Donald C. Cook Nuclear Plant • Units 1 & 2

Annual Environmental Operating Report

January 1, through December 31, 1987

Indiana & Michigan Electric Company

Bridgman, Michigan

Docket Nos. 50-315 & 50-316

License Nos. DPR-58 & DPR-74

AEP

AMERICAN ELECTRIC POWER

LIST OF APPENDICES

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I. INTRODUCTION

Environmental Technical Specifications, Appendix A, Section 6.9.1.6 and Appendix B, Part II, Section 5.4.1 require that an annual report be submitted to the Nuclear Regulatory Commission which details the results and findings of ongoing environmental radiological and non-radiological surveillance programs. This report serves to fulfill these requirements and represents the Annual Environmental Operating Report for Units 1 and 2 of the Donald C. Cook Nuclear Plant for the operating period from January 1, 1987 till December 31, 1987.

During 1987, based on the monthly operating reports for Unit 1 and Unit 2, the yearly gross electrical generation, average unit service and capacity factors were:

	Unit 1	Unit 2
Gross electrical generation (MWe)	5,248,800	5,258,580
Unit service factor (%)	67.6	71.4
Unit capacity factor MDC Net (%)	56.3	54.1

The Semi-Annual Radioactive Effluent Release Reports for 1987 reporting year indicated that there were no adverse effects to the environment and general public due to the operation of the Donald C. Cook Nuclear Plant.

II. CHANGES TO THE ENVIRONMENTAL TECHNICAL SPECIFICATIONS

There were no changes made to the Non-radiological Environmental Technical Specifications during 1987. A change to the National Pollution Discharge Elimination System (NPDES) permit MI0005827 in which the applicant received permission to reroute Makeup Plant prefilter backwash to Lake Michigan became effective April 2, 1987. For further information, see Appendix 1.1 to this document.

No changes were made to the Radiological Technical Specifications during 1987.

III

NON-RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

Environmental Protection Plan (EPP)

III.A.1 Plant Design and Operation

There were no changes in station design, tests or experiments performed which constituted an unreviewed environmental question.

Five environmental assessments were written for construction activities performed in 1987 which are included in this document as Appendix 1.2. Based on the attached assessments, it is concluded that the actions described did not result in an unreviewed environmental question and there was no need to conduct an environmental evaluation as described in Section 3.1 of Appendix B to the Technical Specifications.

One environmental evaluation was conducted for the construction of the temporary on-site steam generator storage facility, and is included as Attachment C to this document. Based on the evaluation, it was concluded that with proper mitigation practices there would be no adverse environmental impact arising from the proposed activity.

III.A.2 Reporting Related to the NPDES Permit and State Certification

Notifications made to the Michigan Department of Natural Resources regarding the NPDES Permit are listed under Nonroutine Reports which comprises Appendix 1.3 to this document.

III.B Environmental Monitoring - Herbicide Application

Krovar I and OUST were used for bare ground weed control in the areas and concentrations specified in the attached letter from Dane M. McKay to H. E. Brooks (Appendix 1.4). Tordon 101R was applied to tree stumps as part of the transmissions line right-of-way maintenance performed within the owner controlled area in 1987. (See attached letter from R. J. Cheeney.) No adverse environmental impacts were observed as a result of these activities.

III.C Aquatic Studies - Corbicula Monitoring Program

As part of the Corbicula Monitoring Program, performed in accordance with our response to the NRC IE Bulletin 81-03; entrainment, diver-collected sand and gravel samples, and beach areas at the Donald C. Cook Nuclear Plant were examined for the presence of the Asiatic clam, Corbicula fluminea. No veligers, small or adult clams, or empty shells were detected in any of the sampling.

To date, inspections of lake water systems for biofouling, conducted by Environmental Section personnel have indicated no evidence of Corbicula.

The Cook Plant Corbicula Monitoring Program conducted by the University of Michigan will continue in 1988, as well as in-house inspections of lake water systems.

For further information concerning the Corbicula Monitoring Program results for 1987, please refer to Appendix 1.5.

During 1987, this was the only aquatic study performed for the Donald C. Cook Nuclear Plant.

IV

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

IV.A Changes or Control to the REMP

As discussed above, the D. C. Cook Nuclear Plant Unit 1 and Unit 2 Technical Specifications were not changed in 1987.

During 1987 sampling for the Radiological Environmental Monitoring Program was accomplished by both plant and contractor personnel. Up until December of 1987, plant personnel were responsible for the REMP samples. In December of 1987, contractor personnel took over responsibility for collection of these samples except for fish samples. Plant personnel have had continuous responsibility for the collection of fish samples.

On April 7, 1987 the environmental supplier/processor changed from Nuclear Sources and Services, Inc. to Teledyne Isotopes.

In general, the Annual Environmental Operating Report shows no observable effect on the surrounding environment from the operation of the Donald C. Cook Nuclear Plant, Units 1 and 2.

For further information concerning the Radiological Environmental Monitoring Program, please see Appendices 2.1 which contain the results of the contractor analysis on environmental samples.

IV.B Land Use Census

IV.B.1 Annual Milk Farm Survey

The annual milk farm survey for 1987 was completed in July, 1987 using the updated Milk Farm List from the Michigan Department of Agriculture and previous year's milk farm survey map. A new milk farm survey map and list were completed according to the appropriate Plant procedure. Changes were identified from the previous year for the closest milk farm in the nine land covering meteorological sectors within the five (5) mile emergency planning zone. The comparison results between the reporting year (1987) and the prior year (1986) are shown in Appendix 2.2 to this report.

IV.B.2 Annual Residential Land Use Survey

The 1987 Residential Land Use Survey was completed in July, 1987 using the updated list of new building permits from Lake Township and the previous year's survey map. There were no new identified residences having a building permit and which were closer than the previous year's closest residence in each of the nine (9) land covering meteorological sections within the five mile emergency planning zone. The comparison results of the residential land use survey for 1986 and 1987 are found in Appendix 2.3 to this report.

Some uncertainty exists in the reported locations of the nearest residences. This matter will be further investigated and the distances to the nearest residences in each of the land covering meteorological sectors will be verified. The results of this investigation and the 1988 Residential Land Use Survey will be incorporated into the 1988 Annual Environmental Operating Report.

IV.C. Condition Reports

In 1987, two (2) conditions reports were issued with respect to the Radiological Environmental Monitoring Program. These condition reports are identified below and are more fully documented in Appendix 2.4 of this report. The two condition reports which were issued are:

1) 12-6-87-940 Missed Drinking Water Samples

2) 12-10-87-1691 Non-Literal Compliance with Technical Specification Table 3.12-1, Item 4a

Appendix 1.1

AMENDED NPDES PERMIT MI0005827

ATTACHMENT E

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
BOX 30028
LANSING, MI 48909

GORDON E. GUYER, Director

April 3, 1987

CERTIFIED MAIL

Indiana & Michigan Electric Company
One Summit Square
P.O. Box 60
Fort Wayne, Indiana 46801

Re: NPDES Permit No. MI 0005827
Donald C. Cook Nuclear Plant
Bridgman, Michigan

Dear Gentlemen:

Your National Pollutant Discharge Elimination System (NPDES) Permit has been processed in accordance with appropriate state and federal regulations.

It contains the requirements necessary for you to comply with state and federal water pollution control laws.

REVIEW THE PERMIT EFFLUENT LIMITS AND PERFORMANCE SCHEDULES CAREFULLY. These are subject to the criminal and civil enforcement provisions of both state and federal law. Permit violations are audited by the United States Environmental Protection Agency and may appear in a published quarterly noncompliance report made available to agencies and the public.

Your monitoring and reporting responsibilities must be complied with in accordance with this permit. If applicable, monthly operating report forms will be transmitted to you in the near future. These reports are to be submitted monthly or otherwise as required by your NPDES permit.

Any reports, notifications, and questions regarding the attached permit or NPDES program should be sent to the following address:

Fred Morley, District Supervisor
621 North Tenth Street
P.O. Box 355
Plainwell, Michigan 49080
Telephone: (616) 685-9886

NOTE: All references within this permit made to the Water Quality Division or Chief of the Water Quality Division are to refer to the Surface Water Quality Division or Chief of the Surface Water Quality Division, respectively.

Sincerely,

William E. McCracken

William E. McCracken, P.E.
Chief, Permits Section
Surface Water Quality Division
517-373-8088

Enclosure: Permit

cc: EPA-Region V (2)
Files
Steve Buda, Planning and Special Programs Section
Fred Morley - Plainwell District
Compliance Section #1
Land Application Unit
208 Agency - Southwest Michigan Regional Planning Commission
Data Entry, SWQD
Point Source Studies (Grand Rapids District Office)

PERMIT NO. MI0005827

MICHIGAN WATER RESOURCES COMMISSION
AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq; the "Act"), and the Michigan Water Resources Commission Act, as amended, (Act 245, Public Acts of 1929, as amended, the "Michigan Act"),

Indiana & Michigan Electric Company
One Summit Square
P.O. Box 60
Fort Wayne, Indiana 46801

is authorized to discharge from a facility located at

Donald C. Cook Nuclear Plant
Red Arrow Highway
Bridgman, Michigan 49106

designated as IN & MI Electric-Cook Plant

to the receiving water named Lake Michigan in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I and II hereof.

This permit takes effect immediately upon the date of issuance. Any person who feels aggrieved by this permit may file a sworn petition with the Commission, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Commission may reject any petition filed more than 60 days after issuance as being untimely. Upon granting of a contested case to the applicant, the Commission shall review the permit to determine which contested term shall be stayed until the Commission takes its final action. All other conditions of the permit remain in full effect. If the contested condition is a modification of a previous permit condition and the Commission determines the contested condition shall be stayed, then such previous condition remains in effect until the Commission takes final action. During the course of any administrative proceeding brought by a person other than the applicant, the conditions of this permit will remain in effect, unless the Commission determines otherwise.

This permit and the authorization to discharge shall expire at midnight August 31, 1990. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit such information and forms as are required by the Michigan Water Resources Commission no later than 180 days prior to the date of expiration.

This permit is based on an application dated May 1979, as amended, and shall supersede any and all Orders of Determination, Stipulation, Final Orders of Determination, or NPDES permits previously adopted by the Michigan Water Resources Commission.

Issued this 19th day of September 1985, and modified this 2nd day of April 1987, by the Michigan Water Resources Commission superseding NPDES Permit No. MI0005827, expiring October 31, 1979.

William S. McCracken

ACTING Paul D. Zugger
Executive Secretary

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. Final Effluent Limitations - Outfalls 001, 002 & 003 (noncontact cooling water and low volume wastes)

During the period beginning on the effective date of this permit and lasting until permit expiration, the permittee is authorized to discharge a maximum of three billion two hundred ninety eight million five hundred eighty three thousand two hundred (3,298,583,200) gallons per day* of noncontact cooling water consisting of condenser cooling water and low volume wastes consisting of steam generator blowdown, heating boiler blowdown and filter backwash through outfalls 001, 002 and 003 to Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations lbs/day Monthly Average	Discharge Limitations lbs/day Daily Maximum	Other Limitations Monthly Average	Other Limitations Daily Maximum	Monitoring Requirements Measurement Frequency	Monitoring Requirements Sample Type
Flow (MGD)					Daily	Report Total Daily Flow
Temperature (°F)						3 instantaneous readings equally spaced over a 24-hr period
Intake					Daily	
Discharge**					Daily	
Heat Addition (BTU/hr)				15.5×10^9	Daily	Calculation
Total Residual Chlorine (TRC)***				0.1 mg/l	5 x weekly	3 grab samples equally spaced during discharge of chlorine
Chlorine Discharge Time				30 min./day	5 x weekly	Report discharge time
Outfall Observation****					Daily	Visual

* This flow is not to be considered as a limitation on either the quanity or rate over time of discharge.

** The discharge, after mixing, shall not increase the temperature of Lake Michigan more than 3°F above the existing natural temperature or above the following monthly maximum temperatures:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
45	45	45	55	60	70	80	80	80	65	60	50

***The permittee may use dechlorination techniques to achieve the applicable limitations using sodium thiosulfate or sodium sulfite or other dechlorinating agents approved by the Chief of the Surface Water Quality Division as dechlorination agents. The quanity of reagent used shall be limited to 1.5 times the stoichiometric amount needed for dechlorination of applied chlorine. The permittee shall report monthly the quanity of each dechlorination reagent used per day.

Part I-A-1. (continued)

**Any unusual characteristics of the discharge (i.e., unnatural turbidity, color, oil film, floating solids, foams, settleable solids, or deposits) shall be reported immediately to the District Office of the Surface Water Quality Division followed with a written report within 5 days detailing the findings of the investigation and the steps taken to correct the condition.

a. The term noncontact cooling water shall mean water used for cooling which does not come into direct contact with any raw material, intermediate product, waste product, or finished product.

b. The pH shall not be less than 6.0 nor greater than 9.0. The pH shall be monitored as follows: weekly; grab sample.

c. The receiving water shall contain no unnatural turbidity, color, oil film, floating solids, foams, settleable solids, or deposits in quantities which are or may become injurious to any designated use as a result of this discharge.

d. Samples, measurements and/or observations taken in compliance with the monitoring requirements above shall be taken as follows: intake - in the intake forebay; discharge - in Unit 1 and Unit 2 discharge bays for Outfalls 001 and 002, respectively. The monitoring requirements specified above do not apply for Outfall 003 since this discharge will be regulated by Outfalls 001 and 002.

e. In the event the permittee shall require the discharge of water treatment additives in addition to any previously approved by the Chief of the Surface Water Quality Division, the permittee shall notify the Division Chief. Written approval from the Chief of the Surface Water Quality Division to discharge such additives at specified levels shall be obtained prior to discharge by the permittee. The permit will be modified in accordance with the requirements of Part II, Section B-4 if a constituent of the additive or additives requires limiting.

2. Final Effluent Limitations - Outfalls 00A and 00B (steam generator blowdown)

During the period beginning on the effective date of this permit and lasting until permit expiration, the permittee is authorized to discharge a maximum of eight hundred sixty-four thousand (864,000) gallons per day* of low volume wastes consisting of steam generator blowdown from each of the internal outfalls 00A and 00B through outfalls 001, 002 and 003 to Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations kg/day (lbs/day) Monthly Average	Daily Maximum	Other Limitations Monthly Average	Daily Maximum	Monitoring Requirements Measurement Frequency	Sample Type
Flow (MGD)					Per Occurrence	Report total daily flow
Total Suspended Solids (mg/l)			30	100	Weekly	Grab
Oil and Grease (mg/l)**				15	Monthly	Grab

*This flow is not to be considered as a limitation on either the quantity or rate over time of discharge.

**After one year of monitoring for oil and grease, the permittee may attempt to demonstrate that further monitoring and limits for oil and grease for internal outfalls 00A and 00B are no longer necessary. Upon successful demonstration by the permittee, this monitoring may be deleted from this permit. Any submittals shall be to the Chief of the Surface Water Quality Division.

a. Samples, measurements and/or observations taken in compliance with the monitoring requirements above shall be taken on both outfalls 00A and 00B prior to mixing with noncontact cooling water in the intake forebay (see figure 1 on page 7 of 12).

b. In the event the permittee shall require the discharge of water treatment additives, the permittee shall notify the Chief of the Surface Water Quality Division. The permittee shall obtain written approval from the Chief of the Surface Water Quality Division to discharge such additives at a specified level. The permit may be modified in accordance with the requirements of Part II, Section B-4 if a constituent of the additive or additives requires limiting.

3. Final Effluent Limitations - Outfall 00C (heating boiler blowdown)

During the period beginning on the effective date of this permit and lasting until permit expiration, the permittee is authorized to discharge a maximum of nineteen thousand (19,000) gallons per day* of low volume wastes consisting of heating boiler blowdown from the internal outfall 00C through outfalls 001, 002 and 003 to Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations kg/day (lbs/day) Monthly Average	Daily Maximum	Other Limitations Monthly Average	Daily Maximum	Monitoring Requirements Measurement Frequency	Sample Type
Flow (MGD)					Per Occurrence	Report total daily flow
Total Suspended Solids (mg/l)			30	100	Per Occurrence**	Grab
Oil and Grease (mg/l)***				15	Monthly	Grab

*This flow is not to be considered as a limitation on either the quantity or rate over time of discharge.

**Total Suspended Solids are to be monitored once per occurrence or weekly if the heating boiler is operated continuously for periods greater than one week.

***After one year of monitoring for oil and grease, the permittee may attempt to demonstrate that further monitoring and limits for oil and grease for internal outfall 00C is no longer necessary. Upon successful demonstration by the permittee, this monitoring may be deleted from this permit. Any submittals shall be to the Chief of the Surface Water Quality Division.

a. Samples, measurements and/or observations taken in compliance with the monitoring requirements above shall be taken after the heating boilers and prior to the intake forebay (see figure 1 on page 7 of 12).

b. In the event the permittee shall require the discharge of water treatment additives, the permittee shall notify the Chief of the Surface Water Quality Division. The permittee shall obtain written approval from the Chief of the Surface Water Quality Division to discharge such additives at a specified level. The permit may be modified in accordance with the requirements of Part II, Section B-4 if a constituent of the additive or additives requires limiting.

4. Final Effluent Limitations - Outfall 00F (filter backwash)

During the period beginning on the effective date of this permit and lasting until permit expiration, the permittee is authorized to discharge a maximum of five hundred eighty-three thousand two hundred (583,200) gallons per day* of low volume wastes consisting of filter backwash from internal outfall 00F through outfalls 001, 002, and 003 to Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below:

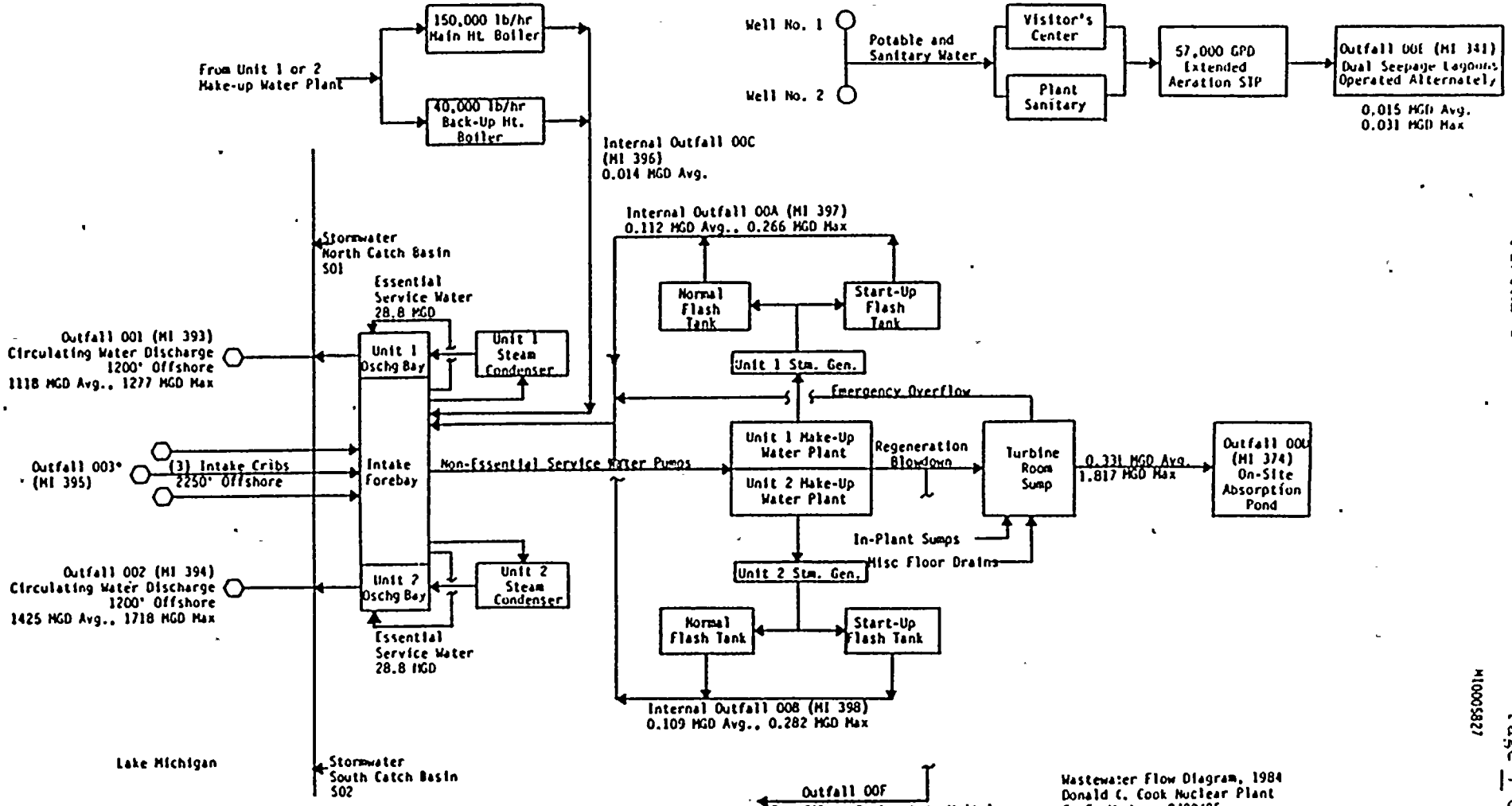
Effluent Characteristic	Discharge Limitations kg/day (lbs/day) Monthly Average	Daily Maximum	Other Limitations Monthly Average	Daily Maximum	Monitoring Requirements Measurement Frequency	Sample Type
Flow (MGD)					Daily	Report total daily flow
Total Suspended Solids (mg/l)			30	100	Weekly	Grab
Oil and Grease (mg/l)**				15	Monthly	Grab

*This flow is not to be considered as a limitation on either quantity or rate over time of discharge.

**After one year of monitoring for oil and grease, the permittee may attempt to demonstrate that further monitoring and limits for oil and grease for internal 00F is no longer necessary. Upon successful demonstration by the permittee, this monitoring may be deleted from the permit. Any submittals shall be to the Chief of the Surface Water Quality Division.

a. Samples, measurements and observations taken in compliance with the monitoring requirements above shall be taken prior to mixing with noncontact cooling water in intake forebay (see figure 1 on page 7 of 12).

b. In the event the permittee shall require the discharge of water treatment additives in addition to any previously approved by the Chief of the Surface Water Quality Division, the permittee shall notify the Division Chief. Written approval from the Chief of the Surface Water Quality Division to discharge such additives at specified levels shall be obtained prior to discharge by the permittee. The permit will be modified in accordance with the requirements of Part II, Section B-4 if a constituent of the additive or additives requires limiting.



* Outfall 003 De-icing Dschg was used 42 days In 1984 -- 224 MGD Avg., 839 MGD Max

Wastewater Flow Diagram, 1984
Donald C. Cook Nuclear Plant
C. E. Hawk - 2/20/85
Revised - 11/18/86

FIGURE 1

M10005827

5. Final Effluent Limitations - Intake Screen Backwash

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge an unspecified amount of intake screen backwash to Lake Michigan. The Company shall collect and remove debris accumulated on the intake trash bars and dispose of such material on land in an appropriate manner.

6. Final Effluent Limitations

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall not discharge any polychlorinated biphenyls to receiving waters of the State of Michigan as a result of plant operations.

7. Cooling Water Intakes

The permittee shall submit to the Chief of the Surface Water Quality Division a detailed study plan and time schedule for conducting environmental monitoring to determine the effects of the cooling water intake and obtain his approval thereof on or before NA--completed. The studies shall be adequate to demonstrate if the existing cooling water intake design, location, construction, and capacity reflects the best technology available for minimizing adverse environmental impact in accordance with Section 316(b), Public Law 92-500. The study shall be completed and the report thereon submitted on or before NA.

If, on the basis of the study report and applicable standards established pursuant to Section 316(b) of Public Law 92-500, the Commission determines that the intake structures do not reflect the best technology available for minimizing adverse environmental impact, it will so notify the company, specifying the reason(s) for its determination, and the company shall submit to the Chief of the Surface Water Quality Division, within 90 days of such notification, its plan and construction time schedule for minimizing the environmental impact of the intake structure.

8. Special Condition

The Nuclear Regulatory Commission is responsible for regulating discharges of radioactive materials.

9. Special Condition

This permit may be modified or, alternatively, revoked and reissued to comply with any applicable standard(s) or limitation(s) promulgated under Section 301(b)(2)(c)(d), 304(b)(2) and 307(a)(2) of the Act, if the effluent standard(s) or limitation(s) so promulgated:

a. is(are) either different in condition or more stringent than any effluent limitation in the permit; or

b. control(s) any pollutant not limited in the permit.

10. Special Condition - Notification Requirement

The discharger shall notify the Chief of the Surface Water Quality Division, in writing, within 10 days of knowing, or having reason to believe, that a change in facility operation, maintenance, or construction has resulted or will result in the discharge of:

1. Detectable levels* of chemicals on the current Michigan Critical Materials Register or priority pollutants or hazardous substances set forth in 40 CFR Vol. 48, No. 64, April 1, 1983, Part 122.21, Appendix D, pp. 14176-14177 which were not acknowledged in the application** or listed in the application at less than detectable levels.

2. Detectable levels* of any other chemical not listed in the application or listed at less than detection, for which the application specifically requested information.

3. Any chemical at levels greater than five times the average level reported in the application**.

Any other monitoring results obtained as a requirement of this permit shall be reported in accordance with the schedule of compliance.

*The detectable level shall be defined as the Method Detection Limit (MDL) as given in Appendix B to Part 136, Federal Register, Vol. 49, No. 209, October 26, 1984, pp. 43430-31.

**The application received May 4, 1979 and updated April 26, 1985.

PART I

3. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting: [A] = applicable to your facility; [NA] = not applicable to your facility

[A] a. MOR Submittal Requirements - The permittee shall submit Monthly Operating Report (MOR) forms to the Data Center of the Michigan Department of Natural Resources for each calendar month of the authorized discharge period(s). The MOR's shall be postmarked no later than the 10th day of the month following each month of the authorized discharge period(s).

[NA] b. Retained Self-Monitoring Requirements - The permittee shall maintain a year-to-date log of retained self-monitoring results and provide such log for inspection to the staff of the

- ☐ (1.) Surface Water Quality Division of the Michigan Department of Natural Resources.
- ☐ (2.) Environmental Health Services Division, Michigan Department of Public Health
- ☐ (3.) Northern Peninsula Division, Michigan Department of Public Health
- ☐ (4.) Division of Health Facility Licensing & Certification, Michigan Department of Public Health

upon request.

The permittee shall certify, in writing, to the Chief of the Surface Water Quality Division of the Department of Natural Resources in accordance with the Schedule of Compliance Part I, C-NA, that;

(1.) all retained self-monitoring requirements have been complied with and a year-to-date log has been maintained.
(2.) the flow rate(s) (if part of retained self-monitoring results) from all outfalls have been substantially the same as the flow rate(s) authorized by this permit or if
(3.) the flow rate(s) (if part of retained self-monitoring results) is (are) substantially different from the flow rate(s) authorized by this permit and the permittee shall provide reasons for the difference in flow rates.

[A] c. Groundwater Monitoring - The permittee shall submit Monthly Operating Report (MOR) forms to the Data Center of the Michigan Department of Natural Resources in accordance with the monitoring requirements set forth in Part III. ___. The MOR's shall be postmarked no later than the 10th day of the month following each completed report period.

[NA] d. First Permit - Existing or Proposed Facility - Upon issuance of the first permit for an existing or proposed facility the permittee is exempt from submitting MOR's for a period of ninety (90) days from the date the permit is issued.

[A] e. Permit Reissuance or Modification - For any parameter added to the monitoring requirements as a result of permit reissuance or modification of the current permit, the permittee will be exempt from submitting MOR data for that parameter for a period of ninety (90) days from the date the permit is issued.

3. Definitions

a. The monthly average discharge is defined as the total discharge by weight, or concentration if specified, during the reporting month divided by the number of days in the reporting month that the discharge from the production or commercial facility occurred. When less than daily sampling occurs, the monthly average discharge shall be determined by the summation of the measured daily discharges by weight, or concentration if specified, divided by the number of days during the reporting month when the samples were collected, analyzed and reported.

b. The daily maximum discharge means the total discharge by weight, or concentration if specified, during any calendar day.

c. The Regional Administrator is defined as the Region V Administrator, U.S. EPA, located at 230 South Dearborn, 13th Floor, Chicago, Illinois 60606.

d. The Michigan Water Resources Commission is located in the Stevens T. Mason Building. The mailing address is Box 30028, Lansing, Michigan 48909.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304(h) of the Act, under which such procedures may be required.

5. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses;

d. The analytical techniques or methods used; and

e. The results of all required analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Monthly Operating Report. Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the Michigan Water Resources Commission.

C. SCHEDULE OF COMPLIANCE

1. The permittee shall continue to operate the installed facilities to achieve the effluent limitations specified for outfalls 001, 002.

2. The permittee shall comply with the requirements of Section 10, Part II-A in accordance with the following:

a. Submit plans for approval to the Chief of the Surface Water Quality Division necessary to comply with the primary power provision of Section 10 in Part II on or before NA.

b. The permittee shall comply with the requirements of items 10a or 10b contained in Part II on or before NA. Notwithstanding the preceding sentence, the permittee shall at all times halt, reduce or otherwise control production in order to protect the waters of the State of Michigan upon reduction or loss of the primary source of power.

3. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written statement of compliance or noncompliance. In the latter case, the statement shall include the cause of noncompliance, any remedial actions taken and the probability of meeting the next scheduled requirement. Failure to submit the written statement is just cause to pursue enforcement action pursuant to the Commission Act and the Part 21 Rules.

PART II

A. MANAGEMENT REQUIREMENTS

1. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit.

It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Special Conditions, or terms of this permit constitutes a violation of Public Acts 245 of 1929, as amended, and/or PL 92-500, as amended, and constitutes grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of an application for permit renewal.

2. Change of Conditions

Any anticipated facility expansion, production increases, or process modification which will result in new, different, or increased discharges of pollutants must be reported by submission of a new application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to specify and limit any pollutant not previously limited.

3. Containment Facilities

The permittee shall provide facilities for containment of any accidental losses of concentrated solutions, acids, alkalies, salts, oils, or other polluting materials in accordance with the requirements of the Michigan Water Resources Commission Rules, Part 5. This requirement is included pursuant to Section 5 of the Michigan Water Resources Commission Act, 1929 PA 245, as amended, and the Part 5 rules of the General Rules of the Commission.

4. Operator Certification

The permittee shall have the waste treatment facilities under direct supervision of an operator certified by the Michigan Water Resources Commission, as required by Section 6a of the Michigan Act.

5. Noncompliance Notification

If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit, the permittee shall provide the Chief of the Surface Water Quality Division with the following information, in writing, within five (5) days of becoming aware of such condition:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and the steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

6. Spill Notification

The permittee shall immediately report any spill or loss of any product, by-product, intermediate product, oils, solvents, waste material, or any other polluting substance which occurs to the surface waters or groundwaters of the state by calling the Department of Natural Resources 24-hour Emergency Response telephone number 1-800-292-4706; and the permittee shall within ten (10) days of the spill or loss, provide the state with a full written explanation as to the cause and discovery of the spill or loss, cleanup and recovery measures taken, preventative measures to be taken, and schedule of implementation. This requirement is included pursuant to Section 5 of the Michigan Water Resources Commission Act, 1929 PA 245, as amended.

7. Facility Operation

The permittee shall at all times properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

8. Adverse Impact.

The permittee shall take all reasonable steps to minimize any adverse impact to the surface or groundwaters of the state resulting from noncompliance with any effluent limitation specified in this permit including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the discharge in noncompliance.

9. By-Passing

Any diversion from or by-pass of facilities necessary to maintain compliance with the terms and conditions of this permit is prohibited, except (i) where unavoidable to prevent loss of life, personal injury, or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. The permittee shall promptly notify the Michigan Water Resources Commission and the Regional Administrator, in writing, of such diversion or by-pass.

10. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. Provide an alternative power source sufficient to operate facilities utilized by permittee to maintain compliance with the effluent limitations and conditions of this permit which provision shall be indicated in this permit by inclusion of a specific compliance date in each appropriate "Schedule of Compliance for Effluent Limitations".

b. Upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

11. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed from or resulting from treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters, or the entry of toxic or harmful contaminants thereof onto the groundwaters in concentrations or amounts detrimental to the groundwater resource.

12. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee) has occurred, the permittee who wishes to establish the affirmative defense of upset shall notify the Chief of the Surface Water Quality Division by telephone within 24 hours of becoming aware of such conditions and within five (5) days, provide in writing, the following information:

a. That an upset occurred and that the permittee can identify the specific cause(s) of the upset;

b. That the permitted wastewater treatment facility was, at the time, being properly operated;

c. That the permittee has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with his permit.

In any enforcement proceedings, the permittee seeking to establish the occurrence of an upset, has the burden of proof.

13. Any requirement of this permit which is included under the unique terms of Michigan, the Water Resources Commission, Act 245, P.A.1929 , as amended, and rules promulgated thereunder, is not enforceable under the Federal Clean Water Act regulations.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Executive Secretary of the Michigan Water Resources Commission, the Regional Administrator and/or their authorized representatives, upon the presentation of the credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

2. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Michigan Water Resources Commission and the Regional Administrator.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Act and Rule 2128 of the Water Resources Commission Rules, Part 21, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State Water Pollution Control Agency and the Regional Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act and Sections 7 and 10 of the Michigan Act.

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully, all relevant facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

5. Toxic Pollutants

Notwithstanding Part II, B-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

6. Civil and Criminal Liability

Except as provided in permit conditions on "By-Passing" (Part II, A-9) and "Power Failures" (Part II, A-10), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond his control, such as accidents, equipment breakdowns, or labor disputes.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee may be subject under Section 311 of the Act except as are exempted by federal regulations.

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any Federal, State or local laws or regulations, nor does it obviate the necessity of obtaining such permits or approvals from other units of government as may be required by law.

10. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances, if held invalid, the application of such provision ot other circumstances, and the remainder of this permit, shall not be affected thereby.

11. Notice to Public Utilities (Miss Dig)

The issuance of this permit does not exempt the permittee from giving notice to public utilities and complying with each of the requirements of Act 53 of the Public Acts of 1974, being sections 460.701 to 460.718 of the Michigan Compiled Laws, when constructing facilities to meet the terms of this permit.

PERMIT CONDITIONS

PART III

A. GROUNDWATER DISCHARGE AUTHORIZATION

The permittee is authorized to discharge from its wastewater treatment facility to the groundwaters of the state in accordance with the conditions below. This authorization shall continue until the Michigan Water Resources Commission makes its final determination on a state groundwater discharge permit.

B. GROUNDWATER DISCHARGE REQUIREMENTS

During the period beginning on the date of issuance of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge process wastes and sanitary wastes to the groundwater. Such discharges shall be monitored by the permittee as specified below:

Process wastes shall be disposed of into the ground in such a manner and by means of such facilities and at such location that they shall not injuriously affect public health, welfare, or commercial, industrial, domestic, agricultural, recreational, or other uses of the underground waters.

Monitoring requirements for boiler water treatment systems process water (water softener, clarifiers, make-up demineralizers) and boiler cleaning water prior to discharge into the ground.

PARAMETER TO BE MEASURED	FREQUENCY	TYPE OF SAMPLE
Flow	Continuous	
pH	Continuous	Daily maximu, minimum
Cadmium	At times of boiler cleaning water discharge	Grab
Oil & Grease	Weekly	Grab
Sulfate (SO_4)	At all times when regeneration of ion exchange resins occurs	24-Hr. Composite
Chloride (CL)	Weekly	24-Hr. Composite
Total Phosphorus	Weekly	24-Hr. Composite
Chemical Oxygen Demand	Weekly	24-Hr. Composite
Total Dissolved Solids	At all times when regeneration of ion exchange resins occurs	24-Hr. Composite

Monitoring requirements for sanitary wastewaters prior to discharge into the ground:

PARAMETER TO BE MEASURED	FREQUENCY	REPORT
Flow	Continuous	
State which seepage area is being utilized	List when seepage areas are alternated	List beginning and ending date and time of use of each seepage area

Part III-B (continued)

Monitoring requirements for groundwater collected in monitoring wells:

PARAMETER TO BE MEASURED	FREQUENCY	TYPE OF SAMPLE
Record static water elevation	Quarterly	Reading at time of sampling
pH	Quarterly	Grab
Total Chromium (Cr)	Quarterly	Grab
Copper (Cu)	Quarterly	Grab
Sulfate(SO_4)	Quarterly	Grab
Chloride (Cl)	Quarterly	Grab
Hardness	Quarterly	Grab
Nitrate-Nitrogen as N	Quarterly	Grab
Sodium (Na)	Quarterly	Grab
Polychlorinated Biphenyls	Quarterly	Grab
Chemical Oxygen Demand	Quarterly	Grab
Boron (B)	Quarterly	Grab
Total Phosphorus (P)	Quarterly	Grab
Total Dissolved Solids	Quarterly	Grab
Cadmium	Quarterly	Grab
Oil & Grease	Quarterly	Grab

Permit No. MI 0005827

MIXING ZONE

Facility: Indiana & Michigan Electric Company

Outfall Number	Receiving Water	Discharge Location
001, 002, 003	Lake Michigan	Berrien County, Lake Township (Town 6S, Range 19W) Sections 5, 6, 7 & 8

The mixing zone for purposes of evaluating compliance with the State Water Quality Standards is defined as an area of Lake Michigan equivalent to that of a circle with a radius of 2811 feet (570 acres) centered at the point of discharge.

Appendix 1.2

ENVIRONMENTAL EVALUATIONS

ATTACHMENT B

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AMERICAN ELECTRIC AEP POWER SYSTEM

DATE: March 31, 1987

SUBJECT: Environmental Assessment for the New Containment Access Building

FROM: T. G. Harshbarger

TO: Environmental File DG-RS-7915

The purpose of this memo is to document that there is no need for an Environmental Evaluation of the construction and use of the Containment Access Building. This memo is being written pursuant to Radiological Support Section Procedure 34.

The Containment Access Building will be a two story structure located at the east end of the Auxiliary Building inside the plant protected area. The Containment Access Building will encompass approximately 11,000 square feet and will be used by repair project personnel as a dress-out facility and radiation protection office. Project personnel will use this building to access Unit 2 containment.

Because the Containment Access Building will be constructed inside the protected area, an area that is currently asphalted, there will be no impact to the geology, hydrology, biological resources or the cultural resources. In addition, because the activity will take place next to an established industrial site aesthetics and noise associated with the activity will not adversely affect the environment. In addition, the activity does not change any plant effluent.

Therefore, it is concluded that the actions described above do not affect the environment and there is no need to conduct an Environmental Evaluation as described in Section 3.1 of the Appendix B Technical Specifications. Construction of the Containment Access Building may proceed.

Prepared by: T. G. Harshbarger
T. G. Harshbarger

Approved by: S. J. Brewer
S. J. Brewer, Manager, Radiological Support Section

edg

cc: S. A. Heinecke
J. D. White
D. Fitzgerald-Stuart

AMERICAN ELECTRIC POWER SERVICE CORPORATION

DATE: April 1, 1987

SUBJECT: Steam Generator Repair Project
Environmental Assessment of the Site Access Building

FROM: T. G. Harshbarger

TO: Environmental File DC-RS-7915

The purpose of this memo is to document that there is no need for an Environmental Evaluation of the construction and use of the Site Access Building. This memo is being written pursuant to Radiological Support Section Procedure 34.

The Site Access Control Building will be a single story structure located on the protected area fence at the south side of the plant. The Site Access Control Building will encompass approximately 3,000 square feet and will be used by repair project personnel requiring access to the plant protected area. This facility will house a bullet proof guard island, three ingress lanes equipped with explosive sniffers, metal detectors, and x-ray machines, and three exit lanes equipped with portal radiation monitors.

Because the Site Access Control Building will be constructed along the protected area fence, an area previously disturbed and void of any habitat, there will be no impact to the geological, hydrological, ecological or cultural resources associated with plant environs. In addition, because the facility is being constructed next to an established industrial site, aesthetics and noise impacts associated with the construction and use are not significant. The construction and use of the Site Access Control Building does not change any plant effluent.

Therefore, it is concluded that the actions described above do not adversely affect the environment and there is no need to conduct an Environmental Evaluation as described in Section 3.1 of Appendix B to the Facility Operating License. Construction of the Site Access Control Building may proceed.

Prepared by: T. G. Harshbarger
T. G. Harshbarger

Approved by: S. O. Brewer
S. O. Brewer, Manager, Radiological Support Section

edg
cc: S. A. Heinecke
D. Fitzgerald-Stuart
J. D. White

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AMERICAN ELECTRIC AEP POWER SYSTEM

DATE: April 7, 1987

SUBJECT: Steam Generator Repair Project
Environmental Assessment of the Gas Cylinder Storage Building

FROM: T. G. Harshbarger

TO: Environmental File DC-RS-7915

The purpose of this memo is to document that there is no need for an Environmental Evaluation of the construction and use of the Gas Cylinder Storage Building. This memo is being written pursuant to Radiological Support Section Procedure 34.

The Gas Cylinder Storage Building will be a single story structure attached to the south end of the Donald C. Cook Turbine Building. The Gas Cylinder Storage Building will encompass approximately 1300 square feet. This building will be used to store cylinders containing pressured gas used for welding, instrumentation calibration, and other activities associated with the Steam Generator Repair Project and normal Plant operations.

Because the Gas Cylinder Storage Building will be located inside the protected area fence on an area previously disturbed and void of any habitat, there will be no impact to the geological, hydrological, ecological or cultural resources associated with the plant environs. In addition, because the storage building is being constructed next to an established industrial site, aesthetics and noise impacts associated with the construction and use of the Gas Cylinder Storage Building does not change any plant effluent.

Therefore, it is concluded that the actions described above do not adversely affect the environment and there is no need to conduct an Environmental Evaluation as described in Section 3.1 of Appendix B to the Facility Operating License, Construction of the Gas Cylinder Storage Building may proceed.

Prepared by: T. G. Harshbarger

Approved by: S. J. Brewer, Manager, Radiological Support Section

edg

cc: S. A. Heinecke
D. Fitzgerald-Stuart
J. D. White

AMERICAN ELECTRIC POWER SERVICE CORPORATION

DATE: May 1,1987

SUBJECT: Environmental Assessment for the Turbine Room Sump Pump Discharge Line

FROM: T. G. Harshbarger

TO: Environmental File DC-RS-7915

The purpose of this memo is to document that there is no need for an Environmental Evaluation of the installation of the new turbine room sump pump discharge line. This memo is being written pursuant to Radiological Support Section Procedure 34.

The proposed activity involves the installation of a new 12-inch polyethylene turbine room sump pump discharge line. This activity is required because the existing discharge line has suffered a number of line breaks in the past. Replacement of this line will eliminate costly repairs, and environmental regulatory and operational problems that result form the line breaks.

Because the new discharge line will be installed next to the existing discharge line, an area previously disturbed by the installation of the existing line, there will be minimal impact to the geological, hydrological, biological and cultural resources associated with the discharge line route. In addition, a number of measures aimed at mitigating impacts to the environment have been included as part of the work specification and contract. These mitigative measures include limitations on machinery movement, dewatering activities, storage and handling of oil, and limitations on the removal of vegetation. The proposed activity does not change any plant effluent.

Therefore, it is concluded that the activity described above does not significantly affect the environment and there is no need to

conduct an Environmental Evaluation as described in Section 3.1 of the Appendix B Technical Specifications. Installation of the new turbine building sump pump drain may proceed.

Prepared by: T. G. Harshbarger

Approved by: S. J. Brewer, Manager, Radiological Support Section

cc: W. G. Smith, Jr. - Bridgman
L. S. Gibson - Bridgman
T. A. Kriesel - Bridgman
D. Fitzgerald-Stuart - Bridgman
E. F. Mallen - Bridgman
[redacted]
A. J. Lewandowski - Columbus

AMERICAN ELECTRIC POWER SERVICE CORPORATION

DATE: May 29, 1987

SUBJECT: Steam Generator Repair Project
Environmental Assessment of the Fabrication Shop/Warehouse

FROM: T. G. Harshbarger

TO: Environmental File DC-RS-7915

The purpose of this memo is to document that there is no need for an Environmental Evaluation of the construction and use of the Fabrication Shop/Warehouse Building. This memo is being written pursuant to Radiological Support Section Procedure 34.

The Fabrication Shop/Warehouse Building will be a single story structure located outside the protected area fence south of the plant proper. The site is currently occupied by house trailers used by the training department. A portion of the site is also used for laydown space and parking. The Fabrication Shop/Warehouse Building will encompass approximately 10,000 square feet and will be used during the repair project for storage, field fabrication, and mock-up training. The building will have a concrete foundation and will be a pre-engineered steel structure with siding.

Because the Fabrication Shop/Warehouse Building will be constructed on an area previously disturbed and void of any habitat, there will be no impact to the geological, hydrological, ecological or cultural resources associates with plant environs. In addition, because the facility is being constructed next to an established industrial site, aesthetics and noise impacts associated with the construction and use of the Fabrication Shop/Warehouse Building are not significant. The construction and use of the Fabrication Shop/Warehouse Building does not change any plant effluent.

Therefore, it is concluded that the actions described above do not adversely affect the environment and there is no need to conduct an Environmental Evaluation as described in Section 3.1 of Appendix B to the Facility Operating License. Construction of the Fabrication Shop/Warehouse Building may proceed.

Prepared by: T. G. Harshbarger

Approved by: S. W. Brewer, Manager, Radiological Support Section

edg
cc: S. A. Heinecke
D. [redacted]
J. D. White

ATTACHMENT C

INDIANA & MICHIGAN ELECTRIC COMPANY

DONALD C. COOK NUCLEAR PLANT

ENVIRONMENTAL EVALUATION

FOR

THE TEMPORARY ON-SITE STEAM GENERATOR STORAGE FACILITY

Prepared by: T. D. Jarshberg

Approved by: S J Brewer
S. J. Brewer, Manager, Radiological Support Section

Concurred by: Diane Fitzgerald-Stuart
Donald C. Cook Environmental Coordinator

I. EXECUTIVE SUMMARY

This Environmental Evaluation was conducted to determine if the construction and use of the temporary on-site steam generator storage facility constitutes an unreviewed environmental question pursuant to Part II, Section 3.1 of the Donald C. Cook Plant Environmental Technical Specifications.

The temporary on-site steam generator storage facility will be used to store the steam generator lower assemblies that will be replaced as the result of the Unit 2 Steam Generator Repair Project.

Based on this Environmental Evaluation it is concluded that the construction and use of the temporary on-site steam generator storage facility is not an unreviewed environmental question. Therefore, it will not be necessary to obtain approval from the Nuclear Regulatory Commission prior to the start of the construction of the temporary on-site steam generator storage facility.

II. PURPOSE OF THIS ENVIRONMENTAL EVALUATION

The purpose of this environmental evaluation is to determine if the construction and use of the temporary on-site steam generator storage facility constitutes an unreviewed environmental question as defined by Part II, Section 3.1 of the Donald C. Cook Plant Environmental Technical Specification.

As stated in Part II, Section 3.1 of the Donald C. Cook Plant Environmental Technical Specifications, "A proposed change, test or experiment shall be deemed to involve an unreviewed environmental question if it concerns (1) a matter which may result in a significant increase in any adverse environmental impact previously evaluated in the final environmental statement (FES) as modified by staff's testimony to the Atomic Safety and Licensing Board, supplements to the FES, environmental impact appraisals, or in any decisions of the Atomic Safety and Licensing Board; or (2) a significant change in effluents or power level [in accordance with 10 CFR Part 51.5(b)(2)] or (3) a matter not previously reviewed and evaluated in the documents specified in (1) of the Subsection, which may have a significant adverse environmental impact."

III. DESCRIPTION OF THE PROPOSED ACTIVITY

The Indiana & Michigan Electric Company is planning to repair the four Donald C. Cook Nuclear Plant Unit No. 2 Steam Generators by replacement to the steam generator lower assemblies. This repair effort will include the disposal of the replaced steam generator lower assemblies. The objectives of this disposal operation are as follows:

- To dispose of the steam generator lower assemblies safely and economically.

- To provide a method of disposing of the steam generator lower assemblies while keeping the radiation exposure levels to personnel as low as reasonably achievable.

- To minimize the release potential of radioactivity to the environment to ensure that radiation exposure to the public is as low as is reasonably achievable.

- To comply with all federal, state, and local regulations.

To meet these objectives, the lower assemblies will be temporarily stored on-site until it is feasible from both an economical and dose expenditure standpoint to dispose of the lower assemblies at a licensed burial facility. Difficulties with immediate off-site shipment to a licensed burial facility are discussed in Section VI.

To store the steam generator lower assemblies on-site a temporary on-site steam generator storage facility will be constructed. This storage facility will be located just east of the 345 kV switchyard (see Figure 1). The structure will be at grade level and will be blocked from view by the area terrain.

The temporary on-site steam generator storage facility will be designed as a Class III structure in accordance with the requirements of the American Concrete Institute Standards ACI-318-83, the AISC Manual of Steel Construction, eighth edition, and the Michigan State Building Code. The concrete will have a design strength of f'c = 3500 PSI at 28 days and be reinforced with ASTM A-615 grade 60 reinforcing steel. See Figure 2 for details of temporary on-site steam generator storage facility.

A drainage system with a collection sump will be included in the foundation. Any liquids collected in the sump will be monitored through an outside accessible port. Additional ports will be included to facilitate radiological monitoring. All ports will be sealed and locked when not in use. High Efficiency Particulate Absolute (HEPA) filters will be installed on all air equalization ports. Access for changing filters will be on the outside with the access locked.

A radiological monitoring program will be established as part of the temporary on-site steam generator storage facility procedures. The surface radiation levels will not exceed those listed in 10 CFR 20.105, "Permissible Levels of Radiation in Unrestricted Areas" using concrete wall thickness to provide necessary shielding. Ground water observation wells will be installed to monitor the area ground water.

The temporary on-site stream generator storage facility and the steam generator lower assemblies are non-combustible which will eliminate the need for any permanently installed fire detection or suppression systems. The floor and the walls up to a height of one foot will be coated with a protected coating system to facilitate clean-up.

The maximum water level increase along the lake shore at the plant site should not exceed 8 feet. The temporary on-site steam generator storage facility will be located approximately 5,000 feet from Lake Michigan and at an elevation approximately 35 feet above the lake level, which will eliminate any concern with flooding.

Access will be through vestibules at the northeast corner of the temporary on-site steam generator storage facility. Vestibules are approximately 6' x 6' x 8' high inside dimensions. Exterior doors will be made of 3'0" x 6'8" steel doors with louvers. Interior doors will be made of 3'8" x 6'8" steel doors with gaskets to provide air seal and 6" high door sill above vestibule floor level. Interior and exterior doors will have security locks.

IV. DESCRIPTION OF THE AFFECTED AREA

A. Location

The temporary on-site steam generator storage facility will be located east of the 345 kV switchyard and north of the security force pistol range (see Figure 1). The facility will occupy approximately 4200 square feet. The site for the storage facility is a level area of approximately 3 acres surrounded on two sides by plant access roads and on two sides by low sand dunes covered with scrub growth. This site was used during plant construction as a lay down area and has remained void of wildlife habitat.

B. Geology and Soils

Soils of the site are comprised of dune sands and glacial till deposits.

Underlying the sand and till is bedrock consisting of shale, limestone, sandstone, and dolomite.

C. Groundwater and Surface Water

The groundwater table has remained unchanged since the issuance of 1973 Final Environmental Statement for the operation of the D. C. Cook Plant.

There are no significant surface water resources associated with the site.

D. Biological Resources

1. Terrestrial Ecology

As stated earlier the site was previously used as a laydown area during original plant construction. The site has demanded void of vegetation growth with the exception of sparse clumps of annual grasses. The site is also sprinkled with very young shoots of sumac.

The lack of vegetation precludes the area from providing substantial wildlife habitat.

2. Aquatic Ecology

As stated earlier in this evaluation, no significant surface water resources are associated with this site.

E. Cultural Resources

1. Land Use

The site that will be occupied by the storage facility is currently an unused vacant area. Adjacent land use includes wooded dunes to the north and east and plant access roads to south and west.

As stated above, the site is a previously disturbed area that was used during initial plant construction.

2. Archaeology

Previous construction evacuation in the immediate area of the storage facility site have not unearthed any artifacts or other examples of archaeological significance. These previous excavations in the construction of the 365 kV switchyard, construction of the access road and construction of the pistol range and warehouse.

