ALABAMA POWER COMPANY

ANNUAL ENVIRONMENTAL OPERATING REPORT

PART B: RADIOLOGICAL

JOSEPH M. FARLEY NUCLEAR PLANT

UNIT NO. 1

LICENSE NO. NPF-2

AND

UNIT NO. 2

LICENSE NO. NPF-8

PERIOD ENDING DECEMBER 31, 1993

ANNUAL ENVIRONMENTAL OPERATING REPORT
PART B: RADIOLOGICAL

TABLE OF CONTENTS

RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

LIST OF FIGURES

RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

LIST OF TABLES

RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

LIST OF ATTACHMENTS

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL PROGRAM

JOSEPH M. FARLEY NUCLEAR PLANT

UNITS 1 AND 2

I. Introduction

The Joseph M. Farley Nuclear Plant, owned by Alabama Power Company (APCo) and operated by Southern Nuclear Operating Company (SNC), located in Houston County, Alabama is approximately fifteen miles east of Dothan, Alabama on the west bank of the Chattahoochee River. Unit 1, a Westinghouse Electric Corporation Pressurized Water Reactor (PWR) with a rated power output of 860 megawatts electrical (MWe) achieved initial criticality on August 9, 1977. The unit was declared "commercial" on December 1, 1977. Unit No. 2, also a 860 MWe Westinghouse PWR, achieved initial criticality on May 8, 1981 and was declared "commercial" on July 30, 1981.

Unit II was shutdown for its ninth refueling outage from September 24, 1993, through December 2, 1993.

The Farley Nuclear Plant Environmental Monitoring Program is designed to detect the effects, if any, of plant operation on environmental radiation levels. The sample collection and analysis schedule was implemented in 1977, and modified on July 1, 1980, by adding 14 TLD stations. The program was further modified in April 1982, by Amendment No. 26 to the Unit I Technical Specifications. The program was changed a third time in 1989, with the addition of two more control TLDs and has continued through 1993 without further change. Indicator sampling stations are located, where practical, at locations where detection of the radiological effects of the plant's operation is thought to be most likely, where the samples collected should provide a significant indication of potential dose to man, and where an adequate comparison of predicted radiological levels might be made with measured levels. The control stations are placed at locations where radiological levels are not expected to be significantly influenced by plant operation, i.e., at background locations. For some airborne radioactivity samples, community stations are located at the principal population centers between the indicator and the control stations (3-5 miles). Community TLDs were placed at locations approximately 1.2 miles southwest of the plant site (nearest occupied residence) and 8 miles west southwest of the plant site (City of Ashford, Alabama). A community air monitoring station is also located in the city of Ashford. Community stations could be used, if desired, as additional control stations, and alternatively, as indicator stations for the nearest population centers in the event of a major airborne release from the plant.

II. Radiological Sampling and Analysis

To assess the environmental impact of plant operation, the Farley Nuclear Plant Environmental Monitoring Program monitors airborne, waterborne, ingestion and direct radiation pathways in the area surrounding the plant site. Table 1 details the sample types, collection and analysis frequency and locations of indicator, community and control stations. For each sample type and location, one sample was collected and analyzed to meet Technical Specification requirements for Units I and II. While no longer required by Technical Specifications, in situ soil monitoring was continued in 1993.

The samples were collected by Southern Nuclear's technical staff except for in situ soil measurements, fish and river sediment samples. The in situ soil measurements were collected by staff members of the University of Georgia (UGA), Center for Applied Isotope Studies, and the fish and river sediment samples were collected by Alabama Power Company (APCo) Environmental Field Services personnel. All sample analyses were contracted to UGA, except TLD's, which are read at the plant. The minimum detectable concentration (MDC), specified for the various samples and their respective analyses are given in Table 2. The reporting levels for radioactivity concentrations in environmental samples are provided in Table 3. Sampling and analysis deviations during 1993 are listed in Table 4.

