| Cs-134 | <0.0056 | <0.022 |
| Cs-137 | <0.011 | <0.020 |
| Ce-141 | <0.0046 | <0.033 |
| Ce-144 | <0.019 | <0.11 |
| | <u>Indicator</u> | |
| Location | D-51 | D-51 |
| Date Collected | 06-06-85 | 10-31-85 |
| Lab Code | DBS-426 | DBS-527 |
| Sr-90 | <0.011 | <0.011 |
| K-40 | 11.50±0.51 | 12.00±0.39 |
| Mn-54 | <0.022 | <0.018 |
| Co-58 | <0.025 | <0.019 |
| Co-60 | <0.025 | <0.016 |
| Nb-95 | <0.033 | <0.024 |
| Zr-95 | <0.043 | <0.036 |
| Ru-103 | <0.022 | <0.020 |
| Ru-106 | <0.16 | <0.14 |
| Cs-134 | <0.022 | <0.016 |
| Cs-137 | <0.020 | <0.017 |
| Ce-141 | <0.038 | <0.036 |
| Ce-144 | <0.11 | <0.11 |

Table 37. (continued)

| Sample Description and Activity (pCi/g dry) | | | |
|---|-------------|----------------|--|
| | | <u>Control</u> | |
| Location | D-50 | D-50 | |
| Date Collected | 06-06-85 | 10-31-85 | |
| Lab Code | DBS-425 | DBS-526 | |
| Sr-90 | 0.013±0.008 | <0.0089 | |
| K-40 | 8.09±0.26 | 7.63±0.21 | |
| Mn-54 | <0.023 | <0.016 | |
| Co-58 | <0.041 | <0.017 | |
| Co-60 | <0.023 | <0.015 | |
| Nb-95 | <0.042 | <0.020 | |
| Zr-95 | <0.076 | <0.033 | |
| Ru-103 | <0.054 | <0.018 | |
| Ru-106 | <0.18 | <0.14 | |
| Cs-134 | <0.027 | <0.020 | |
| Cs-137 | <0.021 | <0.017 | |
| Ce-141 | <0.12 | <0.031 | |
| Ce-144 | <0.14 | <0.11 | |
| | | <u>Control</u> | |
| Location | D-49 | D-49 | |
| Date Collected | 06-06-85 | 10-31-85 | |
| Lab Code | DBS-424 | DBS-524,5 | |
| Sr-90 | <0.0087 | <0.0073 | |
| K-40 | 7.35±0.34 | 6.94±0.29 | |
| Mn-54 | <0.0085 | <0.019 | |
| Co-58 | <0.010 | <0.020 | |
| Co-60 | <0.010 | <0.022 | |
| Nb-95 | <0.013 | <0.026 | |
| Zr-95 | <0.018 | <0.039 | |
| Ru-103 | <0.0084 | <0.018 | |
| Ru-106 | <0.064 | <0.15 | |
| Cs-134 | <0.0086 | <0.017 | |
| Cs-137 | <0.0080 | <0.018 | |
| Ce-141 | <0.014 | <0.033 | |
| Ce-144 | <0.038 | <0.10 | |

Table 38. Precipitation samples, analysis for gross beta and tritium.
Collection: Monthly.

| Collection Date | Lab Code | pCi/l | |
|-----------------|-----------------|------------|------|
| | | Gross Beta | H-3 |
| January, 1985 | ND ^a | -- | -- |
| February, 1985 | DP-604 | 3.4±0.6 | <330 |
| March, 1985 | DP-638 | 2.0±0.6 | <330 |
| April, 1985 | DP-666 | <1.1 | <330 |
| May, 1985 | DP-683 | 8.1±0.8 | <330 |
| June, 1985 | DP-699 | 9.4±1.5 | <330 |
| July, 1985 | DP-747,8 | 5.7±0.7 | <330 |
| August, 1985 | DP-750 | <0.9 | <330 |
| September, 1985 | DP-767 | 4.1±0.5 | <330 |
| October, 1985 | DP-806 | <0.6 | <330 |
| November, 1985 | DP-813 | 5.2±2.5 | <330 |
| December, 1985 | ND ^a | -- | -- |

^a ND = No data; no precipitation to collect.