V. ENVIRONMENTAL IMPACTS

A. Geological and Soils

Soil removed during the excavation of the storage facility foundation will either be used as backfill or placed in an approved spoils area.

B. Surface and Ground Water

The excavation for the storage facility foundation is not expected to be deep enough to cause any impact on the area watertable.

In addition, due to the small amount of soil that will be displaced there is not expected to be any significant runoff from the construction site.

C. Biological Resources

1. Terrestrial Ecology

Impacts to terrestrial ecology could result from the removal of habitat in the area and/or the intrusion of workers and machinery near adjacent habitat. However, these impacts do not appear to be significant for the following reasons:

a. No habitat will be removed as a result of this construction activity since the site is void of existing habitat. Machinery will be limited to areas previously disturbed and the removal of existing habitat on the north and east side will be prohibited.

b. Since the area affected is already subjected to the intrusion of man and machinery (i.e. periodic security patrols, use of the pistol range and use of the warehouse) animals residing in the areas adjacent to the construction should not be disturbed by the increased activity.

2. Aquatic Ecology

No significant surface water resources exist close enough to the construction site to be affected by the proposed project.

D. Cultural Resources

1. Land Use

The affected area has been previously disturbed and is currently sitting idle. The construction of this storage facility will remove this land from other use for as long as 30 years. However, because of the poor growing condition of the soil and lack of an alternative productive use of this site this change in land use is not considered an adverse impact.

2. Archaeology

No archaeological resources are known to exist in the area based on previous construction excavations.

E. Noise

Noise levels generated by construction equipment during the construction site is not expected to be a nuisance due to the location of the site.

VI. ALTERNATIVES TO THE PROPOSED ACTIVITY

A. Off-Site Storage

This alternative has two major options:

- o Intact shipment to a licensed burial facility.
- o Sectioning at the site and shipment to a licensed burial facility.

The major difficulty associated with the intact shipment of the lower assemblies is their relatively high degree of radioactivity. Immediate shipment would not be possible under Department of Transportation regulations. To meet these regulations, the assemblies could be placed in casks or decontaminated. Obtaining casks of the magnitude necessary to hold an intact steam generator is not feasible. Decontamination would result in the expenditure of additional man-rem and would pose other potential problems such as gaseous and liquid releases. It would be difficult to meet the regulations even with decontamination because of the number of plugged tubes which could not be easily deconned. Decontamination would also raise the economic costs involved.

Sectioning of the steam generator lower assemblies will add a large man-rem burden to the project. This option also increases economic costs by requiring extra shipments and enclosure envelopes for the cutting process.

VII. SUMMARY COST-BENEFIT ANALYSIS

Not Applicable.

VIII. ENVIRONMENTAL CONTROLS

The following environmental controls shall be utilized to minimize the environmental impacts associated with the steam generator repair program. These environmental controls shall be reviewed by the contractor prior to the start of work. In addition, it is recommended that these environmental controls be included as part of the contractor work specifications.

A. Noise

To reduce the impact of noise on the surrounding community, the majority of the construction activities involving the use of heavy machinery will take place only during the day shift. If second shift construction activity involving heavy machinery must occur, it will end by 9:00 p.m. Noise from internal combustion engines will be controlled by the use of exhaust mufflers.

B. Limitations of Machinery Movement

No machinery will be allowed to operate in areas not previously disturbed by construction activities. If areas not previously disturbed are inadvertently impacted by machinery, it will be the responsibility of the contractor operating the machinery to restore the disturbed area to its original state.

C. Handling and Storage of Oil

The handling and storage of oil will be conducted in accordance with the D. C. Cook policies and procedures.

D. Environmental Monitoring

Periodic inspections of the construction activities will be conducted. If any of the construction activities appear to be causing significant environmental impacts, appropriate actions will be taken.

E. Permits

A list of State and local permits needed to begin construction activities at D. C. Cook will be developed by the D. C. Cook Environmental Section and the AEPSC Radiological Support Section. However, it will be the responsibility of the contractor to obtain the required permits.

IX. CONCLUSION

It is concluded that with the proper mitigation practices as outlined in the Environmental Controls Section of this report, no significant adverse environmental impact will result from the proposed activity and that there are no preferable alternatives to the proposed action.

It is further concluded that the construction of the storage facility, as described above, does not involve an unreviewed environmental question pursuant to Part II, Section 3.1 of the Donald C. Cook Plant Environmental Technical Specifications.

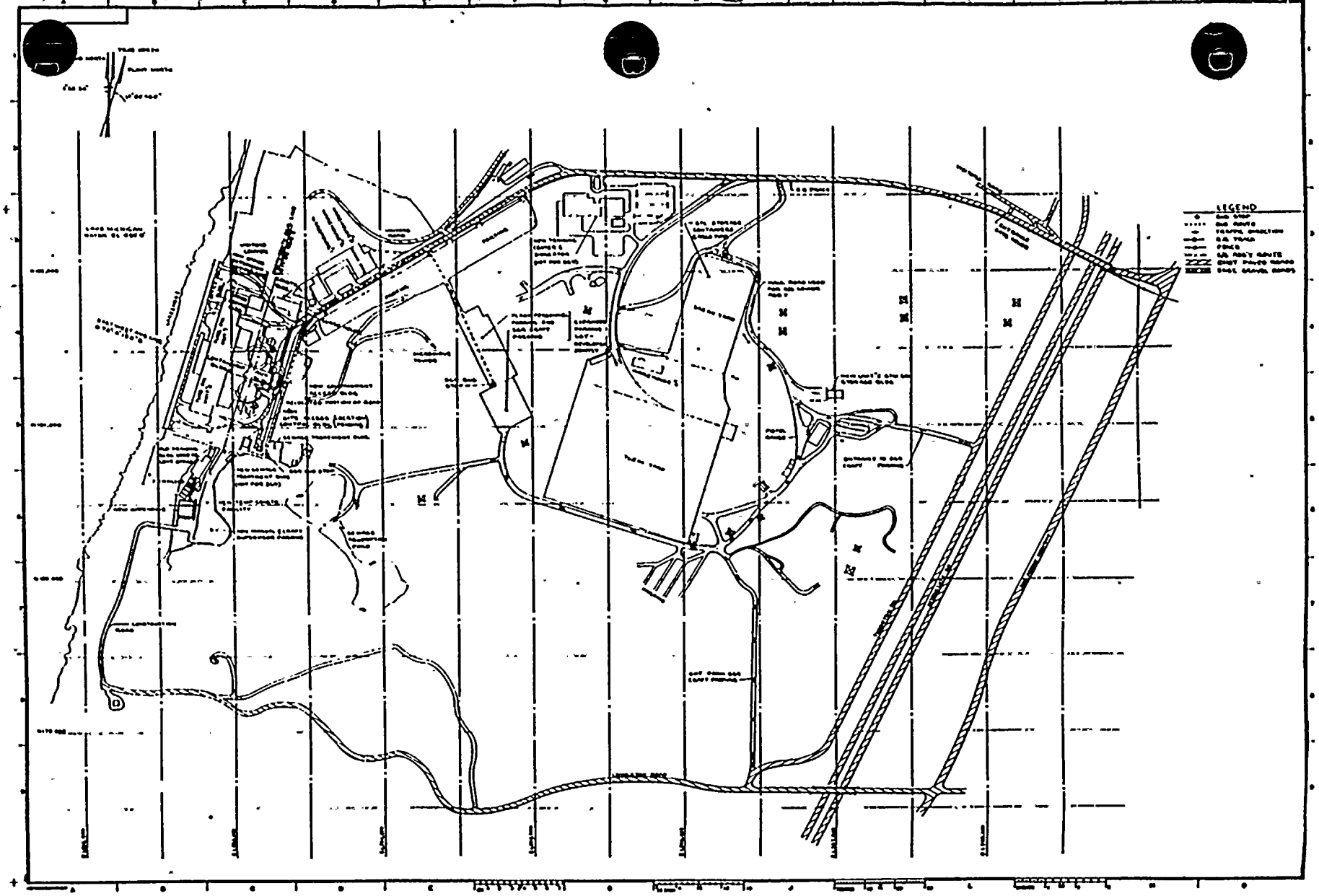


FIGURE 1

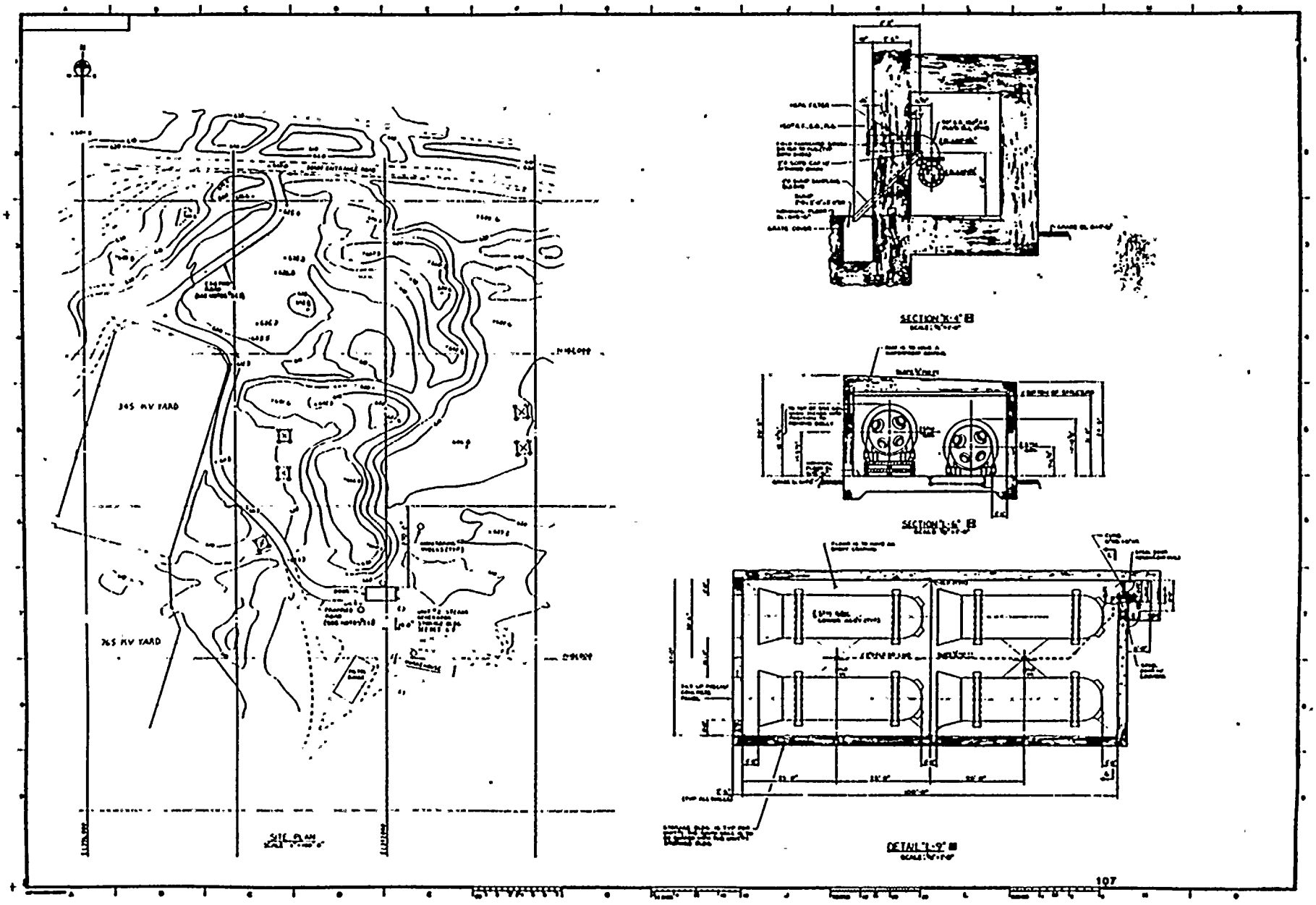


FIGURE 2

Appendix 1.3

NPDES Non-Routine Reports - 1987

ATTACHMENT D

NONROUTINE REPORTS

EVENT DATE	DESCRIPTION
4/10/87	Heating Boiler Fuel Oil Spill - An estimated 10 gallons of No. 2 fuel oil was spilled to Lake Michigan.
4/14/87	Heating Boiler Blowdown - Total Suspended Solids concentration exceeded NPDES Permit limit.
5/18/87	Turbine Room Sump - Flow Integrator was inoperable while discharges occurred.
6/28/87	Turbine Room Sump - Process pH Meter was inoperable while discharges occurred.
7/30/87	Turbine Room Sump - Process pH Meter was inoperable while discharges occurred.
8/5/87	Unit 2 Circulating Water Discharge - Total Residual Chlorine concentration exceeded NPDES Permit limit.
8/8/87	Unit 2 Circulating Water Discharge - Total Residual Chlorine concentration exceeded NPDES Permit limit.
8/9/87	Unit 2 Circulating Water Discharge - Total Residual Chlorine concentration exceeded NPDES Permit limit.
9/2/87	Turbine Room Sump overflowed to Lake Michigan.
10/5/87	Unit 1 Circulating Water Discharge - Total Residual Chlorine concentration exceeded NPDES Permit limit.
11/17/87	Unit 1 Circulating Water Discharge - Total Residual Chlorine concentration exceeded NPDES Permit limit.

American Electric Power System
INDIANA & MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR PLANT
P.O. Box 458, Bridgeman, MI 49106
Telephone (616) 465-5901

June 19, 1987

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Operating License DPR-58
Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled Licensee Event Reporting System, the following report is being submitted:

87-007-0

Sincerely,

W. G. Smith, Jr.
Plant Manager

/afh

Attachment

cc: A. B. Davis, Region III
D. L. Wigginton, NRC
J. E. Dolan
M. P. Alexich
R. F. Kroeger
H. B. Brugger
R. W. Jurgensen
G. Charnoff, Esq.
R. C. Callen, MPSC
D. Hahn, MDPH
INPO
NRC Resident Inspector
Dottie Sherman, ANI Library
A. A. Blind
PNSRC
File

Page 2 of 5

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
D. C. COOK NUCLEAR PLANT - UNIT 1	0 5 0 0 0 3 1 5	1 OF 0 3

TITLE (4) MISSED EVENT INITIATED SURVEILLANCE DUE TO FAILURE TO RECOGNIZE FLOW RECORDER EFFECT ON SAMPLER

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 5	2 0	8 7	8 7	— 0 0 7	— 0 0	0 6	1 9	8 7	D. C. Cook Plant-Unit 2	0 5 0 0 0 3 1 6
										0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 7 9	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
T. P. Beilman I&C/Planning Department Superintendent	AREA CODE 6 1 6 4 6 5 - 1 5 9 0 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On May 20, 1987 at 1520 hours, the Turbine Room Sump effluent discharge flow sensor and recorder, DFR-700, was removed from service for routine calibration. It was not recognized at that time that the Turbine Room Sump sample compositor received input from the flow instrument. Due to problems encountered, the compositor remained inoperable overnight and the eight hour samples were not analyzed as required by the action statement of Technical Specification 3.3.3.9.

The error was discovered on May 21 1987 at 0730 hours and manual sampling was begun. The instrument was returned to an operable condition by 1500 hours.

To prevent possible recurrence, Instrumentation personnel who may become involved with this instrument have been informed of this finding. Also, a sign has been added to the recorder informing personnel of its input to the Technical Specification required compositor.

Conditions Prior to Occurrence

Unit One - Mode 1 (power operation) - 79 percent reactor thermal power.
Unit Two - Mode 1 (power operation) - 80 percent reactor thermal power.

Description of Event

On May 20, 1987 at 1520 hours, the Instrumentation and Control (I&C) Section was calibrating the Turbine Room Sump effluent discharge flow recorder (EIIS/FR) for routine preventive maintenance. For this work, the flow sensor is disconnected from the recorder and test equipment is connected to supply a standardized simulated input. The calibration was not completed by the end of the shift and the test equipment was left connected and turned off. This action resulted in making the automatic sample compositor (EIIS/ASV) inoperable due to the simulated no-flow signal being applied.

The Chemical Section performs four-hour checks on the compositor receiver to verify automatic operation of the compositor. Due to abnormal work on the Turbine Room Sump causing very intermittent discharge flow, little increase in sample collection was expected. The compositor actuation was verified manually each time, but the automatic signal was not known to be inoperable.

However, by 0730 hours on May 21, 1987 when no increase in sample was noted, manual sampling was begun due to suspected failure of the automatic sampling. By 1045 hours, the failure was confirmed by direct observation of flow from the sump with no automatic sample being taken by the compositor.

There were no inoperative structures, components or systems at the start of the event that contributed to the missed surveillance.

Cause of Event

The cause of the event was the failure to recognize that the recorder supplies a signal input to the compositor, and to make contingency plans for removing the compositor from service. As the recorder's effect was learned during the calibration, the fact that the compositor being required by Technical Specification was not identified through job order evaluation (prior to job performance).

Analysis of Event

The compositor was inoperable approximately 23.5 hours. Sampling and analysis of the effluent flow was not performed for approximately 16 hours. This incident is considered as a missed surveillance and reportable under 10CFR50.73 due to the fact that eight-hour alternate analysis was not performed as required by the action statement of Technical Specification 3.3.3.9.

As the Turbine Room Sump sample compositor is the last point monitored for radioactive discharge, the related front line radiation monitors were reviewed for that time period and found to be operable. The daily sample requirement of the NPDES permit was determined to be met. A special report was required to estimate flow for the time the recorder was being calibrated, which was submitted.

Corrective Actions

When the Chemical Section notified I&C of the problem with the compositor, steps were taken to restore the recorder. The compositor was declared operable at 1500 hours on May 21, 1987.

To prevent recurrence, the I&C supervisors and job order evaluation group have been informed of the findings in this system. Also, a sign has been added to the recorder informing personnel of its input to the Technical Specification required compositor.

Failed Component Identification

None.

Previous Similar Events

None.

Appendix 1.4

Herbicide Application Program - 1987

ATTACHMENT F

INDIANA MICHIGAN POWER

Date February 18, 1988

Subject 1987 Herbicide Spray Report - D. C. Cook Plant

From Dane M. McKay

To H. E. Brooks

SUMMARY OF PROGRAM

A. During April, May, June and July St. Joseph Division spraying crew used a mixture of Krovar I and Oust to control grass and weed growth on the plant site. Locations treated include: KV yards, roadways, parking lots, perimeters of the sewage ponds and controlled/uncontrolled areas inside the plant fence. A total of 288 lbs. of Krovar I and 5.12 lbs. of Oust were used. (See Attachment 1.)

B. Last fall, tree cutting was performed for right-of-way maintenance beneath the 345KV, 765KV, and 694KV transmission lines. A total of 2 gallons of Tordon 101R was applied to stumps over 1.6 acres to control resprouting (see letter from R. J. Cheeney) attached.

C. Major Areas Covered and the Observations made in November and December (See Attachment 1).

1. Sewage Pond: Very good weed control around ponds and in road, no weeds found at all.

2. Road to absorption pond: Roadway here is starting to become overgrown with grass and weeds.

3. Unit 1 Main Transformer: Excellent control, no weeds.

4. Unit 2 Main Transformer: Excellent control, no weeds.

5. Unit 2 Diesel Fuel Oil Tank Unloading Area: 10' x 20' patch of grass and weeds growing between road and south end of Turbine Building.

Intra-System

6. Construction & Security Office Building and Guard Island: Excellent control, no weeds found.

7. Hydrogen and Nitrogen Storage Tank Area (near 609' East Aux Building Cranebay): 4 weeds found growing along concrete dock. Remaining area is clear of grass and weeds.

8. East Perimeter Fence: Excellent weed control, no weeds found.

9. South Perimeter Fence: Excellent control, no weeds found.

10. West Perimeter Fence: Excellent control, no weeds found.

11. North Perimeter Fence: Grass growing along fence in some areas and also in dirt road adjacent to fence that leads to seawall.

12. Construction Sheet Metal Storage Area (at south end of Turbine Building): Grass, weeds, dandelions and 1 bush growing around storage area fence.

13. Unit 2 Start Up Transformer: Excellent control, no weeds found.

14. Hydro Nuclear Office Trailers (southwest end of Turbine Building): Excellent weed control, no weeds under or around trailers.

15. Numanco Office Trailer and Hydro Nuclear Crew Trailers (southwest end of Turbine Building): Excellent control, no weeds found.

16. Cimco Painters Shed: Excellent control, no weeds found.

17. Heating Boiler Fuel Oil Tank Unloading Area: Excellent control, no weeds found.

18. Gas Cylinder Storage Area: Excellent control, no weeds found.

19. Dayco Building: Good weed control, some grass growing around edge of building.

20. Contractors Supervisors Parking Lot: Excellent weed control, no weeds found.

21. Sewage Plant and 69 KV Switchgear Station: Patches of grass growing along the south and west sides of the sewage plant. Excellent weed control in switchgear station, no weeds found.

22. Q.A. Auditors Office: Excellent weed control, no weeds found.

23. Unit 1 Containment, RWST, CST, and PWST Storage Tank Areas:

    RWST: Excellent Control, no weeds found.

    CST: Weeds and grass growing on all sides at concrete base and sand interface.

    PWST: Weeds and grass growing on all sides at concrete base and sand interface.

    Excellent weed control around and under trailers in this area, no weeds found.

24. Unit 2 Containment, RWST, CST and PWST Storage Tank Areas:

    RWST: Weeds and grass growing on all sides at concrete base and sand interface.

    CST: Grass growing on all sides at concrete base and sand interface.

    PWST: Weeds and grass growing on all sides at concrete base and sand interface.

    Excellent weed control around and under HNS Laundry Trailer, no weeds found.

25. 345 KV Switchgear Yard: A few spots of grass growing along south and west sides of fence. Control is good in all other areas.

26. 765 KV Switchgear Yard: Grass found growing sparsely around all sides of fence.

27. 69/4 KV Lines: Large stumps show no signs of resprouting - appear to be dead. Small diameter oaks are resprouting at the base of their stumps and some sassafrass resprouting is apparent. Pines do not show signs of resprouting.

28. 765 KV Lines - Large stumps show no signs of resprouting - appear to be dead.

29. 345 KV Lines: Large stumps show no signs of resprouting - appear to be dead.

NOTE: The following is a list of areas that have been sprayed in the past as part of the Herbicide Spraying Program that are not included in this report for given reasons.

1. Visitors Parking Lot - Parking lot has been paved.

2. Contractors Parking Lot - Parking lot has been paved.

3. Plant Managers/Construction Storeroom Parking Lot - Parking lot has been paved.

4. Old Training Center - Major excavation and building in progress in this area.

5. Ice Crew, Westinghouse and ANR Trailers (next to east perimeter fence): All trailers have been removed.

6. Employee Picnic Lunch Area: Area has been filled in with cement.

7. Vehicle Entry Control Area: Area has been paved.

8. Unit 1 Diesel Fuel Oil Tank Unloading Area: Area has been covered with sod.

9. New Office Building Construction Area: Construction has been completed and building now has sod on 2 sides and pavement on the other.

The observations made in November and December clearly indicate that the thorough spraying program continues to control encroaching vegetation resulting in a reduction of maintenance costs and an increase in overall plant site visibility. The present resprouting rate of oaks and sassafrass beneath the 69/4 KV lines will become a maintenance concern in future years.

Dane M. McKay

DMM/js

cc: L. S. Gibson
D. Fitzgerald-Stuart
C. R. Mort
1987 Annual Environmental Operating Report

D. C. COOK NUCLEAR PLANT
HERBICIDE APPLICATION DATA
1987

Weed Spray Application by: B. H. Division I&M Electric Name: Dennis Runkel, Greg Myers

Date	Location	Krovar I Used Lbs.	# of Acres Covered	Lbs./ Krovar Per Acre	Gal-lons	Oust Used in Ozs.	# of Acres Covered	Ozs/Oust Per Acre
4-30-87	765 KV Yard	6	1	6	100	6	1	6
4-30-87	345 KV Yard	18	3	6	300	6	3	2
5-1-87	345 KV Yard	12	2	6	200	12	2	6
5-4-87	345 KV Yard	18	3	6	300	None	N/A	N/A
5-5-87	765 KV Yard	18	3	6	300	None	N/A	N/A
5-5-87	765 KV Yard	12	2	6	200	None	N/A	N/A
5-6-87	765 KV Yard	12	2	6	200	None	N/A	N/A
5-7-87	765 KV Yard	18	3	6	300	None	N/A	N/A
5-8-87	765 KV Yard	18	3	6	300	None	N/A	N/A
5-11-87	345 KV Yard	18	3	6	300	None	N/A	N/A
5-11-87	345 KV Yard	18	3	6	300	None	N/A	N/A
5-13-87	Protected Area Fence	30	3	10	300	18	3	6
5-15-87	Protected Area and Controlled Area Fences	30	3	10	300	18	3	
5-21-87	Visitors Parking Lot, Storeroom Parking Lot, and Craft Parking Lot	24	3	8	300	9	3	3
5-22-87	69KV Yard, Sewage Treatment Building, Old Training Building, Microwave Tower Area, Sewage Pond Area	24	3	8	300	9	3	3
6-17-87	R.R. Tracks	6	1	6	100	2	1	2
7-16-87	R.R. Tracks	6	1	6	100	2	1	2
		288 lbs	42 acres	114 lbs	4200 gallons	82 ozs.	20 acres	36 ozs.

SUMMARY: Used 288 lbs of Krovar I applied to approximately 42 acres
I.E. 168 lbs @ 6 lbs/acre - outer yards
120 lbs @ 8.57 lbs/acre - inner yards
5.12 lbs of Oust - All areas

INDIANA MICHIGAN POWER

Date January 26, 1988

Subject Cook Plant

From R. J. Cheeney

To E. Mallen

The following cutting and chemical usage was done at the Cook Plant during the month of December 1987.

Under the 345 KV generator leads in the 765 KV station:

Cut 70 trees and 70 brush units (35,000 square feet).
Used one gallon of Tordon 101R for stump treatment.

Under the 345 KV generator leads between the 765 KV station and the plant:

Cut 11 trees and 50 brush units (25,000 square feet).
Used 3/4 gallon of Tordon 101R for stump treatment.

Under the 765 KV generator leads between the 765 KV station and the plant:

Cut 5 trees and 20 brush units (10,000 square feet).
Used ½ gallon of Tordon 101R for stump treatment.

If you have any questions about the work, please call me at Extension 2254.

R. J. Cheeney

RJC:et

c: H. E. Brooks

Intra-System

Appendix 1.5

Corbicula Monitoring Program - 1987

ATTACHMENT A

A Technical Report To:

The D. C. Cook Nuclear Plant

American Electric Power Service Corporation

Indiana and Michigan Electric Company

RESULTS OF THE 1987 MONITORING PROGRAM (WITH A SUMMARY OF 1982-1986 RESULTS) TO DETECT THE ASIATIC CLAM (CORBICULA) IN THE VICINITY OF THE D. C. COOK NUCLEAR PLANT

By

David S. White
Benthos Laboratory
1061 North University Building
University of Michigan
Ann Arbor, MI 48109
(313) 764-7486

DRDA Contract

No. 83-1766-P1

December 9, 1987

SUMMARY

Entrainment, diver-collected sand and gravel samples, and beach areas at the D. C. Cook Nuclear Plant were examined for the presence of the Asiatic clam Corbicula fluminea in mid-June, mid-July, and early September 1987. No veligers, small or adult clams, or empty shells were detected in any of the sampling. There is only one confirmed report of the species (a single empty shell recovered in 1984) being collected from any site in Lake Michigan in the immediate vicinity of the D. C. Cook Nuclear Plant. Live Corbicula were collected in Lake Michigan near the J. H. Campbell Power Plant (White et al. 1984) north of the D. C. Cook Nuclear Plant in November 1983. I have seen no published data or additional specimens to confirm that the population near the Campbell Plant still exists, but I have had verbal communication that it does. However, from our data, we concluded that no population has become established nor were there any reproducing individuals detected at the D. C. Cook Nuclear Plant. At present, Corbicula does not appear to be a threat to operations of the water systems at the D. C. Cook Nuclear Plant.

INTRODUCTION

Corbicula fluminea (Muller) (=Corbicula manilensis) was introduced into the Columbia River of Washington State in the late 1930s and since has spread eastward throughout the Mississippi River drainage and most recently (1980-1981) into Lake Erie. For Lake Michigan, a small population was detected

near the J. H. Campbell power plant (southeastern Lake Michigan) in November 1983 (White et al. 1984), and a single intact, empty shell was found in diver collected sand and gravel, 22 May 1984, from the water intake at D. C. Cook.

Biofouling of power plant service water systems by Corbicula in the Mississippi and southern drainages and now western Lake Erie has prompted monitoring of Great Lakes nuclear plants to allow for early detection and creation of control procedures. A monitoring program specifically for Corbicula was initiated at the D. C. Cook power plant in 1982. In that year, three 24-hour entrainment samples were examined for veligers (planktonic larvae) and small clams. Entrainment samples are collected in one of the forebays using a pump and either a #30 or #20 net following the methods summarized in Zdeba and White (1985). Dates of sampling in 1982 were late May, mid-August, and early October (Table 1). Entrainment samples were supplemented by collections of clam shells washed onto the beach in front of the power plant and near the mouth of the St. Joseph River. Beach walks of at least 300 meters were begun in late September and late October 1982 (Table 1). The St. Joseph River site was chosen as a possible point of entry of Corbicula into Lake Michigan. No Corbicula veligers or small clams were detected in entrainment samples nor were specimens found in the more than 400 shells (primarily fingernail clams in the family Pisidiidae) collected in beach walks. Shells of Corbicula are much more sturdy than are shells of pisidiids; thus, if present in the lake, they should wash ashore (White 1979). Further, no Corbicula had been collected in lake benthos sampling programs

from 1970 through April 1982 or in previous entrainment studies nor had there been any validated reports of Corbicula being collected from Lake Michigan or its drainage (Mackie et al. 1981, Zdeba and White 1985).

RESULTS OF SAMPLING DURING THE 1983-1987 MONITORING PERIOD

Entrainment samples, beach walk collections, and diver-collected gravel samples were again examined in 1983, 1984, 1985, 1986, and 1987. Beginning in 1983, sampling periods were moved to mid-June, mid-July, and mid-August, based upon life cycle data gathered for western Lake Erie by Scott-Wasilk et al. (1983). The mid-August period for 1987 was delayed until early September due to pump malfunctions. The three week difference should not have affected our ability to detect Corbicula (See Table 1 for sampling dates). No specimens of Corbicula were found in thorough examination of entrainment samples. Several hundred Pisidiidae (fingernail clams) have been collected in the beach walks each year, but no Corbicula have been located either at D. C. Cook or at the mouth of the St. Joseph River.

From a November 1983 diver-collected sample near the J. C. Campbell Power Plant, we identified 10 live Corbicula (White et al. 1984) which we assumed were in their first year of growth. We do not know if that population has survived. On 7 January 1985, I confirmed a single whole shell of Corbicula from diver-collected sand and gravel collected 22 May 1984 from the water intake of D. C. Cook. It was my opinion that the specimen was quite recent because it was intact, and it appeared to be of the

TABLE 1

Sampling dates, sample type, and numbers of *Corbicula* collected from 1982 through 1987 at the D. C. Cook Nuclear Plant.

Date	Sample Type		
	Entrainment	Beach Walk	Diver-collected Sand and Gravel
1982			
25-26 May	none	-	-
18-19 Aug	none	-	-
21 Sep	-	none	-
5-6 Oct	none	-	-
26 Oct	-	none	-
1983			
15-16 Jun	none	none	-
13-14 Jul	none	none	-
17-18 Aug	none	none	-
1984			
22 May	-	-	1*
14-15 Jun	none	none	-
12-13 Jul	none	none	-
16-17 Aug	none	none	-
1985			
13-14 Jun	none	none	-
July	-	-	none
12-13 Jul	none	none	none
15-16 Aug	none	none	none
1986			
16-17 Jun	none	none	-
14-15 Jul	none	none	-
18-19 Aug	none	none	-
1987			
15-16 Jun	none	none	-
15-16 Jul	none	none	-
10-11 Sep	none	none	-
Fall	-	-	none

* intact empty shell

same cohort as the specimens collected near the J. C. Campbell Power Plant. In the summer of 1985, I examined a similar sample from the D. C. Cook Nuclear Plant water intake but found only naturally occurring Pisidiidae. In the fall of 1987, I again examined diver-collected gravel taken from the intake which contained several thousand fragments of Pisidiidae but none of Corbicula. To date, the only verified specimen of Corbicula fluminea collected in the vicinity of the D. C. Cook Nuclear Plant was that found it the 1984 sand and gravel collection.

CONCLUSIONS

No Corbicula veligers or small clams were collected in the 1987 samplings. Only a single empty shell has been collected during all years of sampling. We do not suspect that Corbicula is present in the vicinity of the D. C. Cook Nuclear Plant, but if occasionally present, the populations have remained so small as to be undetectable and have not posed a threat to plant operations.

REFERENCES CITED

Mackie, G. L., D. S. White, and T. W. Zdeba. 1980. A guide to freshwater mollusks of the Laurentian Great Lakes with special emphasis on the genus Pisidium. EPA-600/3-80-068. 144 pp.

Scott-Wasilk, J., G. G. Downing, and J. S. Leitzow. 1983. Occurrence of the asiatic clam Corbicula fluminea in the Maumee River and Western Lake Erie. J. Great Lakes Res. 9:9-13.

White, D. S. 1979. The effect of lake-level fluctuations on Corbicula and other pelecypods in Lake Texoma, Texas and Oklahoma. Proc. 1st Internat. Corbicula Symp. pp. 81-88.

White, D. S., M. H. Winnell, and D. J. Jude. 1984. Discovery of the asiatic clam, Corbicula fluminea in Lake Michigan. J. Great Lakes Res. 10:329-331.

Zdeba, T. W., and D. S. White. 1985. Part 4: Pisidiidae. 93 pp. In: D. S. White (ed.). Ecology of the zoobenthos of Southeastern Lake Michigan near the D. C. Cook Nuclear Power Plant. Spec. Rept. Great Lakes Res. Div., Univ. Mich., Ann Arbor, Mich.

Appendix 2.1

1987 Annual Report

Radiological Environmental Monitoring Program

Donald C. Cook Nuclear Plant

Units 1 and 2

Controls for Environmental Pollution, Inc.

AMERICAN ELECTRIC POWER SERVICE CORPORATION

DONALD C. COOK NUCLEAR PLANT

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL REPORT FOR 1987

SUBMITTED BY:

CONTROLS FOR ENVIRONMENTAL POLLUTION, INC.

1925 ROSINA STREET

SANTA FE, NEW MEXICO 87502

COPY NO. 01

Prepared By: B. Bates

Bob Bates, Contract Manager

Approved By:

James J. Mueller, President

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Abstract

Controls for Environmental Pollution, Inc (CEP) has conducted a operational radiological environmental monitoring program for American Electric Power Service Corporation (AEPSC), Donald C. Cook Nuclear Plant, Units 1 and 2, starting October 1, 1985. This annual report presents data for 1987.

Analytical results are presented and discussed along with other pertinent information. Possible trends and anomalous results, as interpreted by CEP, are discussed.

1.0 Introduction

This report presents an analysis of the results of the Radiological Environmental Monitoring Program conducted during 1987 for American Electric Power Service Corporation, Donald C. Cook Nuclear Plant, Units 1 and 2.

In compliance with federal and state regulations and in its concern to maintain the quality of the local environment, AEPSC began its radiological monitoring program in 1973.

The objectives of the radiological environmental monitoring program are as follows: 1) to establish baseline radiation levels in the environs prior to reactor operations; 2) to monitor potential critical pathways of radioeffluent to man; 3) to determine radiological impact on the environment caused by the operation of the D.C. Cook Nuclear Plant.

A number of techniques are being used to distinguish Cook Plant effects from other sources during the operational phase, including application of established background levels. Operational radiation levels measured in the vicinity of the Cook Plant will be compared with the pre-operational measurements at each of the sampling locations. In addition, results of the monitoring program will help to evaluate sources of elevated levels of radiation during reactor operation in the environment, e.g., atmospheric fallout or abnormal plant releases.

The Donald C. Cook Nuclear Plant is located on the shore of Lake Michigan approximately one mile northwest of Bridgman, Michigan. The Plant consists of two pressurized water reactors, Unit 1, 1030 MWE and Unit 2, 1100 MWE. Unit 1 achieved initial criticality on January 18, 1975 and Unit 2 achieved initial criticality on March 10, 1978.

Changes to the monitoring program during 1987 are as follows:

1. December 1987 - A CEP hired sample collector began collecting environmental samples, taking the place of the D.C. Cook plant personnel.

2. April 7, 1987 - Environmental TLD supplier changed from Nuclear Sources and Services, Inc. to Teledyne Isotopes.

Changes to the monitoring program during 1986 are as follows:

1. November 21, 1986 - Two new milk farms are added to the REMP.

2. November 1, 1986 - The D.C. Cook plant personnel began collecting all environmental samples, taking the place of the CEP hired sample collector.

3. September 8, 1986 - Air samples are collected on Mondays versus Tuesdays.

4. May 15, 1986 - New Buffalo drinking station is deleted by Technical specification (Amendment 94 for Unit #1 and Amendment 80 for Unit #2).

5. January 14, 1986 - All air samples began to be collected on the same day of the week. This replaces the old system where on-site samples were collected on a different day than the offsite samples.

2.0 Description of the Monitoring Program

American Electric Power Service Corporation has contracted with Controls for Environmental Pollution, Inc., starting October 1, 1985, to determine the radiation levels existing in and around the Donald C. Cook Nuclear Plant area.

From January 1, 1987, to December 31, 1987, CEP and Cook Plant personnel have collected the samples and shipped them to CEP for analysis. The type of samples collected during 1987 were: milk, airborne particulates, airborne radioiodine, direct radiation (TLD), groundwater, food products, fish, bottom sediment, drinking water and surface water.

Locations of the monitoring sites are shown in Figures 1 and 2. Table I presents the monitoring sites and the respective samples collected. Sample collection frequency for each of the monitoring locations is depicted in Table II.

Meanings of sample type codes used in Table I are as follows:

CODE	MEANING
ONS	On Site Location
NBF	New Buffalo, MI Location
SBN	South Bend, IN Location
DOW	Dowagiac, MI Location
COL	Coloma, MI Location
OFS	Off Site
LS	Lake Sediment

Figure 1

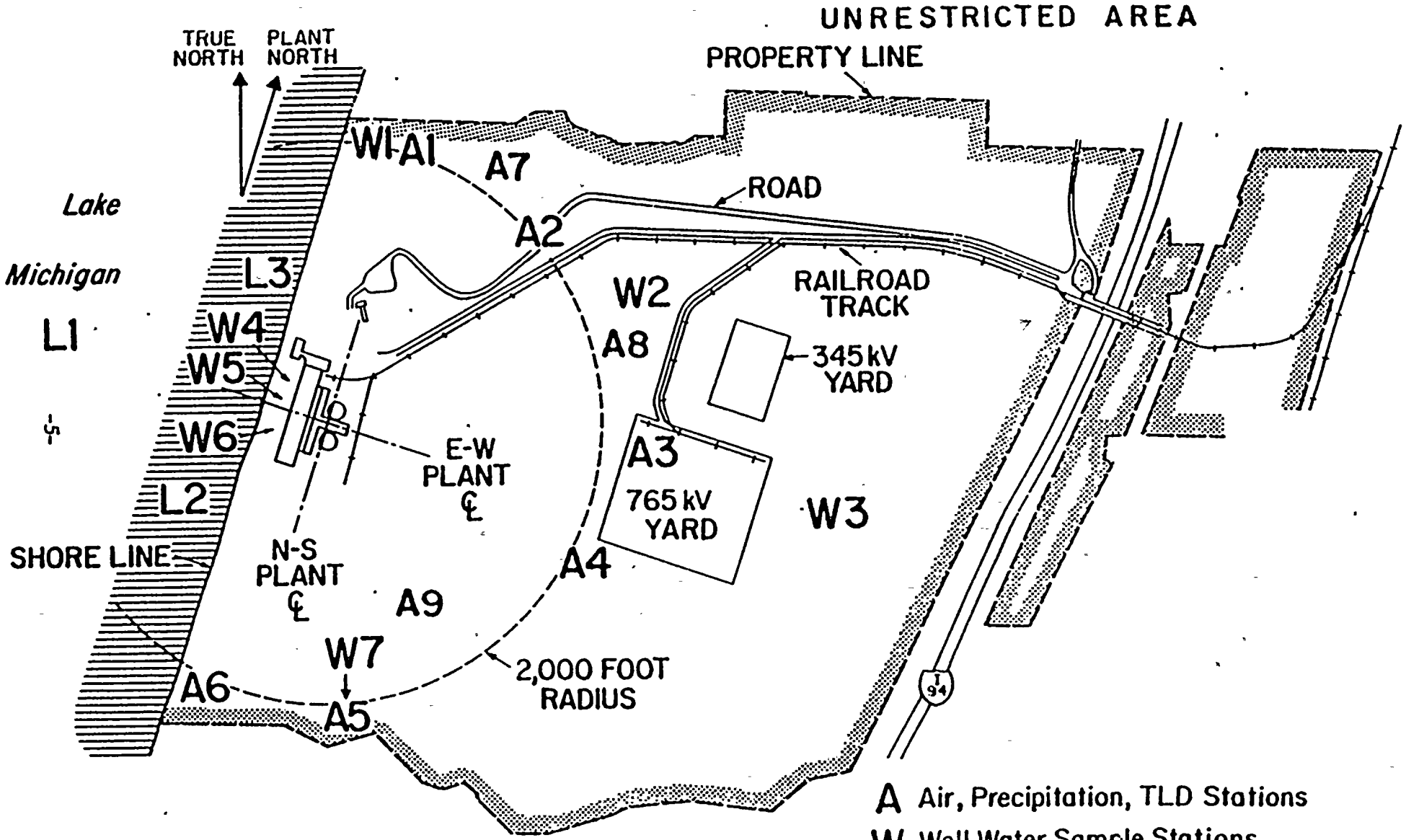

UNRESTRICTED AREA
PROPERTY LINE
TRUE NORTH
PLANT NORTH
Lake Michigan
L1
L2
L3
W1
W2
W3
W4
W5
W6
W7
A1
A2
A3
A4
A5
A6
A7
A8
A9
ROAD
RAILROAD TRACK
345kV YARD
765 kV YARD
E-W PLANT ℄
N-S PLANT ℄
SHORE LINE
2,000 FOOT RADIUS
I 94
0 1000 2000 3000 4000 FEET
SCALE
A Air, Precipitation, TLD Stations
W Well Water Sample Stations
L Lake Water Sample Stations
Note
Stations A7, 8 and 9 are TLD Stations Only

Figure 2

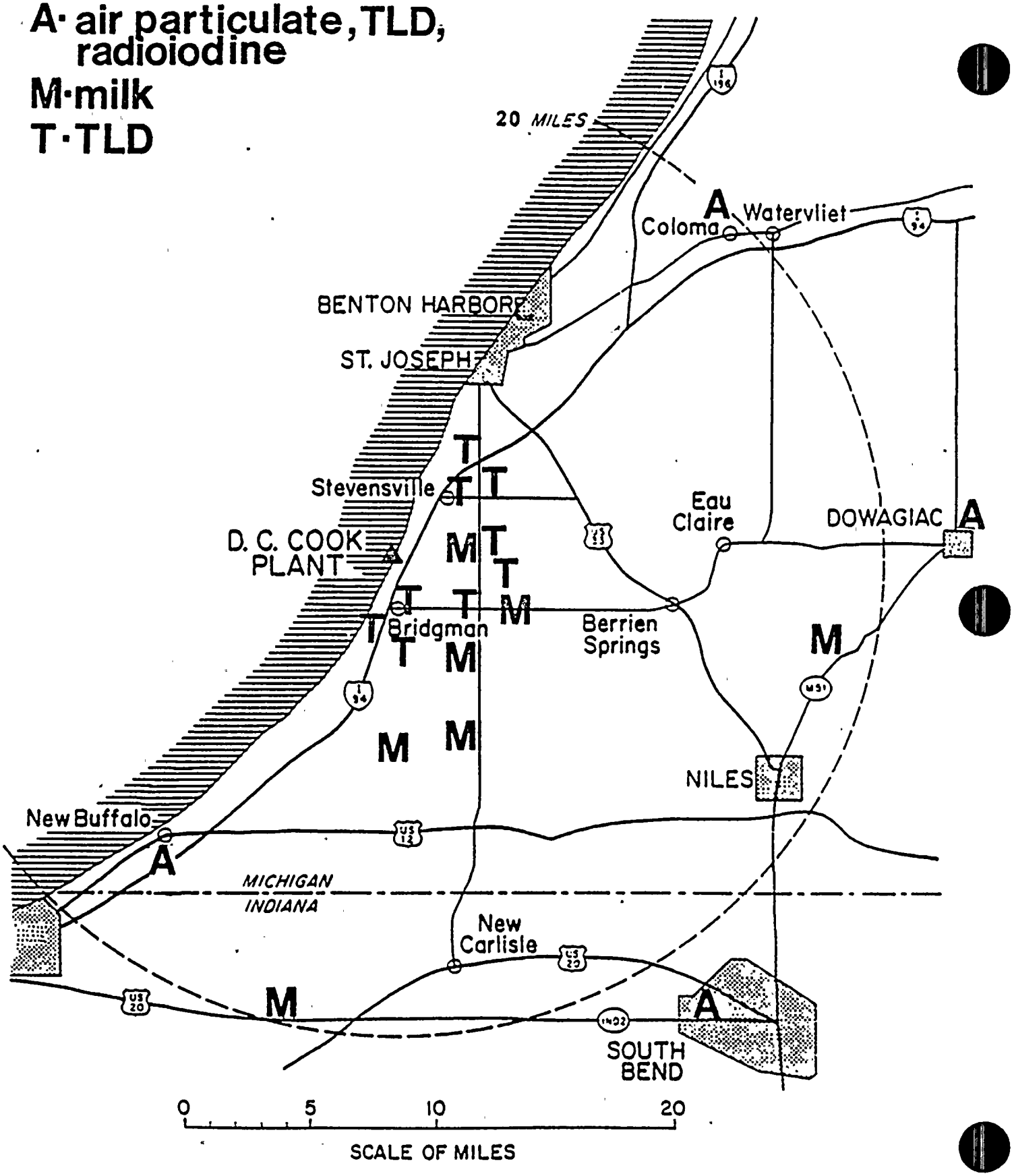

A- air particulate, TLD, radioiodine
M-milk
T-TLD
20 MILES
A
Watervliet
Coloma
BENTON HARBOR
ST. JOSEPH
Stevensville
Eau Claire
DOWAGIAC
A
D. C. COOK PLANT
A
Bridgman
Berrien Springs
NILES
New Buffalo
A
MICHIGAN
INDIANA
New Carlisle
A
SOUTH BEND
0
5
10
20
SCALE OF MILES

TABLE I

SAMPLING LOCATIONS

LOCATION CODE	DESCRIPTION*	SAMPLE TYPES
ONS-1 (A1)	0.4 mi NNE, Meteorological Tower	Air, TLD
ONS-2 (A2)	0.4 mi NE, Visitors Center road	Air, TLD
ONS-3 (A3)	0.5 mi ENE, 765 KV Yard	Air, TLD
ONS-4 (A4)	0.4 mi ESE, Onsite	Air, TLD
ONS-5 (A5)	0.4 mi SW, Onsite	Air, TLD
ONS-6 (A6)	0.4 mi SSW, Shoreline and Fence Line Junction	Air, TLD
NBF	16.0 mi SSW, Town of New Buffalo, MI	Air, TLD
SBN	24.0 mi SE, City of South Bend ID	Air, TLD
DOW	26.0 mi ENE, Town of Dowagiac, MI	Air, TLD
COL	20.0 mi NNE, Town of Coloma, MI	Air, TLD
ONS-7 (A7)	0.4 mi NNE, Onsite	TLD
ONS-8 (A8)	0.4 mi ENE, Onsite	TLD
ONS-9 (A9)	0.3 mi SSE, Onsite	TLD
OFS-1	3.5 mi NNE, Intersection of Red Arrow Highway and Marquette Woods Road, Pole # B294-44	TLD
OFS-2	3.0 mi NNE, Stevensville Substation	TLD
OFS-3	4.0 mi NE, Pole #B296-13	TLD
OFS-4	3.2 mi ENE, Pole # B350-72	TLD
OFS-5	3.2 mi ESE, Intersection of Shawnee and Cleveland, Pole # B387-32	TLD
OFS-6	3.5 mi SE, Intersection of Snow Road and Holden Pole # B426-70	TLD
OFS-7	2.0 mi S, Bridgman Substation	TLD
OFS-8	3.0 mi SSE, California Road, Pole # B424-20	TLD

TABLE I (Continued)

SAMPLING LOCATIONS

LOCATION CODE	DESCRIPTION*	SAMPLE TYPES
OFS-9	3.25 mi E, Riggles Road, Pole # B369-214	TLD
OFS-10	2.6 mi SSW, Intersection of Red Arrow Highway and Hildebrant Road, Pole # B422-152	TLD
W1	0.4 mi NNE, Rosemary Beach	Well Water
W2	0.5 mi NE, Scrapyard	Well Water
W3	0.7 mi ENE, MSU Trailer	Well Water
W4	0.01 mi NW, Onsite	Well Water
W5	0.01 mi W, Onsite	Well Water
W6	0.01 mi SSW, Onsite	Well Water
W7	0.4 mi S, Livingston Beach	Well Water
Totzke	4.5 mi ENE, Totzke Farm, STV (M)	Milk
Wyant	18.0 mi E, Wyant Farm, DOW (M)	Milk
Lozmack	9.0 mi SSE, Lozmack Farm, TOK (M)	Milk
Schuler	4.25 mi SE, Schuler Farm, BRD (M)	Milk
Livinghouse	20 mi S, Livinghouse Farm, LPT (M)	Milk
Warmbien	7.8 S, Warmbien Farm, TKS (M)	Milk
Zelmer	4.75 mi SSE, Zelmer Farm, BDG (M)	Milk
ONS-S	0.5 mi S (maximum), Lake Michigan	Fish
ONS-N	0.5 mi N (maximum), Lake Michigan	Fish
OFS-S	0.5 mi S (minimum), Lake Michigan	Fish
OFS-N	0.5 mi N (minimum), Lake Michigan	Fish
LS-2	0.24 mi SSW, South Shoreline, Lake Michigan	Sediment
LS-3	0.35 mi N, North Shoreline, Lake Michigan	Sediment
L1	Circulating intake	Circulating W

TABLE I (Continued)

SAMPLING LOCATIONS

LOCATION CODE	DESCRIPTION*	SAMPLE TYPES
L2	0.24 mi SSW, Lake Michigan - South (South Lake)	Surface Water
L3	0.35 mi NNE, Lake Michigan - North (North Lake)	Surface Water
STJ (D)	St. Joseph Station	Drinking Water
LTW (D)	Lake Township Station	Drinking Water

*All distances are measured from the center line between Unit 1 and Unit 2.

TABLE II

COLLECTION SCHEDULE

Collection Site	Air Particulates	Air Radioiodine	Well Water	Lake Water	Drinking Water	Sediment	Fish	Milk	Vegetation	TLD
ONS-1 (A1)	W	W								Q
ONS-2 (A2)	W	W								Q
ONS-3 (A3)	W	W								Q
ONS-4 (A4)	W	W								Q
ONS-5 (A5)	W	W								Q
ONS-6 (A6)	W	W								Q
ONS-7 (A7)										Q
ONS-8 (A8)										Q
ONS-9 (A9)										Q
OFS-1										Q
OFS-2										Q
OFS-3										Q
OFS-4										Q
OFS-5										Q
OFS-6										Q
OFS-7										Q
OFS-8										Q
OFS-9										Q
OFS-10										Q
NBF	W	W								
SBN	W	W								
DOW	W	W								
COL	W	W								
W-1			Q							
W-2			Q							
			Q							

TABLE II (Continued)

COLLECTION SCHEDULE

Collection Site	Air Particulates	Air Radioiodine	Well Water	Lake Water	Drinking Water	Sediment	Fish	Milk	Vegetation	TLD
W-4			Q							
W-5			Q							
W-6			Q							
W-7			Q							
BDG (M)								M(2)*		
STV (M)								M(2)*		
TKS (M)								M(2)*		
DOW (M)								M(2)*		
LPT (M)								M(2)*		
TOK (M)								M(2)*		
BRD (M)								M(2)*		
ONS-S							SA(2)**			
ONS-N							SA(2)**			
OFS-S							SA(2)**			
OFS-N							SA(2)**			
LS-2						SA(2)**				
LS-3						SA(2)**				
L1				M						
L2				M						
L3				M						
V1									Y	
V2									Y	
STJ (D)					M(2)*					
LTW (D)					M(2)*					

*Twice a month

SA = Semi Annual W = Weekly Q = Quarterly Y = Yearly M = Monthly

**Twice a year

3.0 Analytical Procedures

The analytical procedures discussed in this report are those routinely used by CEP to analyze samples.