To identify the locations of environmental monitoring stations, the area surrounding Farley Nuclear Plant is divided into sixteen radial sectors whose common origin is the point midway between the Unit I and Unit II plant vent stacks. This point is defined as "the plant site". Each sector of the resulting circle is numbered sequentially clockwise and the circle is oriented so that the centerline of sector 16 is due north. Each sampling point is identified by a four digit number. The first two digits indicate the sector number, and the last two digits indicate the distance, to the nearest mile, from the origin. For example, TLD station 0304 is located 4 miles east northeast of the plant site. Fish and sediment sample points are identified by their "river mile" location. The Jim Woodruff Dam near Chattahoochee, Florida is designated as river mile zero, and the miles are numbered sequentially northward along the navigable portion of the river to Columbus, Georgia. River mile 41 is approximately three miles downstream of the plant site, and river mile 47 is approximately three miles upstream.

A. Airborne Particulates and Iodine

The airborne particulate and iodine monitoring stations shown in Figures 1 and 3 are equipped with FN-210B air samplers manufactured by Science Applications International Corporation (SAIC). Each air sampler is a modular unit consisting of a sample pump, regulator valve assembly, a microprocessor based air volume totalizer, an open faced combination filter holder and a thermostatically controlled exhaust fan, all mounted in a ventilated aluminum weather house. In March 1993, electrical surge protectors were installed on all air monitoring stations. A 47 millimeter particulate filter and a 50 millimeter F&J activated charcoal cartridge are installed in separate compartments of the combination filter holder, which is mounted vertically on the pump suction. Sampled air flows vertically from top to bottom, first through the particulate filter, then through the charcoal cartridge. To compensate for dust buildup on the sample filters, the regulator valve assembly, located downstream of the combination filter holder, maintains a constant sample flowrate over a wide range of pressure differentials across the filters.

The design of the filter holder allows uniform distribution of sampled airborne particulates over the entire filter disk. The totalizers are calibrated using the SAIC Model C-812 calibrator.

In September 1993, the Gelman VM-1 Metricel membrane filters, used for sampling airborne particulates since 1977, were replaced by Gelman A/E glass fiber filters. The reasons for the change are discussed in paragraph III A, "Results and Discussion", and are documented in FNP Environmental Incident Report No. EIR-93-007. The radioiodine collection filter used was the F&J model TE3C, 50 millimeter cartridge, which contains triethylenediamine (TEDA) impregnated activated carbon.

Particulate filters and charcoal cartridges were collected weekly and sent to UGA for radioactivity analysis. Gross beta radioactivity measurements were performed on each air particulate filter using a Tennelec low background alpha-beta counting system. The filters from each station, composited at the end of each quarter, were analyzed for gamma emitters using a fifteen percent relative efficiency low background germanium lithium (Ge(Li)) detector and a Canberra 4096 channel computer-based multichannel analyzer (MCA).

All air monitoring station locations shown in Figures 1 and 3 have the capability of monitoring airborne iodine. Weekly routine samples were analyzed for I-131 by UGA using a Canberra 1024 channel MCA and two 1" x 3" NaI detectors and matched photomultiplier tubes.

B. External Radiation

For the continuous measurement of environmental gamma radiation, natural Lithium Fluoride (LiF) (TLD-700) chips, manufactured by Harshaw-Filtrol Chemical Company, were used. TLD packets, each containing four annealed LiF chips, were sealed in opaque mylar to produce a packet that was light-tight, weather-proof, and which had a low mass attenuation for radiation (approximately 50mg/cm^2). On the plant site, all TLD packets were kept in a lead safe with 2-inch walls except for those receiving field exposure or those in the process of being exchanged.

At each external radiation monitoring station (shown in Figures 1-3), two TLD packets, one changed and read quarterly and one changed and read annually, were exposed side-by-side on metal stakes at a height of one meter above the ground. For the computation of the net field doses, a log of all exposure periods was maintained for each TLD packet.

C. Milk

The milk sample location is as indicated on Figure 3. All milk samples, collected bi-weekly, were analyzed by UGA for I-131 and gamma emitters. As a preservative for shipment, 1 ml of 25 weight percent merthiolate (Thimerosal) solution was added to each one gallon sample. The I-131 concentration in each sample was determined by collection on anion exchange resin, elution with sodium hypochlorite, followed by organic extraction and counting, by beta-gamma coincidence, the resultant toluene-iodine solution in a low level liquid scintillation counter. Stable iodine carrier was added to each sample for determination of the radiochemical yield.