3.1 Fresh Milk

3.1.1 Iodine-131

Two liters of milk containing standardized Iodine carrier are stirred with Dowex 1 X 8 anion exchange resin for one hour. The Iodine is stripped from the resin with sodium perchlorate ($NaClO_4$) and precipitated with silver nitrate ($AgNO_3$). The precipitate is filtered onto a tared glass fiber filter, and dried. The dried precipitate is weighed for percent recovery and counted for Iodine-131 in a thin window, gas flow, proportional counter.

3.1.2 Gamma Spectrometry

A suitable aliquot of sample is placed in a marinelli beaker and counted with a multichannel analyzer equipped with an intrinsic Germanium detector which is coupled to a 4096 channel, computer based, multichannel analyzer (Nuclear Data LB9900).

3.2 Vegetation (Food Products)

3.2.1 Gamma Spectrometry

Refer to Milk Subsection 3.1.2.

3.3 Surface Water, Ground Water, and Drinking Water

3.3.1 Gamma Spectrometry

Refer to Milk Subsection 3.1.2.

3.3.2 Gross Beta

A one liter aliquot of sample is evaporated to dryness and transferred to a stainless steel planchet. The Gross Beta radioactivity is measured by counting the planchet in an internal gas flow, simultaneous proportional, low background counter.

3.3.3 Tritium

Three milliliters of the sample are mixed with Packard Optifluor cocktail. The mixture is nineteen percent sample in a clear gel type aquasol. The vials are then counted for Tritium in a Beckman Model LS-5801 Liquid Scintillation System for 400 minutes.

3.4 Air Particulate

3.4.1 Gross Beta

The filter is placed in a stainless steel planchet and counted for Gross Beta activity using a low background, internal gas flow, simultaneous proportional counter.

3.4.2 Gamma Spectrometry

The air filters are sealed in small, plastic Marinelli beakers and counted utilizing the method described in Milk Subsection 3.1.2.

3.5 Airborne Radioiodine (Alkaline Leach Method)

Radioiodine is removed from activated charcoal along with a standardized iodine carrier using concentrated ammonium hydroxide (NH_4OH) and hydrogen peroxide (H_2O_2). The charcoal is filtered and the remaining solution is acidified with nitric acid (HNO_3) and extracted with carbon tetrachloride (CCl_4). A 0.2% hydrazine solution supplies further purification and an aqueous media for precipitation. Iodine is precipitated with silver nitrate ($AgNO_3$) and filtered onto a tared glass fiber filter as silver iodide (AgI). The dried precipitate is weighed for recovery and counted for Iodine-131 in a thin window, gas flow, proportional counter.

3.6 Sediment (Shoreline) - Gamma Spectrometry

Refer to Milk Subsection 3.1.2.

3.7 Fish - Gamma Spectrometry

Refer to Milk Subsection 3.1.2.

4.0 Major Instrumentation

4.1 Beckman Liquid Scintillation Counting System

A Beckman LS-5801 Liquid Scintillation System will be used for all Tritium determinations. The system has a tritium counting efficiency of sixty percent in a wide open window.

4.2 Nuclear Data Genie Model ND 9900 Gamma Spectrometer

The Nuclear Data Gamma Spectrometer Model ND 9900 is a fully integrated multiple user, data acquisition, display and processing system equipped with a DEC Micro VAX II computer, along with an auxillary power battery pack to ensure no loss of data. This system has complete spectral display manipulation, including ROI selection and applications interface. Other features include linear and logarithmic spectral data display, display of two spectra for comparison, intensified regions of interest and display of experiment status parameters. This system is expandable to 32 ADC's with a live time resolution of 0.01 sec.

4.3 Beckman Wide Beta II Low Background Gas Proportional System (Simultaneous)

The Beckman Wide Beta II two-inch planchet counting system has an average of 2.5 cpm Beta background and 0.1 cpm Alpha background. The detector has a sixty percent efficiency for Strontium-90 and forty percent for Plutonium-239. This system has been designed for simultaneous Alpha and Beta counting. The system sample capacity is one hundred samples.

4.4 Beckman Low Beta II Low Background Beta System

The Beckman Low Beta II Gas proportional one-inch detector counting system has an average of 3.0 cpm Beta background and 0.2 cpm Alpha background and detector efficiency of sixty percent for Strontium-90 and forty percent for Plutonium-239. The system capacity is one hundred samples. The system can also be set up with a two-inch detector having 1.5 cpm Beta background and 0.1 cpm Alpha background.

4.5 Tennelec LB5100 System

The Tennelec LB5100 System has two-inch planchet counting system and has an average of 2 cpm Beta background and 0.1 cpm Alpha backgorund. This system has been designed for simultaneous Alpha and Beta counting. The system sample capacity is fifty samples. The system efficiency for Alpha (Plutonium-239) is twenty-one percent, while the Beta (Strontium-90) efficiency is fifty-one percent.

4.6 Berthold-10-Channel Low-Level Planchet Counting System

The Berthold LB770 is capable of simultaneously counting 10 planchets for Gross Alpha and Gross Beta activities alternately with proportional gas flow detectors. The system has an average background count rate of less than 1 count per minute for Beta and less than 0.05 count per minute for Alpha. The instrument has an Alpha efficiency of thirty-three percent for Plutonium-239 and Beta efficiencies of forty-five percent for Strontium-Yttrium-90, and forty-three percent for Cesium-137. The system is connected to a computer to calculate samples as pCi/unit volume.

5.0 Isotopic Detection Limits and Activity Determinations

Analytical Detection limits are governed by a number of factors including:

5.1 Sample Size

The sample size taken is based on the numerical data one wishes to obtain which can describe a particular situation and can be interpreted as a basis for possible action. The sample size has to be representative and provide for accurate analysis or the entire process is invalid (Table III).

5.2 Counting Efficiency

The fundamental quality in the measurement of a radioactive substance is the number of disintegrations per unit time. As with most physical measurements in analytical chemistry, it is seldom possible to make an absolute measurement of the disintegration rate but rather it is necessary to compare the sample with one or more standards. The standards determine the counter efficiency which may then be used to convert sample counts per minute (cpm) to disintegrations per minute (dpm).

5.3 Background Count Rate

Any counter will show a certain counting rate without a sample in position. This background counting rate comes from several sources: 1) natural environmental radiation from the surroundings; 2) cosmic radiation; and 3) the natural radioactivity in the counter material itself. The background counting rate will depend on the amount of these types of radiation and the sensitivity of the counter to the radiation.

5.4 Background and Sample Counting Time

The amount of time devoted to counting background depends on the level of activity being measured. In general, with low level samples, this time should be about equal to that devoted to counting a sample (Table V).

5.5 Time Interval Between Sample Collection and Counting

Decay measurements are useful in identifying certain short-lived isotopes. The disintegration constant, or its related quantity, the half-life, is one of the basic characteristics of a specific radionuclide and is readily determined if the half-life is sufficiently short.

5.6 Chemical Recovery of the Analytical Procedures

Most radiochemical analyses are carried out in such a way that losses occur during the separations. These losses occur due to a large number of contaminants that may be present and interfere during chemical separations. Thus it is necessary to include a technique for estimating these losses in the development of the analytical procedure.

The Lower Limits of detection are calculated using the following formula:

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \cdot Y' \cdot \exp(-\lambda \Delta t)}$$

WHERE:

LLD = "A priori" lower limit of detection as defined above (as pCi per unit mass or volume).

s_b = Standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute).

E = Counting efficiency (as counts per disintegration).

V = Sample size (in units of mass or volume).

2.22 = Number of disintegrations per minute per picocurie.

Y = Fractional radiochemical yield (when applicable).

λ = Radioactive decay constant for the particular radioisotope.

Δt = Elapsed time between sample collection (or end of the sample collection period) and time of counting.

The value of s_b used in the calculation of the LLD for a particular measurement system is based on the actual observed variance of the background counting rate, or of the counting rate of the blank sample, (as appropriate), rather than on an unverified theoretically predicated variance.

In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background included the typical contributions of other nuclides normally present in the samples.

The activities per unit sample mass or volume are determined using the following formula:

$$A = \frac{C-B}{(2.22)(V)(R)(E)(e^{-\lambda\Delta t})} \pm \frac{1.96\left[\frac{C+B}{T^2}\right]^{1/2}}{(2.22)(V)(R)(E)(e^{-\lambda t})}$$

WHERE:

A = Activity as pCi per units sample mass or volume.
C = Sample count rate in counts per minute.
B = Background counts per minute.
V = Sample volume or mass analyzed.
E = Counter efficiency as cpm/dpm.
2.22 = Numerical constant to convert disintegrations per minute to picocuries.
$(e^{-\lambda\Delta t})$ = Decay factor to correct the activity to time of collection.
T = Counting time in minutes.
1.96 = Statistical constant for the 95% confidence level.
R = Chemical recovery or photon yield.

6.0 Quality Control Program

CEP employs a multi-faceted Quality Control Program designed to maintain high performance of its laboratory. The overall objectives of the program are to:

1. Verify that work procedures are adequate to meet specifications of AEPSC.
2. Coordinate an in-house quality control program independent of external programs, to assure that CEP is operating at maximum efficiency.

Objectives are met by a variety of procedures that oversee areas of sample receipt and handling, analysis and data review. These procedures include standard operating procedures, known and unknown spike analysis, blank analysis, reagent, carrier and

nuclide standardization as well as participation in the U.S. Environmental Protection Agency's Interlaboratory Cross-check Program. (See Appendix A for EPA Radiological Cross-check results).

TABLE III

ALIQUOT USED FOR DETECTION LIMIT CALCULATION

AND ACTUAL ANALYSIS

Sample Type	Gross Beta	Gamma Spec	Iodine-131	Tritium
Air Particulates	265 m^3	265 m^3		
Airborne Radioiodine			265 m^3	
Milk		1000 ml	2000 ml	
Vegetation (Food Products)		500 g		
Surface Water		1000 ml		3 ml
Ground Water		1000 ml		3 ml
Drinking Water	1000 ml	1000 ml		3 ml
Sediment (Shoreline)		200 g		
Fish		200 g		

TABLE IV

DETECTION LIMITS BY OTHER THAN GAMMA SPECTROMETRY

Sample Type	Gross Beta	Iodine-131	Tritium
Air Particulates	0.004 pCi/m^3		
Airborne Radioiodine		0.005 pCi/m^3	
Milk		0.4 pCi/l	
Surface Water	2.0 pCi/l	0.5 pCi/l	300 pCi/l
Ground Water	2.0 pCi/l	0.5 pCi/l	300 pCi/l
Drinking Water	2.0 pCi/l	0.5 pCi/l	300 pCi/l

TABLE V

SAMPLE COUNTING TIMES

Sample Type	Gross Beta	Gamma Spec.	Iodine-131	Tritium
Air Particulates	100 min	8 hrs		
Airborne Radioiodine			100 min	
Milk		8 hrs	100 min	
Vegetation (Food Products)		8 hrs		
Surface Water	100 min	8 hrs		400 min
Ground Water	100 min	8 hrs		400 min
Drinking Water	100 min	8 hrs		400 min
Sediment (Shoreline)		8 hrs		
Fish		8 hrs		

TABLE VI

DETECTION LIMITS BY GAMMA SPECTROMETRY

Isotope	Vegetation pCi/Kg (wet)	Water pCi/l	Milk pCi/l	Air Filter pCi/m^3	Fish pCi/Kg (wet)	Soil pCi/Kg (dry)
Cerium-144	121	17	10	0.005	80	80
Barium-La-140	75	4	4	0.030	40	40
Cesium-134	29	7	5	0.023	40	70
Ru, Rh-106	143	2	2	0.001	40	40
Cesium-137	40	2	4	0.001	40	40
Zr, Nb-95	66	5	8	0.026	80	40
Manganese-54	21	2	2	0.001	60	80
Iron-59	21	3	3	0.006	100	30
Zinc-65	60	15	16	0.045	100	100
Cobalt-60	63	5	5	0.019	30	80
Cobalt-58	20	5	3	0.001	60	20
Iodine-131	30	1	1	0.02*	30	30

*Charcoal Trap

7.0 Data Interpretation and Conclusions

Interpretations and conclusions regarding all types of samples analyzed during 1987 are discussed in the following sections.

7.1 Air Particulates

Air particulate samples were collected from each of the ten monitoring sites on a weekly basis during 1987. During the year, one sample could not be reported due to the following reason:

Date	Station	Reason
02/02/87	ONS2	Filter missing at site

Air filters were analyzed for Gross Beta activity. Gamma Spectral Analysis of the air filters is done on the individual station composites on a quarterly basis.

Table VII presents the Gross Beta activities observed during the first quarter of 1987. Levels ranged from a low of 0.011 ± 0.001 pCi/m^3 at Station ONS1 to a high of 0.035 ± 0.003 pCi/m^3 at Station ONS6 (01/05/87). Mean weekly activities ranged from a low of 0.013 ± 0.003 pCi/m^3 at the onsite collection locations, to a high of 0.029 ± 0.002 pCi/m^3 at the offsite collection locations on 01/05/87. This data is consistent with preoperational data.

Table VIII presents the Gross Beta activities observed during the second quarter of 1987. Levels ranged from a low of 0.009 ± 0.003 pCi/m^3 at Station NBF to a high of 0.033 ± 0.003 pCi/m^3 at Station ONS3 (06/15/87). Mean weekly activities ranged from 0.011 ± 0.001 pCi/m^3 to 0.028 ± 0.003 pCi/m^3 at the offsite collection sites on 06/15/87.

Table IX presents the Gross Beta activities observed during the third quarter of 1987. Levels ranged from a low of 0.011 ± 0.002 pCi/m^3 at Station ONS3 on

07/13/87, to a high of 0.042±0.003 pCi/m^3 at station ONS2 (07/27/87). Mean weekly activity ranged from 0.014±0.001 pCi/m^3 at the offsite collection locations on 07/27/87, to 0.029±0.004 pCi/m^3 at the onsite collection locations on 09/28/87. This data is consistent with previous quarters.

Table X presents the Gross Beta activity observed during the fourth quarter of 1987. Levels ranged from a low of 0.010±0.001 pCi/m^3 at Station NBF on 10/26/87, to a high of 0.045±0.003 pCi/m^3 at station ONS6 (11/16/87).

Mean weekly activity ranged from a low of 0.016±0.002 pCi/m^3 at the onsite collection locations on 10/26/87, to a high of 0.039±0.004 pCi/m^3 at the onsite collection locations on 11/16/87.

Table XI contains the mean Gross Beta activities by sampling station. Mean quarterly activities are calculated using all weekly activities except those marked invalid. Mean activity for each quarter ranged from a low of 0.015±0.005 pCi/m^3 at Station NBF during the second quarter to a high of 0.028±0.010 pCi/m^3 at Station ONS6 during the fourth quarter.

Table XII contains the mean Gross Beta activities by station for 1987. Annual mean activities compare well to one another. The annual mean activity for onsite stations was 0.022±0.003 pCi/m^3 during 1987. The offsite station's annual mean activity was 0.022±0.004 pCi/m^3. Man-made Gamma-emitting Nuclides were less than detection limit in all of the quarterly composite air filter samples during 1987.

The high peak seen during the second quarter of 1986 (figures 3 thru 13) was caused by the Chernobyl incident.

TABLE VII

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

FIRST QUARTER

1987

Collection Date	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6	Weekly Mean Gross Beta Activities ±Standard Deviation of the Mean
01/05/87	0.019±0.003	0.028±0.003	0.027±0.003	0.026±0.003	0.032±0.003	0.036±0.003	0.028±0.006
01/12/87	0.016±0.002	0.024±0.002	0.029±0.003	0.019±0.002	0.022±0.002	0.021±0.002	0.022±0.004
01/19/87	0.011±0.001	0.011±0.001	0.012±0.001	0.012±0.001	0.017±0.001	0.017±0.001	0.013±0.003
01/26/87	0.016±0.002	0.021±0.002	0.020±0.002	0.023±0.002	0.027±0.002	0.028±0.003	0.023±0.004
02/02/87	0.019±0.002	*	0.022±0.002	0.020±0.002	0.024±0.002	0.025±0.002	0.022±0.003
02/09/87	0.020±0.002	0.016±0.002	0.021±0.002	0.018±0.002	0.025±0.003	0.030±0.003	0.022±0.005
02/17/87	0.017±0.002	0.023±0.002	0.026±0.002	0.016±0.002	0.019±0.002	0.021±0.002	0.020±0.004
02/23/87	0.014±0.003	0.016±0.003	0.013±0.002	0.013±0.002	0.017±0.002	0.019±0.003	0.015±0.002
03/02/87	0.014±0.003	0.016±0.002	0.016±0.003	0.013±0.002	0.017±0.002	0.016±0.002	0.015±0.002
03/09/87	0.019±0.003	0.024±0.003	0.021±0.003	0.024±0.003	0.033±0.003	0.029±0.003	0.025±0.005
03/16/87	0.016±0.002	0.027±0.003	0.019±0.003	0.020±0.003	0.026±0.003	0.030±0.003	0.023±0.005
03/23/87	0.027±0.003	0.011±0.002	0.023±0.003	0.022±0.002	0.021±0.002	0.021±0.003	0.021±0.005
03/30/87	0.011±0.002	0.019±0.002	0.012±0.002	0.010±0.002	0.012±0.002	0.015±0.002	0.013±0.003
Mean Gross Beta Activity ± Standard Deviation of the Mean	0.017±0.004	0.020±0.006	0.020±0.006	0.018±0.0005	0.022±0.006	0.024±0.007	

*Filter missing

TABLE VII (Continued)

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

FIRST QUARTER

1987

Collection Date	NBF	SBN	DOW	COL	Weekly Mean Gross Beta Activities ± Standard Deviation of the Mean
01/05/87	0.028±0.003	0.030±0.003	0.032±0.003	0.028±0.003	0.030±0.002
01/12/87	0.017±0.002	0.020±0.002	0.022±0.002	0.023±0.002	0.021±0.003
01/19/87	0.012±0.001	0.016±0.001	0.016±0.001	0.013±0.001	0.014±0.002
01/26/87	0.019±0.002	0.026±0.003	0.022±0.003	0.022±0.002	0.022±0.003
02/02/87	0.019±0.002	0.022±0.002	0.022±0.003	0.022±0.002	0.021±0.002
02/09/87	0.018±0.002	0.021±0.002	0.022±0.002	0.028±0.002	0.022±0.004
02/17/87	0.014±0.002	0.020±0.002	0.020±0.002	0.022±0.002	0.019±0.004
02/23/87	0.012±0.003	0.016±0.002	0.018±0.003	0.016±0.002	0.016±0.003
03/02/87	0.016+0.003	0.023±0.002	0.015±0.002	0.013±0.002	0.017±0.004
03/09/87	0.024±0.004	0.028±0.003	0.030±0.003	0.030±0.003	0.028±0.003
03/16/87	0.022±0.004	0.020±0.002	0.025±0.003	0.020±0.003	0.022±0.002
03/23/87	0.015±0.003	0.019±0.002	0.015±0.002	0.018±0.002	0.017±0.002
03/30/87	0.014±0.002	0.015±0.002	0.014±0.002	0.016±0.002	0.015±0.001
Mean Gross Beta Activity ± Standard Deviation of the Mean	0.018±0.005	0.021±0.005	0.021±0.006	0.021±0.006	

TABLE VIII

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

SECOND QUARTER

1987

Collection Date	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6	Weekly Mean Gross Beta Activity ± Standard Deviation of the Mean
04/06/87	0.014±0.002	0.015±0.002	0.017±0.002	0.015±0.002	0.017±0.002	0.013±0.002	0.015±0.002
04/13/87	0.017±0.002	0.020±0.003	0.019±0.002	0.017±0.002	0.025±0.003	0.020±0.002	0.020±0.003
04/20/87	0.018±0.002	0.021±0.002	0.018±0.002	0.015±0.002	0.019±0.002	0.026±0.003	0.020±0.004
04/27/87	0.013±0.002	0.012±0.002	0.017±0.002	0.013±0.002	0.016±0.002	0.015±0.002	0.014±0.002
05/04/87	0.014±0.002	0.019±0.002	0.018±0.002	0.014±0.002	0.018±0.002	0.018±0.002	0.017±0.002
05/11/87	0.019±0.002	0.024±0.002	0.021±0.002	0.018±0.002	0.027±0.002	0.028±0.002	0.023±0.004
05/18/87	0.016±0.002	0.017±0.002	0.017±0.002	0.017±0.002	0.022±0.003	0.027±0.003	0.019±0.004
05/25/87	0.010±0.002	0.010±0.002	0.010±0.002	0.015±0.002	0.011±0.002	0.011±0.002	0.011±0.002
06/01/87	0.023±0.002	0.029±0.003	0.021±0.002	0.023±0.002	0.024±0.002	0.024±0.003	0.024±0.003
06/08/87	0.017±0.002	0.019±0.002	0.017±0.002	0.016±0.002	0.019±0.002	0.019±0.002	0.018±0.001
06/15/87	0.025±0.003	0.024±0.003	0.033±0.003	0.025±0.002	0.028±0.002	0.023±0.002	0.026±0.004
06/22/87	0.014±0.002	0.015±0.002	0.012±0.002	0.015±0.002	0.012±0.002	0.014±0.002	0.014±0.001
06/29/87	0.020±0.002	0.021±0.002	0.018±0.002	0.018±0.002	0.023±0.002	0.020±0.002	0.020±0.002
Mean Gross Beta Activity ± Standard Deviation of the Mean	0.017±0.004	0.019±0.005	0.018±0.005	0.017±0.003	0.020±0.005	0.020±0.006	

TABLE VIII (Continued)

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

SECOND QUARTER

1987

Collection Date	NBF	SBN	DOW	COL	Weekly Mean Gross Beta Activities ±Standard Deviation of the Mean
04/06/87	0.012±0.002	0.016±0.002	0.016±0.002	0.013±0.002	0.014±0.002
04/13/87	0.015±0.002	0.025±0.003	0.019±0.002	0.015±0.002	0.019±0.005
04/20/87	0.015±0.002	0.018±0.002	0.016±0.002	0.021±0.003	0.018±0.003
04/27/87	0.011±0.002	0.020±0.002	0.018±0.002	0.016±0.002	0.016±0.004
05/04/87	0.012±0.002	0.018±0.002	0.018±0.002	0.017±0.002	0.016±0.003
05/11/87	0.020±0.002	0.024±0.002	0.023±0.002	0.022±0.002	0.022±0.002
05/18/87	0.023±0.003	0.021±0.003	0.020±0.003	0.021±0.003	0.021±0.001
05/25/87	0.009±0.003	0.012±0.002	0.020±0.003	0.011±0.002	0.013±0.005
06/01/87	0.016±0.003	0.025±0.003	0.019±0.003	0.026±0.003	0.022±0.005
06/08/87	0.014±0.002	0.019±0.002	0.014±0.002	0.016±0.002	0.016±0.002
06/15/87	0.024±0.002	0.030±0.003	0.027±0.002	0.030±0.003	0.028±0.003
06/22/87	0.009±0.002	0.010±0.002	0.011±0.002	0.012±0.002	0.011±0.001
06/29/87	0.016±0.004	0.019±0.002	0.020±0.002	0.025±0.002	0.020±0.004
Mean Gross Beta Activity ± Standard Deviation of the Mean	0.015±0.005	0.020±0.005	0.019±0.004	0.019±0.006	

TABLE IX

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

THIRD QUARTER

1987

Collection Date	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6	Weekly Mean Gross Beta Activity ± Standard Deviation of the Mean
07/06/87	0.024±0.003	0.026±0.003	0.026±0.003	0.024±0.002	0.028±0.003	0.022±0.002	0.025±0.002
07/13/87	0.013±0.002	0.015±0.003	0.011±0.002	0.014±0.003	0.020±0.003	0.015±0.003	0.015±0.003
07/20/87	0.019±0.002	0.023±0.003	0.024±0.003	0.028±0.003	0.027±0.003	0.018±0.002	0.023±0.004
07/27/87	0.039±0.002	0.042±0.003	0.012±0.002	0.012±0.002	0.015±0.002	0.012±0.002	0.022±0.014
08/03/87	0.026±0.002	0.028±0.002	0.023±0.002	0.026±0.002	0.028±0.003	0.023±0.002	0.026±0.002
08/10/87	0.014±0.002	0.014±0.002	0.017±0.002	0.015±0.002	0.019±0.003	0.022±0.003	0.017±0.003
08/17/87	0.022±0.002	0.028±0.003	0.038±0.003	0.025±0.002	0.030±0.003	0.023±0.002	0.028±0.006
08/24/87	0.024±0.002	0.024±0.002	0.023±0.002	0.024±0.002	0.027±0.003	0.023±0.003	0.024±0.001
08/31/87	0.016±0.003	0.016±0.002	0.018±0.002	0.021±0.002	0.020±0.002	0.014±0.002	0.018±0.003
09/07/87	0.025±0.003	0.023±0.002	0.025±0.002	0.021±0.002	0.028±0.002	0.023±0.002	0.024±0.002
09/14/87	0.019±0.003	0.023±0.003	0.022±0.003	0.019±0.003	0.022±0.003	0.025±0.003	0.022±0.002
09/21/87	0.020±0.002	0.021±0.002	0.022±0.002	0.026±0.002	0.024±0.002	0.019±0.002	0.022±0.003
09/28/87	0.025±0.003	0.033±0.003	0.032±0.003	0.024±0.002	0.028±0.003	0.031±0.003	0.029±0.004
Mean Gross Beta Activity ± Standard Deviation of the Mean	0.022±0.007	0.024±0.008	0.023±0.007	0.022±0.005	0.024±0.005	0.021±0.005	

TABLE IX (Continued)

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

THIRD QUARTER

1987

Collection Date	NBF	SBN	DOW	COL	Weekly Mean Gross Beta Activities ±Standard Deviation of the Mean
07/06/87	0.024±0.003	0.029±0.003	0.026±0.002	0.025±0.003	0.026±0.002
07/13/87	0.017±0.003	0.014±0.003	0.016±0.003	0.017±0.002	0.016±0.002
07/20/87	0.020±0.003	0.025±0.002	0.024±0.003	0.026±0.003	0.024±0.003
07/27/87	0.013±0.002	0.014±0.002	0.015±0.002	0.015±0.002	0.014±0.002
08/03/87	0.027±0.003	0.032±0.002	0.025±0.002	0.028±0.003	0.028±0.003
08/10/87	0.015±0.002	0.020±0.002	0.015±0.003	0.016±0.003	0.017±0.002
08/17/87	0.025±0.002	0.030±0.003	0.025±0.002	0.023±0.002	0.026±0.002
08/24/87	0.029±0.002	0.031±0.003	0.029±0.003	0.025±0.003	0.029±0.002
08/31/87	0.020±0.002	0.019±0.002	0.017±0.002	0.018±0.002	0.019±0.001
09/07/87	0.024±0.002	0.029±0.002	0.027±0.002	0.025±0.002	0.026±0.002
09/14/87	0.020±0.003	0.022±0.003	0.022±0.003	0.021±0.003	0.021±0.001
09/21/87	0.027±0.002	0.031±0.003	0.024±0.002	0.020±0.002	0.025±0.003
09/28/87	0.030±0.003	0.026±0.003	0.028±0.003	0.024±0.003	0.027±0.003
Mean Gross Beta Activity ± Standard Deviation of the Mean	0.022±0.005	0.025±0.006	0.023±0.005	0.022±0.004	

TABLE X

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

FOURTH QUARTER

1987

Collection Date	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6	Weekly Mean Gross Beta Activity ± Standard Deviation of the Mean
10/05/87	0.015±0.002	0.018±0.002	0.017±0.002	0.019±0.002	0.024±0.003	0.024±0.003	0.020±0.004
10/12/87	0.024±0.002	0.022±0.002	0.028±0.002	0.028±0.002	0.027±0.002	0.026±0.003	0.026±0.002
10/19/87	0.034±0.003	0.034±0.003	0.037±0.003	0.033±0.003	0.033±0.003	0.040±0.003	0.035±0.003
10/26/87	0.019±0.002	0.016±0.002	0.013±0.002	0.016±0.002	0.014±0.002	0.016±0.002	0.016±0.002
11/02/87	0.037±0.002	0.033±0.003	0.031±0.003	0.035±0.003	0.031±0.003	0.042±0.003	0.035±0.004
11/09/87	0.035±0.002	0.037±0.003	0.031±0.003	0.032±0.003	0.039±0.003	0.036±0.003	0.035±0.003
11/16/87	0.040±0.003	0.039±0.003	0.037±0.003	0.035±0.003	0.040±0.003	0.045±0.003	0.039±0.003
11/23/87	0.018±0.002	0.020±0.002	0.017±0.002	0.017±0.002	0.020±0.002	0.019±0.002	0.019±0.001
11/30/87	0.024±0.002	0.027±0.002	0.024±0.003	0.020±0.002	0.026±0.002	0.025±0.003	0.024±0.002
12/08/87	0.019±0.002	0.021±0.002	0.019±0.002	0.017±0.002	0.015±0.002	0.019±0.002	0.018±0.002
12/14/87	0.021±0.002	0.027±0.003	0.020±0.002	0.022±0.003	0.022±0.002	0.021±0.003	0.022±0.002
12/21/87	0.025±0.001	0.025±0.002	0.023±0.002	0.025±0.001	0.019±0.002	0.020±0.002	0.023±0.003
12/28/87	0.030±0.002	0.032±0.003	0.030±0.002	0.029±0.002	0.031±0.003	0.035±0.003	0.031±0.002
Mean Gross Beta Activity ± Standard Deviation of the Mean	0.026±0.008	0.027±0.007	0.025±0.008	0.025±0.007	0.026±0.008	0.028±0.010	

TABLE X (Continued)

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

FOURTH QUARTER

1987

Collection Date	NBF	SBN	DOW	COL	Weekly Mean Gross Beta Activities ±Standard Deviation of the Mean
10/05/87	0.020±0.002	0.019±0.002	**	0.017±0.002	0.019±0.002
10/12/87	0.028±0.002	0.030±0.002	0.030±0.002	0.031±0.003	0.030±0.001
10/19/87	0.036±0.003	0.033±0.003	0.038±0.003	0.040±0.003	0.037±0.003
10/26/87	0.010±0.001	0.020±0.002	0.031±0.002	0.020±0.002	0.020±0.009
11/02/87	0.037±0.003	0.040±0.003	0.039±0.003	0.037±0.003	0.038±0.002
11/09/87	0.038±0.002	0.029±0.002	0.030±0.002	0.034±0.003	0.033±0.004
11/16/87	0.035±0.002	0.040±0.002	0.033±0.002	0.041±0.003	0.037±0.004
11/23/87	0.021±0.002	0.021±0.002	0.017±0.002	0.018±0.002	0.019±0.002
11/30/87	0.021±0.002	0.027±0.003	0.023±0.002	0.022±0.002	0.023±0.003
12/08/87	0.020±0.002	0.022±0.002	0.014±0.002	0.015±0.002	0.018±0.004
12/14/87	0.023±0.004	0.023±0.002	0.022±0.002	0.026±0.002	0.024±0.002
12/21/87	0.020±0.002	0.023±0.002	0.017±0.002	0.019±0.002	0.020±0.003
12/28/87	0.031±0.003	0.028±0.003	0.027±0.002	0.031±0.003	0.029±0.002
Mean Gross Beta Activity ± Standard Deviation of the Mean	0.026±0.009	0.027±0.007	0.027±0.008	0.027±0.009	

**Invalid sample, no volume

TABLE XI

GROSS BETA IN AIR PARTICULATES (pCi/m^3)

QUARTERLY STATISTICAL SUMMARY

1987

	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6
FIRST QUARTER	0.017±0.004	0.020±0.006	0.020±0.006	0.018±0.005	0.022±0.006	0.024±0.007
SECOND QUARTER	0.017±0.004	0.019±0.005	0.018±0.005	0.017±0.003	0.020±0.005	0.020±0.006
THIRD QUARTER	0.022±0.007	0.024±0.008	0.023±0.007	0.022±0.005	0.024±0.005	0.021±0.005
FOURTH QUARTER	0.026±0.008	0.027±0.007	0.025±0.008	0.025±0.007	0.026±0.008	0.028±0.010

	NBF	SBN	DOW	COL
FIRST QUARTER	0.018±0.005	0.021±0.005	0.021±0.006	0.021±0.006
SECOND QUARTER	0.015±0.005	0.020±0.005	0.019±0.004	0.019±0.006
THIRD QUARTER	0.022±0.005	0.025±0.006	0.023±0.005	0.022±0.004
FOURTH QUARTER	0.026±0.009	0.027±0.007	0.027±0.008	0.027±0.009

TABLE XII

GROSS BETA IN AIR PARTICULATES (pCi/m3)

ANNUAL STATISTICAL SUMMARY

1987

Station	Mean	1987 Range	
		Low Value	High Value
ONS1	0.021±0.007	0.010±0.002	0.040±0.003
ONS2	0.023±0.007	0.010±0.002	0.042±0.003
ONS3	0.022±0.007	0.010±0.002	0.038±0.003
ONS4	0.020±0.006	0.012±0.002	0.035±0.003
ONS5	0.023±0.007	0.011±0.002	0.040±0.003
ONS6	0.023±0.008	0.011±0.002	0.045±0.003
Onsite Stations Mean	0.022±0.003		
NBF	0.020±0.007	0.009±0.003	0.038±0.002
SBN	0.023±0.007	0.012±0.002	0.040±0.003
DOW	0.022±0.006	0.011±0.002	0.039±0.003
COL	0.022±0.007	0.011±0.002	0.041±0.003
Offsite Stations Mean	0.022±0.004		

Figure 3
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION ONS1

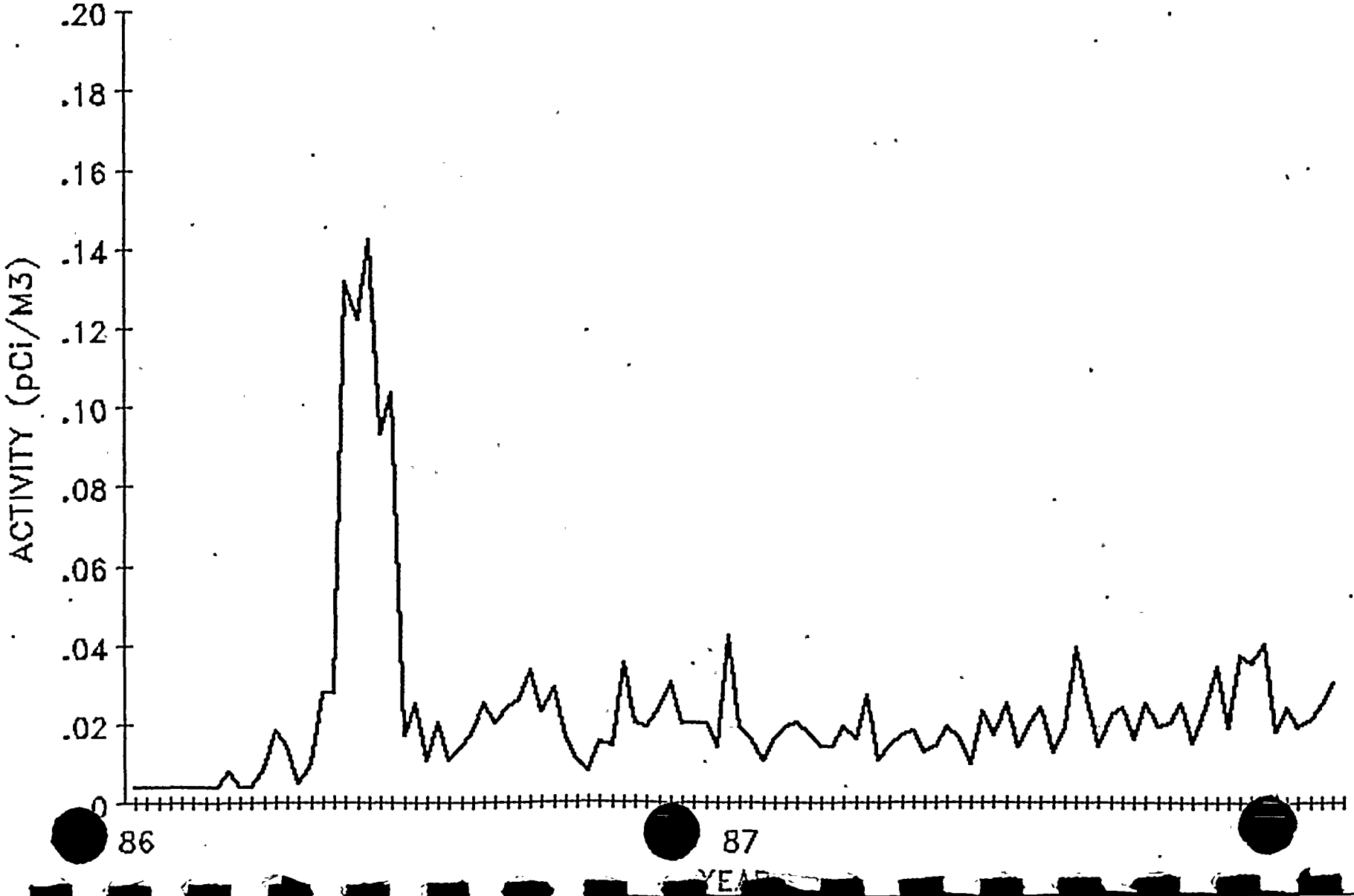


Figure 4
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION ONS2

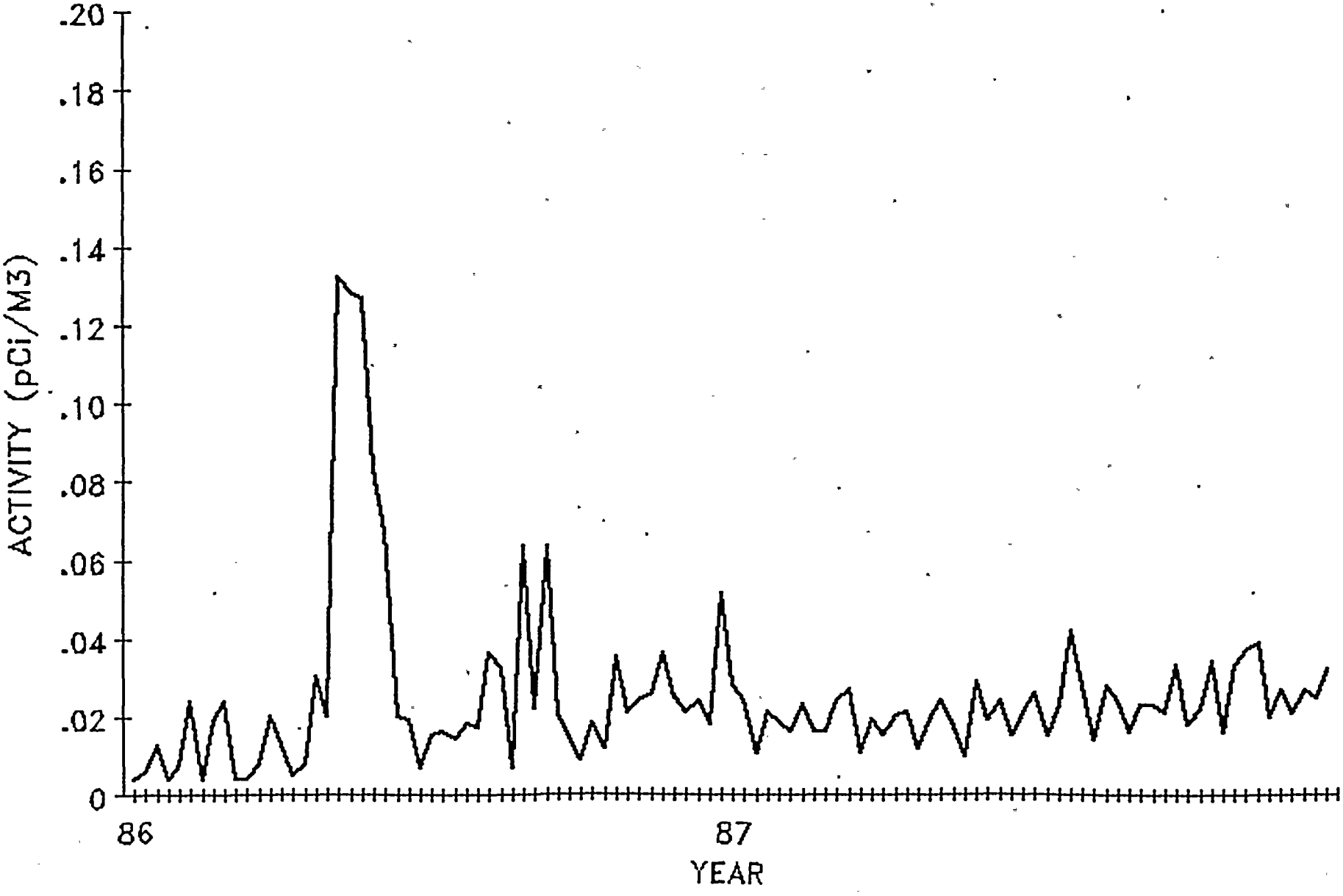


Figure 5
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION ONS3

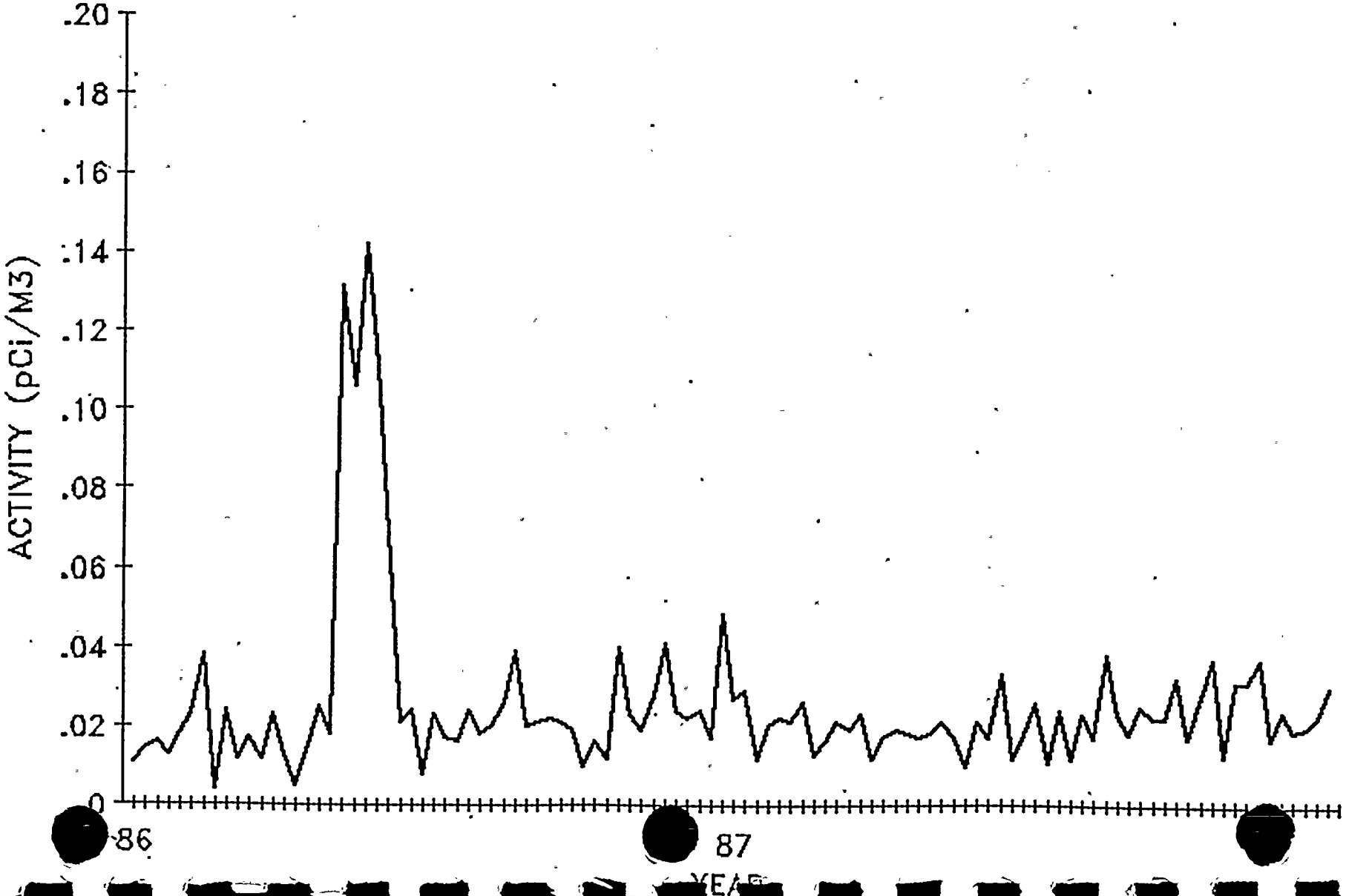


Figure 6
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION ONS4

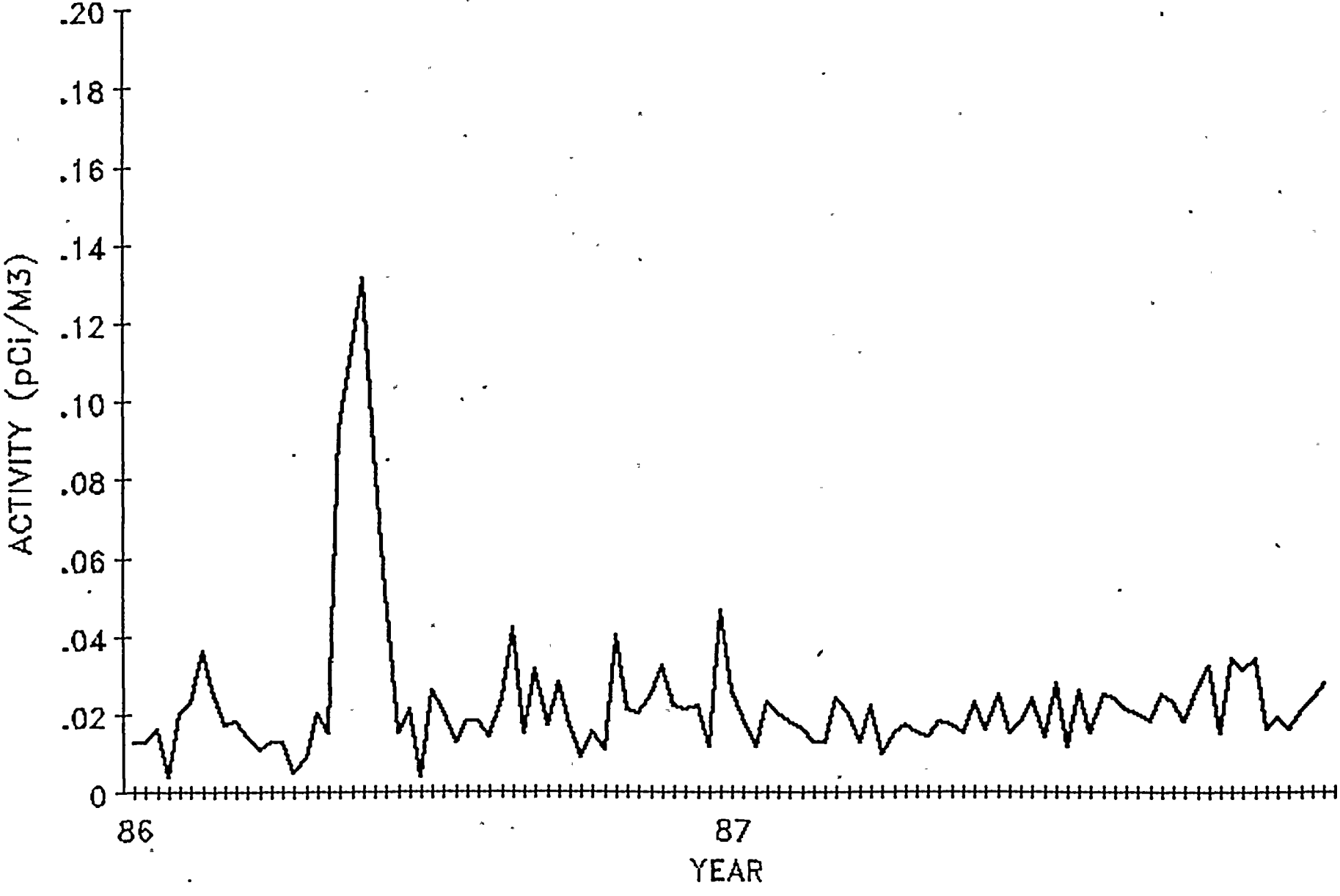


Figure 7
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION ONS5

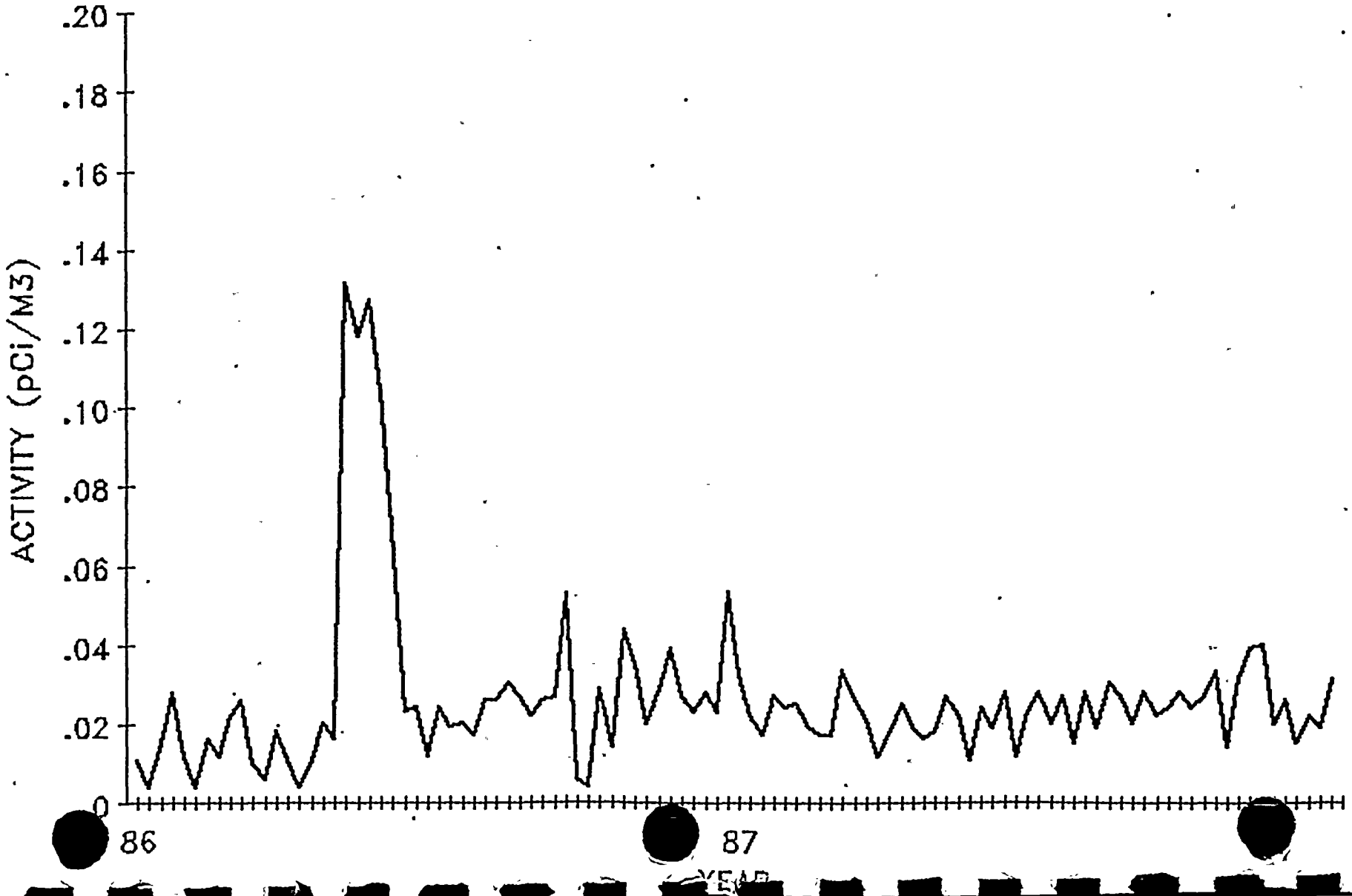


Figure 8
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION ONS6

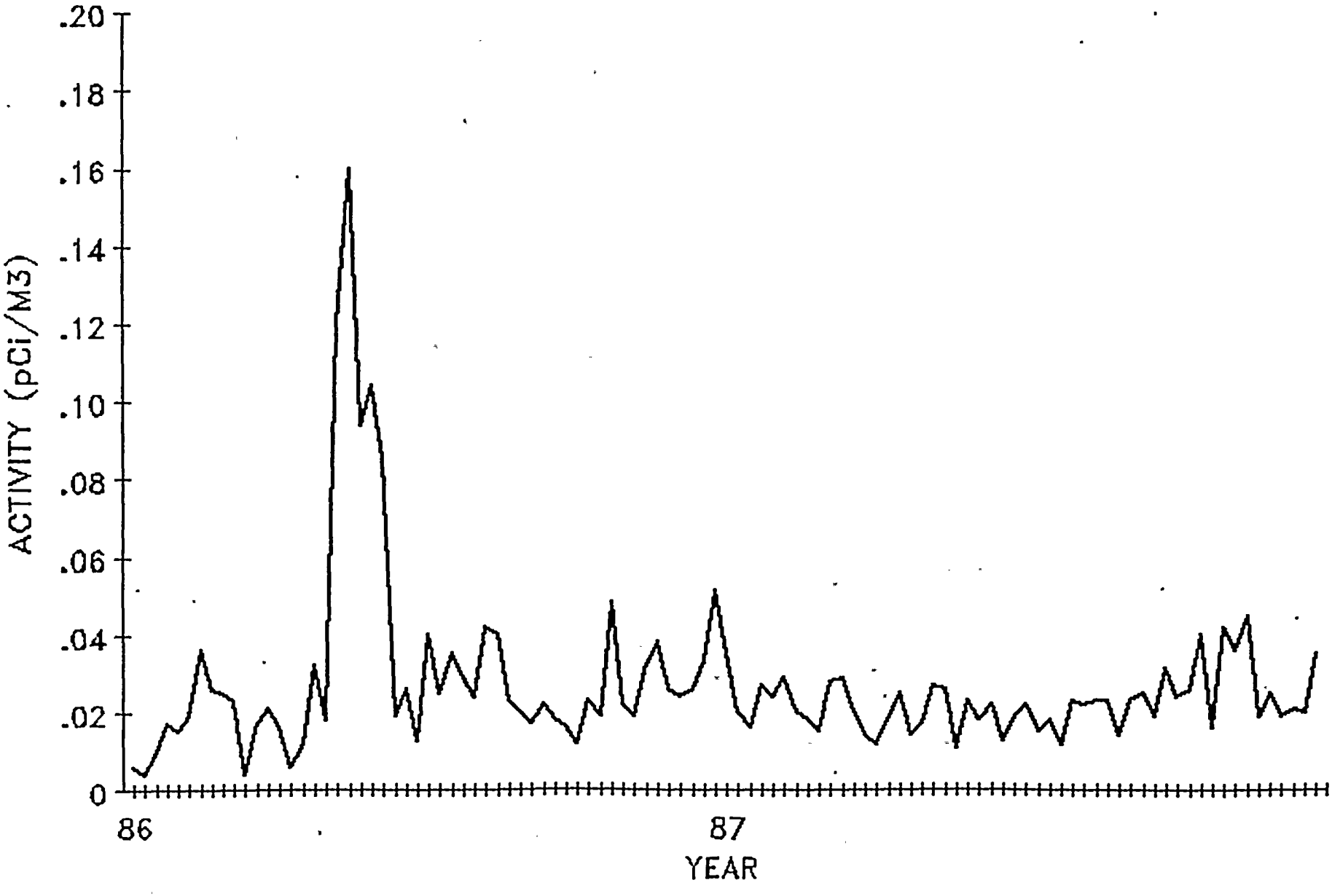


Figure 9
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION NBF

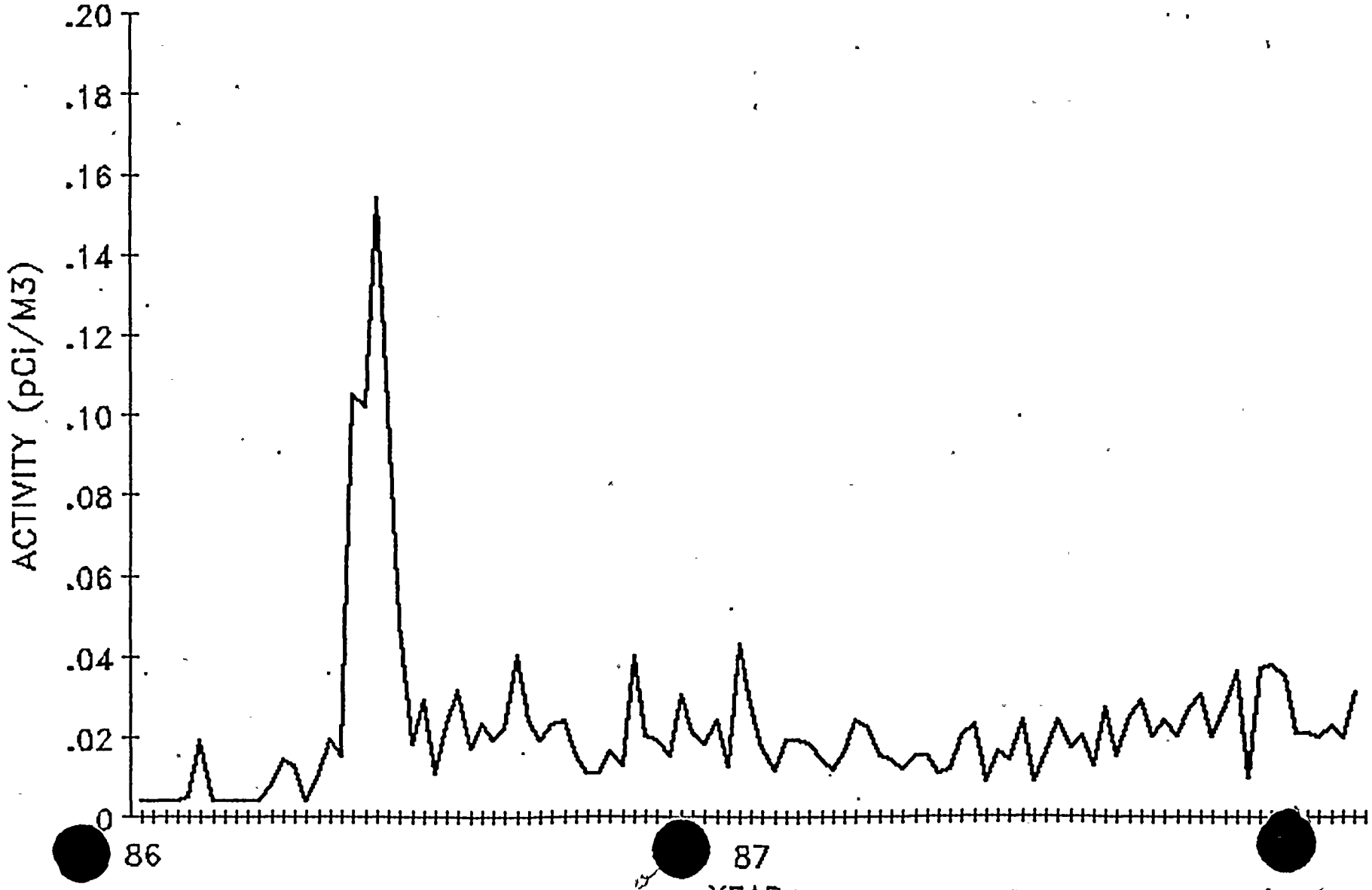


Figure 10
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION SBN

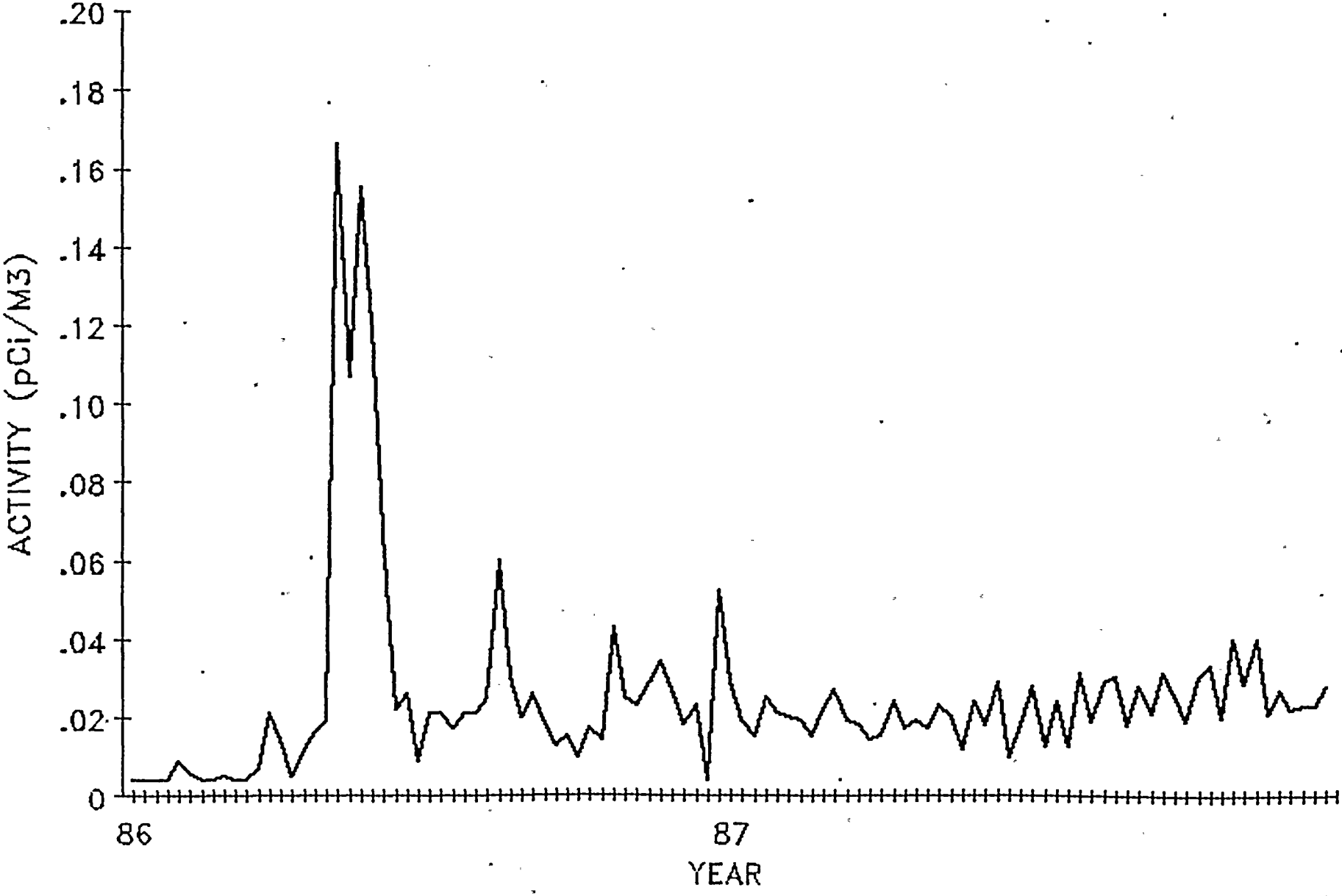


Figure 11
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION DOW

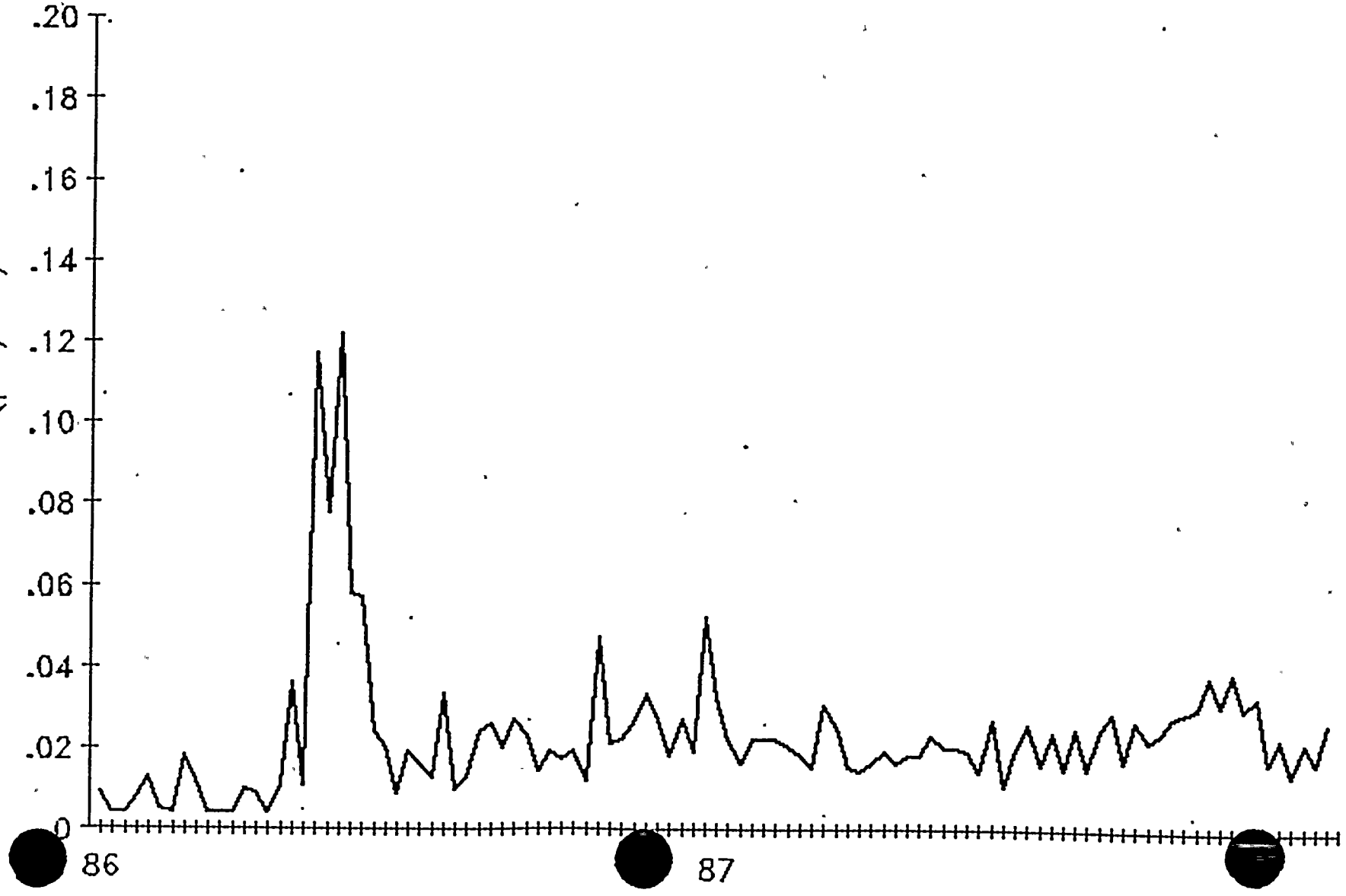


Figure 12
GROSS BETA IN AIR PARTICULATES
WEEKLY ACTIVITY-STATION COL

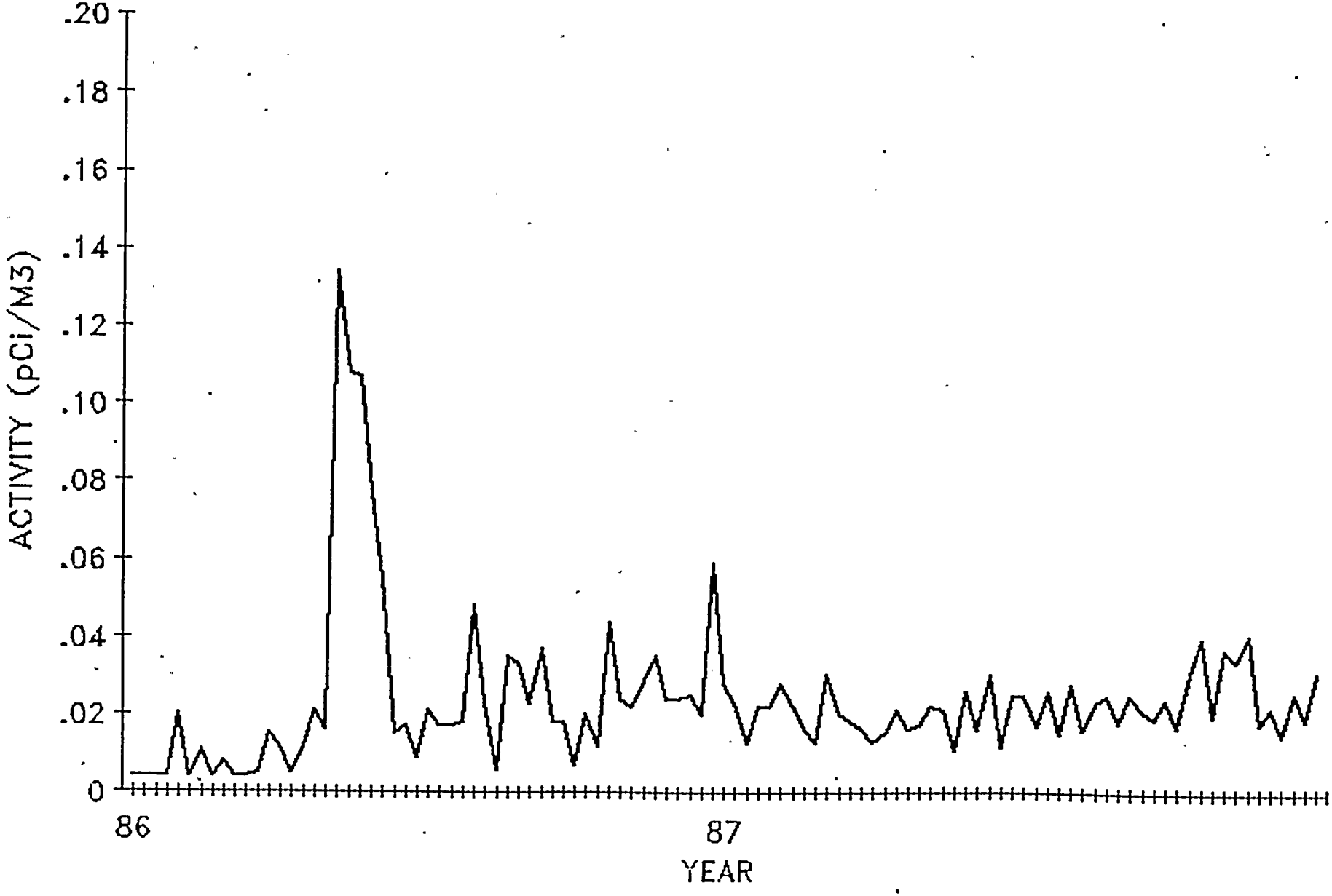
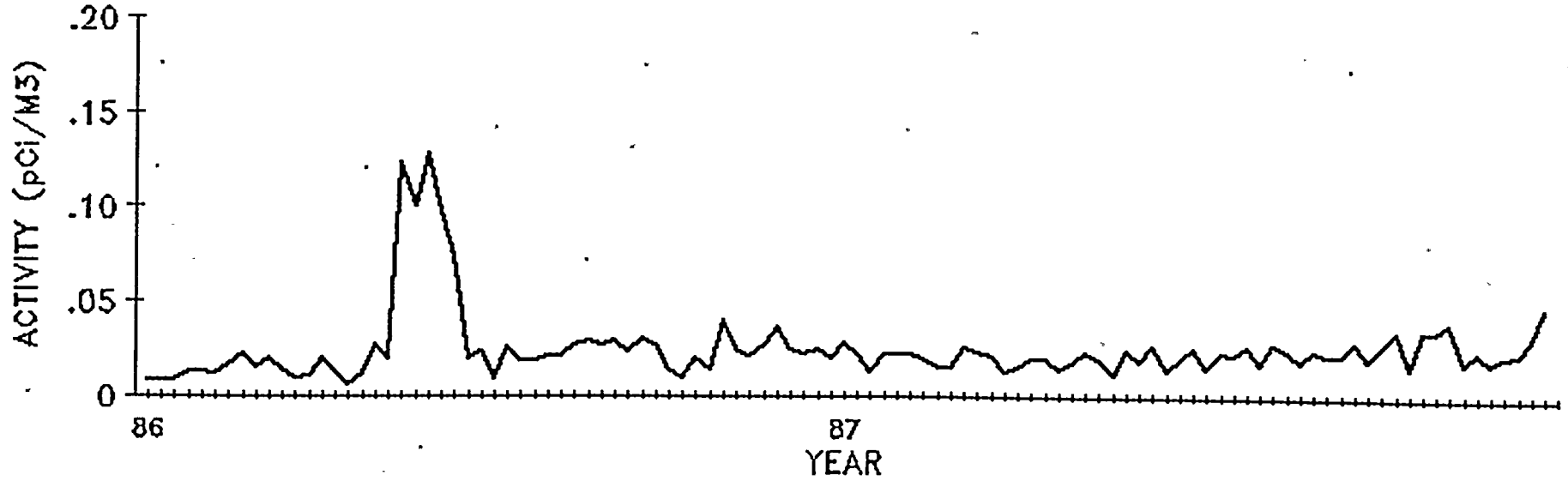
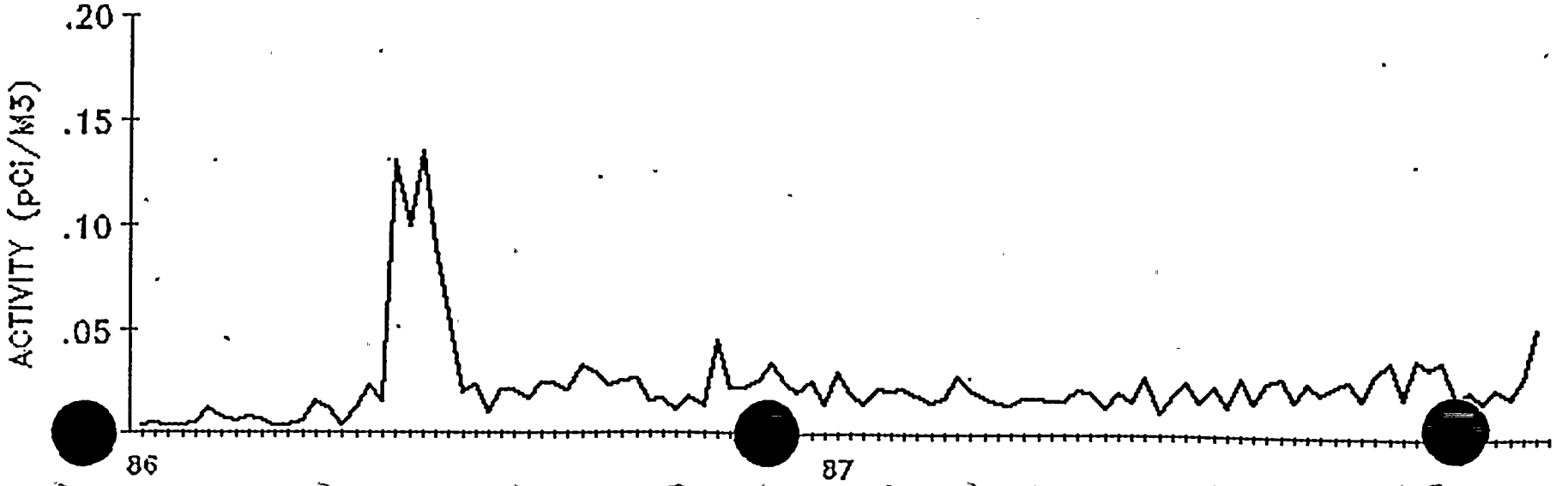


Figure 13
GROSS BETA IN AIR PARTICULATES
MEAN WEEKLY ACTIVITY-ON SITE COLLECTION



GROSS BETA IN AIR PARTICULATES
MEAN WEEKLY ACTIVITY-OFF SITE COLLECTION



7.2 Airborne Radioiodine

Samples for airborne radioiodine were collected concurrently with the air particulate samples from the ten monitoring stations. These samples were collected in charcoal cartridges and analyzed for I-131.

Airborne radioiodine levels for the four quarters of 1987 can be seen in Tables XIII through XVI.

The detected levels of radioiodine during the first, second, third, and fourth quarters were less than the plant Technical Specification detection limit (7E-2 pCi/m^3) of table 4.12-1.

TABLE XIII

AIRBORNE RADIOIODINE (pCi/m^3)

FIRST QUARTER

1987

Collection Date	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6
01/05/87	*	*	*	*	*	*
01/12/87	*	*	*	*	*	*
01/19/87	*	*	*	*	*	*
01/26/87	*	*	*	*	*	*
02/02/87	*	*	*	*	*	*
02/09/87	*	*	*	*	*	*
02/17/87	*	*	*	*	*	*
02/23/87	*	*	*	*	*	*
03/02/87	*	*	*	*	*	*
03/09/87	*	*	*	*	*	*
03/16/87	*	*	*	0.014±0.004	*	0.016±0.005
03/23/87	*	*	*	*	*	*
03/30/87	*	*	*	*	*	*

*Less than detection limit; 0.005 pCi/m^3

TABLE XIII (Continued)

AIRBORNE RADIOIODINE (pCi/m^3)

FIRST QUARTER

1987

Collection Date	NBF	SBN	DOW	COL
01/05/87	*	*	*	*
01/12/87	*	*	*	*
01/19/87	*	*	*	*
01/26/87	*	*	*	*
02/02/87	*	*	*	*
02/09/87	*	*	*	*
02/17/87	*	*	*	*
02/23/87	*	*	*	*
03/02/87	*	*	*	*
03/09/87	*	*	*	*
03/16/87	*	*	*	*
03/23/87	*	*	*	*
03/30/87	*	*	*	*

*Less than detection limit; 0.005 pCi/m^3

TABLE XIV

AIRBORNE RADIOIODINE (pCi/m^3)

SECOND QUARTER

1987

Collection Date	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6
04/06/87	*	*	*	*	*	*
04/13/87	*	*	*	*	*	*
04/20/87	*	*	*	*	*	*
04/27/87	*	*	*	*	*	*
05/04/87	*	*	*	*	*	*
05/11/87	*	*	*	*	*	*
05/18/87	*	*	*	*	*	*
05/25/87	*	*	*	*	*	*
06/01/87	*	*	*	*	*	*
06/08/87	*	*	*	*	*	*
06/15/87	*	*	*	*	*	*
06/22/87	*	*	*	*	*	*
06/29/87	*	*	*	*	*	*

*Less than detection limit; 0.005 pCi/m^3

TABLE XIV (Continued)

AIRBORNE RADIOIODINE (pCi/m^3)

SECOND QUARTER

1987

Collection Date	NBF	SBN	DOW	COL
04/06/87	*	*	*	*
04/13/87	*	*	*	*
04/20/87	*	*	*	*
04/27/87	*	*	*	*
05/04/87	*	*	*	*
05/11/87	*	*	*	*
05/18/87	*	*	*	*
05/25/87	*	*	*	*
06/01/87	*	*	*	*
06/08/87	*	*	*	*
06/15/87	*	*	*	*
06/22/87	*	*	*	*
06/29/87	*	*	*	*

*Less than lower limit of detection (0.005 pCi/m^3)

TABLE XV

AIRBORNE RADIOIODINE (pCi/m^3)

THIRD QUARTER

1987

Collection Date	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6
07/06/87	*	*	*	*	*	*
07/13/87	*	*	*	*	*	*
07/20/87	*	*	*	*	*	*
07/27/87	*	*	*	*	*	*
08/03/87	*	*	*	*	*	*
08/10/87	*	*	*	*	*	*
08/17/87	*	*	*	*	*	*
08/24/87	*	*	0.005 ± 0.004	*	*	*
08/31/87	*	*	*	*	*	*
09/07/87	*	*	*	*	*	*
09/14/87	*	*	*	*	*	*
09/21/87	*	*	*	*	*	*
09/28/87	*	*	*	*	*	*

*Less than detection limit; 0.005 pCi/m^3

TABLE XV (Continued)

AIRBORNE RADIOIODINE (pCi/m^3)

THIRD QUARTER

1987

Collection Date	NBF	SBN	DOW	COL
07/06/87	*	*	*	*
07/13/87	*	*	*	*
07/20/87	*	*	*	*
07/27/87	*	*	*	*
08/03/87	*	*	*	*
08/10/87	*	*	*	*
08/17/87	*	*	*	*
08/24/87	*	*	*	*
08/31/87	*	*	*	*
09/07/87	*	*	*	*
09/14/87	*	*	*	*
09/21/87	*	*	*	*
09/28/87	*	*	*	*

* Less than detection limit; 0.005 pCi/m^3

TABLE XVI

AIRBORNE RADIOIODINE (pCi/m^3)

FOURTH QUARTER

1987

Collection Date	ONS1	ONS2	ONS3	ONS4	ONS5	ONS6
10/05/87	*	*	*	*	*	*
10/12/87	*	*	*	*	*	*
10/19/87	*	*	*	*	*	0.006±0.003
10/26/87	*	*	*	*	*	*
11/02/87	*	*	*	*	*	*
11/09/87	*	*	*	*	*	*
11/16/87	*	*	*	*	*	*
11/23/87	*	*	*	*	*	*
11/30/87	*	*	*	*	*	*
12/08/87	*	*	*	*	*	*
12/14/87	*	*	*	*	*	*
12/21/87	0.005±0.004	*	*	*	*	*
12/28/87	*	*	*	*	*	*

*Less than detection limit; 0.005 pCi/m^3

TABLE XVI (Continued)

AIRBORNE RADIOIODINE (pCi/m^3)

FOURTH QUARTER

1987

Collection Date	NBF	SBN	DOW	COL
10/05/87	*	*	**	*
10/12/87	*	*	*	*
10/19/87	*	*	*	*
10/26/87	*	*	*	*
11/02/87	*	*	*	*
11/09/87	*	*	*	*
11/16/87	*	*	*	*
11/23/87	*	*	*	*
11/30/87	*	*	*	*
12/08/87	*	*	*	*
12/14/87	*	*	*	*
12/21/87	*	*	*	*
12/28/87	*	*	*	*

*Less than detection limit; 0.005 pCi/m^3

**Invalid sample, no volume

7.3 Thermoluminescent Dosimetry

Thermoluminescent Dosimetry (TLD) was employed to determine direct radiation in and around the Donald C. Cook Nuclear Plant. The TLD's were placed at 23 locations and exchanged quarterly. Listed below are the mean quarterly readings in mR/week for all TLD's.

	mR/week		
	Onsite	Offsite	Background
First Quarter	0.53 ± 0.11	0.71 ± 0.18	0.62 ± 0.09
Second Quarter	0.55 ± 0.05	0.62 ± 0.09	0.63 ± 0.13
Third Quarter	0.87 ± 0.09	0.94 ± 0.07	0.94 ± 0.10
Fourth Quarter	*	*	*
Annual	0.65 ± 0.18	0.75 ± 0.18	0.73 ± 0.18

*Results are invalid

Figures 14 through 36 present the mR/week values obtained for each TLD station collected during each quarter of 1987.

The highest reading for Onsite stations was seen at Station ONS-9 during the third quarter with a value of 1.00±0.05 mR/week. The highest reading for Offsite stations was at Station OFS-6 (1.04±0.03 mR/week) in the third quarter. Background stations had a high value of 1.05±0.05 mR/week during the third quarter at Station SBN.

The causes for the abnormal TLD results for the Fourth Quarter are in the process of being evaluated and the results of our investigation will be included in the 1988 Annual Environmental Operating Report.

TABLE XVII

THERMOLUMINESCENT DOSIMETRY (mR/week)

1987

Station Location	First Quarter 01/05/87-04/07/87	Second Quarter 04/07/87-07/08/87	Third Quarter 07/08/87-10/08/87	Fourth Quarter (a) 10/08/87-01/15/88
ONS-1	0.63	0.56 ± 0.02	0.91 ± 0.03	
ONS-2	0.59	0.56 ± 0.05	0.91 ± 0.04	
ONS-3	0.44	0.53 ± 0.06	0.92 ± 0.04	
ONS-4	0.33	0.49 ± 0.03	0.71 ± 0.04	
ONS-5	0.44	0.52 ± 0.03	0.78 ± 0.03	
ONS-6	0.58	0.50 ± 0.08	0.88 ± 0.03	
ONS-7	0.63	0.56 ± 0.02	0.89 ± 0.06	
ONS-8	0.64	0.54 ± 0.05	0.80 ± 0.02	
ONS-9	0.49	0.65 ± 0.09	1.00 ± 0.05	
Mean TLD ± Standard Deviation Of the Mean	0.53 ± 0.11	0.55 ± 0.05	0.87 ± 0.09	
OFS-1	0.58	0.53 ± 0.02	0.85 ± 0.06	
OFS-2	0.67	0.59 ± 0.05	Missing	
OFS-3	0.62	0.62 ± 0.02	0.88 ± 0.02	
OFS-4	0.81	0.73 ± 0.02	1.01 ± 0.05	
OFS-5	0.72	0.67 ± 0.03	0.99 ± 0.03	
OFS-6	0.59	0.61 ± 0.05	1.04 ± 0.03	
OFS-7	0.62	0.50 ± 0.02	0.86 ± 0.03	
OFS-8	0.80	0.74 ± 0.05	0.88 ± 0.04	
OFS-9	1.15	0.69 ± 0.04	0.97 ± 0.05	
OFS-10	0.58	0.53 ± 0.03	1.01 ± 0.05	
Mean TLD ± Standard Deviation Of the Mean	0.71 ± 0.18	0.62 ± 0.09	0.94 ± 0.07	
NBF	0.59	0.76 ± 0.06	0.88 ± 0.02	
SBN	0.75	0.72 ± 0.07	1.05 ± 0.05	
DOW	0.59	0.51 ± 0.02	0.99 ± 0.05	
COL	0.59	0.54 ± 0.03	0.83 ± 0.03	
Mean TLD ± Standard Deviation Of the Mean	0.62 ± 0.09	0.63 ± 0.13	0.94 ± 0.10	

(a) All data is invalid for the fourth quarter.

Figure 14
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-1

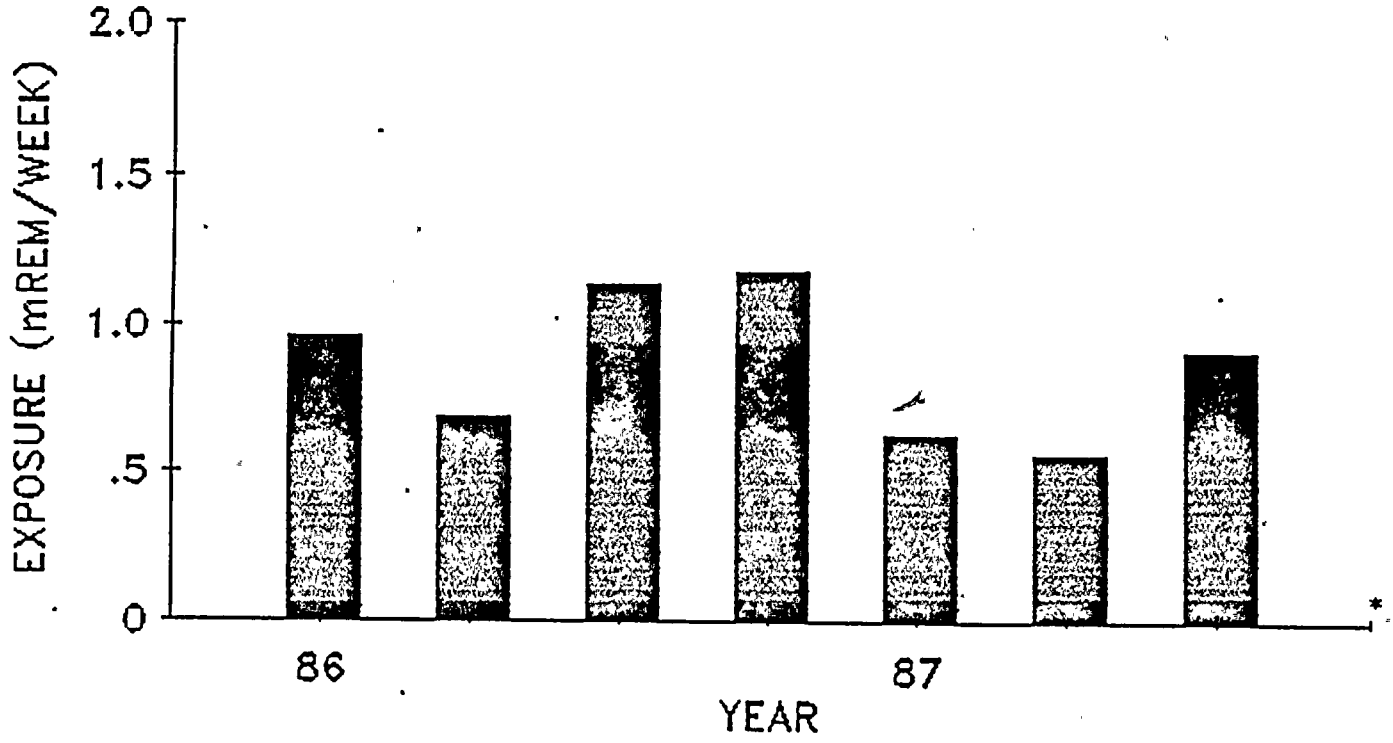
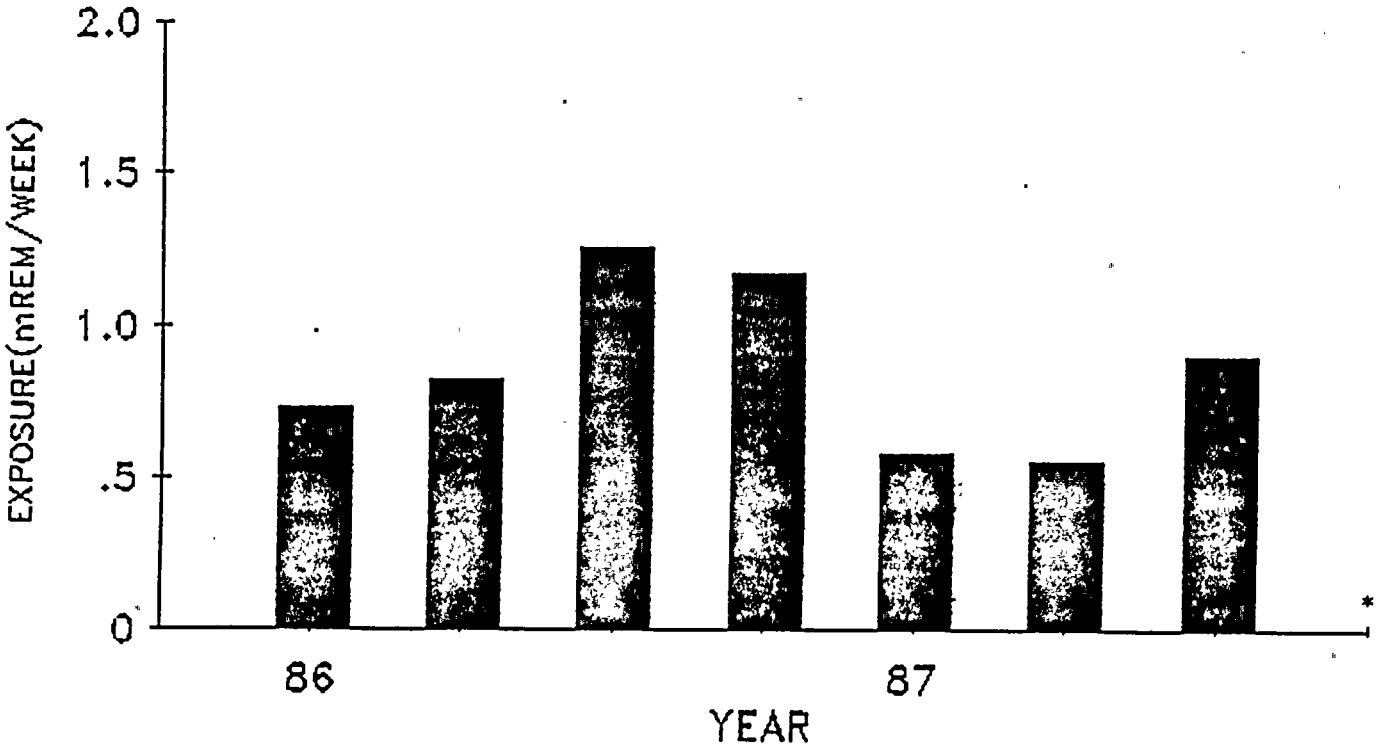


Figure 15
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-2



* Results are invalid.

Figure 16
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-3

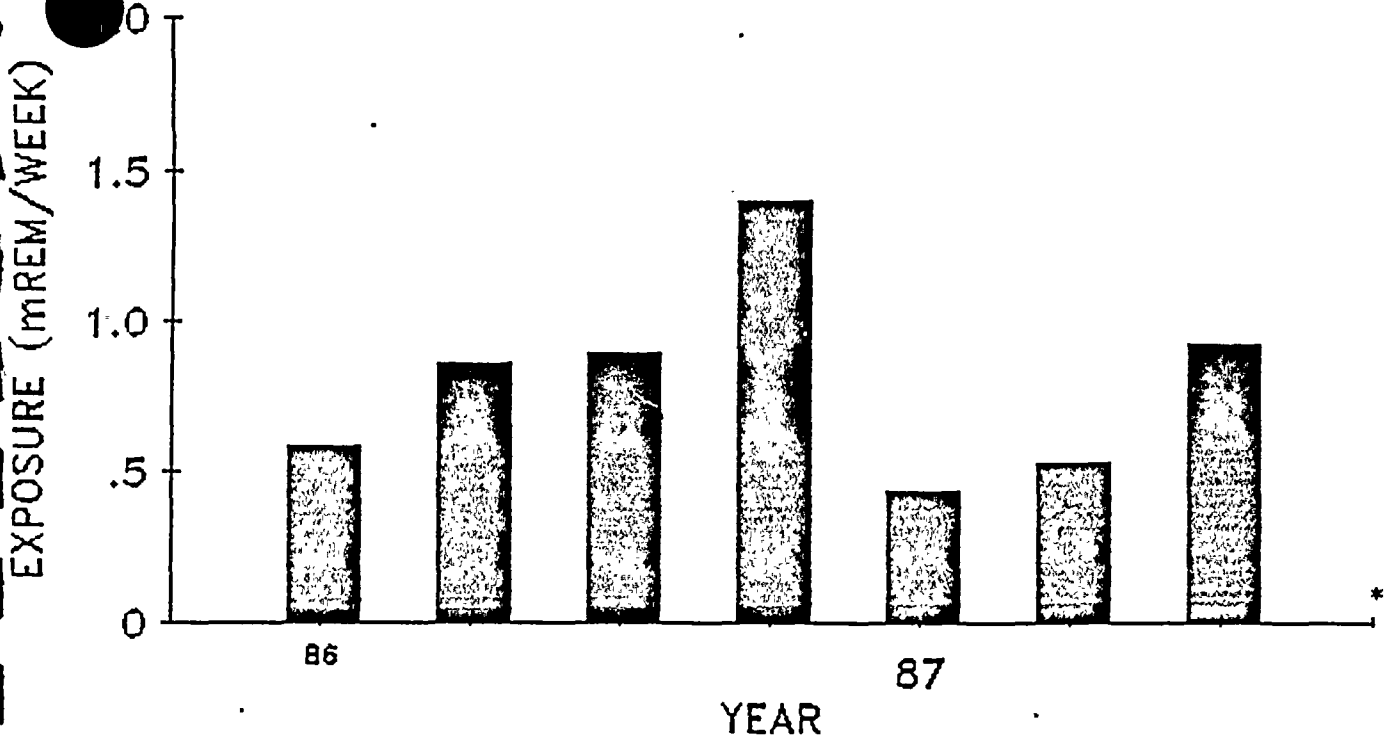
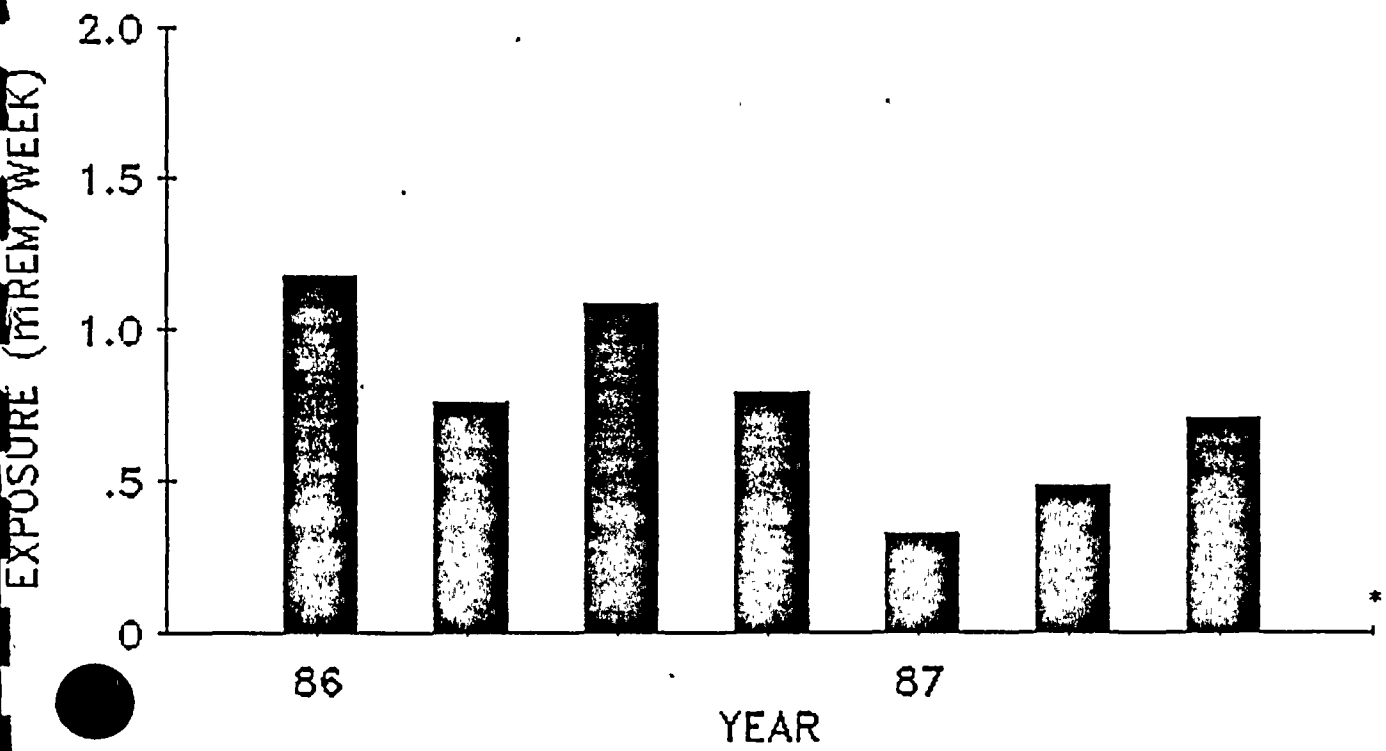


Figure 17
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-4



* Results are invalid.

Figure 18
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-5

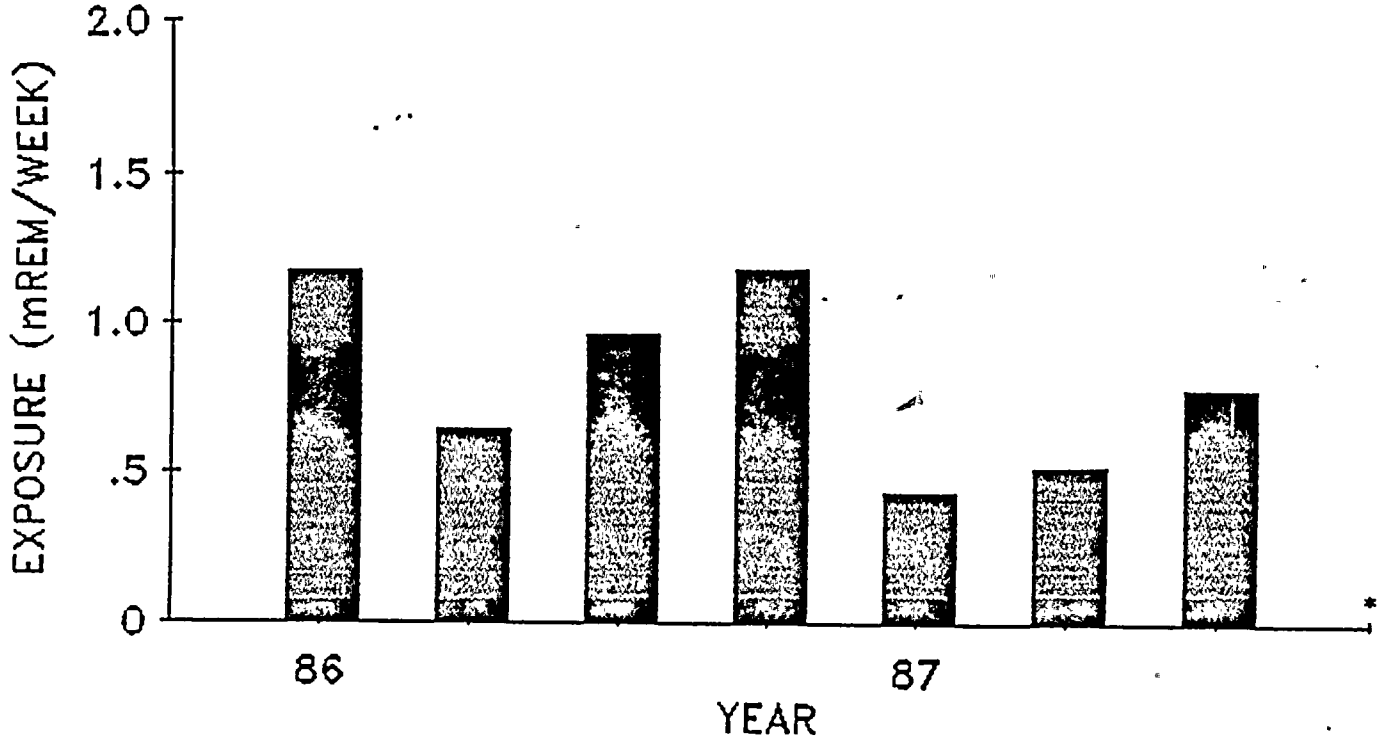
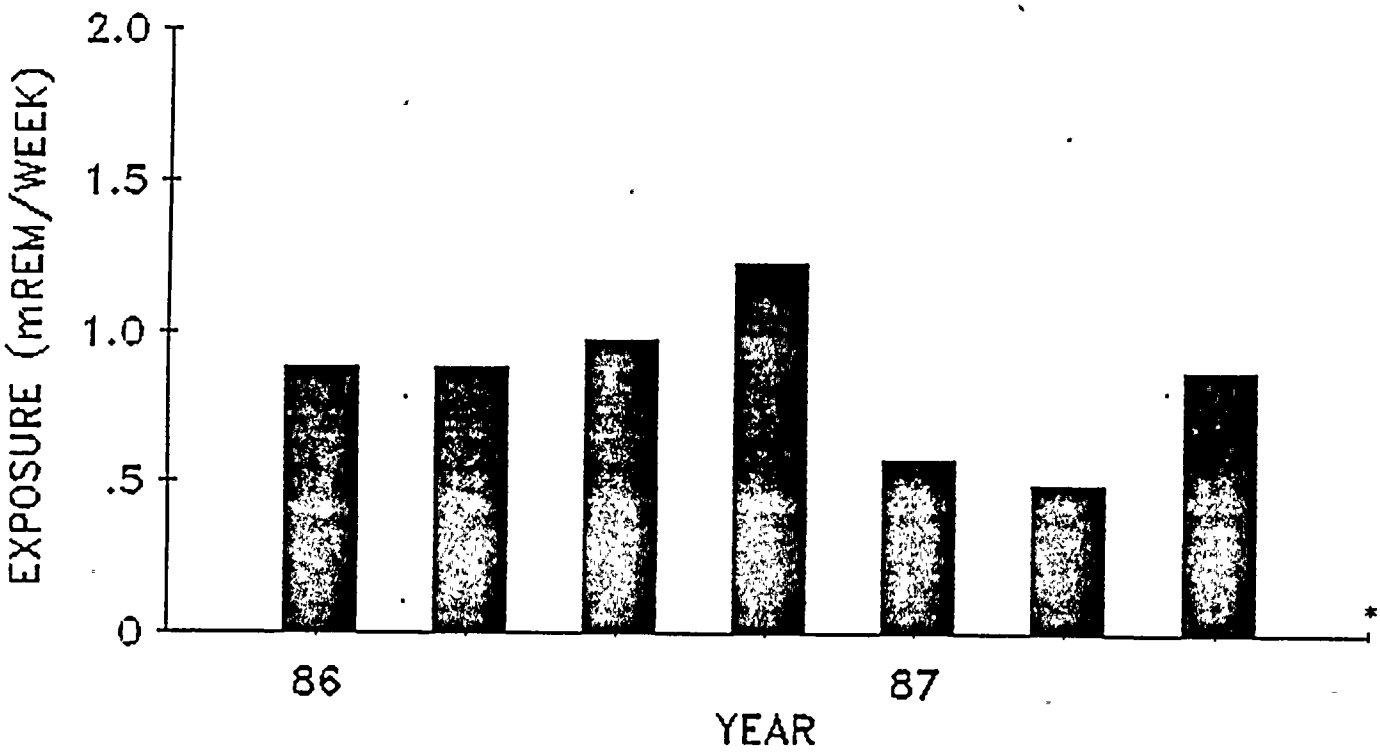


Figure 19
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-6



* Results are invalid.