One liter of each sample was placed in a marinelli beaker and analyzed for gamma emitters using a 15 percent relative efficiency low background Ge(Li) detector and a Canberra 4096 channel computer-based MCA.

D. Vegetation: Forage

Monthly, forage was collected from indicator grass plots located near the air monitoring stations at the plant site perimeter in the SSE and N sectors, or alternate plots if needed, and from a control grass plot located near the air monitoring station in Dothan, Alabama. After drying and pulverizing, the samples were analyzed by UGA for gamma emitters using a 15 percent relative efficiency low background Ge(Li) detector and a Canberra 4096 channel computer-based MCA.

E. Soil

Annual in situ gamma-ray spectroscopy measurements were made by UGA using a 10 percent relative efficiency high purity germanium detector and gamma-ray spectroscopy system specially designed for field use. Measurements were taken at the seven indicator locations and at the three community and two control (background) locations listed in Table 1. A 1024 channel Canberra MCA interfaced to a Hewlett-Packard 9825A calculator was used for data storage and analysis.

F. Surface (River) Water

Weekly, samples of water from the Chattahoochee River, upstream and downstream of the plant site at the locations shown in Figure 4 were collected on a semi-continuous basis with Instrumentation Specialties Company (ISCO) samplers. For each 28-day surveillance interval, one liter of each week's background and indicator samples were combined to make 4-liter composite samples which were sent to UGA for radioactivity analysis. Two liter aliquots from each 28-day composite were placed in trays lined with plastic film and evaporated to dryness at 100°C. The residue (on plastic film) was folded to fit a petri-dish and analyzed for gamma emitters using a 15 percent relative efficiency Ge(Li) low background detector and a Canberra 4096 channel computer-based MCA.

For each calendar quarter, 75 milliliters (ml) of each week's indicator and background samples were combined to make a 975 milliliter composite sample for tritium analysis. Approximately 50 ml from each quarterly composite sample was distilled and a 25 ml aliquot taken for tritium analysis using a large volume (100 ml) Hewlett-Packard 200 low background liquid scintillation counter.

G. Ground (Well) Water

In the Farley Plant area there are no true indicator sources of groundwater. A well which serves Georgia Pacific Paper Company as a source of potable water, located on the east bank of the Chattahoochee River about four miles south-southeast of the plant, was sampled quarterly as an indicator station. A deep well which supplies water to the Whatley residence located about 1.2 miles southwest of the plant was sampled quarterly as a control (background) station. Samples from both were sent to UGA for radioactivity analysis. An aliquot from each sample was taken for tritium analysis. After distillation, 25 ml samples were analyzed using a large volume (100 ml) low background liquid scintillation counter. From the remainder of each sample, a two liter aliquot was taken and evaporated to dryness at 100°C in a tray lined with plastic film. The residue (on plastic film) was folded to fit a petri dish and analyzed for gamma emitters using a 15 percent relative efficiency Ge(Li) detector and a Canberra 4096 channel computer-based MCA.

H. **Fish (River)**

Semi-annually, two types of fish, game and bottom feeding, were collected from the Chattahoochee River at the locations shown in Figure 4, and sent to UGA for gamma-ray spectroscopy analysis. All fish samples sent to UGA consisted of fish fillets that had been split with Alabama Division of Radiation Control. These fish samples were coarsely chopped at UGA and were analyzed for gamma emitters using a 15 percent relative efficiency low background Ge(Li) detector and 4096 channel Canberra computer-based MCA.

I. **Sediment (River)**

Semi-annually, sediment samples were collected from the Chattahoochee River at the locations shown in Figure 4. Approximately one kilogram of each sample was sent to UGA where it was dried, mixed, and analyzed for gamma emitters using a 15 percent relative efficiency low background Ge(Li) detector and a Canberra 4096 channel computer-based MCA. One set of semi-annual sediment samples was split with Alabama Division of Radiation Control.

III. Results and Discussion

No known atmospheric nuclear tests were conducted during 1993.