Figure 20
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-7

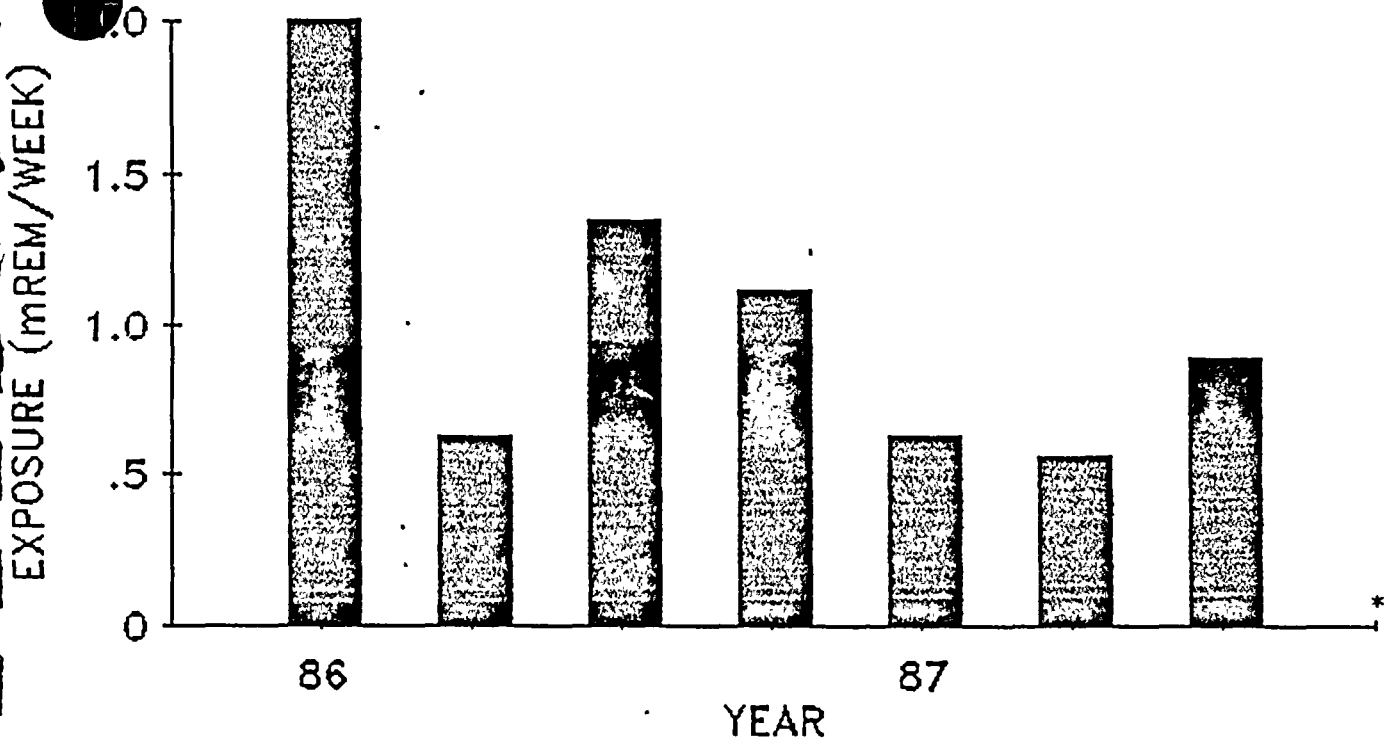
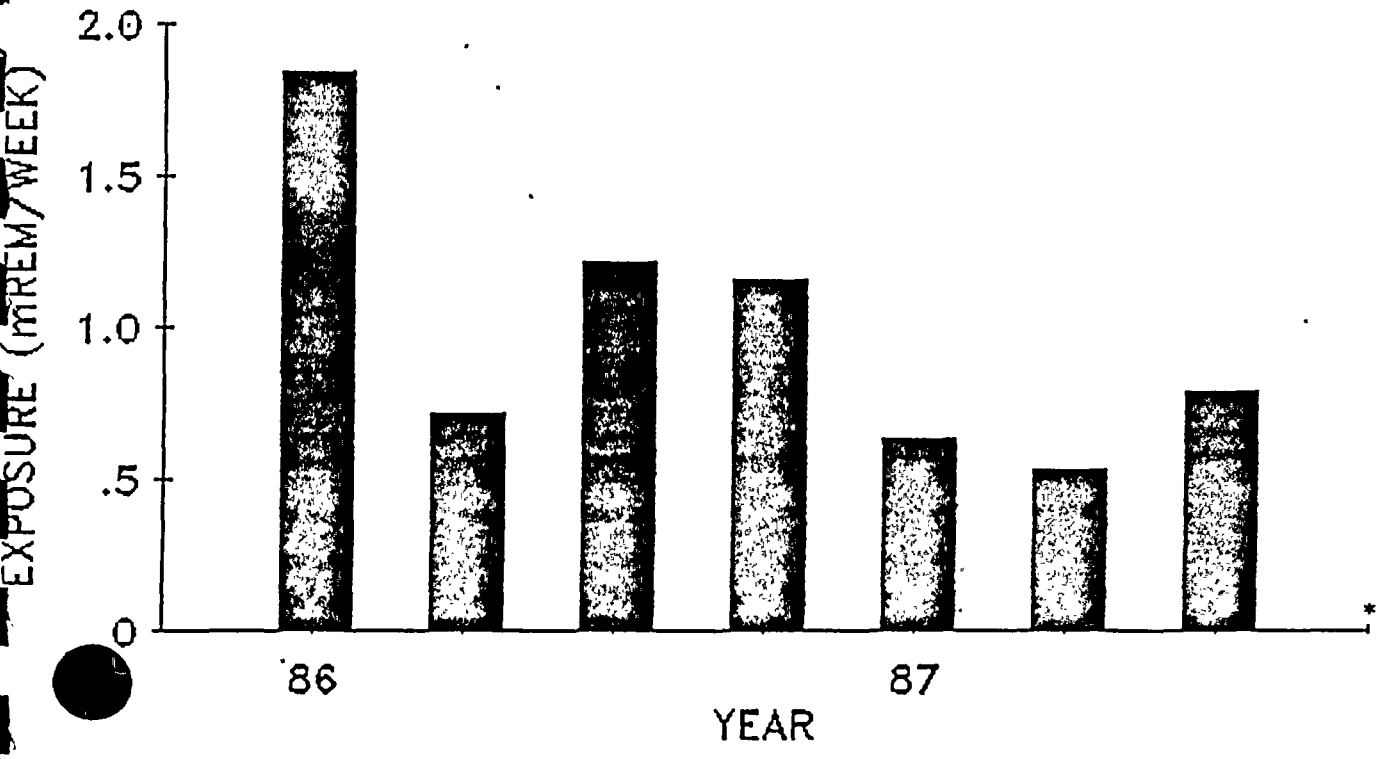
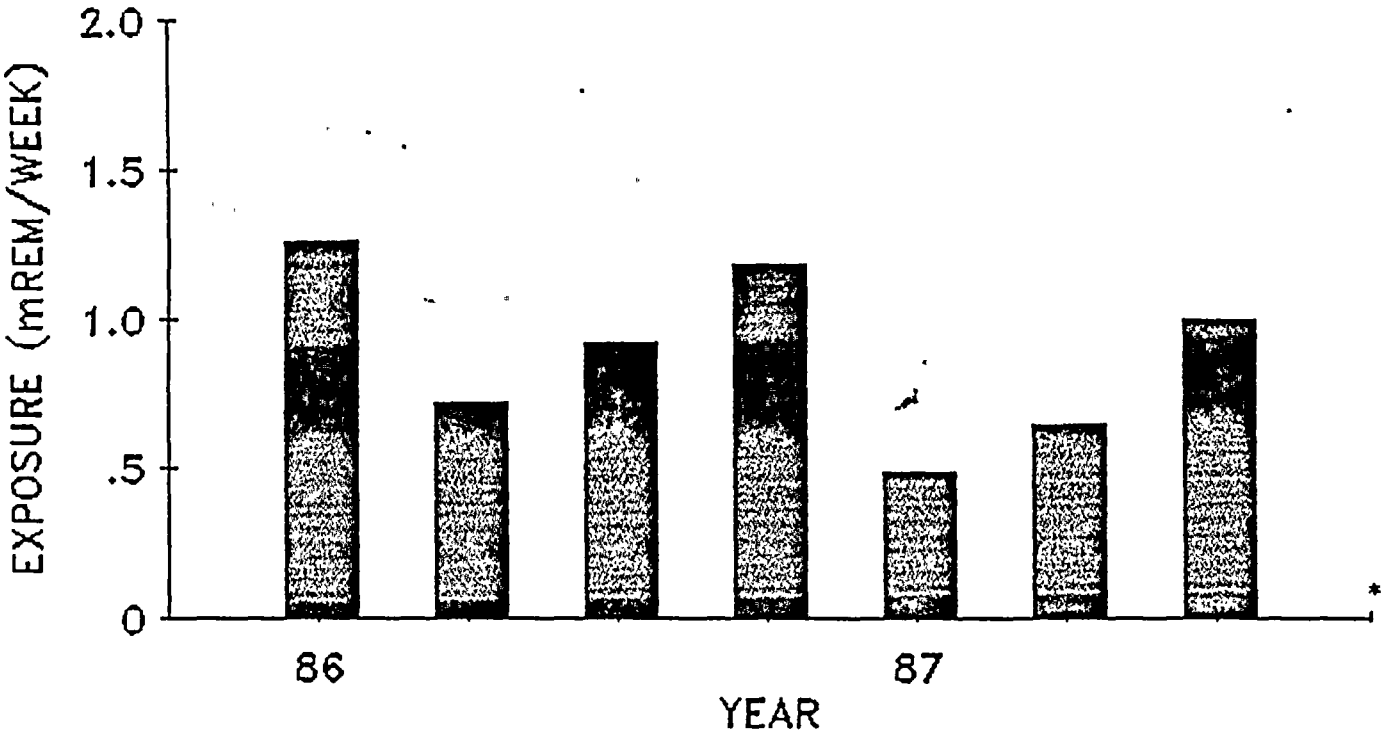


Figure 21
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-8



* Results are invalid.

Figure 22
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION ONS-9



* Results are invalid.

Figure 23
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-1

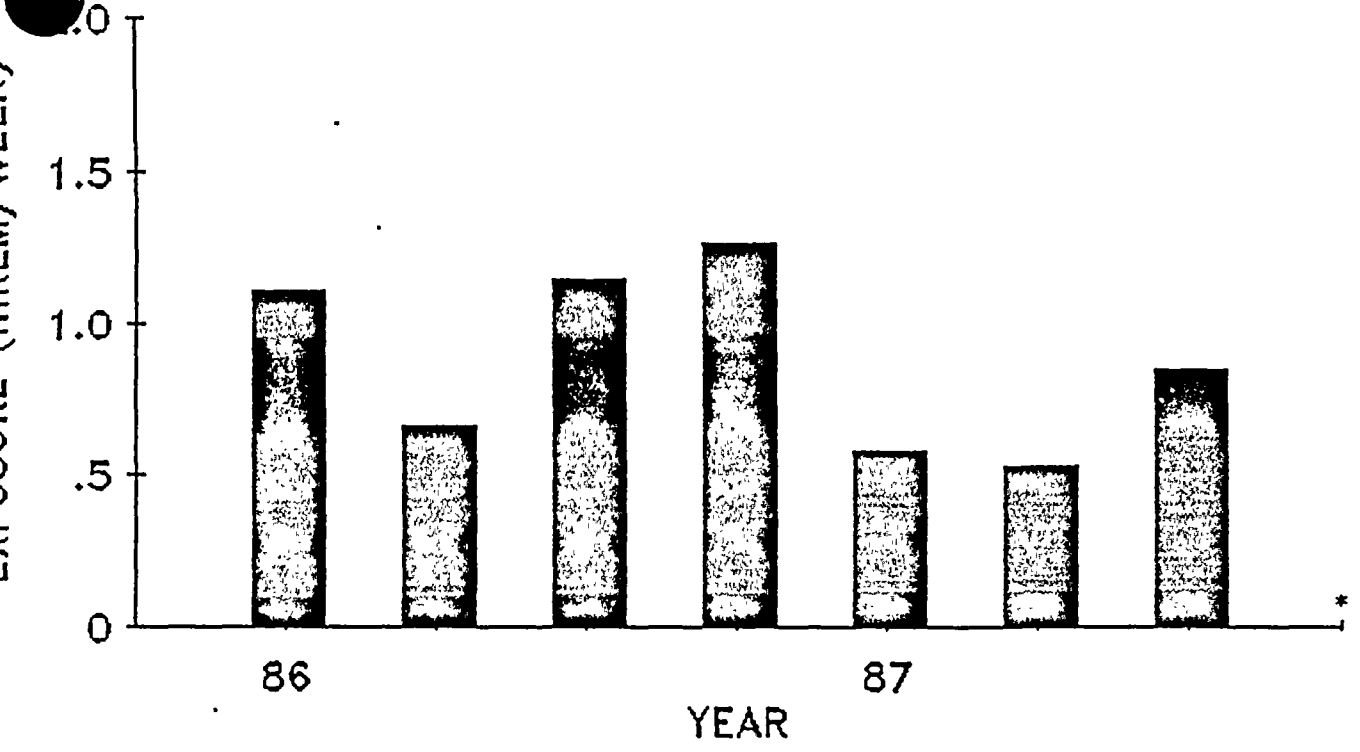
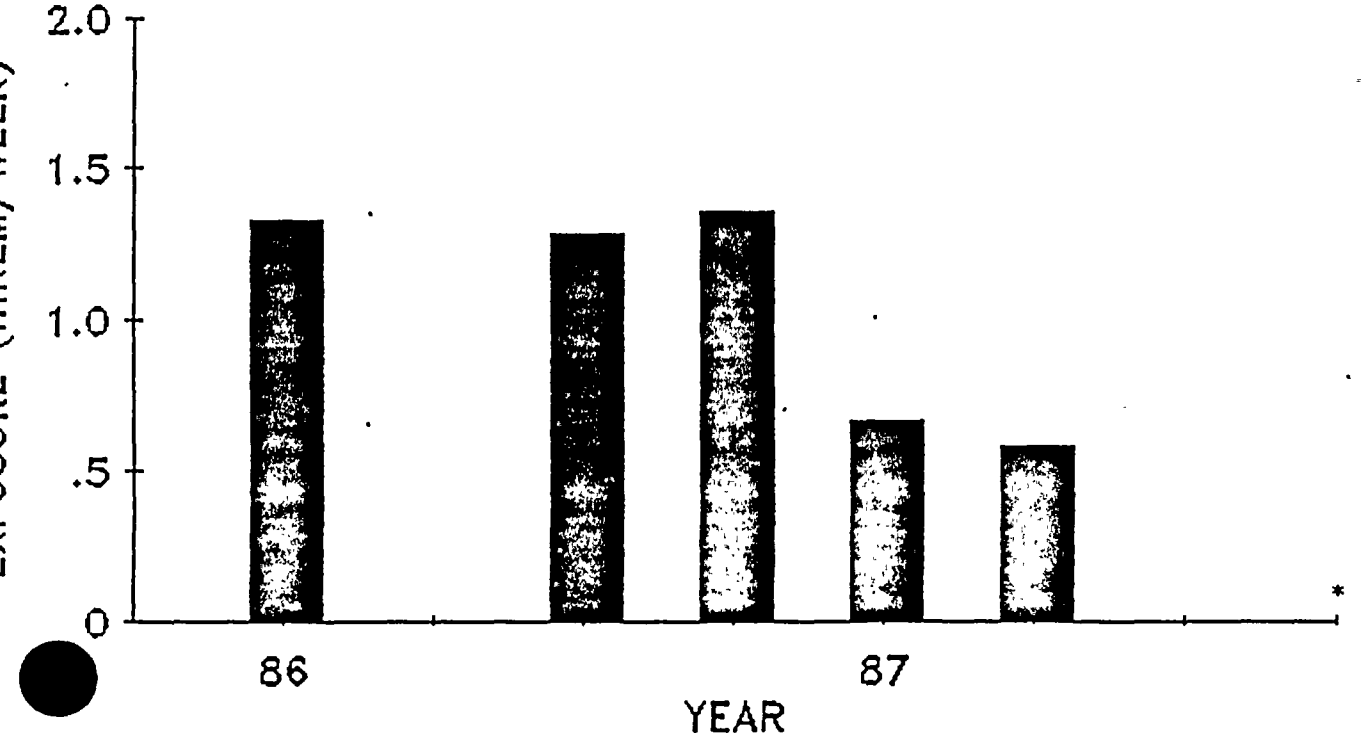


Figure 24
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-2



* Results are invalid.

Figure 25
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-3

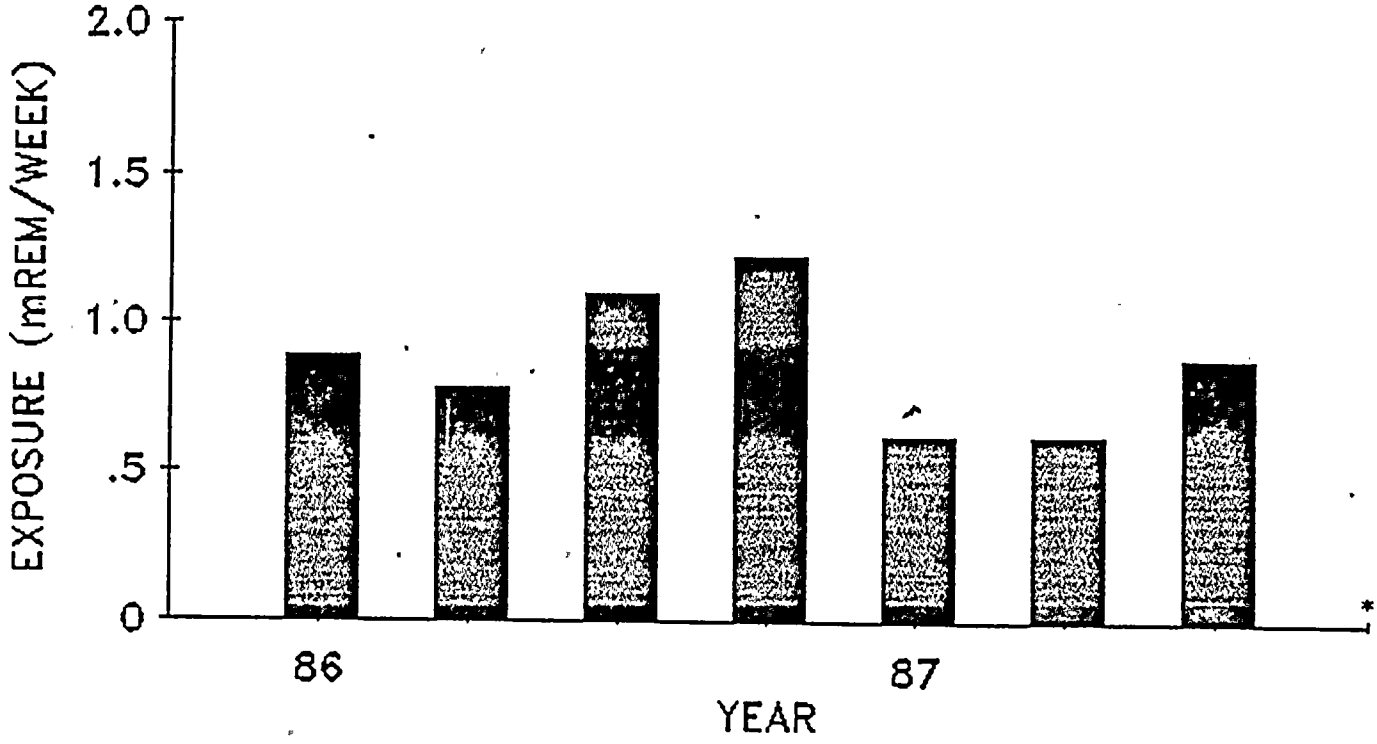
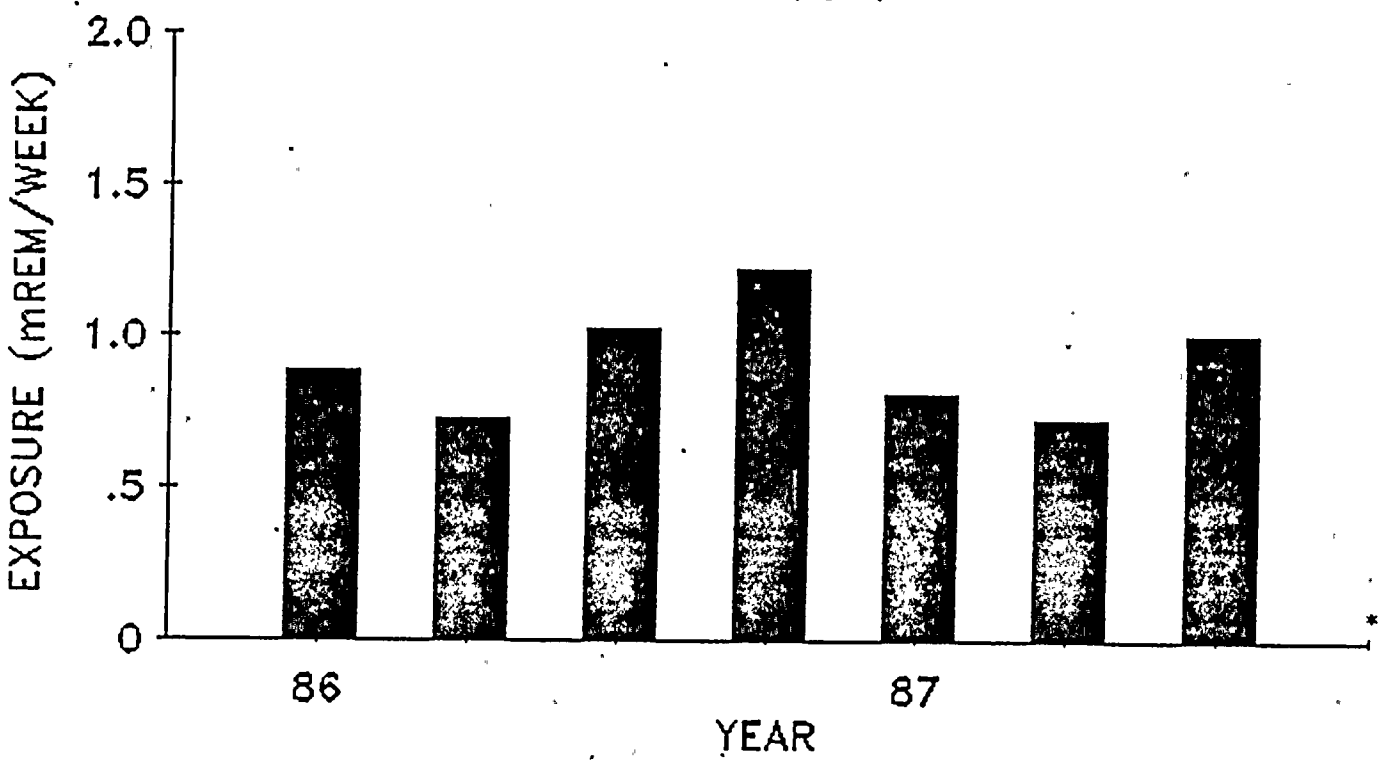


Figure 26
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-4



* Results are invalid.

Figure 27
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-5

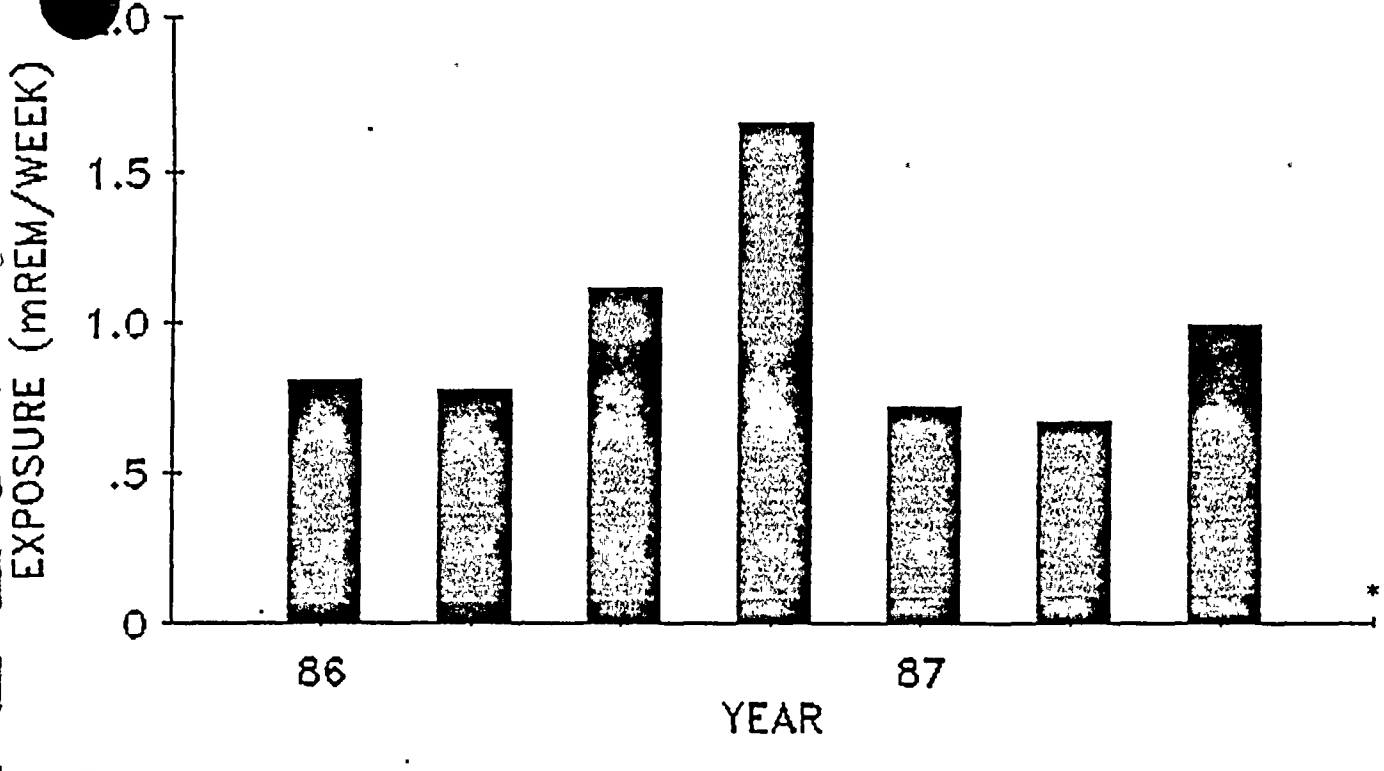
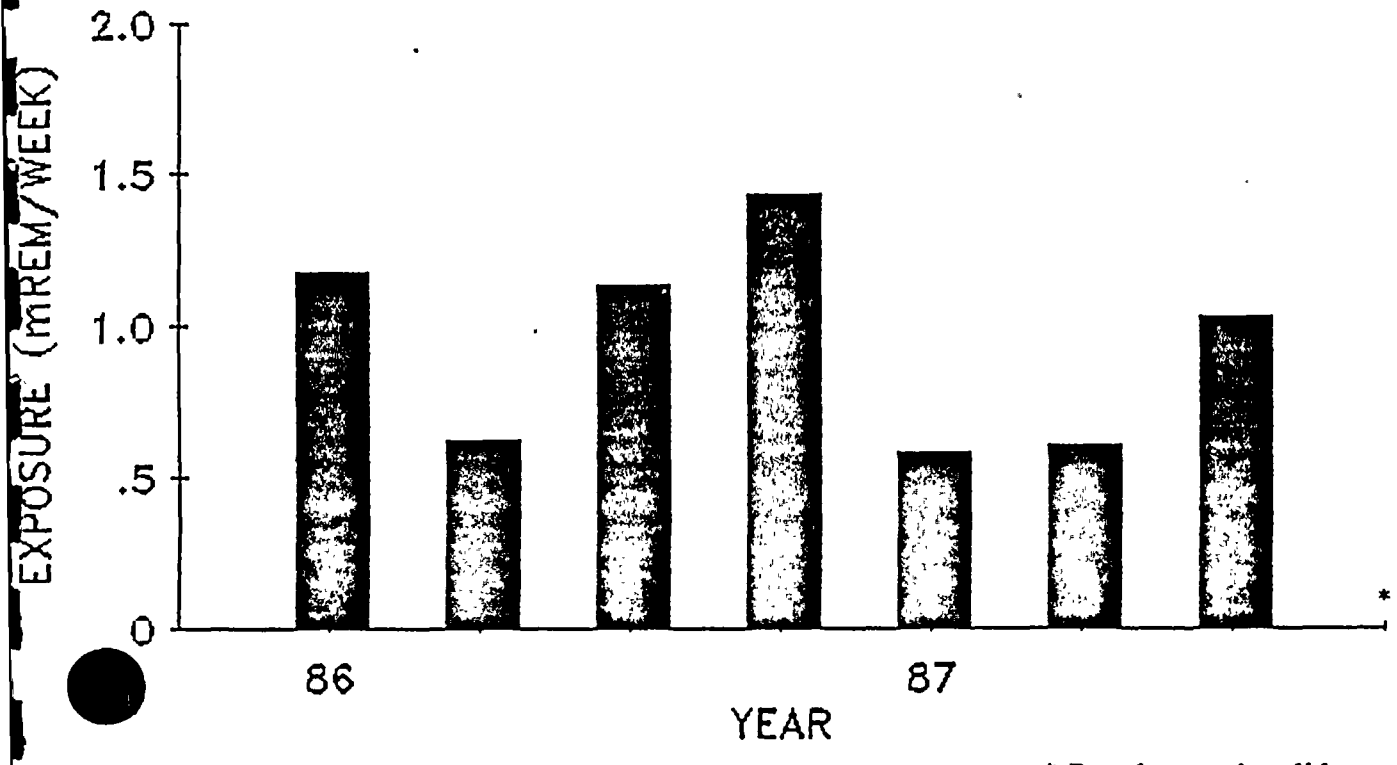


Figure 28
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-6



* Results are invalid.

Figure 29
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-7

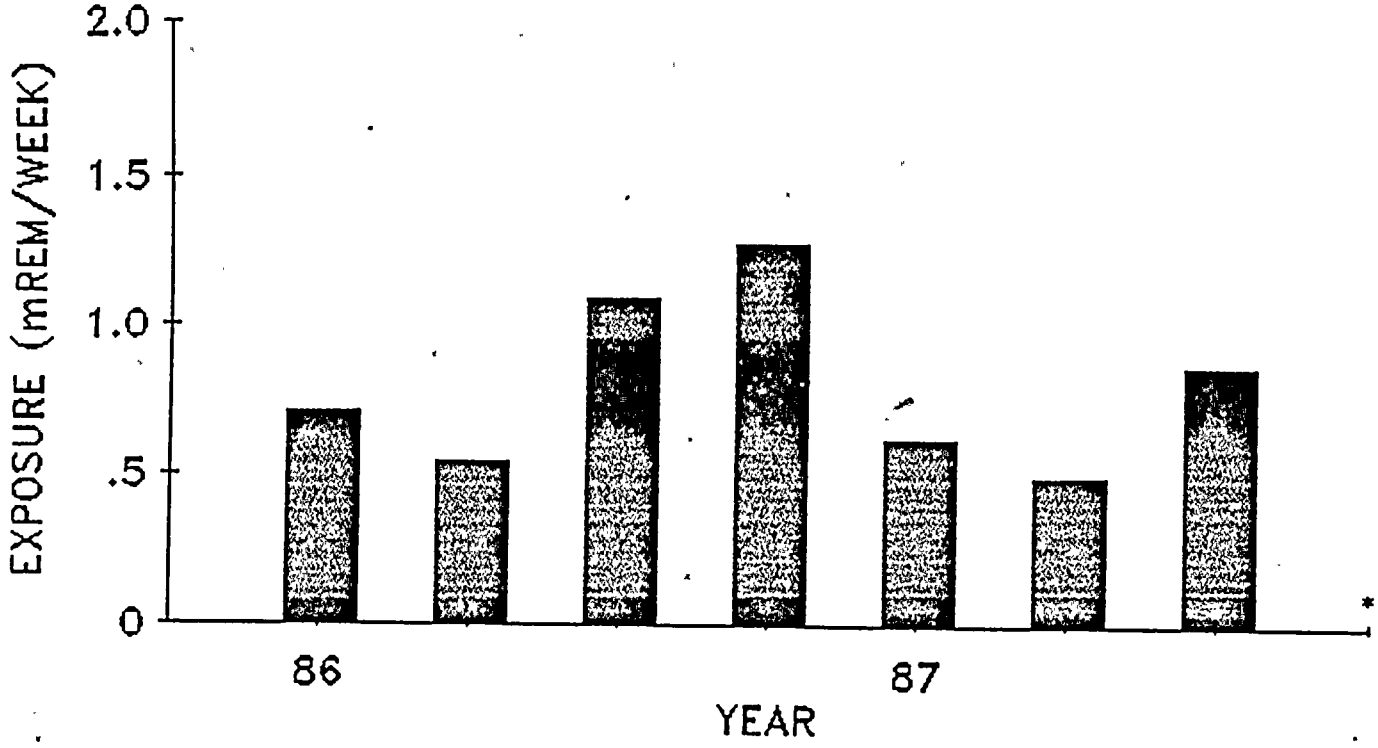
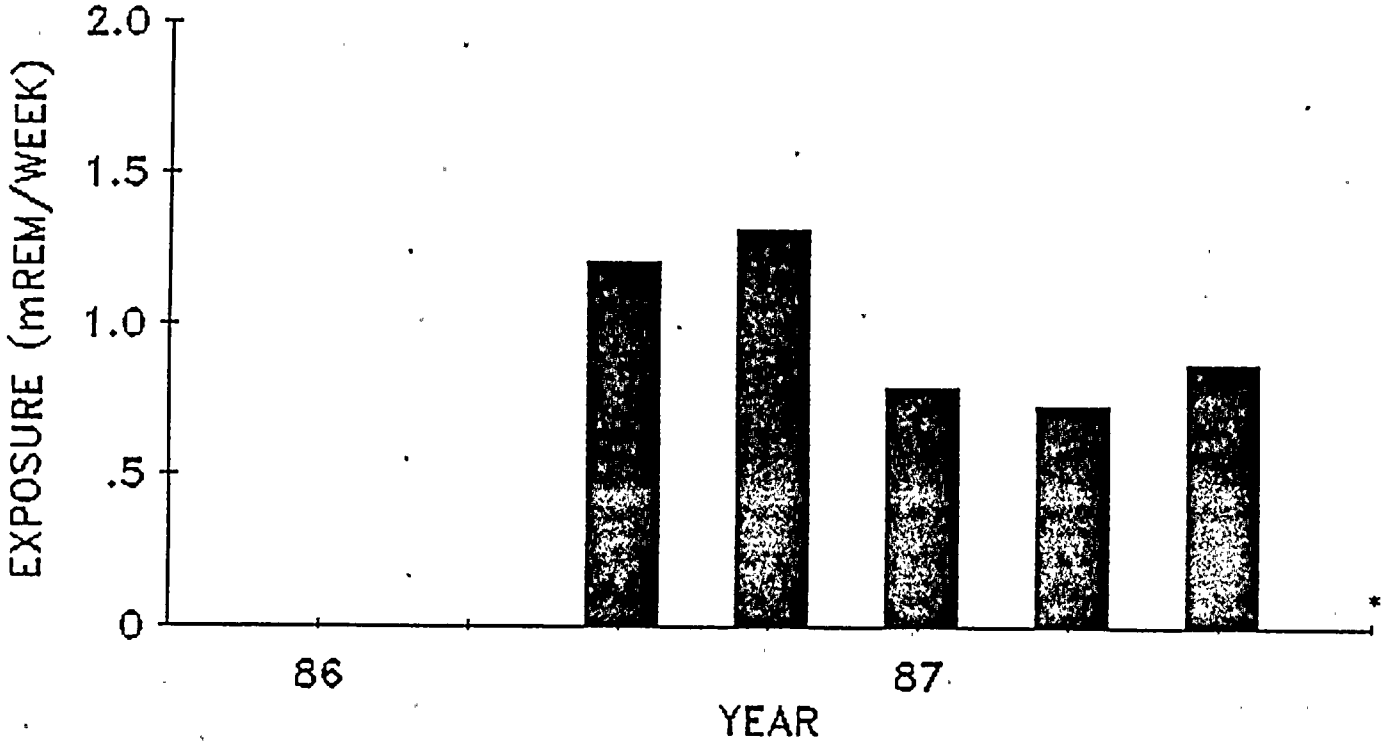


Figure 30
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-8



* Results are invalid.

Figure 31
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-9

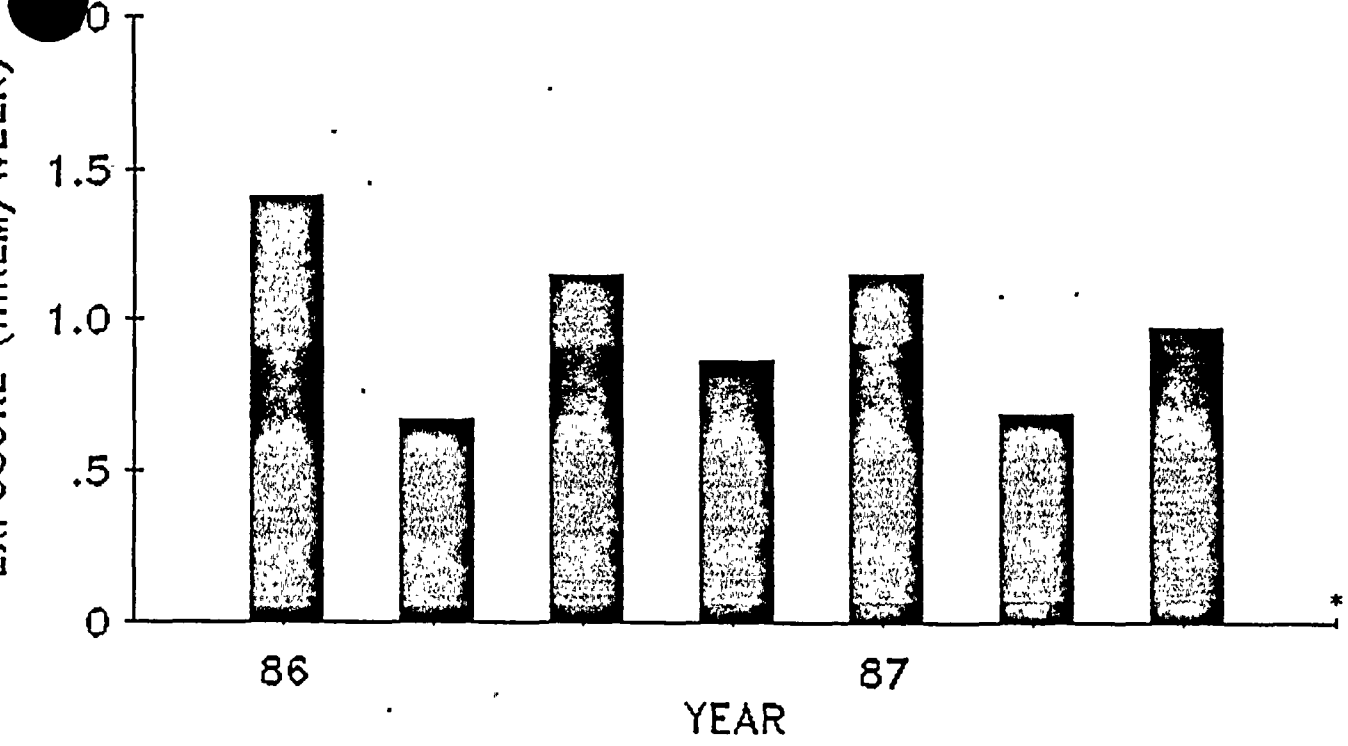
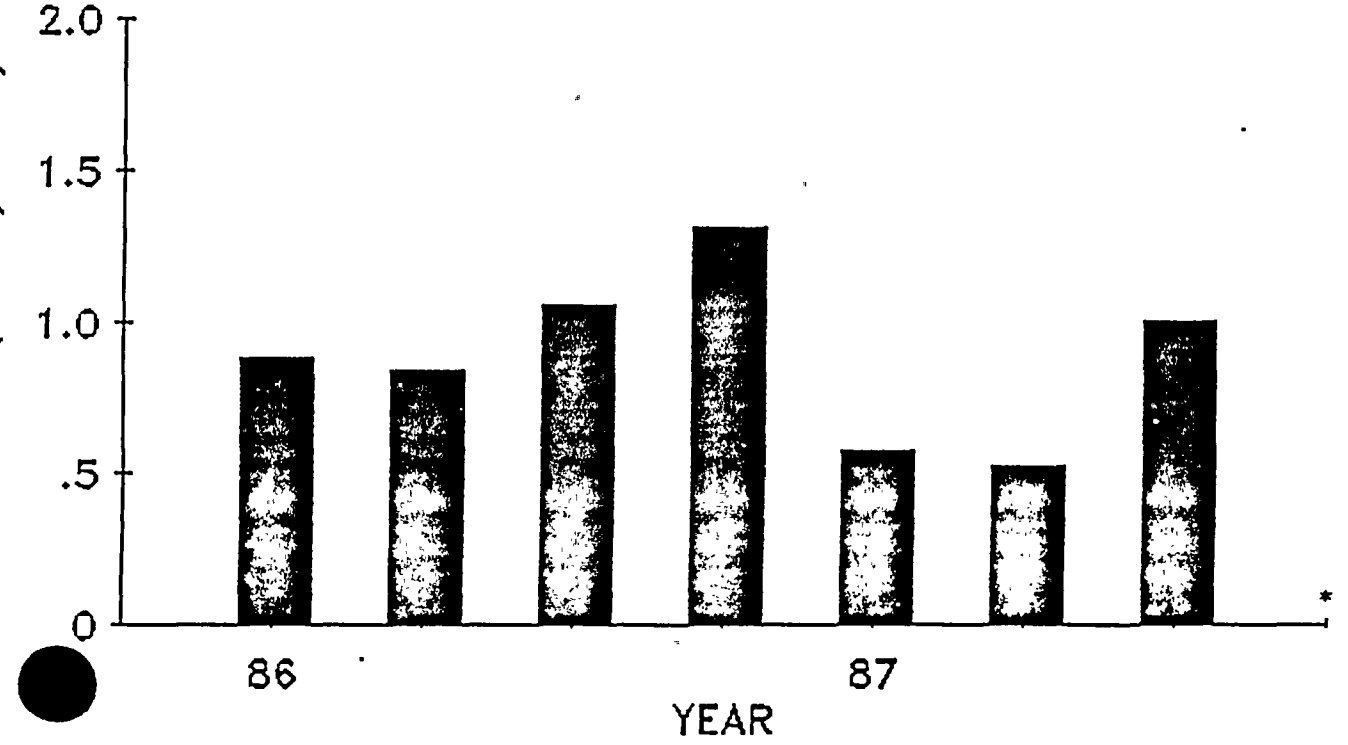


Figure 32
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION OFS-10



* Results are invalid.

Figure 33
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION NBF

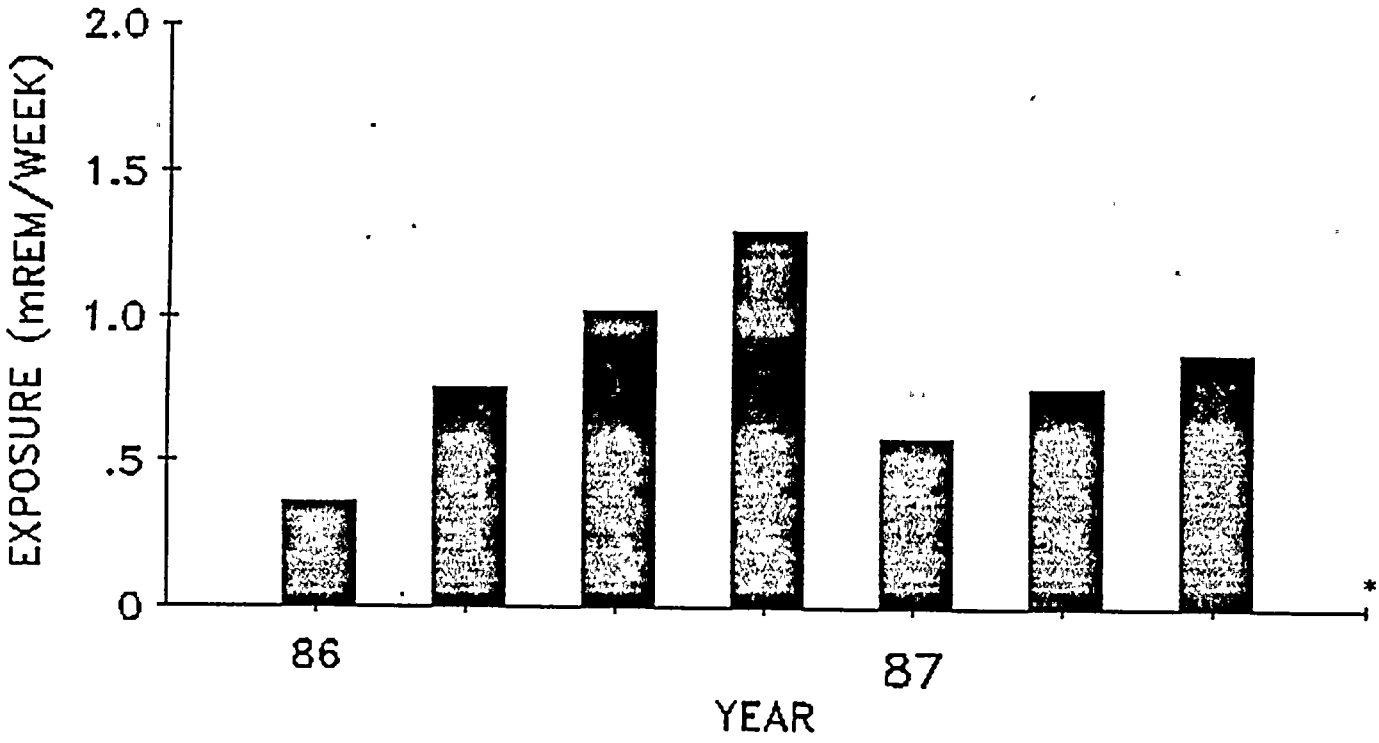
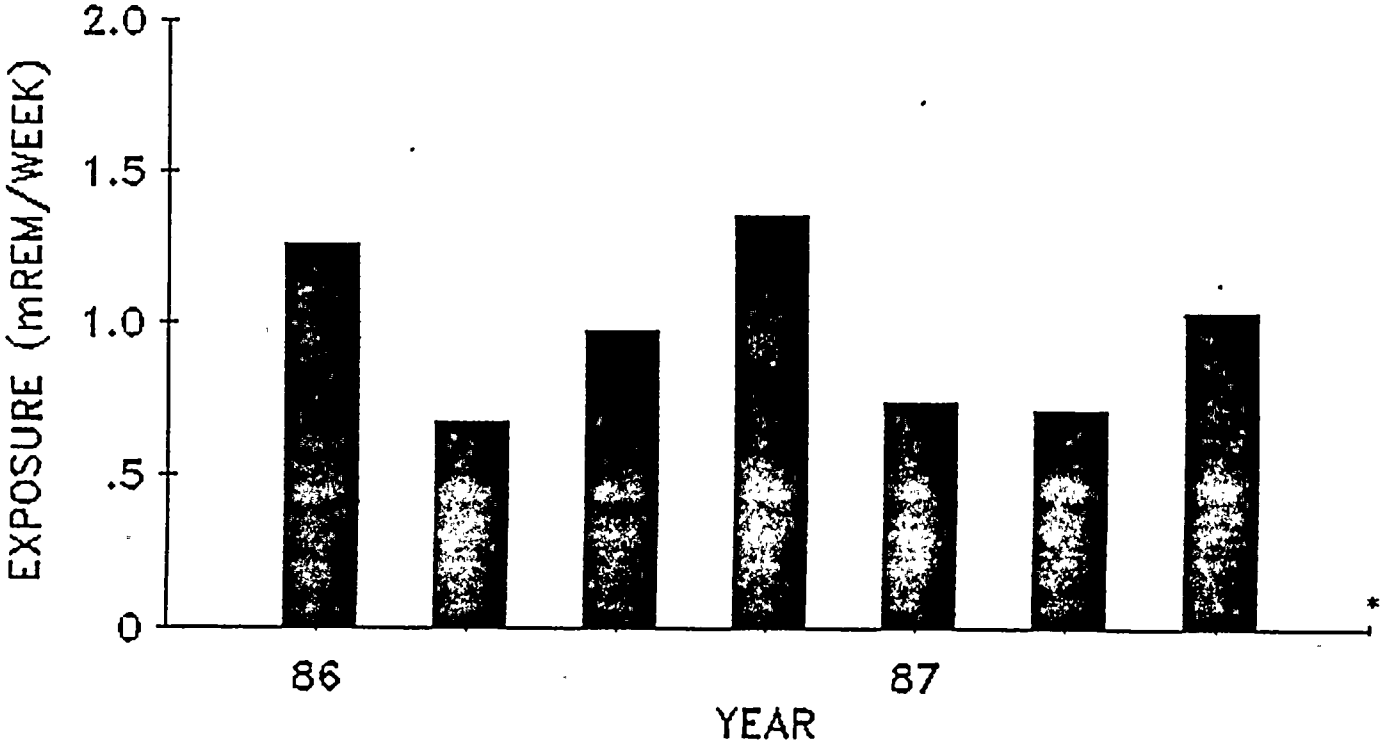


Figure 34
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION SBN



* Results are invalid.