Attachment 2 , Plots of Selected Environmental Data, is included as an enhancement to trending. In general, the mean annual concentrations of frequently identified isotopes were chosen to be plotted. In cases where many naturally occurring isotopes were identified, those chosen to be plotted were from differing decay chains. Significant uptrends in the data were as follows:

(1) Atmospheric Tests, Peoples Republic of China:

September 17, 1977
March 14, 1978
December 14, 1978
October 15, 1980

(2) Chernobyl Disaster, USSR, April 1986

A. Airborne Particulates and Iodines

Analysis results of airborne particulate filters and charcoal cartridges are shown in Tables 1993-1 and 1993-2, and Attachment 2, pages 1-4. The 1993 results, while below pre-operational levels, showed expected increases in mean particulate Beta activity and mean particulate Beryllium-7 activity. The 1992 Annual Environmental Operating Report documented step increases in these two parameters following the installation of new air monitoring stations in May 1992. The mean activities for these parameters in 1993 (0.021 pCi/m^3 Beta, 0.061 pCi/m^3 Beryllium-7) were consistent with mean activities observed from June through December 1992 (0.022 pCi/m^3 Beta, 0.057 pCi/m^3 Beryllium-7). The measured activities of these parameters are expected to stabilize at these levels and will be monitored for future trends.

As stated in Paragraph II A, in September 1993, the Gelman VM-1 Metricel membrane filters used for airborne particulate sampling since 1977 were replaced with Gelman A/E glass fiber filters. Following installation of the new air monitors in 1992, the membrane filters were found to clog and rupture occasionally. Ruptured filters were observed more frequently during the summer months, when high ambient temperatures and humidities prevailed. Review of product information and literature documented a "high resistance to airflow" and "brittleness" as undesirable characteristics of membrane filters and indicated that glass fiber filters are generally more desirable for use in sampling airborne particulates. The Gelman A/E glass fiber filter was selected for use in the FNP Radiological Environmental Monitoring Program (REMP) after comparison with other filters on the basis of flowrate, particle size retention, and cost. This filter is also used by the other nuclear generating plants in the Southern Company for sampling airborne particulates. There have been no instances of damaged filters since the change, and analytical results have been more consistent, with less variance between sampling stations than previously observed.

Deviations from the Environmental Monitoring Program resulting from airborne particulate and iodine analysis are given in Table 4.

B. External Radiation

The results of the external radiation measurements are shown in Table 1993-3 and Attachment 2 page 5. Mean external gamma dose measured in 1993 was greater than in 1992 and slightly greater than during the pre-operational period. The doses measured at all stations in the fourth quarter of 1993 were generally greater than those measured in the third quarter by a factor of approximately 1.5. The higher fourth quarter results are not considered to be the result of plant operation since similar readings were obtained for indicator, control and community locations. The highest mean annual dose to a single location, 94.9 mRem, was measured at station RI-0401, located on the plant perimeter 0.8 miles east of the midpoint between the Unit I and Unit II plant vent stacks. Review of data and results for the entire year revealed elevated doses at that location in the second, third and fourth quarters. The observed increases are possibly due to disturbances in natural radiation fields and releases of Radon and other naturally occurring isotopes during river dredging operations conducted near station RI-0401. The mean external gamma doses for all stations are consistent with previously observed annual variations, and no significant differences in indicator, community and control measurements were noted.

Deviations from the Environmental Monitoring Program resulting from external radiation measurements are given in Table 4.

C. Milk

The milk analysis results are shown in Table 1993-4 and Attachment 2, pages 6-8. Lewis Dairy was used as the control location. There were no indicator samples during 1993. The 1993 results are consistent with those of previous years, and Potassium-40 was the only isotope detected in milk samples.

No deviations from the Environmental Monitoring Program resulted from milk sample analysis.

D. **Vegetation**

Forage analysis results are shown in Table 1993-5 and Attachment 2, pages 9-12. The 1993 results are below pre-operational levels and consistent with the downward trends of recent years. The control sample collected November 30, 1993 contained 24 pCi/kg Cesium 137 activity. This value is below pre-operational levels and is not considered significant since Cesium 137 has been shown to be present in the soil throughout the area.

No deviations from the Environmental Monitoring Program resulted from forage sample analysis.

E. **Soil**

The in situ soil analysis results are shown in Table 1993-6 and in Attachment 2, pages 13 and 14. The only man-made isotope found was Cesium 137 which has been present since the pre-operational period. Increases in mean Cesium 137 activity were observed at control and indicator stations, while decreases were observed at community stations. The measured activities are consistent with annual variations and the downward trends observed in the years since the cessation of atmosphere nuclear weapons testing.

F. **Waterborne (Surface Water)**

The surface water analysis results are shown in Table 1993-7 and in Attachment 2, pages 15-17. The mean indicator Tritium activity was consistent with that observed in 1992 and higher than pre-operational levels. The activity was measured during all four quarters and was highest in the fourth quarter. No activity was measured in control samples.

No deviations from the Environmental Monitoring Program resulted from surface water analysis.

G. Waterborne (Ground Water)

The ground water analysis results are shown in Table 1993-8 and in Attachment 2, pages 18-20. No measurable activity from man-made isotopes was detected in ground water samples in 1993.

No deviations from the Environmental Monitoring Program resulted from ground water analysis.

H. River Sediment

The river sediment analysis results are shown in Table 1993-9, and in Attachment 2, pages 21-24. Along with activity from a variety of naturally occurring isotopes, Cesium 134 activity was again measured in the fall control and indicator samples. Cesium 134 activity has been detected sporadically in previous control samples, and for the second consecutive year has been detected in the fall control and indicator samples. Review of 1992 and 1993 Semi-Annual Effluent Reports revealed that Cesium-134 activity in 1993 plant effluents was greater than in 1992, and was distributed uniformly in releases over all four quarters. The presence of Cesium-134 in only the fall samples in 1992 and 1993 is possibly due to the fact that in both years, the fall samples were collected after lengthy periods of dry weather, when the river level was lowered and the flowrates were greatly reduced. Such conditions favor the settling of more of the isotope from the water into sediment in the riverbed.

No deviations from the Environmental Monitoring Program resulted from river sediment analysis.

I. Game Fish (River)

The analysis results of edible portions of Chattahoochee River game fish are shown in Table 1993-10 and in Attachment 2, page 25. Cesium 137 activity was detected in the spring indicator sample. Detected activity was below pre-operational levels and consistent with established trends.

No deviations from the Environmental Monitoring Program resulted from game fish analysis.

J. Bottom-Feeding Fish (River)

Analysis results of edible portions of Chattahoochee River bottomfeeding fish are shown in Table 1993-11 and in Attachment 2, page 26. Cesium-137 activity in the spring indicator sample was 208 pCi/kg. This value is greater than pre-operational levels but well below the reporting level of 2000 pCi/kg. No activity other than Potassium-40 was measured in the fall samples. Review of 1992 and 1993 Semi-Annual Effluent Reports revealed that Cesium-137 activity in plant effluents was greater in 1993 than in 1992, and that the Cesium-137 activity released in 1993 was spread evenly over all four quarters. The Cesium-137 activity released during the first two quarters of 1993 was also found to be greater than the same period in 1992. Since no Cesium-137 activity was measured in the fall samples, and since Cesium-137 activity was not measured at abnormal or unexpectedly high levels in other pathways monitored, the activity measured in the spring indicator sample is not considered significant.

No deviations from the Environmental Monitoring Program resulted from bottom feeding fish analysis.

IV. Land Use Census and Interlaboratory Comparison Program

A. Land Use Census and Milk Animal Survey

The Land Use Census and Milk Animal Survey was completed on June 21, 1993. The results are given in Attachment I.