Figure 35
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION DOW

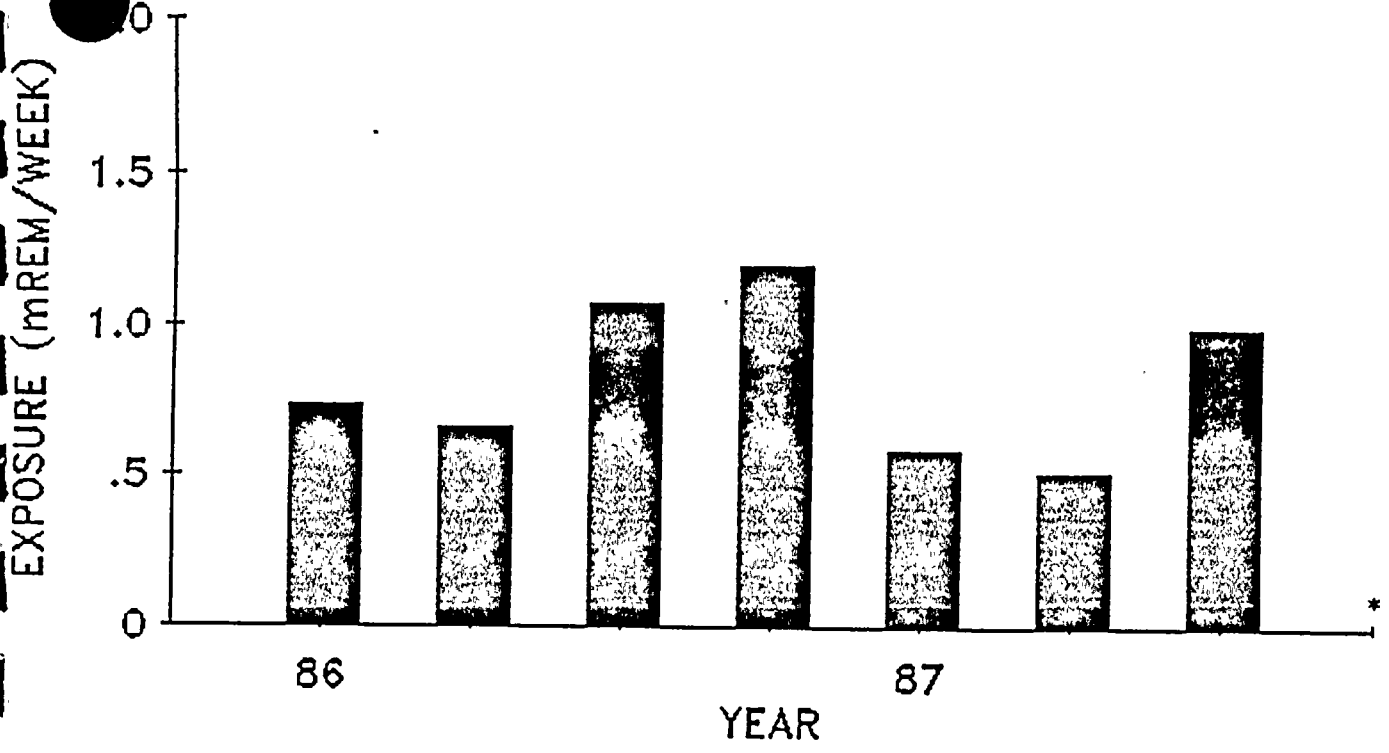
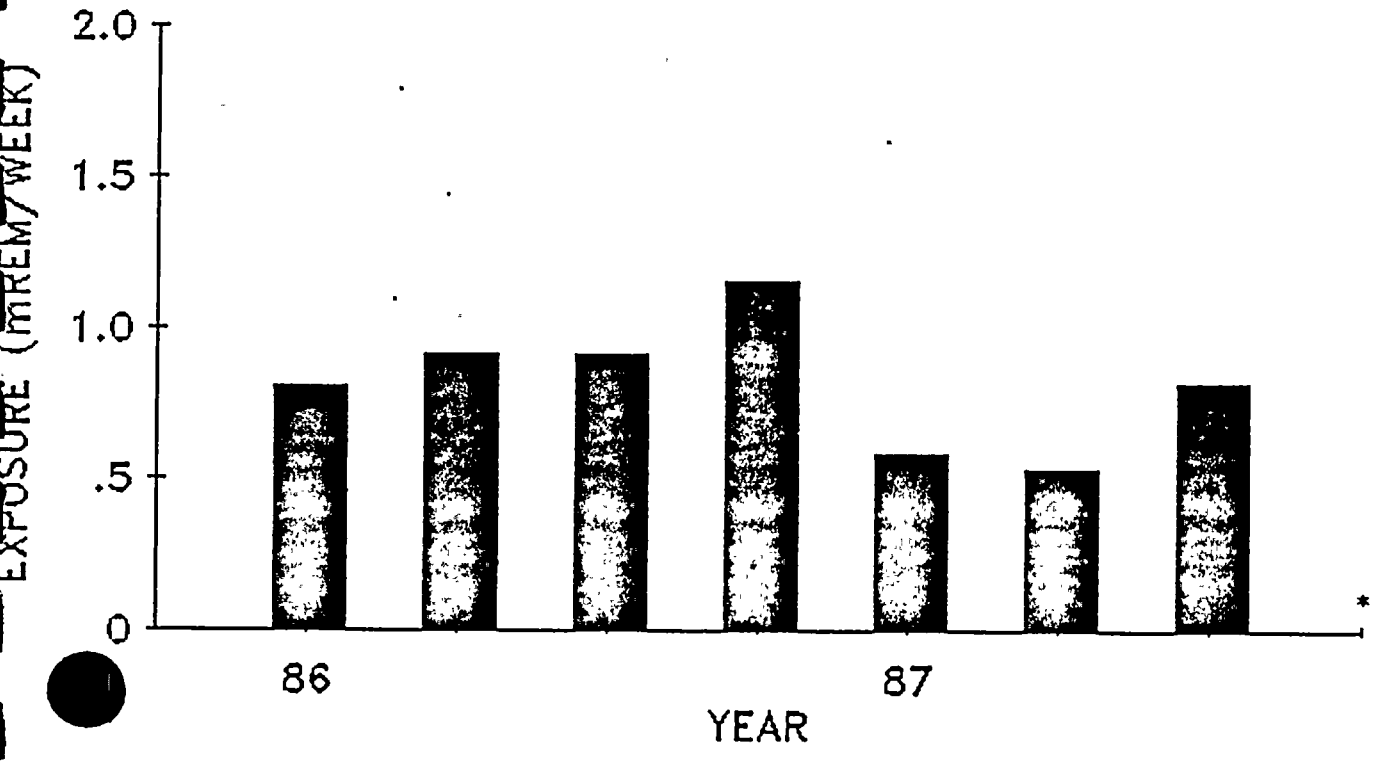


Figure 36
QUARTERLY THERMOLUMINESCENT DOSIMETRY
LOCATION COL



* Results are invalid.

7.4 Milk (Fresh)

Fresh milk samples were collected on a twice monthly basis during 1987 from th following locations:

1. Schuler Farm
2. Totzke Farm
3. Lozmack Farm
4. Wyant Farm
5. Livinghouse Farm
6. Zelmer Farm
7. Warmbien Farm

All milk samples were analyzed for Iodine-131 and Gamma-emitting nuclides. Results of these analyses are presented in Table XVIII through XXXI.

Gamma-emitting nuclides of interest remain below the level of detection for all milk samples collected in 1987.

TABLE XVIII

FRESH MILK

Sample Location	Collection Date	Radiochemical (pCi/l) Iodine-131
Schuler Farm	01/02/87	<0.4
	01/16/87	<0.4
	01/30/87	<0.4
	02/13/87	<0.4
	02/27/87	<0.4
	03/13/87	<0.4
	03/27/87	<0.4
	04/10/87	<0.4
	04/24/87	<0.4
	05/08/87	<0.4
	05/22/87	0.9 ± 0.7
	06/05/87	<0.4
	06/19/87	<0.4
	07/03/87	<0.4
	07/17/87	<0.4
	07/31/87	<0.4
	08/14/87	<0.4
	08/28/87	<0.4
	09/11/87	<0.4
	09/25/87	<0.4
	10/09/87	<0.4
	10/23/87	<0.4
	11/06/87	<0.4
	11/20/87	<0.4
	12/04/87	<0.4
	12/18/87	<0.4

TABLE XIX

FRESH MILK

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l								
		Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
Schuler Farm	01/02/87									
	01/16/87									
	01/30/87									
	02/13/87									
	02/27/87									
	03/13/87									
	03/27/87									
	04/10/87									
	04/24/87									
	05/08/87									
	05/22/87	LESS THAN DETECTION LIMIT								
	06/05/87									
	06/19/87									
	07/03/87									
	07/17/87									
	07/31/87									
	08/14/87									
	08/28/87									
	09/11/87									
	09/25/87									
	10/09/87									
	10/23/87									
	11/06/87									
	11/20/87									
	12/04/87									
	12/18/87									

*Detection Limit

TABLE XX

FRESH MILK

Sample Location	Collection Date	Radiochemical (pCi/l) Iodine-131
Totzke Farm	01/02/87	< 0.4
	01/16/87	< 0.4
	01/30/87	< 0.4
	02/13/87	< 0.4
	02/27/87	< 0.4
	03/13/87	< 0.4
	03/27/87	< 0.4
	04/10/87	< 0.4
	04/24/87	< 0.4
	05/08/87	< 0.4
	05/22/87	0.9 ± 0.7
	06/05/87	< 0.4
	06/19/87	< 0.4
	07/03/87	< 0.4
	07/17/87	< 0.4
	07/31/87	< 0.4
	08/14/87	< 0.4
	08/28/87	< 0.4
	09/11/87	< 0.4
	09/25/87	< 0.4
	10/09/87	< 0.4
	10/23/87	< 0.4
	11/06/87	< 0.4
	11/20/87	< 0.4
	12/04/87	< 0.4
	12/18/87	< 0.4

TABLE XXI

FRESH MILK

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
Totzke Farm	01/02/87									
	01/16/87									
	01/30/87									
	02/13/87									
	02/27/87									
	03/13/87									
	03/27/87									
	04/10/87									
	04/24/87									
	05/08/87									
	05/22/87	LESS THAN DETECTION LIMIT								
	06/05/87									
	06/19/87									
	07/03/87									
	07/17/87									
	07/31/87									
	08/14/87									
	08/28/87									
	09/11/87									
	09/25/87									
	10/09/87									
	10/23/87									
	11/06/87									
	11/20/87									
	12/04/87									
	12/18/87									

*Detection Limit

TABLE XXII

FRESH MILK

Sample Location	Collection Date	Radiochemical (pCi/l) Iodine-131
Lozmack Farm	01/02/87	<0.4
	01/16/87	<0.4
	01/30/87	3.0 ± 0.7
	02/13/87	<0.4
	03/01/87	<0.4
	03/13/87	<0.4
	03/27/87	<0.4
	04/11/87	<0.4
	04/24/87	<0.4
	05/08/87	<0.4
	05/22/87	<0.4
	06/05/87	<0.4
	06/19/87	<0.4
	07/03/87	<0.4
	07/17/87	<0.4
	07/31/87	<0.4
	08/14/87	<0.4
	08/28/87	<0.4
	09/11/87	<0.4
	09/25/87	<0.4
	10/09/87	<0.4
	10/23/87	<0.4
	11/06/87	<0.4
	11/20/87	<0.4
	12/04/87	<0.4
	12/18/87	<0.4

TABLE XXIII

FRESH MILK

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
Lozmack Farm	01/02/87									
	01/16/87									
	01/30/87									
	02/13/87									
	03/01/87									
	03/13/87									
	03/27/87									
	04/11/87									
	04/24/87									
	05/08/87									
	05/22/87									
	06/05/87	LESS THAN DETECTION LIMIT								
	06/19/87									
	07/03/87									
	07/17/87									
	07/31/87									
	08/14/87									
	08/28/87									
	09/11/87									
	09/25/87									
	10/09/87									
	10/23/87									
	11/06/87									
	11/20/87									
	12/04/87									
	12/18/87									

*Detection Limit

TABLE XXIV

FRESH MILK

Sample Location	Collection Date	Radiochemical (pCi/l) Iodine-131
Wyant Farm	01/02/87	< 0.4
	01/16/87	< 0.4
	01/30/87	< 0.4
	02/13/87	< 0.4
	02/27/87	< 0.4
	03/13/87	< 0.4
	03/27/87	< 0.4
	04/10/87	< 0.4
	04/24/87	< 0.4
	05/08/87	< 0.4
	05/22/87	< 0.4
	06/05/87	< 0.4
	06/19/87	< 0.4
	07/03/87	< 0.4
	07/17/87	< 0.4
	07/31/87	< 0.4
	08/14/87	< 0.4
	08/28/87	< 0.4
	09/11/87	< 0.4
	09/25/87	< 0.4
	10/09/87	< 0.4
	10/23/87	< 0.4
	11/06/87	< 0.4
	11/20/87	< 0.4
	12/04/87	< 0.4
	12/18/87	< 0.4

TABLE XXV

FRESH MILK

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
Wyant Farm	01/02/87									
	01/16/87									
	01/30/87									
	02/13/87									
	02/27/87									
	03/13/87									
	03/27/87									
	04/10/87									
	04/24/87									
	05/08/87									
	05/22/87									
	06/05/87	LESS THAN DETECTION LIMIT								
	06/19/87									
	07/03/87									
	07/17/87									
	07/31/87									
	08/14/87									
	08/28/87									
	09/11/87									
	09/25/87									
	10/09/87									
	10/23/87									
	11/06/87									
	11/20/87									
	12/04/87									
	12/18/87									

*Detection Limit

TABLE XXVI

FRESH MILK

Sample Location	Collection Date	Radiochemical (pCi/l) Iodine-131
Livinghouse Farm	01/02/87	<0.4
	01/16/87	<0.4
	01/30/87	<0.4
	02/13/87	<0.4
	02/27/87	<0.4
	03/13/87	<0.4
	03/27/87	<0.4
	04/10/87	<0.4
	04/24/87	<0.4
	05/08/87	<0.4
	05/22/87	<0.4
	06/05/87	<0.4
	06/19/87	<0.4
	07/03/87	*
	07/17/87	<0.4
	07/31/87	<0.4
	08/14/87	<0.4
	08/28/87	<0.4
	09/11/87	<0.4
	09/25/87	<0.4
	10/09/87	<0.4
	10/23/87	<0.4
	11/06/87	<0.4
	11/20/87	<0.4
	12/04/87	<0.4
	12/18/87	<0.4

* Sample lost in shipment

TABLE XXVII

FRESH MILK

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l								
		Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
Livinghouse Farm	01/02/87									
	01/16/87									
	01/30/87									
	02/13/87									
	02/27/87									
	03/13/87									
	03/27/87									
	04/10/87									
	04/24/87									
	05/08/87									
	05/22/87									
	06/05/87	LESS THAN DETECTION LIMIT								
	06/19/87									
	07/03/87[a]									
	07/17/87									
	07/31/87									
	08/14/87									
	08/28/87									
	09/11/87									
	09/25/87									
	10/09/87									
	10/23/87									
	11/06/87									
	11/20/87									
	12/04/87									
	12/18/87									

*Detection Limit

[a] Sample lost in shipment

TABLE XXVIII

FRESH MILK

Sample Location	Collection Date	Radiochemical (pCi/l) Iodine-131
Zelmer Farm	01/02/87	< 0.4
	01/16/87	< 0.4
	01/30/87	< 0.4
	02/13/87	< 0.4
	02/27/87	< 0.4
	03/13/87	< 0.4
	03/27/87	< 0.4
	04/10/87	< 0.4
	04/24/87	< 0.4
	05/08/87	< 0.4
	05/22/87	< 0.4
	06/05/87	< 0.4
	06/19/87	< 0.4
	07/03/87	< 0.4
	07/17/87	< 0.4
	07/31/87	< 0.4
	08/14/87	< 0.4
	08/28/87	< 0.4
	09/11/87	< 0.4
	09/25/87	< 0.4
	10/09/87	< 0.4
	10/23/87	< 0.4
	11/06/87	< 0.4
	11/20/87	< 0.4
	12/04/87	< 0.4
	12/18/87	< 0.4

TABLE XXIX

FRESH MILK

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l								
		Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
Zelmer Farm	01/02/87									
	01/16/87									
	01/30/87									
	02/13/87									
	02/27/87									
	03/13/87									
	03/27/87									
	04/10/87									
	04/24/87									
	05/08/87									
	05/22/87									
	06/05/87	LESS THAN DETECTION LIMIT								
	06/19/87									
	07/03/87									
	07/17/87									
	07/31/87									
	08/14/87									
	08/28/87									
	09/11/87									
	09/25/87									
	10/09/87									
	10/23/87									
	11/06/87									
	11/20/87									
	12/04/87									
	12/18/87									

*Detection Limit

TABLE XXX

FRESH MILK

Sample Location	Collection Date	Radiochemical (pCi/l) Iodine-131
Warmbien Farm	01/02/87	<0.4
	01/16/87	<0.4
	01/30/87	<0.4
	02/13/87	<0.4
	02/27/87	<0.4
	03/13/87	<0.4
	03/27/87	<0.4
	04/13/87	<0.4
	04/24/87	<0.4
	05/08/87	<0.4
	05/22/87	<0.4
	06/05/87	<0.4
	06/19/87	<0.4
	07/03/87	<0.4
	07/17/87	<0.4
	07/31/87	<0.4
	08/14/87	<0.4
	08/28/87	<0.4
	09/11/87	<0.4
	09/25/87	<0.4
	10/09/87	<0.4
	10/23/87	<0.4
	11/06/87	<0.4
	11/20/87	<0.4
	12/04/87	<0.4
	12/18/87	<0.4

TABLE XXXI

FRESH MILK

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
Warmbien Farm	01/02/87									
	01/16/87									
	01/30/87									
	02/13/87									
	02/27/87									
	03/13/87									
	03/27/87									
	04/13/87									
	04/24/87									
	05/08/87									
	05/22/87									
	06/05/87	LESS THAN DETECTION LIMIT								
	06/19/87									
	07/03/87									
	07/17/87									
	07/31/87									
	08/14/87									
	08/28/87									
	09/11/87									
	09/25/87									
	10/09/87									
	10/23/87									
	11/06/87									
	11/20/87									
	12/04/87									
	12/18/87									

*Detection Limit

7.5 Groundwater

Quarterly groundwater samples were collected quarterly from seven wells. All groundwater samples were analyzed for Gross Beta, Tritium and Gamma-emitting nuclides. Results obtained from the analysis of the samples is presented in Tables XXXII and XXXIII.

Four groundwater sites; Well No. 4 - Onsite, Well No. 5 - Onsite, Well No. 6 - Onsite and Well No. 7 -Livingston Beach exhibited tritium activity during 1987. These sites had activity ranging from 755±309 pCi/l at Well No. 6 - Onsite (01/09/87) to 5563±1021 pCi/l at Well No. 7 - Livingston Beach (07/10/87). Well numbers 1, 2, and 3 had no tritium activity above the lower limit of detection (300 pCi/l) during 1987.

Gamma spectralanalysis of the groundwater samples revealed no gamma-emitting isotopes of interest.

TABLE XXXII

GROUNDWATER

Sample Location	Collection Date	Radiochemical (pCi/l) Gross Beta	Tritium
Well No. 1 - Rosemary Beach	01/09/87	2.3 ± 0.5	<300
	04/09/87	2.3 ± 0.5	<300
	07/10/87	2.9 ± 0.6	<300
	10/02/87	<2.0	<300
Well No. 2 - Scrapyard	01/09/87	2.6 ± 0.5	<300
	04/09/87	3.2 ± 0.5	<300
	07/10/87	<2.0	<300
	10/02/87	<2.0	<300
Well No. 3 - Univ. of Michigan Trailer	01/09/87	<2.0	<300
	04/09/87	2.0 ± 0.5	<300
	07/10/87	<2.0	<300
	10/02/87	<2.0	<300
Well No. 4 - Onsite	01/09/87	2.1 ± 0.5	4444 ± 331*
	04/09/87	3.7 ± 0.5	3462 ± 282*
	07/10/87	5.8 ± 0.7	2477 ± 970*
	10/02/87	3.4 ± 0.6	1655 ± 324*
Well No. 5 - Onsite	01/09/87	<2.0	2631 ± 319*
	04/09/87	3.2 ± 0.5	1946 ± 277*
	07/10/87	3.9 ± 0.7	1060 ± 944*
	10/02/87	5.2 ± 0.7	896 ± 325*
Well No. 6 - Onsite	01/09/87	<2.0	755 ± 309*
	04/09/87	9.4 ± 0.7	816 ± 268*
	07/10/87	10.1 ± 0.8	<300
	10/02/87	3.7 ± 0.6	<300
Well No. 7 - Livingston Beach	01/09/87	2.1 ± 0.5	3930 ± 330*
	04/09/87	<2.0	5192 ± 300*
	07/10/87	<2.0	5563 ± 1021*
	10/02/87	<2.0	1889 ± 336*

*Verified by reanalysis

TABLE XXXIII

GROUNDWATER

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l Cs-134 7*	Cs-137 2*	Mn-54 2*	Co-58 5*	Co-60 5*	Zr,Nb-95 5*	Fe-59 3*	Zn-65 15*	Ba,La-140 4*
Well No. 1 Rosemary Beach	01/09/87									
	04/09/87									
	07/10/87									
	10/02/87									
Well No. 2 Scrapyard	01/09/87									
	04/09/87									
	07/10/87									
	10/02/87	LESS THAN DETECTION LIMIT								
Well No. 3 Univ. of Michigan Trailer	01/09/87									
	04/09/87									
	07/10/87									
	10/02/87									
Well No. 4 Onsite	01/09/87									
	04/09/87									
	07/10/87									
	10/02/87									
Well No. 5 Onsite	01/09/87									
	04/09/87									
	07/10/87									
	10/02/87									

*Detection Limit

TABLE XXXIII (Continued)

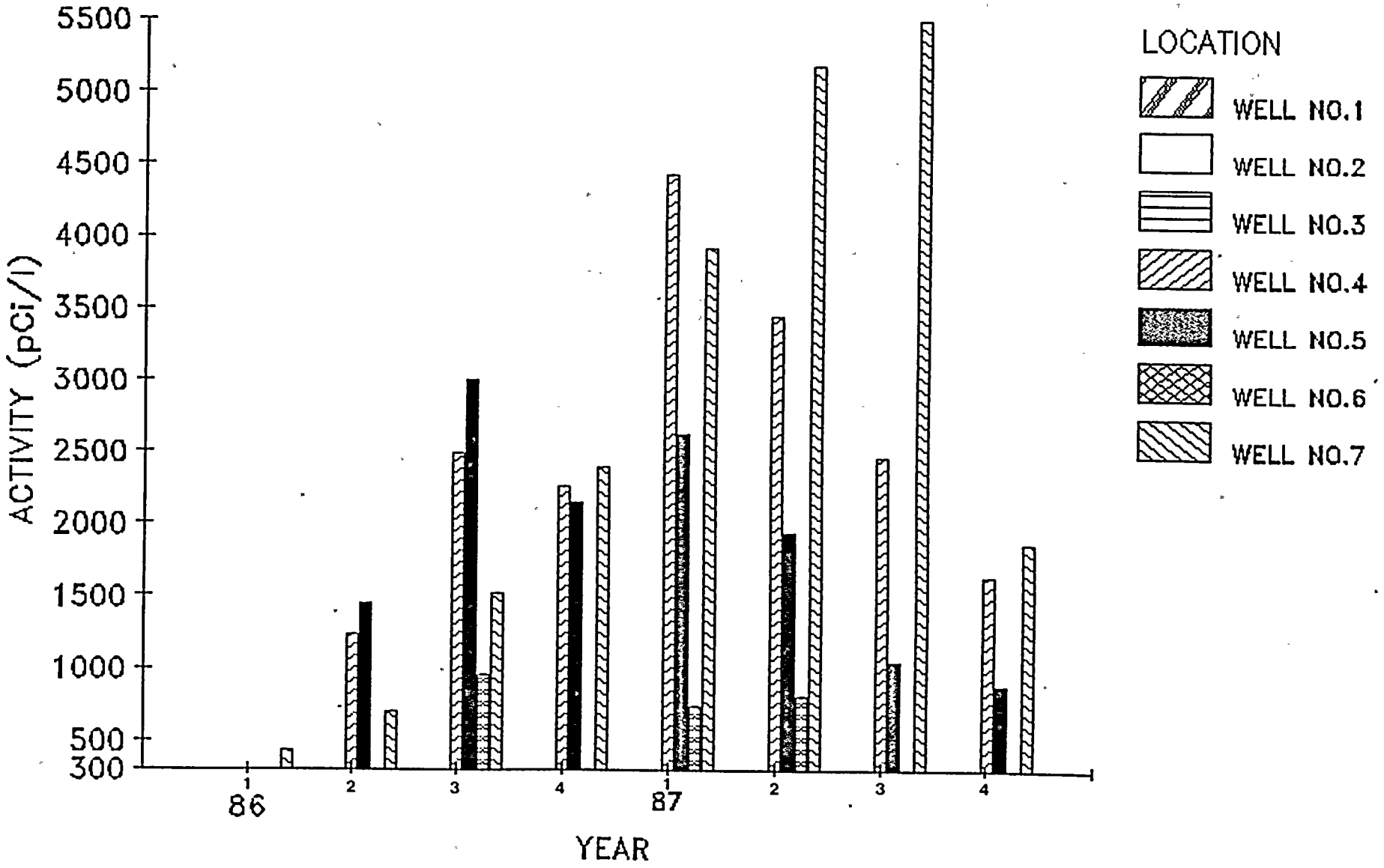
GROUNDWATER

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l Cs-134 7*	Cs-137 2*	Mn-54 2*	Co-58 5*	Co-60 5*	Zr,Nb-95 5*	Fe-59 3*	Zn-65 15*	Ba,La-140 4*
Well No. 6 Onsite	01/09/87									
	04/09/87									
	07/10/87									
	10/02/87									
Well No. 7 Livingston Beach	01/09/87	LESS THAN DETECTION LIMIT								
	04/09/87									
	07/10/87									
	10/02/87									

*Detection Limit

Figure 37
TRITIUM IN GROUNDWATER
1986-1987



LLD=300pCi/l

7.6 Vegetation

Five vegetation samples were collected from two sectors during 1987. A samples were analyzed for man-made gamma-emitting isotopes.

Table XXXIV presents the results of the gamma spectralanalysis of the vegetation samples. Gamma-emitting nuclides of interest were less than lower limit of detection.

TABLE XXXIV

VEGETATION

GAMMA SPECTROMETRY

Sample Identification	Date Collected	pCi/Kg (wet) Cs-134 29*	Cs-137 40*
Sector D			
Broad Leaf	08/13/87		
Grapes	08/20/87		
Grape Leaves	08/20/87	LESS THAN DETECTION LIMIT	
Sector G			
Grapes	08/20/87		
Grape Leaves	08/20/87		

*Detection Limit

7.7 Fish

Fish samples were collected from four locations on a twice yearly basis. Species of fish collected during 1987 include coho salmon, lake perch, white sucker, yellow perch, round whitefish, lake trout, carp, freshwater drum, walleye pike, and longnose sucker. Gamma spectralanalysis was performed on all fish samples. The results are in terms of pCi/Kg (wet). Table XXXV lists the results of analysis.

Three samples collected on 05/28/87 indicated the presence of Cesium-137. Activity ranged from 79±16 pCi/kg at the onsite - south sample point (Lake Trout) to 153±12 pCi/kg at the offsite - north sample point (Coho Salmon).

Three samples collected 10/13/87 indicated the presence of Cesium-137. The samples from OFS-S had a low activity of 42±12 pCi/kg and the samples from OFS-N had a high activity of 153±14 pCi/kg.

All other gamma-emitting nuclides of interest were less than the lower limit of detection in the 1987 fish samples.

TABLE XXXV

FISH

GAMMA SPECTROMETRY

Location	Identification	Collection Date	pCi/Kg (wet) Cs-134 40*	Cs-137 40*	Mn-54 60*	C0-58 60*	Co-60 30*	Fe-59 100*	Zn-65 100*
ONS-S	Lake Trout	05/28/87	**	79±16	**	**	**	**	**
OFS-S	White Sucker	05/28/87	**	**	**	**	**	**	**
OFS-N	Coho Salmon	05/28/87	**	153±12	**	**	**	**	**
ONS-N	Coho Salmon/ Lake Perch	05/28/87	**	106±21	**	**	**	**	**
ONS-S	Round Whitefish/ Yellow Perch	10/13/87	**	76±18	**	**	**	**	**
OFS-S	Longnose Sucker/ White Sucker	10/13/87	**	40±12	**	**	**	**	**
OFS-N	Walleye Pike/ Freshwater Drum	10/13/87	**	153±14	**	**	**	**	**
ONS-N	White Sucker/ Carp	10/13/87	**	**	**	**	**	**	**

*Detection Limit

**Less than detection limit

7.8 Bottom Sediment

Bottom sediment samples were collected twice from two locations of Lake Michigan in 1987. Samples were analyzed for gamma-emitting nuclides. Table XXXVI lists the results of the gamma spectral analysis.

Three of the four samples indicated a Cesium-137 activity but it was less than the detection limit of 180 pCi/kg (dry) as per Cook Plant technical specification 3.12.1, Table 4.12-1.

All other gamma-emitting nuclides of interest were less than the lower limit of detection in the bottom sediment samples.

TABLE XXXVI

BOTTOM SEDIMENT

GAMMA SPECTROMETRY

Location	Collection Date	pCi/Kg (dry) Cs-134 70*	Cs-137 40*	Mn-54 80*	Co-58 160*	Co-60 80*	Zr,Nb-95 40*	Fe-59 30*	Zn-65 100*	Ba,La-140 40*
LS-2	04/22/87	**	14±6	**	**	**	**	**	**	**
LS-3	04/22/87	**	**	**	**	**	**	**	**	**
LS-2	10/22/87	**	40±7	**	**	**	**	**	**	**
LS-3	10/22/87	**	19±5	**	**	**	**	**	**	**

*Detection Limit

**Less than detection limit

7.9 Water

Three types of water samples are collected. Drinking water samples were collected from Lake Township and St. Joseph during 1987. Surface water samples were collected from two locations in Lake Michigan; one south of the plant and one north of the plant. Circulating water samples were also collected during 1987.

Tables XXXVII to XXXX list the results of the analyses of the drinking water samples. Gross Beta activity for 1987 ranged from less than the lower limit of detection (2.0 pCi/l) to a high of 12.8±1.2 pCi/l in the Lake Township sample of 01/29/87.

Tritium analysis of the drinking water samples were less than the lower limit of detection (300 pCi/l). Gamma spectralanalysis of the drinking water samples indicated that no gamma-emitting isotopes of interest were above the lower limit of detection.

Tables XXXXI to XXXXIV list the results of the analyses of the surface water samples. Gross Beta activity for 1987 ranged from less than the lower limit of detection (2.0 pCi/l) to a high of 7.4± 1.4 pCi/l in the North Lake sample of 06/04/87. Tritium analysis of the surface water samples indicated activity in four samples during 1987. North Lake (03/12/87) was 553±300 pCi/l, North Lake (10/22/87) was 435±315 pCi/l, South Lake (03/12/87) was 747±300 pCi/l and South Lake (04/09/87) was 333±297 pCi/l. All other samples were less than the lower limit of detection (300 pCi/l). Gamma spectralanalysis of the surface water samples indicated that no gamma emitting isotopes of interest were above the lower limit of detection.

Tables XXXXV and XXXXVI list the results of the analyses of the circulating water samples. Gross Beta activity ranged from less than the lower limit of detection (2.0 pCi/l) to a high of 5.5±1.1 pCi/l (02/12/87). Tritium analysis indicated one sample with activity above the lower limit of detection (300 pCi/l). No gamma-emitting isotopes of interest were detected in any of the circulating water samples during 1987.

TABLE XXXVII

DRINKING WATER

1987

Sample Location	Collection Date	Radiochemical (pCi/l) Gross Beta	Tritium
Lake Township	01/15/87	< 2.0	< 300
	01/29/87	12.8 ± 1.2	< 300
	02/12/87	2.9 ± 0.5	< 300
	02/26/87	2.0 ± 0.5	< 300
	03/12/87	< 2.0	< 300
	03/26/87	< 2.0	< 300
	04/09/87	2.0 ± 0.4	< 300
	04/23/87	2.6 ± 0.5	< 300
	05/07/87	< 2.0	< 300
	05/21/87	< 2.0	< 300
	06/04/87	2.9 ± 0.6	< 300
	06/18/87	< 2.0	< 300
	07/02/87	< 2.0	< 300
	07/16/87	2.4 ± 0.7	< 300
	07/30/87	< 2.0	< 300
	08/13/87	3.1 ± 0.5	< 300
	08/27/87	2.1 ± 0.5	< 300
	09/10/87	< 2.0	< 300
	09/24/87	< 2.0	< 300
	10/08/87	< 2.0	< 300
	10/22/87	< 2.0	< 300
	11/05/87	< 2.0	< 300
	11/19/87	< 2.0	< 300
	12/03/87	< 2.0	< 300
	12/17/87	< 2.0	< 300
	12/31/87	< 2.0	< 300

TABLE XXXVIII

DRINKING WATER

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l I-131 1*	Cs-134 7*	Cs-137 2*	Mn-54 2*	Co-58 5*	Co-60 5*	Zr,Nb-95 5*	Fe-59 3*	Zn-65 15*	Ba,La-140 4*
Lake Township	01/15/87										
	01/29/87										
	02/12/87										
	02/26/87										
	03/12/87										
	03/26/87										
	04/09/87										
	04/23/87										
	05/07/87										
	05/21/87										
	06/04/87	LESS THAN DETECTION LIMIT									
	06/18/87										
	07/02/87										
	07/16/87										
	07/30/87										
	08/13/87										
	08/27/87										
	09/10/87										
	09/24/87										
	10/08/87										
	10/22/87										
	11/05/87										
	11/19/87										
	12/03/87										
	12/17/87										
	12/31/87										

*Detection Limit

TABLE XXXIX

DRINKING WATER

1987

Sample Location	Collection Date	Radiochemical (pCi/l) Gross Beta	Tritium
St. Joseph	01/15/87	2.4 ± 1.0	< 300
	01/29/87	3.3 ± 2.6	< 300
	02/12/87	2.2 ± 0.6	< 300
	02/26/87	< 2.0	< 300
	03/12/87	< 2.0	< 300
	03/26/87	2.0 ± 0.5	< 300
	04/09/87	2.4 ± 0.4	< 300
	04/23/87	2.3 ± 0.4	< 300
	05/07/87	< 2.0	< 300
	05/21/87	< 2.0	< 300
	06/04/87	< 2.0	< 300
	06/18/87	< 2.0	< 300
	07/02/87	< 2.0	< 300
	07/16/87	< 2.0	< 300
	07/30/87	< 2.0	< 300
	08/13/87	3.0 ± 0.5	< 300
	08/27/87	< 2.0	< 300
	09/10/87	< 2.0	< 300
	09/24/87	< 2.0	< 300
	10/08/87	< 2.0	< 300
	10/22/87	< 2.0	< 300
	11/05/87	< 2.0	< 300
	11/19/87	< 2.0	< 300
	12/03/87	< 2.0	< 300
	12/17/87	< 2.0	< 300
	12/31/87	< 2.0	< 300

TABLE XXXX

DRINKING WATER

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l I-131 1*	Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
St. Joseph	01/15/87										
	01/29/87										
	02/12/87										
	02/26/87										
	03/12/87										
	03/26/87										
	04/09/87										
	04/23/87										
	05/07/87										
	05/21/87										
	06/04/87										
	06/18/87										
	07/02/87	LESS THAN DETECTION LIMIT									
	07/16/87										
	07/30/87										
	08/13/87										
	08/27/87										
	09/10/87										
	09/24/87										
	10/08/87										
	10/22/87										
	11/05/87										
	11/19/87										
	12/03/87										
	12/17/87										
	12/31/87										

*Detection Limit

TABLE XXXXI

SURFACE WATER

1987

Sample Location	Collection Date	Radiochemical (pCi/l) Gross Beta	Tritium
North Lake (L3)	01/15/87	< 2.0	< 300
	02/12/87	2.8 ± 0.6	< 300
	03/12/87	< 2.0	553 ± 300
	04/09/87	< 2.0	< 300
	05/07/87	< 2.0	< 300
	06/04/87	7.4 ± 1.4	< 300
	07/02/87	4.3 ± 0.8	< 300
	07/30/87	2.4 ± 0.5	< 300
	08/27/87	< 2.0	< 300
	09/24/87	< 2.0	< 300
	10/22/87	< 2.0	< 300
	11/19/87	< 2.0	790 ± 287
	12/17/87	2.1 ± 0.5	< 300

TABLE XXXXII

SURFACE WATER

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l I-131 1*	Cs-134 5*	Cs-137 4*	Mn-54 2*	Co-58 3*	Co-60 5*	Zr,Nb-95 8*	Fe-59 3*	Zn-65 16*	Ba,La-140 4*
North Lake (L3)	01/15/87										
	02/12/87										
	03/12/87										
	04/09/87										
	05/07/87										
	06/04/87										
	07/02/87	LESS THAN DETECTION LIMIT									
	07/30/87										
	08/27/87										
	09/24/87										
	10/22/87										
	11/19/87										
	12/17/87										

*Detection Limit

TABLE XXXXIII

SURFACE WATER

1987

Sample Location	Collection Date	Radiochemical (pCi/l) Gross Beta	Tritium
South Lake (L2)	01/15/87	< 2.0	<300
	02/12/87	2.4 ± 0.6	<300
	03/12/87	< 2.0	747 ± 300
	04/09/87	4.0 ± 1.0	333 ± 297
	05/07/87	2.5 ± 0.8	<300
	06/04/87	3.0 ± 1.0	<300
	07/02/87	2.6 ± 0.7	<300
	07/30/87	< 2.0	<300
	08/27/87	< 2.0	<300
	09/24/87	< 2.0	<300
	10/22/87	< 2.0	<300
	11/19/87	2.3 ± 0.5	2504 ± 320
	12/17/87	< 2.0	<300

TABLE XXXXIV

SURFACE WATER

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l I-131 1*	Cs-134 7*	Cs-137 2*	Mn-54 2*	Co-58 5*	Co-60 5*	Zr,Nb-95 5*	Fe-59 3*	Zn-65 15*	Ba,La-140 4*
South Lake (L2)	01/15/87										
	02/12/87										
	03/12/87										
	04/09/87										
	05/07/87										
	06/04/87										
	07/02/87	LESS THAN DETECTION LIMIT									
	07/30/87										
	08/27/87										
	09/24/87										
	10/22/87										
	11/19/87										
	12/17/87										

*Detection Limit

TABLE XXXXV

SURFACE WATER

1987

Sample Location	Collection Date	Radiochemical (pCi/l) Gross Beta	Tritium
Circulating Intake	01/15/87	< 2.0	< 300
	02/12/87	5.5 ± 1.1	< 300
	03/12/87	2.0 ± 1.1	< 300
	04/09/87	4.1 ± 1.4	309 ± 301
	05/07/87	2.3 ± 0.8	< 300
	06/04/87	< 2.0	< 300
	07/02/87	< 2.0	< 300
	07/30/87	2.1 ± 0.6	< 300
	08/27/87	< 2.0	< 300
	09/24/87	< 2.0	< 300
	10/22/87	2.0 ± 0.5	< 300
	11/19/87	< 2.0	< 300
	12/17/87	< 2.0	< 300

TABLE XXXXVI

SURFACE WATER

GAMMA SPECTROMETRY

Sample Location	Collection Date	pCi/l Cs-134 7*	Cs-137 2*	Mn-54 2*	Co-58 5*	Co-60 5*	Zr,Nb-95 5*	Fe-59 3*	Zn-65 15*	Ba,La-140 4*
Circulating	01/15/87	**	**	**	**	**	**	**	**	**
Intake	02/12/87	QNS	QNS	QNS	QNS	QNS	QNS	QNS	QNS	QNS
	03/12/87	**	**	**	**	**	**	**	**	**
	04/09/87	**	**	**	**	**	**	**	**	**
	05/07/87	**	**	**	**	**	**	**	**	**
	06/04/87	**	**	**	**	**	**	**	**	**
	07/02/87	**	**	**	**	**	**	**	**	**
	07/30/87	**	**	**	**	**	**	**	**	**
	08/27/87	**	**	**	**	**	**	**	**	**
	09/24/87	**	**	**	**	**	**	**	**	**
	10/22/87	**	**	**	**	**	**	**	**	**
	11/19/87	**	**	**	**	**	**	**	**	**
	12/17/87	**	**	**	**	**	**	**	**	**

*Detection Limit

**Less than lower limit of detection

QNS - Quantity not sufficient for analysis.

8.0 Missing Samples

Sample Type	Location	Required Collection Date	Reason
Air particulate	ONS-2	02/02/87	Missing at site
Milk	Livinghouse	07/03/87	Sample burst in shipment
TLD	OFS-2	10/08/87	Missing at site
Air particulate	DOW	10/05/87	Unable to quantify due
Air radioiodine	DOW	10/05/87	to personnel error

APPENDIX A

RESULTS OF THE EPA CROSS-CHECK PROGRAM

1987

EPA CROSS-CHECK PROGRAM

1987

Radionuclides in Air Filters

Date	Parameter	EPA Known Value pCi/filter ± 1 σ	CEP Reported Value pCi/filter ± 2 σ
4/87	Gross Alpha	14 ± 5	20 ± 1 18 ± 1 17 ± 1
	Gross Beta	43 ± 5	63 ± 2 64 ± 2 66 ± 2
	Strontium-90	17 ± 1.5	19 ± 10 23 ± 10 24 ± 10
	Cesium-137	8 ± 5	17 ± 5 19 ± 5 20 ± 5
8/87	Gross Alpha	10 ± 5	10 ± 1 12 ± 1 13 ± 1
	Gross Beta	30 ± 5	29 ± 2 31 ± 2 33 ± 2
	Strontium-90	10 ± 1.5	8 ± 1 9 ± 1 9 ± 1
	Cesium-137	10 ± 5	8 ± 5 10 ± 5 10 ± 5

EPA CROSS-CHECK PROGRAM

1987

Gross Alpha and Gross Beta in Water

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
1/87	Gross Alpha	11 ± 5	12 ± 2 12 ± 2 12 ± 2
	Gross Beta	10 ± 5	22 ± 6 25 ± 6 27 ± 7
3/87	Gross Alpha	3 ± 5	4 ± 2 4 ± 2 4 ± 2
	Gross Beta	13 ± 5	12 ± 4 9 ± 4 8 ± 4
5/87	Gross Alpha	11 ± 5	11 ± 2 11 ± 2 12 ± 2
	Gross Beta	7 ± 5	17 ± 6 18 ± 6 19 ± 6
7/87	Gross Alpha	5 ± 5	4 ± 2 5 ± 2 6 ± 2
	Gross Beta	5 ± 5	6 ± 3 7 ± 3 9 ± 3
9/87	Gross Alpha	4 ± 5	3 ± 1 3 ± 1 3 ± 1
	Gross Beta	12 ± 5	13 ± 1 13 ± 1 15 ± 1

EPA CROSS-CHECK PROGRAM

1987

Gross Alpha and Gross Beta in Water (Cont.)

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
11/87	Gross Alpha	7 ± 5	6 ± 2 7 ± 2 8 ± 2
	Gross Beta	19 ± 5	16 ± 3 18 ± 3 20 ± 3

EPA CROSS-CHECK PROGRAM

1987

Gamma in Water

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
2/87	Cobalt-60	50 ± 5	55 ± 5 55 ± 5 56 ± 5
	Zinc-65	91 ± 5	102 ± 7 114 ± 6 108 ± 6
	Ruthenium-106	100 ± 5	93 ± 5 105 ± 5 108 ± 5
	Cesium-134	59 ± 5	61 ± 3 57 ± 2 60 ± 3
	Cesium-137	87 ± 5	109 ± 6 98 ± 6 102 ± 5
6/87	Cobalt-60	64 ± 5	69 ± 5 69 ± 5 71 ± 5
	Zinc-65	10 ± 5	12 ± 3 14 ± 3 16 ± 3
	Ruthenium-106	75 ± 5	80 ± 5 75 ± 5 71 ± 5
	Cesium-134	40 ± 5	40 ± 3 39 ± 3 38 ± 3
	Cesium-137	80 ± 5	82 ± 5 84 ± 5 85 ± 5
	Chromium-51	41 ± 5	46 ± 3 44 ± 3 40 ± 3

EPA CROSS-CHECK PROGRAM

1987

Gamma in Water (Cont.)

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
10/87	Chromium-51	70 ± 5	66 ± 8 67 ± 8 73 ± 8
	Cobalt-60	15 ± 5	17 ± 2 18 ± 2 19 ± 2
	Zinc-65	46 ± 5	55 ± 15 57 ± 15 61 ± 15
	Ruthenium-106	61 ± 5	71 ± 10 75 ± 10 79 ± 10
	Cesium-134	25 ± 5	26 ± 3 26 ± 3 27 ± 3
	Cesium-137	51 ± 5	56 ± 5 56 ± 5 58 ± 5

EPA CROSS-CHECK PROGRAM

1987

Tritium in Water

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
2/87	Tritium	4209 ± 421	4600 ± 500 4510 ± 500 4330 ± 500
6/87	Tritium	2895 ± 357	2866 ± 285 2831 ± 288 2792 ± 288
10/87	Tritium	4492 ± 449	3867 ± 300 3925 ± 300 4211 ± 300

EPA CROSS-CHECK PROGRAM

1987

Strontium In Water

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
1/87	Strontium-89	25 ± 5	15 ± 5 17 ± 6 20 ± 5
	Strontium-90	25 ± 1.5	22 ± 5 24 ± 6 24 ± 5
5/87	Strontium-89	41 ± 5	26 ± 5 34 ± 5 34 ± 5
	Strontium-90	20 ± 1.5	14 ± 3 15 ± 3 17 ± 3

EPA CROSS-CHECK PROGRAM

1987

Iodine-131 in Water

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
3/87	Low Level *	7.0 ± 0.7	2 ± 4 2 ± 4 2 ± 4
8/87	High Level	48 ± 6	43 ± 5 41 ± 4 39 ± 3
10/87	Mid Level	26 ± 6	19 ± 4 20 ± 4 22 ± 4

*Unable to reanalyze due to half-life decay.

EPA CROSS-CHECK PROGRAM

1987

Radionuclides in Milk

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
6/87	Strontium-90	35 ± 1.5	29 ± 3 28 ± 3 32 ± 3
	Cesium-137	74 ± 5	75 ± 2 77 ± 2 70 ± 2
	Strontium-89	69 ± 5	5 ± 2 5 ± 2 4 ± 2
	Iodine-131	59 ± 6	63 ± 2 64 ± 2 64 ± 2
	Potassium	1525 ± 76 mg/l	1617 ± 150 mg/l 1648 ± 150 mg/l 1648 ± 150 mg/l
10/87	EPA cancelled Milk Study due to EPA facility being reroofed.		

EPA CROSS-CHECK PROGRAM

1987

Iodine-131 In Milk

Date	Parameter	EPA Known Value pCi/l ± 1 σ	CEP Reported Value pCi/l ± 2 σ
2/87	Low Level	9.0 ± 0.9	9.0 ± 1.0 8.0 ± 0.5 8.0 ± 0.5

APPENDIX B

TLD

QUALITY ASSURANCE/QUALITY CONTROL

DATA

TELEDYNE ISOTOPES

1987

TELEDYNE ISOTOPES

MEMORANDUM

March 10, 1987

To: J. D. Martin, H. Jeter, H. King, N. Cobin, R. Vento, B. Lindgren

Fr: B. Campbell

Attached is a copy of the data resulting from the quality control tests of environmental thermoluminescent dosimeters conducted in the first quarter of 1987. Included is an analysis of the data.

Eleven badges with no cases were prepared. Two were blank controls and nine were irradiated to three different levels. They were read on a Model 8300 Reader, Serial No. 205 on February 27, 1987.

The average deviation of the first group irradiated to 9.58 mR was +0.49 or 5.11% high. The average deviation of the second group, irradiated to 23.96 mR was -0.09 or 0.376% low. The average deviation of the third group irradiated to 59.80 mR was +1.03 or 1.72% high.

These results compare favorably with the requirements of Regulatory Guide 4.13, Section C. The standard deviation is less than 7.5% and the variation from the known is less than 30%.

Attached also is a graph of the four quarters of 1986 and the first quarter of 1987. This is a normalized deviation from the known based on an expected laboratory precision for a single determination of 20% and for three determinations. A consistent trend toward low or high readings is not indicated.

Barbara Campbell

Barbara Campbell

BC:cs

att

104 A22

TELEDYNE ISOTOPES
50 VAN BUREN AVENUE
WESTWOOD, NEW JERSEY
(201) 664-7070

ENVIRONMENTAL TLD EXPOSURE REPORT

/ / - / /

TI99 TELEDYNE ISOTOPES

THE RESULTS INDICATED BELOW HAVE BEEN OBTAINED USING THE TELEDYNE ISOTOPES READOUT SYSTEM AND DOSIMETERS. THE ORIGINAL DATA ARE RETAINED ON FILE.