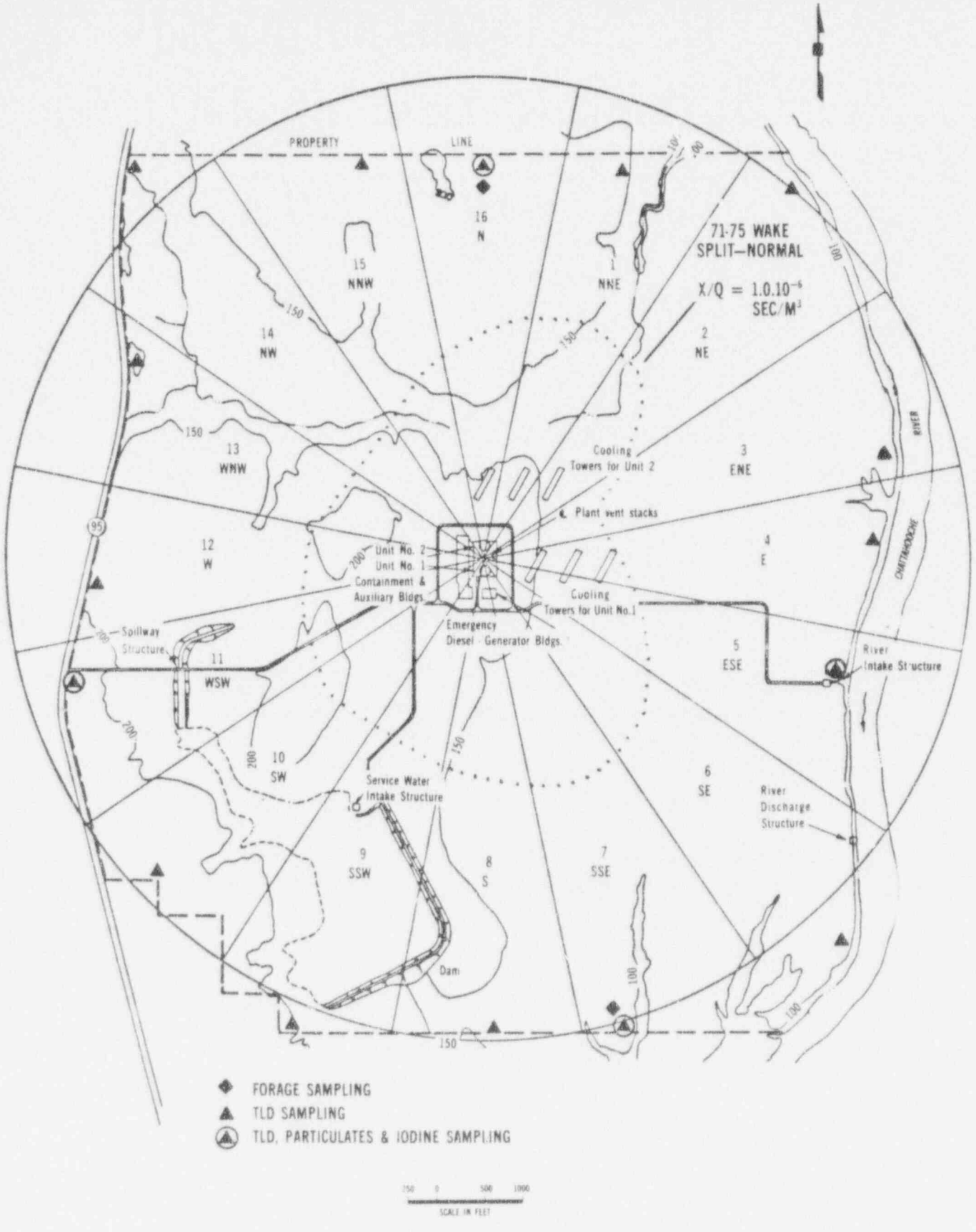
No deviations from the Environmental Monitoring Program occurred as a result of the Land Use Census and Milk Animal Survey.

B. Interlaboratory Comparison Program

During 1993, the University of Georgia Center for Applied Isotope Studies (UGA) was a participant in the EPA Crosscheck Program. The UGA EPA Program code designation is EA.