NET EXPOSURES IN MR

IDENT.	AREA 1	AREA 2	AREA 3	AREA 4	AVERAGE	STD. DEV.
STA-01	9.3	9.9	9.3	9.4	9.5	0.3
STA-02	23.6	24.0	24.9	24.2	24.2	0.5
STA-03	59.9	60.0	60.1	60.3	60.1	0.2
STA-04	9.7	9.5	9.3	9.2	9.4	0.2
STA-05	23.9	24.5	23.2	23.7	23.8	0.6
STA-06	62.6	63.3	63.5	60.0	62.4	1.6
STA-07	12.1	11.8	11.5	9.9	11.3	1.0
STA-08	24.2	23.6	23.3	23.3	23.6	0.4
STA-09	61.3	59.3	58.8	60.7	60.0	1.[illegible]

THESE NET EXPOSURE VALUES RESULTED AFTER SUBTRACTING AN AVERAGE CONTROL READING OF 0.6 MR, DERIVED FROM THE FOLLOWING CONTROL DOSIMETERS

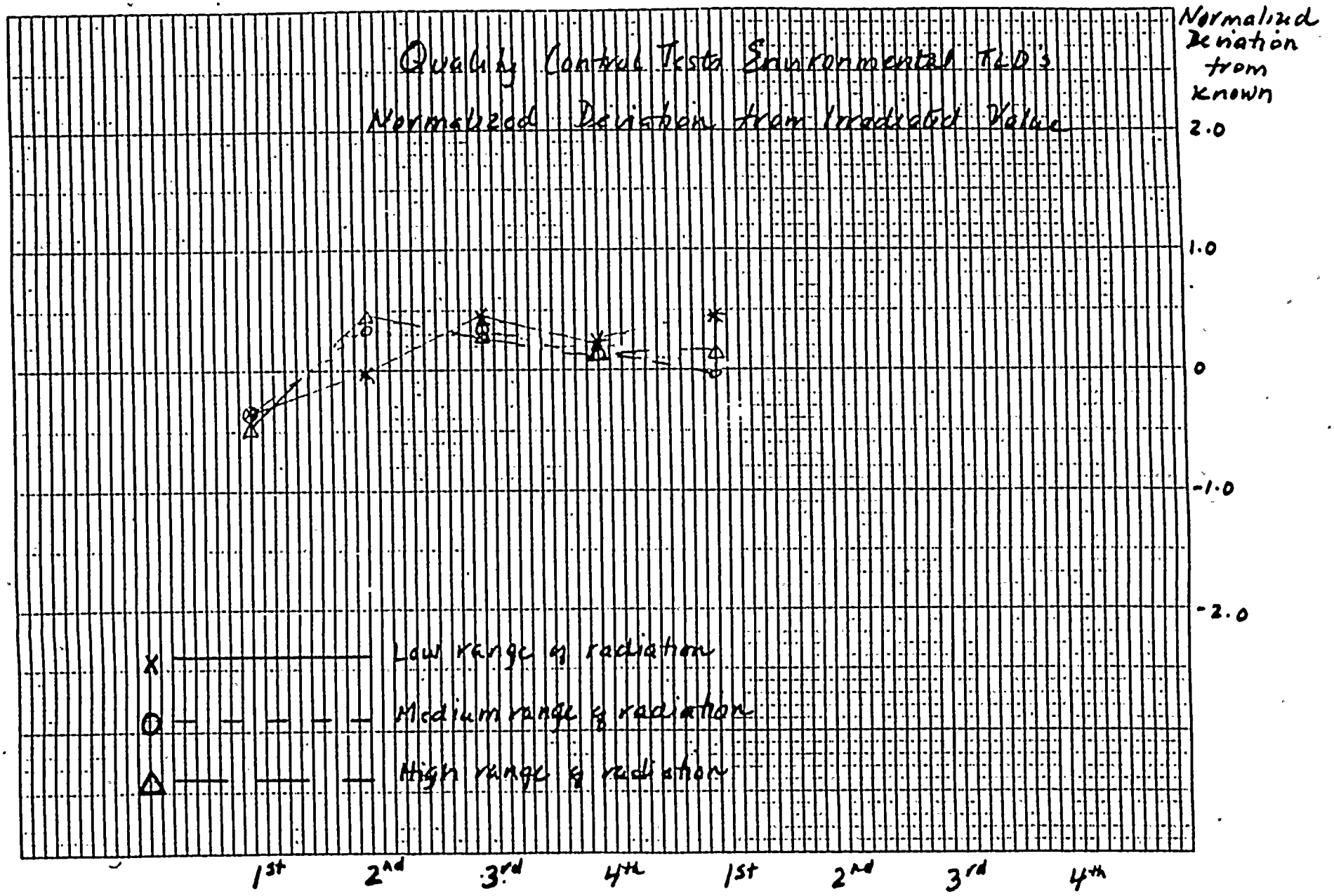
CONTROL 10	0.5	0.5	0.5	0.5	0.5	0.0
CONTROL 11	0.6	0.7	0.9	0.5	0.7	0.2

APPROVED [signature]

DATE 3/05/87

1987

Date	Irrad Dose mR	Meas. Dose mR	Aver ± Std Dev. mR	Range	Aver Dev from Irrad	Meas Dose ÷ Irrad.	% Dose
7/26	9.58	9.50 9.40 11.30	10.07 ± 1.07	(11.30 - 9.40) 1.90	+ 0.49	1.05	+ 5.11 %
	23.96	24.20 23.80 23.60	23.87 ± 0.31	(24.20 - 23.60) 0.60	- 0.09	0.996	- 0.376 %
	59.80	60.10 62.40 60.00	60.83 ± 1.36	(62.40 - 60.00) 2.40	+ 1.03	1.02	+ 1.72 %


Quality Control Tests Environmental TLD's
Normalized Deviation from Irradiated Value
Normalized Deviation from Known
2.0
1.0
0
-1.0
-2.0
Low range of radiation
Medium range of radiation
High range of radiation
1st
2nd
3rd
4th
1st
2nd
3rd
4th
1986
1987

1st Quarter Trending

σ_m = standard error of mean

$$\sigma_m = \frac{\sigma}{\sqrt{N}} = \frac{\text{Irrad. level} \times 0.2}{\sqrt{3}}$$

σ = expected laboratory precision, one single determinate

single determinant = 20%.

$$\sigma_m = \frac{9.58 \times 0.2}{\sqrt{3}} : 1.11$$

$$\frac{23.96 \times 0.2}{\sqrt{3}} : 2.77$$

$$\frac{59.80 \times 0.2}{\sqrt{3}} : 6.91$$

$$ND = \frac{\text{measured - mean}}{\sigma_m}$$

$$\frac{10.07 - 9.58}{1.11} : 0.441 \quad *$$

$$\frac{23.87 - 23.96}{2.77} = -0.032 \quad 0$$

$$\frac{60.83 - 59.80}{6.91} = 0.149 \quad \Delta$$

TELEDYNE ISOTOPES

Quality Assurance Testing Program of . T.L.D. Badges

Summarized below are the results of the quarterly test program of the overall accuracy of the 9100 TLD Reader for personnel radiation dosimeters.

Nine TLD personnel badges are dosed to three exposure levels under the supervision of the quality assurance group. The test were conducted by B Campbell on Feb. 26, 1987.

Summarized below are the irradiation doses and the measured doses for the three levels. The irradiated badges were read by N. Colburn of the TLD Badge Service Group on Feb. 27 198[illegible] and measured on the Model ~~9100~~ 8300 Serial No. 205 reader.

irradiation dose	average measured dose ± std. dev.	Meas Dose ÷ Irrad Dose	% deviatio
9.58	10.07 ± 1.07	1.05	+5.11%
23.96	23.87 ± 0.31	0.996	-0.37%
59.80	60.83 ± 1.36	1.02	+1.72%

Attachments:

1. T.L.D. Exposure Report
2. Q.A. Group data summary

MEMORANDUM

TELEDYNE ISOTOPES

MEMORANDUM

July 9, 1987

To: J. D. Martin, H. Jeter, H. King, N. Cobin, R. Vento, B. Lindgren

Fr: B. Campbell

Attached is a copy of the data resulting from the quality control tests of environmental thermoluminescent dosimeters conducted in the second quarter of 1987. Included is an analysis of the data.

Eleven badges with no cases were prepared. Two were blank controls and nine were irradiated to three different levels. They were read on a Model 8300 Reader, Serial No. 242 on June 30, 1987.

The average deviation of the first group irradiated to 11.78 mR, was +0.02 or 0.17% high. The average deviation of the second group, irradiated to 32.99 mR was +0.24 or 0.73% high. The average deviation of the third group irradiated to 62.45 mR was +0.05 or 0.08% high.

These results compare favorably with the requirements of Regulatory Guide 4.13, Section C. The standard deviation is less than 7.5% and the variation from the known is less than 30%.

Attached also is a graph of the four quarters of 1986 and the first two quarters of 1987. This is a normalized deviation from the known based on an expected laboratory precision for a single determination of 20% and for three determinations. A consistent trend toward low or high readings is not indicated.

Barbara Campbell

Barbara Campbell

BC:cs

att

104 B05

ENVIRONMENTAL TLD EXPOSURE REPORT

/ / - / /

TELEDYNE ISOTOPES
50 VAN BUREN AVENUE
WESTWOOD, NEW JERSEY
(201) 664-7070 TE[illegible] 134474

TI99 TELEDYNE ISOTOPES

THE RESULTS INDICATED BELOW HAVE BEEN OBTAINED USING THE TELEDYNE ISOTOPES READOUT SYSTEM AND DOSIMETERS. THE ORIGINAL DATA ARE RETAINED ON FILE.

NET EXPOSURES IN MR

IDENT.	AREA 1	AREA 2	AREA 3	AREA 4	AVERAGE	STD. DEV.
STA-01	33.1	33.8	33.6	33.0	33.4	0.4
STA-02	11.9	11.9	11.8	11.9	11.8	0.1
STA-04	63.2	62.7	62.1	62.9	62.7	0.5
STA-05	11.6	11.9	11.4	11.5	11.6	0.2
STA-06	62.1	62.4	62.6	62.8	62.5	0.3
STA-07	12.0	12.0	11.9	12.1	12.0	0.1
STA-08	33.2	33.3	33.1	33.3	33.2	0.1
STA-09	63.6	61.7	62.5	61.2	62.3	1.1
STA-10	33.3	32.9	56.7 (A)	33.2	39.0(A)	11.8(A)

THESE NET EXPOSURE VALUES RESULTED AFTER SUBTRACTING AN AVERAGE CONTROL READING OF 0.6 MR, DERIVED FROM THE FOLLOWING CONTROL DOSIMETERS:

CONTROL 03	0.7	0.6	0.6	0.5	0.6	0.1
CONTROL 11	0.6	0.6	0.6	0.6	0.6	0.0

Using the criteria that if one standard deviation is greater than 10% and that if the value of one area is outside the range of 3 standard deviations of the average of the other three areas, then that area will be eliminated, the results are to be revised such that:

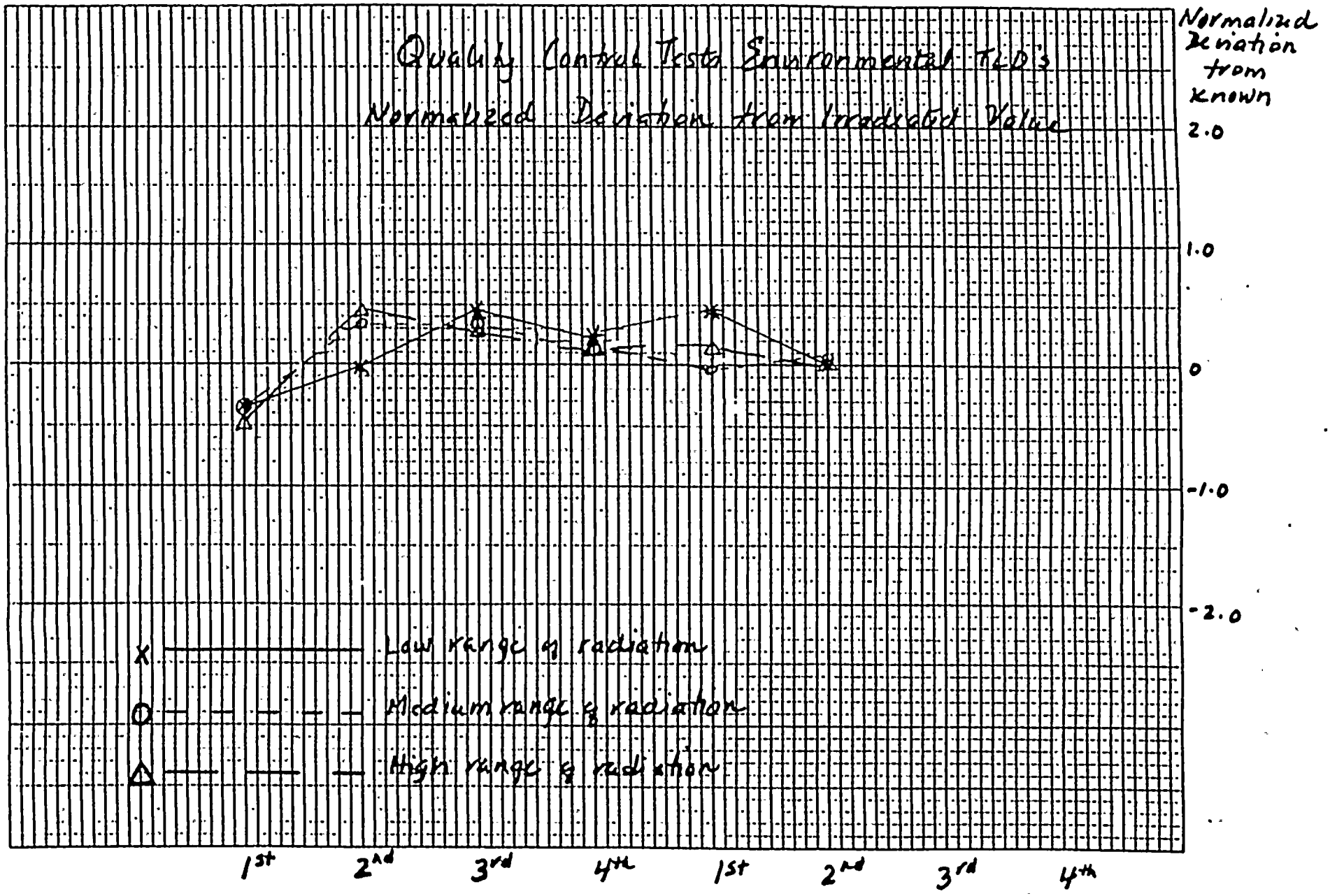
	TLD No.	(3 areas) Average	Std. Dev. (1 sigma)
(A)	STA-10	33.1	0.2

APPROVED: [signature]

DATE 7-02-87

1987

Date	Irrad Dose mR	Meas. Dose mR	Aver ± Std Dev. mR	Range	Aver Dev. frm Irrad	Meas Dose ÷ Irrad.	% Dose
7/26	9.58	9.50 9.40 11.30	10.07 ± 1.07	(11.30 - 9.40) 1.90	+ 0.49	1.05	+ 5.11 %
	23.96	24.20 23 80 23.60	23.87 ± 0.31	(24.20 - 23.60) 0.60	- 0.09	0.996	- 0.376 %
	59.80	60.10 62.40 60.00	60.83 ± 1.36	(62.40 - 60.00) 2.40	+ 1.03	1.02	+ 1.72 %
6/29	11.78	11.80 11.60 12.00	11 80 ± 0.20	(12.00 - 11.60) 0 40	+ 0.02	1.00	+ 0.17 %
	32.99	33 40 33 20 33.10	33 23 ± 0.15	(33.40 - 33.10) 0.30	+ 0.24	1.01	+ 0.73 %
	62.45	62.70 62.50 62.30	62.50 ± 0.20	(62.70 - 62.30) 0.40	+ 0.05	1.00	+ 0.08 %


Quality Control Tests Environmental TLD's
Normalized Deviation from Irradiated Value
Normalized Deviation from Known
2.0
1.0
0
-1.0
-2.0
X —— Low range of radiation
O — — — — Medium range of radiation
Δ —— —— — High range of radiation
1st
2nd
3rd
4th
1st
2nd
3rd
4th
1986
1987

2nd Quarter Trending

σ_m = standard error of mean

$$\sigma_m = \frac{\sigma}{\sqrt{N}} = \frac{\text{irrad. level} \times 0.2}{\sqrt{3}}$$

σ_m = expected laboratory precision, one single determinat
single determinant = 20%

$$\sigma_m = \frac{11.78 \times 0.2}{\sqrt{3}} = 1.36$$

$$\frac{32.99 \times 0.2}{\sqrt{3}} = 3.81$$

$$\frac{62.45 \times 0.2}{\sqrt{3}} = 7.21$$

$$ND = \frac{\text{measured} - \text{known}}{\sigma_m}$$

$$\frac{11.80 - 11.78}{1.36} = 0.015 \quad *$$

$$\frac{33.23 - 32.99}{3.81} = 0.063 \quad O$$

$$\frac{62.50 - 62.45}{7.21} = 0.007 \quad \Delta$$

TELEDYNE ISOTOPES

Quality Assurance Testing Program of Environmental T.L.D. Badges

Summarized below are the results of the quarterly test program of the overall accuracy of the 9100 TLD Reader for personnel radiation dosimeters.

Nine TLD personnel badges are dosed to three exposure levels under the supervision of the quality assurance group. The test were conducted by B. Campbell on June 29, 1987.

Summarized below are the irradiation doses and the measured doses for the three levels. The irradiated badges were read by N. Colbin of the TLD Badge Service Group on June 30, 198[illegible] and measured on the Model ~~9100~~ 8300 Serial No. 242 reader.

irradiation dose	average measured dose ± std. dev.	meas. Dose ÷ Irrad. Dose	% deviation
11.78	11.80 ± 0.20	1.00	0.17
32.99	33.23 ± 0.15	1.01	0.73
62.45	62.50 ± 0.20	1.00	0.08

Attachments:

1. T.L.D. Exposure Report
2. Q.A. Group data summary

MEMORANDUM

TELEDYNE ISOTOPES

MEMORANDUM

September 18, 1987

To: J. D. Martin, H. Jeter, H. King, N. Cobin, B. Lindgren

Fr: B. Campbell

Attached is a copy of the data resulting from the quality control tests of environmental thermoluminescent dosimeters conducted in the third quarter of 1987. Included is an analysis of the data.

Eleven badges with no cases were prepared. Two were blank controls and nine were irradiated to three different levels. They were read on a Model 8300 Reader, Serial No. 205 on September 17, 1987.

The average deviation of the first group irradiated to 18.88 mR, was +0.09 or 0.48% high. The average deviation of the second group, irradiated to 44.84 mR was +1.09 or 2.43% high. The average deviation of the third group, irradiated to 94.40 mR was +3.03 or 3.21% high.

These results compare favorably with the requirements of Regulatory Guide 4.13, Section C. The standard deviation is less than 7.5% and the variation from the known is less than 30%.

Attached also is a graph of the four quarters of 1986 and the three quarters of 1987. This is a normalized deviation from the known based on an expected laboratory precision for a single determination of 20% and for three determinations. A consistent trend toward low or high readings is not indicated.

B. Campbell
Barbara Campbell

BC:cs

att

104 B15

ENVIRONMENTAL TLD EXPOSURE REPORT

/ / - / /

TELEDYNE ISOTOPES
50 VAN BUREN AVENUE
WESTWOOD, NEW JERSEY 076
(201) 664-7070 TE 74

TI99 TELEDYNE ISOTOPES

THE RESULTS INDICATED BELOW HAVE BEEN OBTAINED USING THE TELEDYNE ISOTOPES READOUT SYSTEM AND DOSIMETERS. THE ORIGINAL DATA ARE RETAINED ON FILE.

NET EXPOSURES IN MR

IDENT.	AREA 1	AREA 2	AREA 3	AREA 4	AVERAGE	STD. DEV.
STA-01	18.6	19.1	17.9	19.1	18.7	0.6
STA-02	46.9	48.3	46.8	47.2	47.3	0.7
STA-03	44.6	44.2	44.4	45.2	44.6	0.4
STA-04	19.2	18.9	18.8	18.8	19.0	0.2
STA-05	19.3	19.3	18.8	19.3	19.2	0.2
STA-06	46.3	45.2	46.4	45.7	45.9	0.6
STA-09	97.3	98.1	98.4	98.8	98.2	0.6
STA-10	98.6	99.1	98.6	98.3	98.6	0.4
STA-11	94.8	95.4	96.7	95.2	95.5	0.8

THESE NET EXPOSURE VALUES RESULTED AFTER SUBTRACTING AN AVERAGE CONTROL READING OF 0.7 MR, DERIVED FROM THE FOLLOWING CONTROL DOSIMETERS:

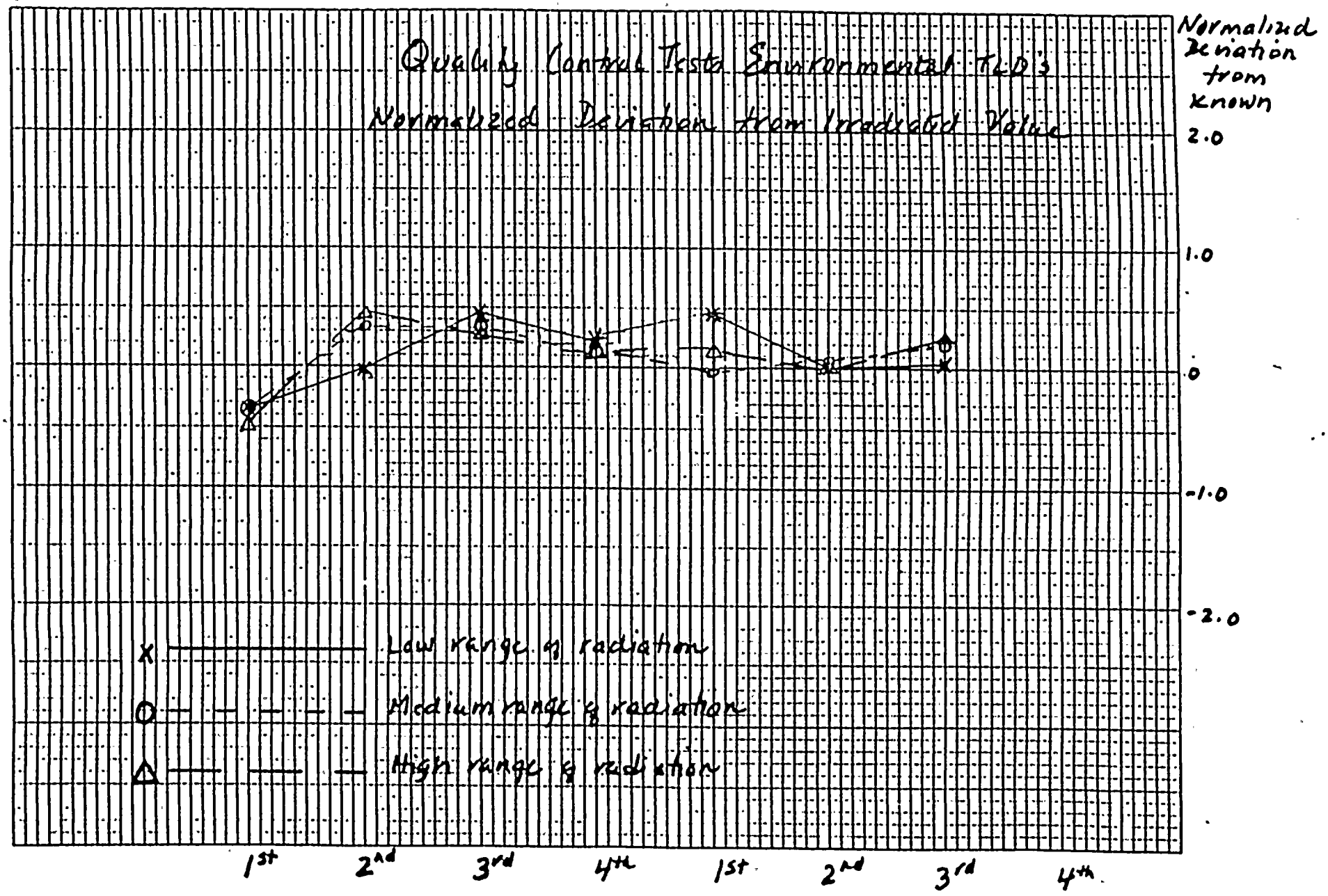
CONTROL 07	0.8	0.6	0.6	0.7	0.7	0.1
CONTROL 08	0.8	0.6	0.7	0.6	0.7	0.1

APPROVED: D Martin

DATE 9-17-87

1987

Date	Irrad Dose mR	Meas. Dose mR	Aver ± Std Dev. mR	Range	Aver Dev frm Irrad	Meas Dose ÷ Irrad.	% Dev.
7/26	9.58	9.50 9.40 11.30	10.07 ± 1.07	(11.30 - 9.40) 1.90	+ 0.49	1.05	+ 5.11 %
	23.96	24.20 23.80 23.60	23.87 ± 0.31	(24.20 - 23.60) 0.60	- 0.09	0.996	- 0.376 %
	59.80	60.10 62.40 60.00	60.83 ± 1.36	(62.40 - 60.00) 2.40	+ 1.03	1.02	+ 1.72 %
6/29	11.78	11.80 11.60 12.00	11 80 ± 0.20	(12.00 - 11.60) 0.40	+ 0.02	1.00	+ 0.17 %
	32.99	33 40 33 20 33 10	33 23 ± 0.15	(33.40 - 33.10) 0.30	+ 0.24	1.01	+ 0.73 %
	62.45	62.70 62 50 62.30	62.50 ± 0.20	(62.70 - 62.30) 0.40	+ 0.05	1.00	+ 0.08 %
9/15	18.88	18.70 19.00 19.20	18.97 ± 0.25	(19.20 - 18.70) 0.50	+ 0.09	1.00	0.48 %
	44.84	47.30 44.60 45.90	45.93 ± 1.35	(47.30 - 44.60) 2.70	+ 1.09	1.02	2.43 %
	94.40	98.20 98.60 95.50	97.43 ± 1.69	(98.60 - 95.50) 3.10	+ 3.03	1.03	3.21 %


Quality Control Tests Environmental TLD's
Normalized Deviation from Irradiated Value
Normalized Deviation from Known
2.0
1.0
0
-1.0
-2.0
X —— Low range of radiation
O — — — — Medium range of radiation
Δ —— —— —— High range of radiation
1st
2nd
3rd
4th
1st
2nd
3rd
4th
1986
1987

3rd Quarter Trending

σ_m = Standard error of mean

$$\sigma_m = \frac{\sigma}{\sqrt{N}} = \frac{\text{Irrad. level} \times 0.2}{\sqrt{3}}$$

σ_m = expected laboratory precision, one single determination

single determinant = 20%

$$\sigma_m = \frac{18.88 \times 0.2}{\sqrt{3}} = 2.18$$

$$\frac{44.84 \times 0.2}{\sqrt{3}} = 5.18$$

$$\frac{94.40 \times 0.2}{\sqrt{3}} = 10.90$$

$$ND = \frac{\text{measured} - \text{known}}{\sigma_m}$$

$$\frac{18.97 - 18.88}{2.18} = 0.041 \quad *$$

$$\frac{45.93 - 44.84}{5.18} = 0.210 \quad \circ$$

$$\frac{97.43 - 94.40}{10.90} = 0.278 \quad \Delta$$

TELEDYNE ISOTOPES

Quality Assurance Testing Program of ~~Environmental~~ T.L.D. Badges

Summarized below are the results of the quarterly test program of the overall accuracy of the 9100 TLD Reader for personnel radiation dosimeters.

Nine TLD personnel badges are dosed to three exposure levels under the supervision of the quality assurance group. The test were conducted by B. Campbell on Sept. 15, 1987.

Summarized below are the irradiation doses and the measured doses for the three levels. The irradiated badges were read by N. Cobin of the TLD Badge Service Group on ~~Sept~~ 17. 1987 and measured on the Model ~~9100~~ 8300 Serial No. 205 reader.

irradiation dose	average measured dose ± std. dev.	Meas. Dose ÷ Irrad. Dose	% deviation
18.88	18.97 ± 0.25	1.00	0.48
44.84	45.93 ± 1.35	1.02	2.43
94.40	97.43 ± 1.69	1.03	3.21

Attachments:

1. T.L.D. Exposure Report
2. Q.A. Group data summary

MEMORANDUM

TELEDYNE ISOTOPES

January 11, 1988

To: J. D. Martin, H. Jeter, N. Cobin, B. Lindgren

Fr: B. Campbell

Attached is a copy of the data resulting from the quality control tests of environmental dosimeters conducted in the fourth quarter of 1987. Included is an analysis of the data.

Eleven badges with no cases were prepared. Two were blank controls and nine were irradiated to three different levels. They were read on a Model 8300 Reader, Serial No. 242 on December 24, 1987.

The average deviation of the first group irradiated to 11.60 mR, was -0.67 or 5.78% low. The average deviation of the second group, irradiated to 29.00 mR was -1.40 or 4.83% low. The average deviation of the third group, irradiated to 46.40 mR was -4.93 or 10.63% low.

These low results were discussed with N. Cobin who further investigated the matter. N. Cobin felt that the low readings resulted because Reader 242 was due for calibration.

The reader was calibrated on January 4, 1988, new badges were issued and irradiated to the same previous three levels on January 6, 1988. The badges were read on Reader 242 on January 6. The average deviation of the first group was +0.07 or 0.60% high. The average deviation of the second group was -0.23 or 0.79% low. The average deviation of the third group was 0.40 or 0.86% high.

Both sets of results are acceptable according to the requirements set forth in Regulatory Guide 4.13, Section C. The standard deviation is less than 7.5% and the variation from the known is less than 30%.

Attached also is a graph of the four quarters of 1986 and 1987. This is a normalized deviation from the known based on an expected laboratory precision for a single determination of 20% and for three determinations. Included are the results of the second set of badges ("R") reflecting the change due to calibration.

A consistent trend toward high or low readings is not indicated.

B. Campbell
Barbara Campbell

BC:cs
att

104A A01

ENVIRONMENTAL TLD EXPOSURE REPORT

/ / - / /

TELEDYNE ISOTOPES
50 VAN BUREN AVENUE
WESTWOOD NEW JERSEY 07
(201) 664-7070 [redacted] 4474

TI99 TELEDYNE ISOTOPES

THE RESULTS INDICATED BELOW HAVE BEEN OBTAINED USING THE TELEDYNE ISOTOPES READOUT SYSTEM AND DOSIMETERS. THE ORIGINAL DATA ARE RETAINED ON FILE.

NET EXPOSURES IN MR

IDENT.	AREA 1	AREA 2	AREA 3	AREA 4	AVERAGE	STD. DEV.
STA-01	10.9	10.8	10.7	10.9	10.8 *	0.1
STA-02	27.5	28.1	27.0	31.6 (A)	28.6 (A) o	2.1 (A)
STA-03	27.5	27.8	28.0	27.4	27.6 o	0.3
STA-04	11.4	11.2	11.2	11.2	11.2 *	0.1
STA-05	10.8	11.2	10.8	10.6	10.9 *	0.2
STA-06	40.7	42.2	40.8	41.2	41.2 Δ	0.7
STA-07	42.4	42.6	42.5	42.4	42.5 Δ	0.1
STA-08	40.7	40.3	41.1	40.9	40.7 Δ	0.3
STA-09	27.4	27.4	27.7	28.3	27.7 o	0.4

THESE NET EXPOSURE VALUES RESULTED AFTER SUBTRACTING AN AVERAGE CONTROL READING OF 0.5 MR, DERIVED FROM THE FOLLOWING CONTROL DOSIMETERS:

CONTROL 10	0.5	0.5	0.4	0.5	0.5	0.0
CONTROL 11	0.5	0.5	0.5	0.5	0.5	0.0

Using the criteria that if one standard deviation is greater than 10% and that if the value of one area is outside the range of 3 standard deviations of the average of the other three areas, then that area will be eliminated, the results are to be revised such that:

	TLD No.	(3 areas) Average	Std. Dev. (1 sigma)
(A)	STA-02	27.5	0.6

APPROVED: [signature]

DATE 12-30-87

ENVIRONMENTAL TLD EXPOSURE REPORT

00/00/00 - 00/00/00

TELEDYNE ISOTOPES
50 VAN BUREN AVENUE
WESTWOOD, NEW JERSEY 076
(201) 664-7070 TELEX 134474

Repeat

Calibrated 1/4/88

TI99 TELEDYNE ISOTOPES (-242) 1/6

THE RESULTS INDICATED BELOW HAVE BEEN OBTAINED USING THE TELEDYNE ISOTOPES READOUT SYSTEM AND DOSIMETERS. THE ORIGINAL DATA ARE RETAINED ON FILE.

NET EXPOSURES IN MR

IDENT.	AREA 1	AREA 2	AREA 3	AREA 4	AVERAGE	STD. DEV.
STA-1A	14.3	11.4	11.3	11.6	12.2*	1.4
STA-2A	26.2	28.8	28.6	29.3	28.2°	1.4
STA-3A	29.1	29.0	29.0	29.6	29.2°	0.3
STA-4A	11.5	11.1	11.4	11.4	11.3*	0.2
STA-5A	12.0	11.0	11.4	11.7	11.5*	0.5
STA-6A	46.3	46.6	47.2	47.6	46.9Δ	0.6
STA-7A	46.9	47.6	46.5	47.1	47.0Δ	0.4
STA-8A	45.7	46.4	46.5	47.6	46.5Δ	0.8
STA-9A	28.3	28.5	29.6	29.4	28.9°	0.7

THESE NET EXPOSURE VALUES RESULTED AFTER SUBTRACTING AN AVERAGE CONTROL READING OF 0.7 MR, DERIVED FROM THE FOLLOWING CONTROL DOSIMETERS

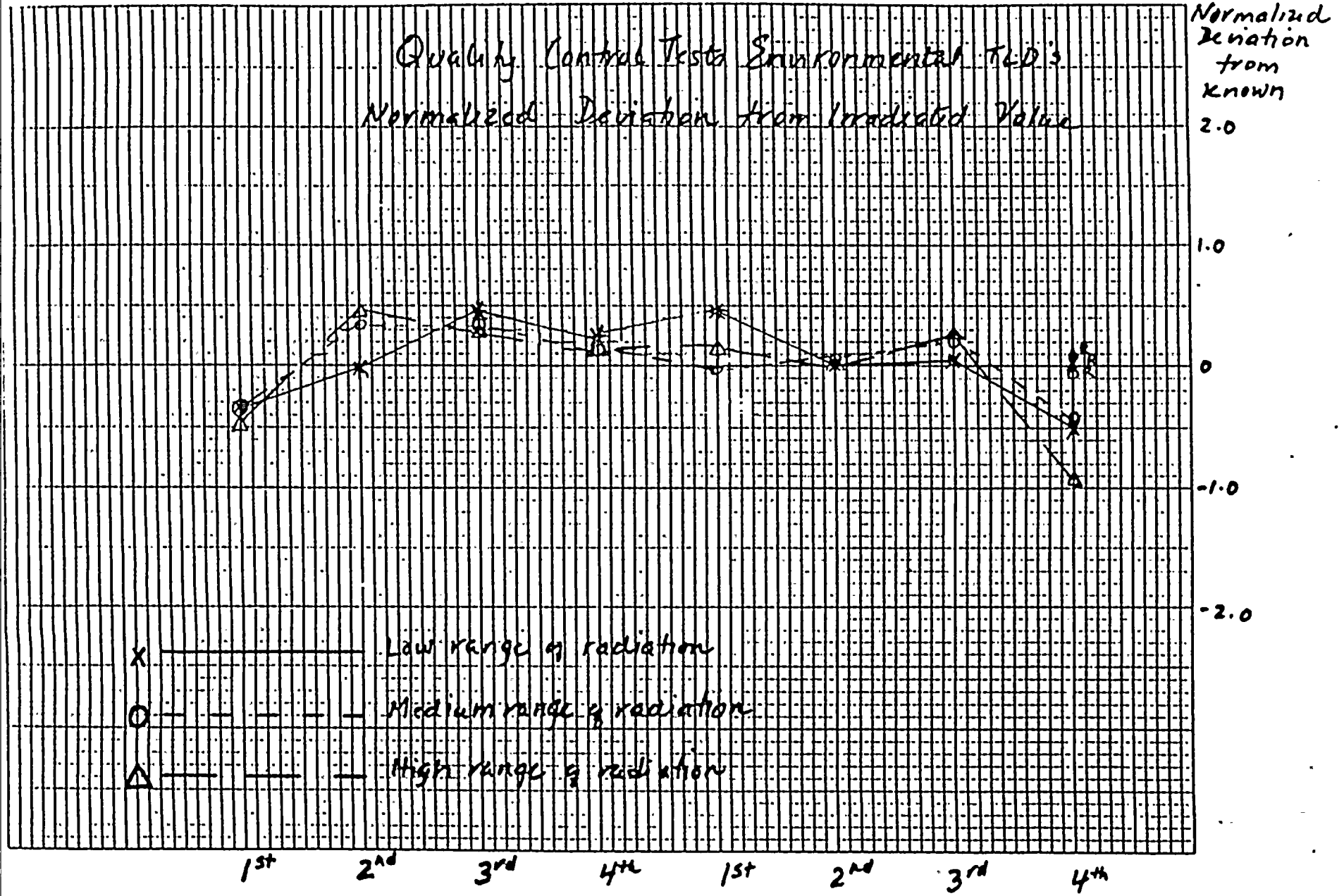
CONTROL A	1.1	0.6	0.5	0.5	0.7	0.3
CONTROL B	1.0	0.6	0.5	0.5	0.7	0.2

APPROVED _____

DATE _____

1987

Dak	Irrad Dose mR	Meas Dose mR	Aver ± Std Dev mR	Range	Aver Dev frm Irrad	Meas Dose ÷ Irrad.	% Dev.
7/26	9.58	9.50 9.40 11.30	10.07 ± 1.07	(11.30 - 9.40) 1.90	+ 0.49	1.05	+ 5 %
	23.96	24.20 23.50 23.60	23.87 ± 0.31	(24.20 - 23.60) 0.60	- 0.09	0.996	- 0.376 %
	59.80	60.10 62.40 60.00	60.83 ± 1.36	(62.40 - 60.00) 2.40	+ 1.03	1.02	+ 1.72 %
6/29	11.78	11.80 11.60 12.00	11.80 ± 0.20	(12.00 - 11.60) 0.40	+ 0.02	1.00	+ 0.17 %
	32.99	33.40 33.20 33.10	33.23 ± 0.15	(33.40 - 33.10) 0.30	+ 0.24	1.01	+ 0.73 %
	62.45	62.70 62.50 62.30	62.50 ± 0.20	(62.70 - 62.30) 0.40	+ 0.05	1.00	+ 0.08 %
9/15	18.88	18.70 19.00 19.20	18.97 ± 0.25	(19.20 - 18.70) 0.50	+ 0.09	1.00	0.48 %
	44.84	47.30 44.60 45.90	45.93 ± 1.35	(47.30 - 44.60) 2.70	+ 1.09	1.02	2.43 %
	94.40	98.20 98.60 95.50	97.43 ± 1.69	(98.60 - 95.50) 3.10	+ 3.03	1.03	3.21 %
12/23	11.60	10.80 11.20 10.80	10.93 ± 0.23	(11.20 - 10.80) 0.40	- 0.67	0.942	- 5.78 %
	29.00	27.50 27.60 27.70	27.60 ± 0.10	(27.70 - 27.50) 0.20	- 1.40	0.952	- 4.83 %
	46.40	41.20 42.50 40.70	41.47 ± 0.93	(42.50 - 40.70) 1.80	- 4.93	0.894	- 10.63 %


Quality Control Tests Environmental TLD's
Normalized Deviation from Irradiated Value
Normalized Deviation from Known
2.0
1.0
0
-1.0
-2.0
Low range of radiation
Medium range of radiation
High range of radiation
1st
2nd
3rd
4th
1st
2nd
3rd
4th
1986
1987

4th. Quarter Trending.

σ_m: standard error of mean.

$\sigma_m = \frac{\sigma}{\sqrt{N}} = \frac{\text{mod. level} \times 0.2}{\sqrt{3}}$

σ_m: expected laboratory precision, one single determinate

single determinant = 20%

$\sigma_m = \frac{11.60 \times 0.2}{\sqrt{3}} = 1.34$

$\frac{29.00 \times 0.2}{\sqrt{3}} = 3.35$

$\frac{46.40 \times 0.2}{\sqrt{3}} = 5.36$

$ND = \frac{\text{measured} - \text{known}}{\sigma_m}$

$\frac{10.93 - 11.60}{1.34} = -0.500$

$\frac{27.60 - 29.00}{3.35} = -0.418$

$\frac{41.47 - 46.40}{5.36} = -0.9198\ (-0.920)$

TELEDYNE ISOTOPES

Quality Assurance Testing Program of Environmental T.L.D. Badges

Summarized below are the results of the quarterly test program of the overall accuracy of the 8300 TLD Reader for personnel radiation dosimeters.

Nine TLD personnel badges are dosed to three exposure levels under the supervision of the quality assurance group. The test were conducted by B. Campbell on Dec. 23. 1987.

Summarized below are the irradiation doses and the measured doses for the three levels. The irradiated badges were read by N. Cabin of the TLD Badge Service Group on Dec 24. 1987 and measured on the Model 8300 Serial No. 242 reader.

irradiation dose	average measured dose ± std. dev.	Meas. Dose ÷ Irrad Dose	% deviation
11.60	10.93 ± 0.23	0.942	-5.78
29.00	27.60 ± 0.10	0.952	-4.83
46.40	41.47 ± 0.93	0.894	-10.63

Attachments:

1. T.L.D. Exposure Report
2. Q.A. Group data summary

Repeat

1987-8

Date	Irrad Dose mR	Meas Dose mR	Aver ± std Dev.	Aver Dev. fm Irrad.	Meas Dose ÷ Irrad Dose.	% Dev
1/6/88 Reader 242 Calibrated 1/4/88	11.60	12.20 11.30 11.50	11.67 ± 0.47	+0.07	1.01	60
	29.00	28.20 29.20 28.90	28.77 ± 0.51	-0.23	0.992	-0.8
	46.40	46.90 47.00 46.50	46.80 ± 0.26	0.40	1.01	0.8

θ_m = expected laboratory precision, one single determination, a single determinant = 20%.

$$\bar{\theta}_m = \frac{11.60 \times 0.2}{\sqrt{3}} = 1.34$$

$$\frac{29.00 \times 0.2}{\sqrt{3}} = 3.35$$

$$\frac{46.40 \times 0.2}{\sqrt{3}} = 5.36$$

$$ND = \frac{\text{measured} - \text{known}}{\theta_m}$$

$$\frac{11.67 - 11.60}{1.34} = 0.052 \quad *$$

$$\frac{28.77 - 29.00}{3.35} = -0.069 \quad o$$

$$\frac{46.80 - 46.40}{5.36} = 0.075 \quad \Delta$$

Appendix 2.2

Milk Farm Census - 1987

TABLE VIII
DONALD C. COOK NUCLEAR PLANT

MILK ANIMAL SURVEY TABLE

SECTOR	SURVEY YEAR	DISTANCE (MILES)	NAME	ADDRESS
B	a 1987	NA	NA	NA
	b 1986	NA	NA	NA
C	a 1987	NA	NA	NA
	b 1986	NA	NA	NA
D	a 1987	4.75	GERALD TOTZKE	6744 TOTZKE RD. BARODA
	b 1986	4.75	GERALD TOTZKE	6744 TOTZKE RD. BARODA
E	a 1987	10.5	ANDREWS UNIVERSITY	BERRIEN SPRINGS, MI.
	b 1986	10.5	ANDREWS UNIVERSITY	BERRIEN SPRINGS, MI.
F	a 1987	6.8	LEE NELSON	RFD 1 BOX 391A SNOW BARODA, MI.
	b 1986	6.8	LEE NELSON	RFD 1 BOX 391A SNOW BARODA MI.
G	a 1987	4.25	G.G. SNUSER & SONS	RFD 1 SNOW RD BARODA, MI.
	b 1986	4.25	G.G. SNUSER & SONS	RFD 1 SNOW RD BARODA MI.
H	a 1987	5.2	NORMAN ZELMER	11701 S. GAST RD BRIDGMAN MI.
	b 1986	5.2	NORMAN ZELMER	11701 S. GAST RD BRIDGMAN MI.
J	a 1987	7.8	WILLIE WARMBIEN	BOX 194 AVERY RD THREE OAKS, MI.
	b 1986	7.8	WILLIE WARMBIEN	BOX 194 AVERY RD THREE OAKS MI.
K	a 1987	12.0	KENNETH TAPPAN	RT-2 KRUGER THREE OAKS, MI.
	b 1986	12.0	KENNETH TAPPAN	RT-2 KRUGER THREE OAKS, MI.

All other sectors are over water.

[a]Reporting Year 1987

[b]Year Prior to Reporting Year 1986

Appendix 2.3

Residential Land Use Census - 1987

TABLE VII
DONALD C. COOK NUCLEAR PLANT
1987
RESIDENTIAL LAND USE SURVEY TABLE

SECTOR	SURVEY YEAR	HOUSE#[1]	DISTANCE IN FEET	LOT#
B	a	2	2700	6-4.1
	b	2	2700	6-4.1
C	a	3	3300	6-6800-28
	b	3	3300	6-6800-28
D	a	4	6150	5-36
	b	4	6150	5-36
E	a	5	6150	5-25.5
	b	5	6150	5-25.5
F	a	6	6000	8-10.3
	b	6	6000	8-10.3
G	a	7	4650	7-4
	b	7	4650	7-4
H	a	8	4950	7-8600-7+8
	b	8	4950	7-8600-7+8
J	a	9	3450	7-10.3
	b	9	3450	7-10.3
K	a	10	3300	7-10.3
	b	10	3300	7-10.3

All other sectors are over water.

[1]House# indicated is not address but reference number used on map when obtaining the raw field data.

[a]Reporting Year - This reporting year is 1987.

[b]Year Prior to Reporting Year - Prior reporting year is 1986.

Appendix 2.4

Condition Reports - REMP

CONDITION REPORT No. 12-6-87-940

COOK [illegible] entered 6-20-87 CW

Page 1 of 4

ATTACHMENT NO. 1

87-529

PART 1 - CONDITION IDENTIFICATION AND DESCRIPTION

Description of Condition/Finding: During the 14-day time interval between 6/4/87 and 6/18/87 only 12 daily grab samples were taken at the Lake Township Intake Facility; as per T.S. Table 3.12-1 Item 3.c, sampling is required daily; therefore two sampling days were missed

Continuation Sheet: ☐

Method of Discovery: Missed samples were discovered by HNS Tech. Vern Wertz / Chemical Section when he went to pick up the routine 14-day composite sample bottles.

Reported by: Kuthglund

Immediate Action Taken: Mr. Tom Schultz, Supervisor of Lake Township Water Plant, was contacted. The situation was described to him. His assistance in determining the actual days of the missed samples was requested. The importance of such sampling for Tech. Spec. compliance was also briefly discussed. Dana Fitzwild-Stuart was informed of event

Continuation Sheet: ☐ Action Taken by: Kuthglund

PART 2 - OFF-SITE NOTIFICATION

- ☐ AEPSC/Person Contacted: ____ By: ____ Date: ____ Time: ____
- ☐ I&M/Person Contacted: ____ By: ____ Date: ____ Time: ____
- ☐ NRC/ENS Person Contacted: ____ By: ____ Date: ____ Time: ____
- ☐ NRC Resident Inspector Contacted By: ____ Date: ____ Time: ____
- ☐ Michigan/Person Contacted: ____ By: ____ Date: ____ Time: ____
- ☐ Not Applicable/Determined by: ____ Date: ____ Time: ____
- ☒ Initial STA Investigation By: [signature] Date: 6-18-87

PART 3 - PAG REVIEW

☐ Return to Originator: ____ Date: __/__/__ (PAG Number)

Classification and Investigation

☐ Condition Report

☐ Problem: Problem Report Number: 87-529

☒ Significant Problem (PNSRC Review Required); To Be Determined ☐

Investigation Assigned To: T.A. KRIESEL Dept. TPS

Investigation Due By: 8/1/87

☐ AEPSC Assistance Required: From ____, Due By: __/__/__

☐ To Be Entered on Records System (Due to Generic Interest)

☐ Part 21: Transfer to Columbus PAG, Date: __/__/__

Date Transferred to AEPSC QA: __/__/__

Part 21 Determination Due By: __/__/__

ANNUAL REPORT

Division Responsibility

☐ LER Required, Assigned To: ____ Dept. ____

Due To: LERC By: __/__/__, NRC By: __/__/__

☐ Other Reports Required, Assigned To: T.A. Kriesel Dept. TPS

Type of Report: ANNUAL REPORT

Due To: PNSRC By: __/__/__ NRC, or Other Outside Agency By: __/__/__

PAG Review By: [signature] Date: 6/19/87

TRENDING/TRACKING DATA

Condition Report Date: 6/17/87

Date of Condition: 6/18/87

Time of Condition: ~1030

Unit Affected: ☐ 1 ☐ 2 ☒ Both

Unit 1 Mode: 1

Power Level: 97 %

Reactor Trip: ☐ Yes ☒ No ESF Actuation: ☐ Yes ☒ No

Action Statement Entered: ☐ Yes ☐ No

Unit 2 Mode: 1

Power Level: 80 %

Reactor Trip: ☐ Yes ☒ No ESF Actuation: ☐ Yes ☒ No

Action Statement Entered: ☐ Yes ☒ No

Component ID Number: NA - ____

QA/QC/NSORC Report Number: NA

Finding No. NA

NRC Inspection Report/Finding No.

315/ __ __ NA - __ __ __

316/ __ __ NA - __ __ __

AEP:NRC: Letter No. ____

REFERENCE DOCUMENTS

Tech. Spec. Reference: 4.12.1

Tech. Spec. Table Reference: Table 3.12-1 Item 3.c.

Tech Spec. Equipment Inoperable ☐ Yes ☒ No

Tech Spec. Instrument Inoperable ☐ Yes ☒ No

Drawing Number: ____ Rev. ____

NA Rev. ____

____ Rev. ____

Procedure Number: ____ Rev. ____

12THP6020CAB.07 Rev. 0

Specification Number:

DCC __ __ __ __ QC __ Rev. ____

DCC NA __ __ __ QC __ Rev. ____

Reference PM Number

__ __ PM __ __ __ __ Rev. ____

Code/Standard Reference: ____

NA

Reference PO Number: NA

Reference RFC Number: NA

Reference JO Number: NA

cc: NRC Resident Inspector, Plant Manager, QA Supervisor, PNSRC Secretary, STA Section, Assigned Dept. (Original), Originator, [illegible]

CR NO. 12-87-740

PROBLEM REPORT No. 87-529

ATTACHMENT NO. 1

COOK
8131.117-86MAP50

INVESTIGATION

Investigation: Following the discovery of the failure to complete the daily intake sampling by Lake Township personnel, Cook Plant personnel were assigned to verify (in person) that the daily sample was taken; this daily verification continued until 7/10/87. On 7/9/87 a meeting was held between Thomas Schultz (Lake Township Water System Superintendent) and Kristine Haglund (Cook Chem. Section) to discuss intake sampling.

Continuation Sheet: ☐

CAUSE DESCRIPTION

Description of Cause: The specific reason for the missed samples could not be determined.

Continuation Sheet: ☐

CORRECTIVE ACTION

CORRECTIVE ACTION: A short term solution to the problem was to verify (in-person) daily sample collection.

Continuation Sheet: ☐

PREVENTIVE ACTION

PREVENTIVE ACTION to Preclude Recurrence: The importance of the Tech. Spec. required intake sampling was explained to Mr. Schultz. He expressed the Township's willingness to continue the daily intake sampling and suggested that sample bottles be labelled to allow recording of sample date & time. Continuation Sheet: ☒

Evaluator: Haglund/kg Date: 12/4/87

Are Corrective/Preventive Actions:

☐ To be implemented before a mode change?

☐ To be implemented by the end of next refueling outage?

DEPARTMENT HEAD/ORIGINATOR APPROVAL

☐ Y	☒ N	1. Investigation is Sufficient to Determine Root Cause
☒ Y	☐ N	2. CORRECTIVE ACTIONS Remedy Symptoms of Problem
☒ Y	☐ N	3. PREVENTIVE ACTIONS Preclude Recurrence of Cause
☐ Y	☒ N	4. Investigation Reveals Outside Agency Notification Required
☐ Y	☒ N	5. SIGNIFICANT PROBLEM (PNSRC Review Required)
☒ Y	☐ N	6. Forms Are Filled Out Completely
☒ Y	☐ N	7. Documentation is Complete
☐ Y	☒ N	8. Investigation Report Returned for Further Action To:

Date Forwarded: _____ Due Date: _____

Comments: _____

Approved By: Department Head _____ Date: 7/9/87

Approved By: QA/NSDRC _____ Date: _____

PNSRC REVIEW

Comments: _____

_____ PNSRC Meeting No. _____ Date: __/__/__

TRENDING/TRACKING DATA

Part 21 Package No. N/A

Plant System Code: ☐☐☐☐ N/A

Safety System Inoperable: ☐ Yes ☒ No — Action Statement(s) Met: N/A ☐ Yes ☐ No

Building Location Code: ☐ N/A

Floor Elevation: ☐☐☐ N/A

Room Code: ☐☐☐ N/A

Department Involved: ☐☐☐ N/A

CAUSE CODES

1.0 Human Factors

__.__ Design, Manufacturing, Construction/Installation

__.__ External Cause

__.__ Defective Procedure

__.__ Management/Quality Assurance Deficiency

__.__ Other

CORRECTIVE ACTION CODES

__.__ Human Factors Correction

__.__ Activity Correction

__.__ External Correction

__.__ Procedure Correction

5.0 Programmatic Correction

__.__ Other

CLOSE OUT DOCUMENTS

	Dept.	Due	Compl.
LER No.	N/A		
J.O. No.	N/A		
Procedure	N/A		
Drawing	N/A		
RFC No.	N/A		
PM No.	N/A		
Spec. No.	N/A		
P.O. No.	N/A		
AEP:NRC No.	N/A		
Other	N/A		

cc: Originating Department Head/Originator, IRC (Original), QA Supervisor, STA Section, NSDRC Subcommittee on Corporate and Plant Occurrences

CONTINUATION SHEET

CR No. 12-6-87-940
PR NO. 87-529
Page 3 of 4

Description of Condition/Finding:

Method of Discovery:

Immediate Action Taken:

Investigation:

Description of Cause:

CORRECTIVE ACTION Taken:

PREVENTIVE ACTION Taken To Preclude Recurrence: Dust samplers initiated. This program began 7/16/87. A letter reflecting this agreement is attached. Resolutions to the problem other than the above were discussed, but were ruled out for various reasons (e.g. the water treatment facility is not staffed 24 hrs/day, and the staffing hours are not always fixed). We believe that this awareness and understanding on the part of the involved personnel provides reasonable assurance that there will not be recurrence of this type of event.

American Electric Power System
INDIANA & MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR PLANT
P.O. Box 458, Bridgeman, MI 49106
Telephone (616) 465-5901

C/R No. 12-6-87-940
P/R NO. 87-529

July 10, 1987

Thomas Schultz
Superintendent
Lake Township Water System
P.O. Box 818
Bridgman, MI 49106

Dear Mr. Schultz:

Thank you for taking time today to discuss the sampling of Lake Township intake water for environmental monitoring purposes. Technical Specifications for the D. C. Cook Plant require daily raw water sampling at this facility. With very few exceptions, such sampling has been faithfully done by Lake Township Water System personnel using sample bottles supplied by the Cook Plant Chemical Section. The assistance of your staff in helping us comply with our environmental monitoring requirements is greatly appreciated.

As per our discussion today, in order to assist with this sampling program, future sample bottles will be labelled to allow recording of sample date, time and sampler's initials.

Thank you for your support of this program. If you or your staff have any questions regarding these samples, please contact me at 465-5901, ext. 1374.

Sincerely,

K M Haglund

Kristine M. Haglund
Chemical Supervisor

cc: W. G. Smith, Jr.
L. S. Gibson
T. A. Kriesel
J. T. Wojcik
Chemical Section
Chemical Section Files

Corrected 10-26 CW

Updated 11-21 CW

CONDITION REPORT No. 12-10-87-1691

Page 1 of 33

ATTACHMENT NO. 1

87-949

PART 1 - CONDITION IDENTIFICATION AND DESCRIPTION

Description of Condition/Finding: The Radiological Environmental Monitoring Program for milk does not literally comply with Technical Specification 3.12.1. Specifically, Table 3.12-1 requires that milk samples be collected from Stevensville and South Bend. We do not collect samples from those locations, nor can we find any records this was ever done. The sampling program does meet the intent of the applicable Reg. Guides, NUREGs, ODCM, etc. in that the available farms in the sectors which have the potential for the highest dose are sampled, yet this does not comply with Tech Specs. Continuation Sheet: ☒

Method of Discovery: Discovered during review of Tech Specs for a procedural change.

Reported by: D. Fitzgerald-Stuart

Immediate Action Taken: Discussed item with AEPSC Rad Support, and Nuclear Safety and Licensing.

Continuation Sheet: ☒ Action Taken by: D. Fitzgerald-Stuart

PART 2 - OFF-SITE NOTIFICATION

☒ AEPSC/Person Contacted: Brian Lenzau, Mike Evarts, Robert Jones By: D. Fitzgerald-Stuart
Date: 10/23/87 Time: 10:30

☐ I&M/Person Contacted: By:
Date: Time:

☐ NRC/ENS Person Contacted: By:
Date: Time:

☐ NRC Resident Inspector Contacted By:
Date: Time:

☐ Michigan/Person Contacted: By:
Date: Time:

☐ Not Applicable/Determined by:
Date: Time:

☒ Initial STA Investigation By: [illegible] Date: 10-27-87

PART 3 - PAG REVIEW

☐ Return to Originator: (PAG Number) Date: / /

Classification and Investigation

☐ Condition Report

☒ Problem: Problem Report Number: 87-949

☒ Significant Problem (PNSRC Review Required); To Be Determined ☐

Investigation Assigned To: Kriesel Dept. TPS

Investigation Due By: 12/9/87

☐ AEPSC Assistance Required: From: , Due By: / /

☐ To Be Entered on Network System (Due to Generic Interest)

☐ Part 21: Transfer to Columbus PAG, Date: / /
Date Transferred to AEPSC QA: / /
Part 21 Determination Due By: / /

Offsite Reportability

☐ LER Required, Assigned To: Dept.
Due To: LERC By: / / , NRC By: / /

☒ Other Reports Required, Assigned To: Kriesel Dept. TPS

Type of Report: Special Per T.S. 3.12-1

Due To: PNSRC By: 11/19/87
NRC, or Other Outside Agency By: 11/23/87

PAG Review By: [illegible] Date: 10/26/87

TRENDING/TRACKING DATA

Condition Report Date: 10/23/87

Date of Condition: 10/23/87

Time of Condition: 10:30

Unit Affected
☐ 1 ☐ 2 ☒ Both

Unit 1 Mode: 1
Power Level: 96 %
Reactor Trip: ☐ Yes ☒ No ESF Actuation: ☐ Yes ☒ No
Action Statement Entered: ☒ Yes ☐ No

Unit 2 Mode: 1
Power Level: 86 %
Reactor Trip: ☐ Yes ☒ No ESF Actuation: ☐ Yes ☒ No
Action Statement Entered: ☒ Yes ☐ No

Component ID Number: N/A

QA/QC/NSDRC Report Number: N/A

Finding No. N/A

NRC Inspection Report/Finding No.
315/ N/A
316/ N/A

AEP:NRC: Letter No. 3-M-88-NRC-MMG-1046

REFERENCE DOCUMENTS

Tech. Spec. Reference: 3.12.1, Table 3.12-1 DRS 1/13/88

Tech. Spec. Table Reference: 3.12-1

Tech Spec. Equipment Inoperable ☐ Yes ☒ No

Tech Spec. Instrument Inoperable ☐ Yes ☒ No

Drawing Number: N/A Rev.
Rev.
Rev.

Procedure Number: 12 THP 6020 RAD 004 Rev. 5

Specification Number:
DCC N/A QC Rev.
DCC N/A QC Rev.

Reference PM Number
PM N/A Rev.

Code/Standard Reference: N/A

Reference PO Number: N/A

Reference RFC Number: N/A

Reference JO Number: N/A

cc: NRC Resident Inspector, Plant Manager, QA Supervisor, PNSRC Secretary, STA Section, Assigned Dept. (Original), Originator, IRC(File Copy)

CONTINUATION SHEET

ATTACHMENT NO. 1

CR No. 12-10-87-1691

PR NO. 87-949

Page 2 of 33

Description of Condition/Finding: because of the requirement to sample from specific tubes.

Method of Discovery:

Immediate Action Taken:

Investigation:

Description of Cause:

CORRECTIVE ACTION Taken:

PREVENTIVE ACTION Taken To Preclude Recurrence:

C/R No. 12-10-87-1691
P/R No. 87-949
Page 3 of 33

DATE: 10-23-87

Subj: C/R on missed surveillance of Milk samples T/S 3.12-1 initial investigation

From: P. T. Daly, STA section

The action statement requires that this condition be reported to the NRC via the Annual Radiological Report. It is the intent of the action statement that corrective action be taken as soon as possible (i.e. prior to the end of the next sampling period).

Per section 4.3 of PMI 4030 there are actions required to be taken upon the discovery of a missed T/S surveillance. It should be noted under the "immediate action taken" part of the C/R form that if these actions have been taken.

P T Daly.

Inspection Report 50-315/87-09
Page 4 of 33

PROBLEM REPORT No. 87-9-9 **ATTACHMENT NO.**

COOK
8131 1/7-REVAP30

INVESTIGATION

Investigation: The current Cook Plant milk sampling program does not literally comply with Tech Specs. in that samples are not collected from Stevensville or South Bend or the sectors in which these towns are located. The Cook Plant program does comply with the available NRC guidance for REMPs.

Continuation Sheet: ☐

CAUSE DESCRIPTION

Description of Cause: Poor wording of the Technical Specifications which limited the sampling locations to specific cities is the cause of the problem.

Continuation Sheet: ☐

CORRECTIVE ACTION

CORRECTIVE ACTION: A request for a change to the Technical Specifications will be submitted by ~~December~~ 31, 1988 per R. Lauzau of NS&I. The NRC was issued a special (30-day) report.

Continuation Sheet: ☐

PREVENTIVE ACTION

PREVENTIVE ACTION to Preclude Recurrence: An increased awareness by plant personnel of the need to comply with the literal interpretation of Tech Specs led to the discovery of this noncompliance, and will serve to identify future problems. There is no need for further preventive action.

Continuation Sheet: ☐

Evaluator: D. Powell-Smart Date: 11/13/87

Are Corrective/Preventive Actions:
- ☐ To be implemented before a mode change?
- ☐ To be implemented by the end of next refueling outage?

DEPARTMENT HEAD/ORIGINATOR APPROVAL

☒ Y ☐ N	1.	Investigation is Sufficient to Determine Root Cause
☒ Y ☐ N	2.	CORRECTIVE ACTIONS Remedy Symptoms of Problem
☒ Y ☐ N	3.	PREVENTIVE ACTIONS Preclude Recurrence of Cause
☒ Y ☐ N	4.	Investigation Reveals Outside Agency Notification Required
☒ Y ☐ N	5.	SIGNIFICANT PROBLEM (PNSRC Review Required)
☒ Y ☐ N	6.	Forms Are Filled Out Completely
☒ Y ☐ N	7.	Documentation is Complete
☐ Y ☒ N	8.	Investigation Report Returned for Further Action To:

Date Forwarded: _____ Due Date: _____

Comments: _____

Approved By: Department Head _____ Date: 11/16/87

Approved By: QA/NSDRC _____ Date: _____

PNSRC REVIEW

Comments: _____

_____ PNSRC Meeting No. 2115 Date: 11/19/87

TRENDING/TRACKING DATA

Part 21 Package No. N/A

Plant System Code: N/A

Safety System Inoperable: ☐ Yes ☒ No

Action Statement(s) Met: ☒ Yes ☐ No

Building Location Code: ☐ N/A

Floor Elevation: MT

Room Code: NA

Department Involved: TRCS NP

CAUSE CODES

- ___ . ___ Human Factors
- ___ . ___ Design, Manufacturing, Construction/Installation
- ___ . ___ External Cause
- ___ . ___ Defective Procedure
- 5 . 3 Management/Quality Assurance Deficiency
- ___ . ___ Other

CORRECTIVE ACTION CODES

- ___ . ___ Human Factors Correction
- ___ . ___ Activity Correction
- ___ . ___ External Correction
- ___ . ___ Procedure Correction
- 5 . 1 Programmatic Correction
- ___ . ___ Other

CLOSE OUT DOCUMENTS

	Dept.	Due	Compl.
LER No.	N/A		
J.O. No.	N/A		
Procedure	N/A		
Drawing	N/A		
RFC No.	N/A		
PM No.	N/A		
Spec. No.			
P.O. No.	N/A		
AEP:NRC No.	N/A		
Other: Request for TS change	TRCS / NSEL	11-30-87 / 1-31-88	2-1-88

cc: Originating Department Head/Originator, IRC (Original), QA Supervisor, STA Section, NSDRC Subcommittee on Corporate and Plant Occurrences

C/R No. 12-10-87-1691
P/R No. 87-949

INDIANA MICHIGAN POWER

Date November 3, 1987

Subject D. C. Cook Nuclear Plant, Problem Report No. 87-949
Noncompliance with T.S. 3/4.12, Table 3.12-1
Requirements for Milk Sampling

From H. W. Jones

To P. A. Barrett

Problem Report No. 87-949 has arisen as a result of non-compliance with the literal interpretation of the requirements of the above Technical Specification. Specifically the above Technical Specification mandates that milk samples shall be obtained from specific locales which are listed in the above table. This table indicates that milk samples shall be obtained from the South Bend area; however, it appears that at no time since this Technical Specification became effective (February 7, 1987) have we ever obtained a milk sample from a milk farm in the South Bend area. Based upon our review of this matter, it appears that this problem is due to specifying the wrong location for this sample. This conclusion is based upon a review of the Livinghouse farm in Rolling Prairrie (i.e., LaPorte), Indiana as being one of the listed background farms in the 1972 and 1987 updated FSAR Section 2.7. Although the actual farm owners names differ slightly, we believe that the farms indicated are one and the same. The difference in names could be due to a typographic error or may be due to the passing down of the farm from one generation to the next. In either case, we believe that the location of this background farm was incorrectly indicated in this Technical Specification.

In order to preclude further occurrences of this problem, we requeste that Table 3.12-1 for milk farm locations be changed to read:

"Indicator Farms - The nearest commercial dairy in each of the land sectors (B-K) within 10 miles of the plant site who is willing to participate in the REMP".

"Background Farms - Two commercial dairies in any of the land sectors at a distance of $\geq$ 10 miles, but less than 50 miles, who are willing to participate in the REMP"

These changes we believe will adequately preclude a recurrence of this or a similar type problem in the REMP and will meet the original intent of the milk farm sampling program.

Should you have any questions or comments concerning this request, please contact the writer at extension 2024.

H. W. Jones

/jl

cc: J. L. Leichner
S. J. Brewer
T. A. Kriesel/D. Fitzgerald-Stuart
PR #87-949 File

FORWARD TO LICENSING COORDINATOR/NS&I

C/R No. 12-10-87-1691
P/R No. 87-949

TECHNICAL SPECIFICATION UPGRADE SHEET

Upgrade Sheet Number: * _____ Priority: * _____

A) Hobert W. Jones / Nov. 3, 1987 B) C) _____
Identified By / Date / Responsible Supervisor (Not Mandatory)

D) Tech Spec Reference: T/S. 3.12 Table 3.12-1

E) Tech Spec Page: _____

Upgrade Title: * _____

F) Upgrade Narrative Description (Tech Spec, FSAR, SER, Design, Other):
Revise T/S Table 3.12-1 milk sample locations to read as follows:
"Indicator Farms - The nearest commercial dairy in each of the land Sectors (B-K) within 10 miles of the plant site who are willing to participate in the REMP."
"Background Farms - Two commercial dairies in any of the land Sectors at a distance ≥10 miles and <50 miles who are will to participate in the REMP."

G) Safety, Operating, or Compliance Significance:
Currently T/S 3.12 Table 3.12-1 lists several locations where milk samples are to be taken. One of the current locations, South Bend, appears to be misidentified as a sample location, thus we are not in compliance with the literal interpretation of this tech spec.

H) Anticipated Resolution:
Revise current tech spec from the current listing of sample locations to a more generic description of the sample location.

Submittal date to NRC: * _____

Basis for submittal date: *

NRC Commitment Problem Report # _____ RFC # _____ OTHER _____

AEP:NRC: * _____ Closed by: _____
Signature

* To be completed by NS&L

TABLE 3.12-1 (Cont)

d. Sediment from Shoreline	L2, L3	2/year	Gamma Isotopic Analyses Semi-Annually.
4. Ingestion			
a. Milk	Stevensville Bridgman Galien Dowagiac South Bend	At least once per 15 days when animals are on Pasture. At Least Once Per 31 Days at Other Times.	Gamma Isotopic and I-131 Analysis of Each Sample.
b. Fish	Plant Site Off-Site	2/year	Gamma Isotopic Analysis on Edible Portion.
c. Food Products	Plant Site Off-Site (approx. 20 mi)	At time of Harvest One Sample of Each of the Following Classes of Food Products 1. Grapes	Gamma Isotopic Analysis on Edible Portion
	Plant Site	At time of Harvest One sample of Broad Leaf Vegetation	Gamma Isotopic Analysis

[a] Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic analysis should be performed on the individual samples.

Note: Current reading of this Technical Specification

C/R No. 12-10-87-1691
P/R No. 87-949
Page 9 of 33

TABLE 3.12-1 (Cont)

d. Sediment from Shoreline		L2, L3	2/year	Gamma Isotopic Analyses Semi-Annually.
4. Ingestion a. Milk	"Indicator Farm - Nearest commercial dairy in each of the land sectors within 10 miles of the Plant site who are willing to participate in the REMP."			
	"Background Farm - Two commercial dairies in any of the land sectors at a distance ≥10 miles but less than 50 miles who are willing to participate in the REMP."		At least once per 15 days when animals are on Pasture. At Least Once Per 31 Days at Other Times.	Gamma Isotopic and I-131 Analysis of Each Sample.
b. Fish		Plant Site Off-Site	2/year	Gamma Isotopic Analysis on Edible Portion.
c. Food Products		Plant Site Off-Site (approx. 20 mi)	At time of Harvest One Sample of Each of the Following Classes of Food Products 1. Grapes	Gamma Isotopic Analysis on Edible Portion
		Plant Site	At time of Harvest One sample of Broad Leaf Vegetation	Gamma Isotopic Analysis

*Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic analysis should be performed on the individual samples.

Note - Proposed version of this Technical Specification

Indiana Michigan
Power Company
Cook Nuclear Plant
P.O. Box 458
Bridgman, MI 49106
616 465 5901

C/R 12-10-87-1641.
P/R 87-949
Page 1 of 33

INDIANA MICHIGAN POWER

November 12, 1987

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Attn: Mr. A. B. Davis

Dear Mr. Davis

This report is submitted in accordance with Technical Specification 3.12.1, Action C, for both Units 1 and 2 of the Cook Nuclear Plant.

During a review of Technical Specifications and procedures relating to the Radiological Environmental Monitoring Program, it was noted that the current milk sampling program does not literally comply with the applicable Technical Specifications. Specifically, Item 4a of Table 3.12-1 indicates that milk samples will be collected for radiological analysis from Stevensville, Bridgman, Galien, Dowagiac, and South Bend. A list of the actual sample locations, and accompanying maps are included in Attachments 1-4. No samples are collected from Stevensville or South Bend, or the sectors in which these cities are located.

The intention of Regulatory Guide 4.8 and the associated NRC Branch Technical Position is to sample, by sector, those farms with the greatest dose potential, plus a control station. This has been the practice at the Cook Plant, and the intention of the NRC guidelines has been met.

The literal Technical Specification noncompliance was caused by poor wording of the milk farm sample locations in the Technical Specification, in that specific towns were listed. Again, it is not the intention of the program to limit sampling to these towns, but to sample the farms with the greatest dose potential, plus control stations.

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In order to remedy this situation, a Technical Specification change to clarify sampling locations will be submitted by January 31, 1988.

Sincerely,

J Burchfield for WGS

W. G. Smith, Jr.

cc: J. E. Dolan
M. P. Alexich
R. F. Kroeger
H. B. Brugger
J. W. Jurgensen
NRC Resident Inspector
R. C. Callen
G. Charnoff, Esq.
D. Hahn
Records Center INPO
PNSRC
A. A. Blind
D. Sherman, ANI Library
A. B. Davis, Region III
D. L. Wiggington, NRC
J. G. Feinstein/B. P. Lauzau
File

Attachment 1

Document Control Desk
November 12, 1987

CURRENT SAMPLE LOCATIONS
COOK PLANT RETS

FARM #1 (See Attachment 2)
G. G. SHULER & SONS
RT. 1, SNOW ROAD, BARODA
SECTOR H & G
PH.#465-6811

FARM #2 (See Attachment 2)
GERALD TOTZKE
RT. 1, TOTZKE, BARODA
SECTOR D
PH.#429-3903

FARM #3 (See Attachment 2)
DEAN LOZMACK
R#1 CLEVELAND ROAD, GALIEN
SECTOR H
PH.#545-3625

FARM #4 (See Attachment 2)
NORMAN ZELMER
11701 S. GAST RD., BRIDGMAN
SECTOR H
PH.#426-3777

FARM #5 (See Attachment 2)
WILLIE WARMBIEN
BOX 184 MILL ROAD, THREE OAKS
SECTOR J
PH.#426-3659

BACKGROUND FARMS

FARM #6 (See Attachment 4)
RAY LIVINGHOUSE
2658 E US 20
LA PORTE, IN
PH. #(219) 778-2446

FARM #7 (See Attachment 3)
VIC WYANT
59603 M-51 SOUTH
DOWAGIAC, MI 49047
PH. #782-2689

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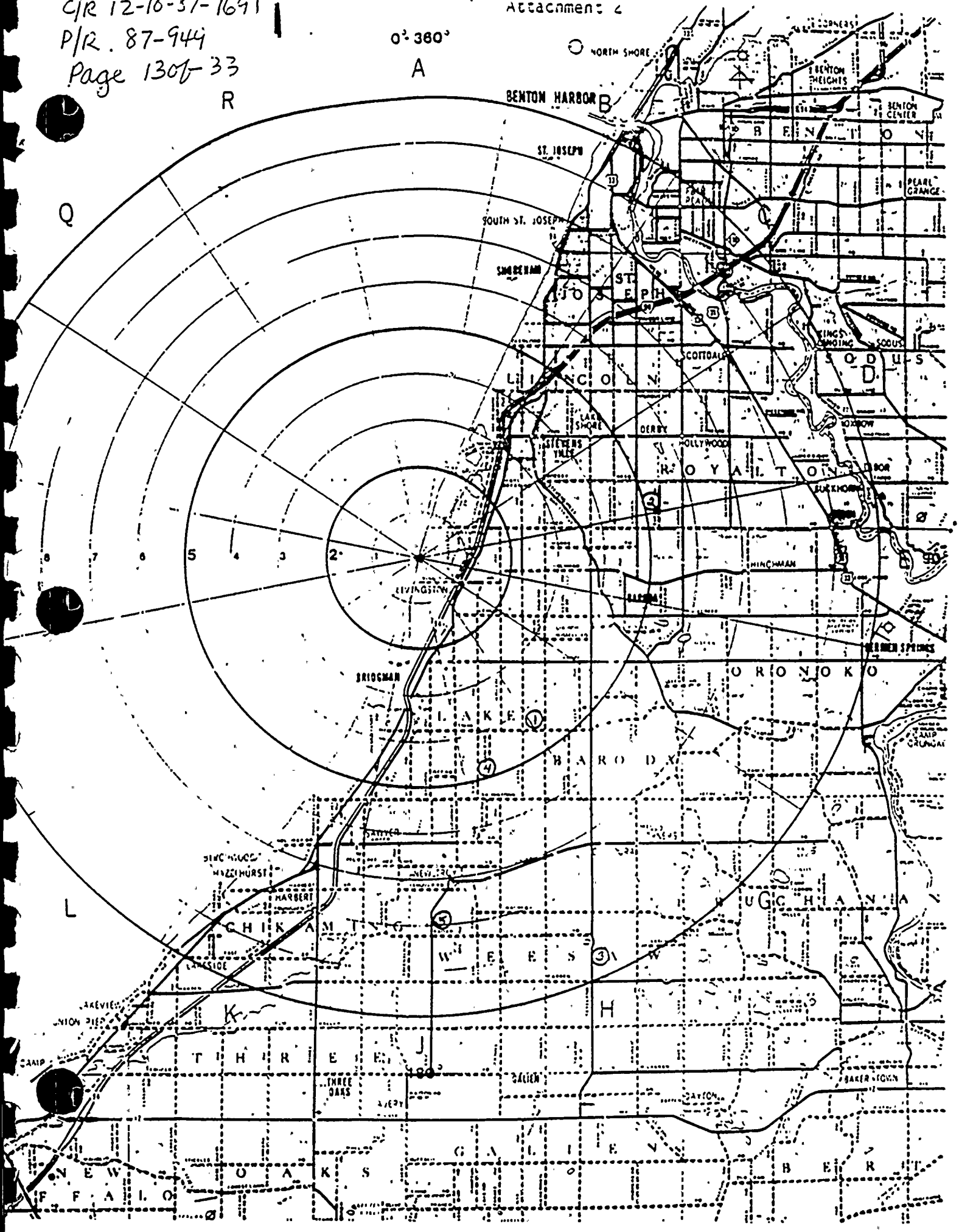
P/R. 87-944
Page 130f-33

Attachment 2



Attachment 3
C/R 12-10-87-1691
-P/R 87-949
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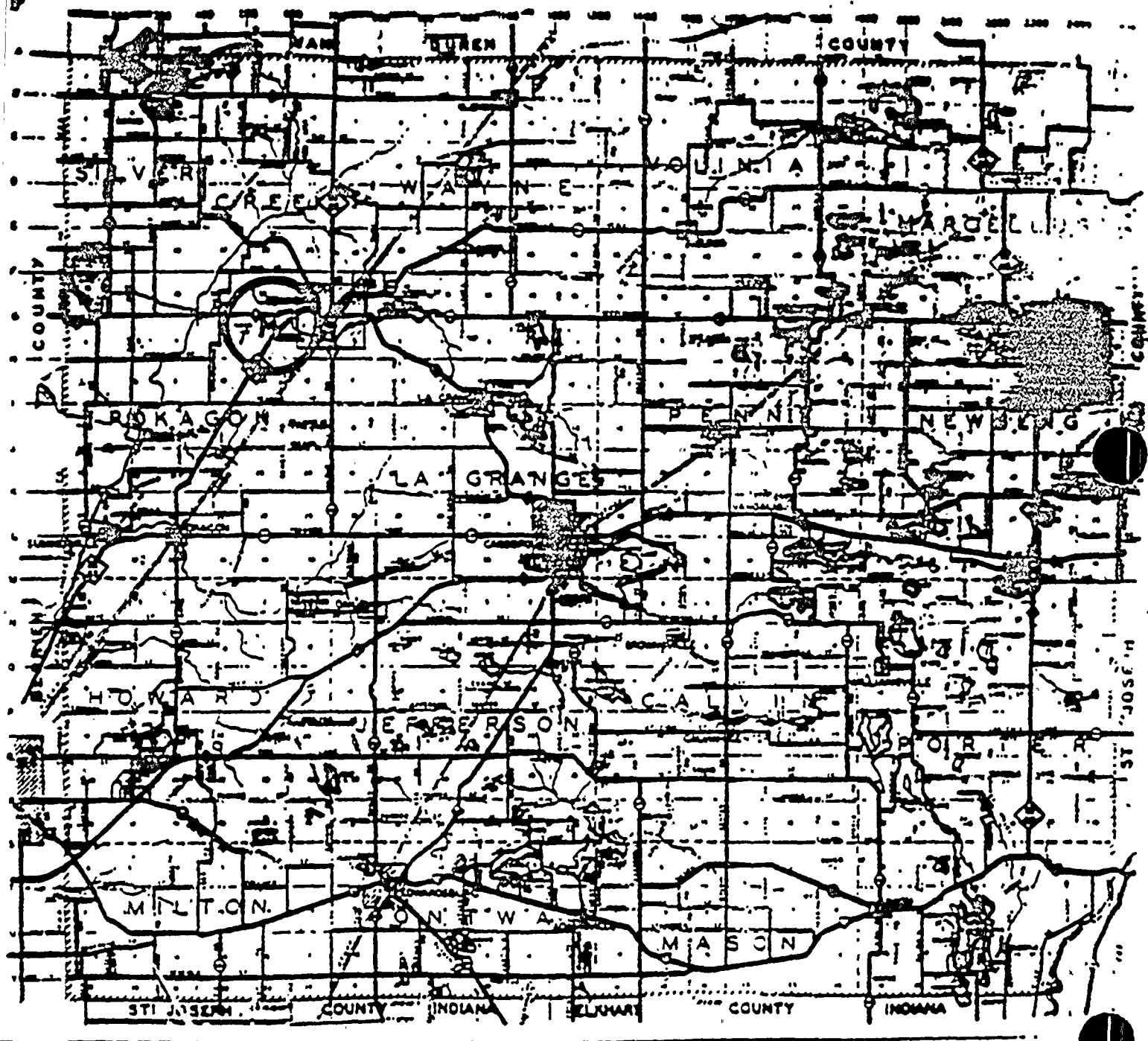
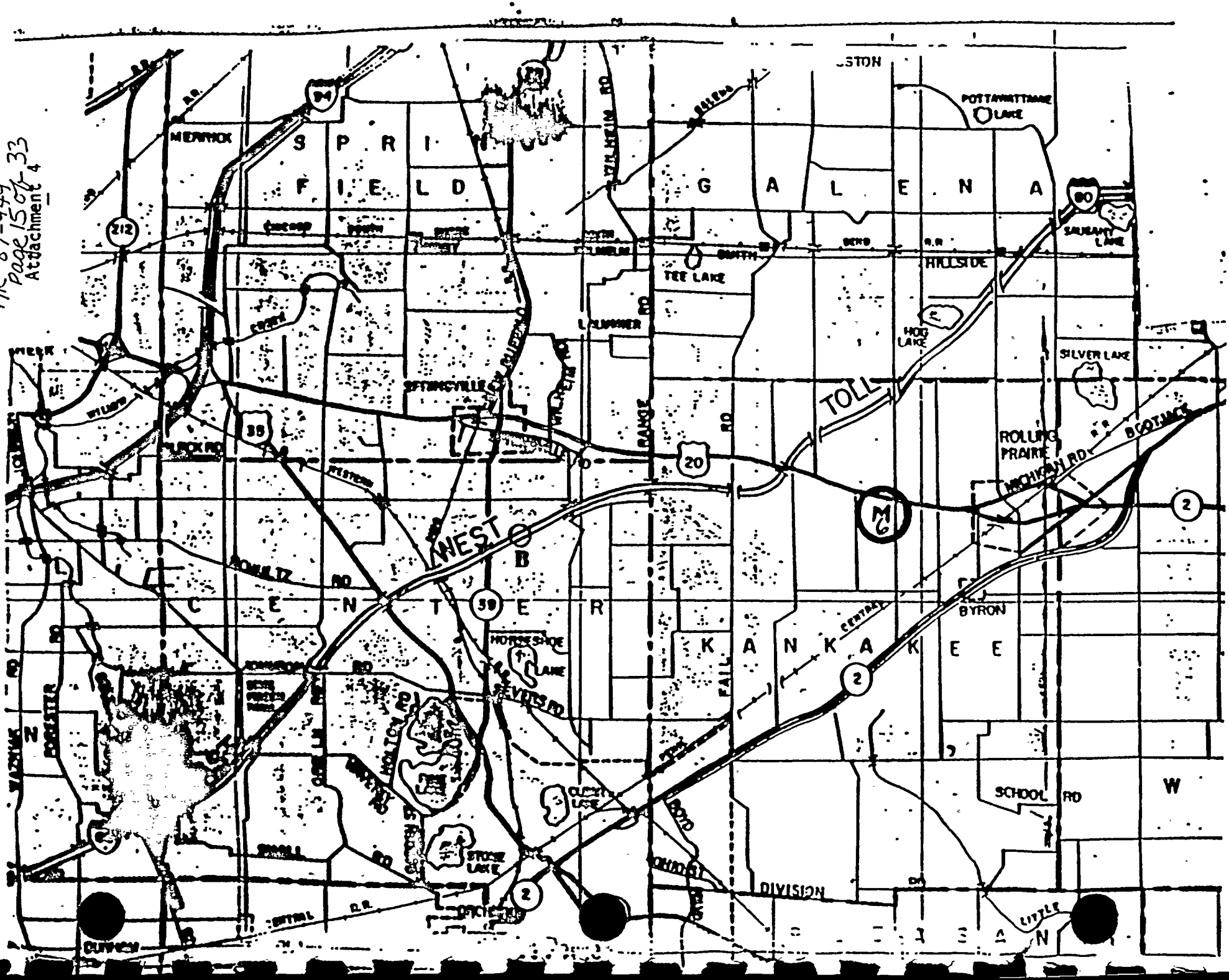


C/R 12-16-87-1491
R/R 87-949
Page 1504-33
Attachment 4



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PMSO.052
Attachment No. 3

FORM QE-66
REV 3-682

NRC SUBMITTAL ROUTING

ON ITEM IDENT. NO.	SUBJECT: Special Report - Milk Sampling for Radiological Environmental Monitoring Program T.S. 3.12.1	NRC SUBMITTAL DUE DATE
..C.		

A SECTION MANAGER-NS&L DATE REC'D.: ______ DATE ASSIGN: ______ ASSIGNED NOD ENGINEER ______

B SUBMITTAL INPUT PREPARATION ASSIGNMENT BY NOD ENGINEER

NAME	ACTION ITEM	NAME	ACTION ITEM
E.C. Mallen	Prepare Response		

C ______ SECTION/DIV./DEPT. MANAGER ______ DATE REC'D ______ DATE ASSIGN. ASSIGN TO: ______

D SUPERVISORY REVIEW, VERIFICATION & APPROVAL OF SUBMITTAL INPUT

______ SECTION/DIV./DEPT. MANAGER ______ DATE ______ OTHER ______ DATE

REFER TO A.P. NO. 5.0 PARA. 5.5 FOR SUPERVISORY VERIFICATION REQUIREMENTS

E PLANT MANAGER'S REVIEW

______ SIGNATURE ______ DATE ☐ 1 ☐ 2 ☐ 3

2nd ROUTING (If Req'd) ______ SIGNATURE ______ DATE ☐ 1 ☐ 2 ☐ 3

* 1 - ACCEPTABLE
2 - ACCEPTABLE W/COMMENTS
3 - SEE COMMENTS REDRAFT & REROUTE

F ______ ASSIGNED NOD ENGR ______ DATE INPUT REC'D.

G AEPSC NUCLEAR OPERATIONS DIVISION REVIEW 1st ROUTING

1. SECTION MANAGER-NS & L ______ SIGNATURE ______ DATE ☐ 4 ☐ 5 ☐ 6

2nd ROUTING (If Req'd) ______ SIGNATURE ______ DATE ☐ 4 ☐ 5 ☐ 6

A. DOES SUBMITTAL REQUIRE NOTARIZATION/OATH/AFFIRMATION ☐ YES ☐ NO
B. DOES SUBMITTAL REQUIRE SIGNATURE OF OFFICER OF THE LICENSEE ☐ YES ☐ NO
C. DOES SUBMITTAL REQUIRE LEGAL REVIEW ☐ YES ☐ NO
D. DOES SUBMITTAL REQUIRE PNSRC REVIEW ☐ YES ☐ NO
E. DOES SUBMITTAL REQUIRE NSDRC REVIEW ☐ YES ☐ NO
F. DOES SUBMITTAL IMPACT FSAR ☐ YES ☐ NO
G. MUST STATE BE NOTIFIED (License Amendment) ☐ YES ☐ NO

2. ASST. DIVISION MANAGER-NOD ______ SIGNATURE ______ DATE ☐ 4 ☐ 5 ☐ 6 | ______ SIGNATURE ______ DATE ☐ 4 ☐ 5 ☐ 6

** 4 - ACCEPTABLE 5 - ACCEPTABLE W/COMMENTS 6 - SEE COMMENTS REDRAFT & REROUTE FOR NOD REVIEW

3. ASSIGNED NOD ENGINEER

H PNSRC REVIEW	2nd REVIEW (If Req'd)	**I** NSDRC REVIEW	2nd REVIEW (If Req'd)
☐ APPROVED	☐ APPROVED	☐ APPROVED	☐ APPROVED
☐ APPROVED W/COMMENTS	☐ APPROVED W/COMMENTS	☐ APPROVED W/COMMENTS	☐ APPROVED W/COMMENTS
☐ DISAPPROVED	☐ DISAPPROVED	☐ DISAPPROVED	☐ DISAPPROVED
MEETING NO. ______	MEETING NO. ______	MEETING NO. ______	MEETING NO. ______
SIGNATURE	SIGNATURE	SIGNATURE	SIGNATURE
DATE	DATE	DATE	DATE

J ASSIGNED NOD ENGINEER

DATE RECEIVED FROM ASST. DIV. MGR.-NOD ______

DATE SUBMITTAL ROUTED FOR FINAL REVIEW & SIGNATURE ______

C/R 12-10-57-1691
P/R 87-944
Page 170-33

PMSO.052
ATTACHMENT NO. 1

NRC SUBMITTAL

SOURCE DOCUMENT LIST

ACTION ITEM: Special Report - Milk Sampling for Radiological Environmental Monitoring Program T.S. 3.12.1

AEP:NRC NUMBER:

INFORMATION FOR PREPARATION OF THE ATTACHED NRC SUBMITTAL. COPIES OF THESE DOCUMENTS ARE AVAILABLE FOR REVIEW AT THE LOCATION SPECIFIED.

SUBMITTAL STATEMENT		SOURCE DOCUMENT DESCRIPTION - TITLE, NUMBER, REVISION, ETC.	CURRENT SOURCE DOC. LOCATION
PAGE	PARA.		
		12 THP 6010 RAD. 006 Collection of Environmental Milk Samples	D.C. Cook N.P.
		Appendix A Technical Specifications	D.C. Cook N.P.
	3.12.1 Table 3.12-1 LA 2.7 Table 2.7-3	Final Safety Analysis Report	D.C. Cook N.P.
		Reg Guide 4.8	D.C. Cook N.P.

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P/R 87-449
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PMSO.052
ATTACHMENT NO. 2

Page 1 of 1

AEP:NRC NUMBER #_____

PREPARER'S STATEMENT

This submittal input was prepared using the sources of information shown on the attached Source Document List and is to the best of my knowledge, technically accurate, factual and complete.

Prepared By

Tech Mgr. Sr. / Environmental
Department or Section

11/19/87
Date

REVIEWER'S STATEMENT

I have reviewed this document and have verified that it is factual by (check all that apply):

- [X] Review of information sources on the Source Document List.
- [ ] Discussions with the Preparer.
- [X] Review of information sources independent of those identified on the Source Document List.
- [X] Discussions with other parties.
- [ ] Alternate or check calculations.

To the best of my knowledge, this submittal input is technically accurate, responsive to the "Action Item" and complete.

Reviewed By

11 19 87
Date

Indiana Michigan
Power Company
P.O. Box 16631
Columbus, OH 43216

C/R 12-10-87-1691
P/R 87-949
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INDIANA
MICHIGAN
POWER

AEP:NRC:1046

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
CHANGES TO THE RADIOLOGICAL ENVIRONMENTAL
TECHNICAL SPECIFICATIONS

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Attn: T. E. Murley

February 1, 1988

Dear Dr. Murley:

This letter constitutes an application for amendment to the Technical Specifications (T/Ss) for the Donald C. Cook Nuclear Plant Units 1 and 2. Specifically, we are proposing to revise T/S 3/4.12.1 and the Bases for T/S 3/4.11.2. These changes will clarify how we obtain milk samples for radiological analysis and will make the T/S Bases consistent with the Westinghouse Standard T/Ss with regard to the thyroid dose release pathway for a child. A detailed description of the proposed changes and our analyses concerning significant hazards considerations are included in Attachment 1 to this letter. Attachment 2 contains the proposed revised T/S pages.

We believe that the proposed changes will not result in (1) a significant change in the types of effluents or a significant increase in the amount of any effluents that may be released offsite, or (2) a significant increase in individual or cumulative occupational radiation exposure.

These proposed changes have been reviewed by the Plant Nuclear Safety Review Committee (PNSRC) and will be reviewed by the Nuclear Safety and Design Review Committee (NSDRC) at their next regularly scheduled meeting.

In compliance with the requirements of 10 CFR 50.91(b)(1), copies of this letter and its attachments have been transmitted to Mr. R. C. Callen of the Michigan Public Service Commission and Mr. G. Bruchmann of the Michigan Department of Public Health. Pursuant to 10 CFR 170.12(c), we have enclosed an application fee of $150.00 for the proposed amendments.

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P/R 87-949.
Page 200-33

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Sincerely,

M. P. Alexich
Vice President

cm

Attachments

cc: John E. Dolan
~~W. G. Smith, Jr. - Bridgman~~ [redacted]
R. C. Callen
G. Bruchmann
G. Charnoff
NRC Resident Inspector - Bridgman
A. B. Davis - Region III

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Page 21 of 33

bc: P. A. Barrett/C. E. Manges
S. J. Brewer/J. L. Leichner/H. W. Jones
L. Gibson/D. Fitzgerald-Stewart
S. H. Horowitz/T. O. Argenta/R. C. Carruth
J. J. Markowsky/S. H. Steinhart/P. G. Schoepf
R. W. Jurgensen
J. G. Feinstein
R. F. Kroeger
M. L. Horvath - Bridgman
E. A. Morse - Bridgman
J. F. Kurgan
J. B. Shinnock
J. F. Stang, NRC - Washington, D.C.
AEP:NRC:1046
DC-N-6015.1

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Attachment 1 to AEP:NRC:1046

Reasons and 10 CFR 50.92 Significant Hazards Evaluation for Changes to the Technical Specifications for Donald C. Cook Units 1 and 2

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P/R 87-949
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The changes we are proposing to Section 3/4.12.1 and Bases Section 3/4.11.2 of the Technical Specifications (T/Ss) are described below.

1. Milk and Broad Leaf Vegetation Sampling - T/S 3/4.12.1

The changes we are proposing to T/S 3/4.12.1 are intended to address problems encountered with our milk sampling T/S requirements. Currently, Item 4a of Table 3.12-1 requires that milk samples be collected for radiological analysis from Stevensville, Bridgman, Galien, Dowagiac, and South Bend. Samples are currently taken from Bridgman, Galien, Dowagiac, and four other locations; however, no samples are collected in Stevensville or South Bend. A letter from Mr. W. G. Smith, Jr. to Mr. A. B. Davis dated November 12, 1987 notified the NRC of this situation and provided a detailed description of our current milk sampling program. As described in that letter, we believe our existing milk sampling program meets the intent of the NRC guidance provided in Regulatory Guide 4.8 and the associated Branch Technical Position (BTP). We concluded the letter by committing to submit revised T/Ss by January 31, 1988 to clarify our T/Ss with regard to the locations used. This letter is intended to satisfy that commitment.

The changes we are proposing make our T/Ss more consistent with the NRC guidance and our existing sampling program. Specifically, we are proposing to require sampling at each indicator farm and each background farm, with indicator farm and background farm defined as follows:

Indicator Farm Nearest milk producer in each of the land sectors within 8 miles of the plant site who is willing to participate in the radiological environmental monitoring program.

Background Farm. A milk producer in one of the less prevalent wind directions at a distance greater than 15 miles but less than 25 miles who is willing to participate in the radiological environmental monitoring program.

The number of locations sampled may vary due to the number of sectors which contain a producer who is willing to participate. The possibility exists that no willing

participants may be found within 8 miles of the plant site. In order to address this possibility, we are proposing changes to the T/S requirements for broad leaf vegetation sampling. Specifically, if fewer than three willing indicator milk farms are found, broad leaf vegetation samples will be collected monthly when available. The indicator vegetation samples should be from broad leaf vegetation grown nearest to the offsite locations of highest calculated annual average D/Q. The vegetation background sample should be from similar vegetation grown 15-25 miles distant in one of the less prevalent wind directions. This proposed change therefore improves the T/Ss by providing a means of monitoring the radioiodine pathway if no cooperative milk producers are found.

We believe that our proposed T/S requirements meet the intent of the NRC guidance, which is to sample three farms with the highest dose potential and to sample one control station. If three samples cannot be obtained, the guidance suggests vegetation sampling as a replacement. Our proposed T/Ss meet this intent since they require that we sample at least three farms and a control station. If this is not possible, vegetation sampling is required. The fact that we sample the closest farm willing to participate in each sector ensures that we meet the guidance which suggests that sampling be performed at locations with the highest dose potential.

The proposed changes constitute an improvement over our current T/S requirements. We believe that neither our program nor the NRC guidance is intended to limit sampling to specific towns. Our proposed T/Ss provide guidelines that ensure that the best available locations are sampled and allows us to update our monitoring program as necessary to reflect changes that might occur in the areas surrounding the Donald C. Cook Nuclear Plant.

Per 10 CFR 50.92, a proposed amendment will not involve a significant hazards consideration if the proposed amendment does not:

(1) involve a significant increase in the probability or consequences of an accident previously analyzed,

(2) create the possibility of a new or different kind of accident from any accident previously analyzed or evaluated, or

(3) involve a significant reduction in a margin of safety.

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Our evaluation of the proposed change with respect to these criteria is provided below.

Criterion 1

The intent of the Radiological Environmental Monitoring Program is to verify that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. The purpose of the program is therefore to verify that actual radiation levels agree with the expected levels, and as such, changes in the program would not impact the safety analysis for any of the previously evaluated accidents described in our updated FSAR. We therefore conclude that the proposed changes would not significantly increase the probability or consequences of any previously analyzed accident.

Criterion 2

The changes we are proposing will not result in any changes in plant configuration or operation. We therefore believe that these changes will not create the possibility of a new or different accident from any accident previously analyzed or evaluated.

Criterion 3

We believe that the proposed T/S requirements are an improvement over our existing T/Ss in that they allow flexibility to ensure that we are sampling the best available locations. In addition, we believe that our proposed requirements are consistent with the intent of the NRC guidance and will allow us to maintain our ability to meet the requirements of Section IV.B.2 of Appendix I to 10 CFR 50. We therefore believe the proposed changes will not result in a significant reduction in a margin of safety.

Lastly, we note that the Commission has provided guidance concerning the determination of significant hazards by providing certain examples (48 FR 14870) of amendments considered not likely to involve significant hazards consideration. The sixth of these examples refers to changes that either may result in some increase to the probability or consequences of a previously analyzed accident or may reduce in some way a safety margin, but where the results are clearly within all acceptable criteria. We believe the change falls within the scope of this example for the reasons cited above. Thus, we believe this change does not involve a significant hazards consideration as defined in 10 CFR 50.92.

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2. Cow-Milk-Infant Pathway - Bases for T/S 3/4.11.2

The proposed change modifies the Bases for T/S 3/4.11.2.1, "Dose Rate." The change we are proposing will make our T/Ss more consistent with the guidance provided in the Bases Section 3/4.11.2.1 of NUREG-0472, Rev. 3 and NUREG-0452, Rev. 5, which states, "These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via the inhalation pathway to less than or equal to 1500 mrems/year. We are therefore proposing that the calculated thyroid dose rate be based on a child via the inhalation pathway.

We believe that the proposed change will make the requirements more stringent than our existing requirements in that it will provide a more conservative thyroid dose rate.

3. Editorial Changes

We also propose a change to Bases Section 3/4.11.2 by deleting the redundant ± signs.

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Attachment 2 to AEP:NRC:1046

Proposed Revised Technical Specification Pages

TABLE 3.12-1 (Cont)

d. Sediment from Shoreline	L2, L3	2/year	Gamma Isotopic Analyses Semi-Annually.
4. Ingestion a. Milk	Each indicator farm and a background farm*	At least once per 15 days when animals are on Pasture. At Least Once Per 31 Days at Other Times.	Gamma Isotopic and I-131 Analysis of Each Sample.
b. Fish	Plant Site Off-Site	2/year	Gamma Isotopic Analysis on Edible Portion.
c. Food Products	Plant Site Off-Site (approx. 20 mi)	At time of Harvest One Sample of Each of the Following Classes of Food Products: 1. Grapes	Gamma Isotopic Analysis on Edible Portion.

[a] Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic analysis should be performed on the individual samples.

* An indicator farm is defined as the nearest milk producer in each of the land sectors within 8 miles of the plant site who is willing to participate in the radiological environmental monitoring program. A background farm is defined as a milk producer in one of the less prevalent wind directions at a distance greater than 15 miles but less than 25 miles who is willing to participate in the radiological environmental monitoring program. If at least three indicator milk samples and one background milk sample cannot be obtained, vegetation sampling will be performed as a replacement for the milk sampling and no milk samples will be required.

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TABLE 3.12-1 (Cont)

Plant Site	At time of Harvest One sample of Broad Leaf Vegetation	Gamma Isotopic Analysis.
3 indicator samples of broad leaf vegetation grown nearest to the offsite locations of highest calculated annual average ground level D/Q if at least three indicator milk samples and one background milk sample cannot be obtained.	Monthly when available	Gamma Isotopic and I-131 monthly when available
1 background sample of each of the similar vegetation grown 15-25 miles distant and in one of the less prevalent wind directions if at least three indicator milk samples and one background milk sample cannot be obtained.	Monthly when available	Gamma Isotopic and I-131 monthly when available

3/4.11.1.3 LIQUID WASTE TREATMENT. The OPERABILITY of the liquid radwaste treatment system ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirements that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonable achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criteria Section 11.1 of the Final Safety Analysis Report for the Donald C. Cook Nuclear Plant, and design objective Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

3/4.11.1.4 LIQUID HOLDUP TANKS. Restricting the quantity of radioactive material contained in the specified tanks provides assurance that in the event of an uncontrolled release of the tanks' contents, the resulting concentrations would be less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in an UNRESTRICTED AREA.

This specification, being applicable to outside temporary tanks, does not apply to the refueling water storage tank, primary water storage tank, or the condensate storage tank, since they are a part of the permanent plant design.

3/4.11.2 GASEOUS EFFLUENTS

3/4.11.2.1 DOSE RATE. This specification is provided to ensure that the dose rate at any time at the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20 for UNRESTRICTED AREAS. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of an individual in an UNRESTRICTED AREA, to annual average concentrations exceeding the limits specified in Appendix B, Table II of 10 CFR Part 20 (10 CFR Part 20.106(b)). For individuals who may at times be within the SITE BOUNDARY, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to an individual at or beyond the site boundary to less than or equal to 500 mrem/year to the total body or to less than or equal to 3000 mrem/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via inhalation pathway to less than or equal to 1500 mrems/year. Iodine adsorbing media refers to silver zeolite cartridges in Table 4.11-2 or the industry standard.

This specification applies to the release of gaseous effluents from all reactors at the site. The gaseous effluents from the shared system are proportioned among the units sharing that system.

TABLE 3.12-1 (Cont)

d. Sediment from Shoreline	L2, L3	2/year	Gamma Isotopic Analyses Semi-Annually.
4. Ingestion a. Milk	Each indicator farm and a background farm*	At least once per 15 days when animals are on Pasture. At Least Once Per 31 Days at Other Times.	Gamma Isotopic and I-131 Analysis of Each Sample.
b. Fish	Plant Site Off-Site	2/year	Gamma Isotopic Analysis on Edible Portion.
c. Food Products	Plant Site Off-Site (approx. 20 mi)	At time of Harvest One Sample of Each of the Following Classes of Food Products: 1. Grapes	Gamma Isotopic Analysis on Edible Portion.

[a] Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic analysis should be performed on the individual samples.

* An indicator farm is defined as the nearest milk producer in each of the land sectors within 8 miles of the plant site who is willing to participate in the radiological environmental monitoring program. A background farm is defined as a milk producer in one of the less prevalent wind directions at a distance greater than 15 miles but less than 25 miles who is willing to participate in the radiological environmental monitoring program. If at least three indicator milk samples and one background milk sample cannot be obtained, vegetation sampling will be performed as a replacement for the milk sampling and no milk samples will be required.

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P/R 87-949
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TABLE 3.12-1 (Cont)

Plant Site	At time of Harvest One sample of Broad Leaf Vegetation	Gamma Isotopic Analysis.
3 indicator samples of broad leaf vegetation grown nearest to the offsite locations of highest calculated annual average ground level D/Q if at least three indicator milk samples and one background milk sample cannot be obtained.	Monthly when available	Gamma Isotopic and I-131 monthly when available
1 background sample of each of the similar vegetation grown 15-25 miles distant and in one of the less prevalent wind directions if at least three indicator milk samples and one background milk sample cannot be obtained.	Monthly when available	Gamma Isotopic and I-131 monthly when available

3/4.11.1.3 LIQUID WASTE TREATMENT. The OPERABILITY of the liquid radwaste treatment system ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirements that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonable achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criteria Section 11.1 of the Final Safety Analysis Report for the Donald C. Cook Nuclear Plant, and design objective Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

3/4.11.1.4 LIQUID HOLDUP TANKS. Restricting the quantity of radioactive material contained in the specified tanks provides assurance that in the event of an uncontrolled release of the tanks' contents, the resulting concentrations would be less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in an UNRESTRICTED AREA.

This specification, being applicable to outside temporary tanks, does not apply to the refueling water storage tank, primary water storage tank, or the condensate storage tank, since they are a part of the permanent plant design.

3/4.11.2 GASEOUS EFFLUENTS

3/4.11.2.1 DOSE RATE. This specification is provided to ensure that the dose rate at any time at the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20 for UNRESTRICTED AREAS. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of an individual in an UNRESTRICTED AREA, to annual average concentrations exceeding the limits specified in Appendix B, Table II of 10 CFR Part 20 (10 CFR Part 20.106(b)). For individuals who may at times be within the SITE BOUNDARY, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to an individual at or beyond the site boundary to less than or equal to 500 mrem/year to the total body or to less than or equal to 3000 mrem/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via inhalation pathway to less than or equal to 1500 mrems/year. Iodine adsorbing media refers to silver zeolite cartridges in Table 4.11-2 or the industry standard.

This specification applies to the release of gaseous effluents from all reactors at the site. The gaseous effluents from the shared system are proportioned among the units sharing that system.

MASTER PLANT FILE DOCUMENT TRANSMITTAL

DIRECTIONS: SENDER FILLS OUT SECTION 1-8 OF THIS FORM COMPLETELY.
SECTIONS 9 AND 10 WILL BE COMPLETED BY IRC PERSONNEL.

1. NAME	2. DEPARTMENT/SECTION	3. DATE	4. DEPARTMENT #
S. Getz	Tech. Pub.	2-9-88	2100

5. ITEM #	6. DOCUMENT TITLE/DESCRIPTION	7. FILE CODE	8. RECORD DATES
29.0	Condition / Problem Rpt. 23-1	Film	
	12-10-87-1691 87-949 ✓		10/23/87

9. IRC SIGNATURE ONLY	10. DATE
Fran Mitchell	2-10-88

FORM 5220 REV. 1/87

cc: M. Barfelz
-TMS