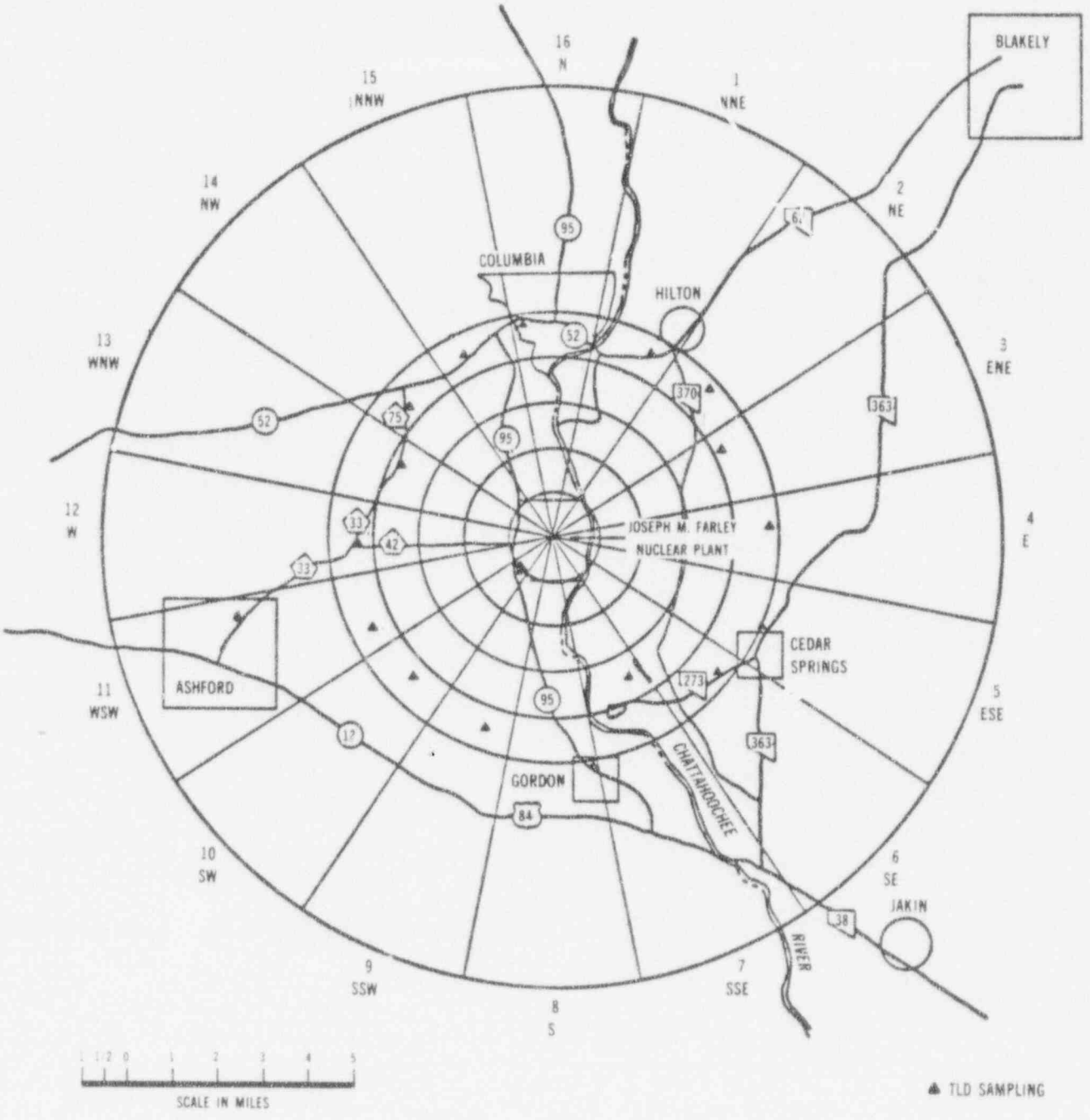
V. Data Trends and Conclusion

Review of the data trends from the pre-operational period through 1993 indicates that environmental radiation levels measured in all the pathways monitored in 1993 remained at background levels and were consistent with pre-operational levels, except river water Tritium, river sediment Cesium-134 in the fall samples and bottom feeding fish Cesium-137 in the spring samples. The atmospheric weapons tests conducted by the People's Republic of China in October 1980, and the Chernobyl disaster in April 1986, produced measured increased in background radiation, but the effects dissipated within two to three years following each event. Even though these levels were slightly higher, overall the data obtained during 1993 demonstrated that continued operation of Farley Nuclear Plant has not harmed or caused any irreversible damage to the environment.



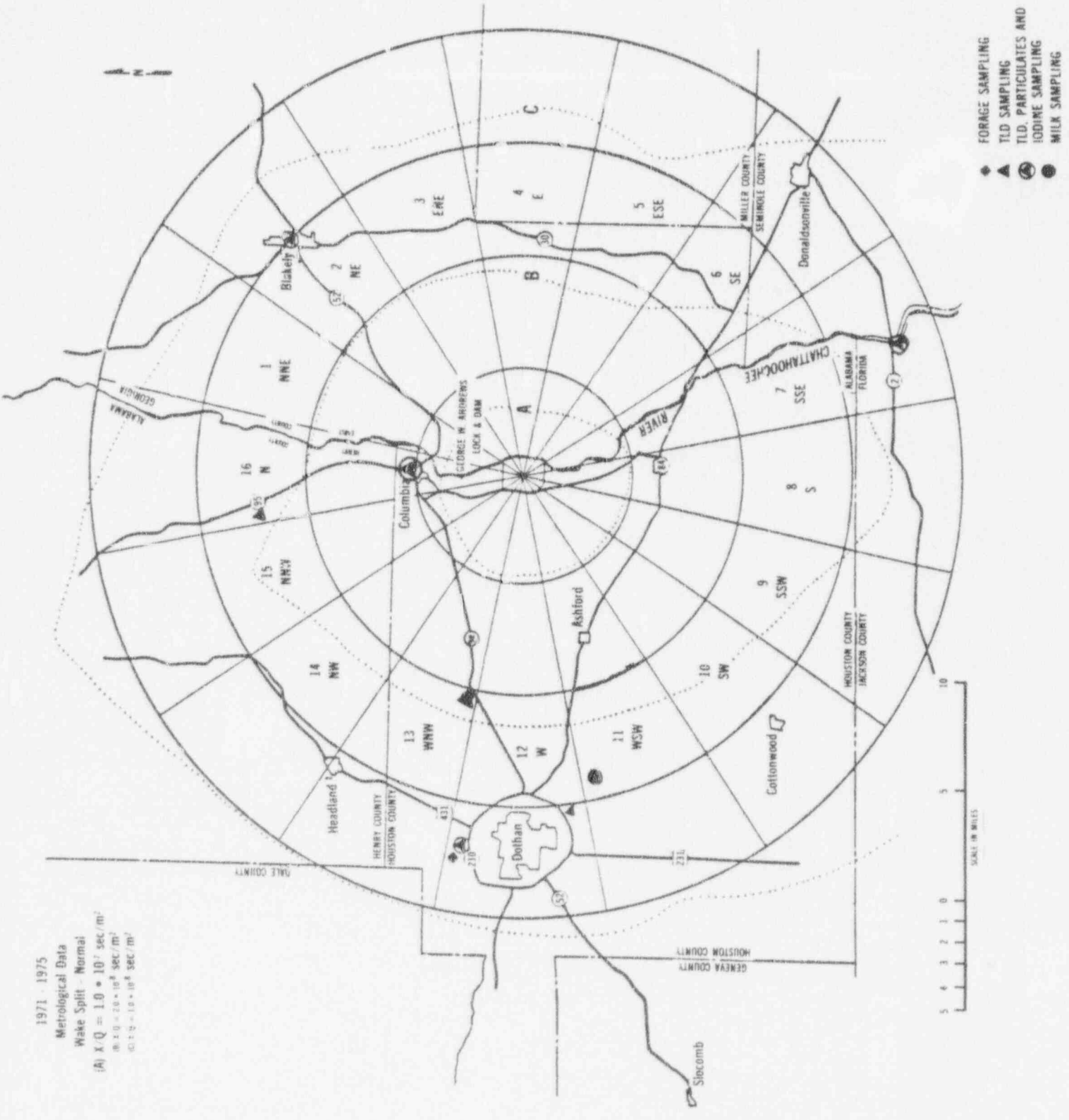
INDICATOR SAMPLING LOCATIONS FOR AIRBORNE/DIRECT ENVIRONMENTAL RADIOACTIVITY AT THE FARLEY NUCLEAR PLANT

FIGURE 1



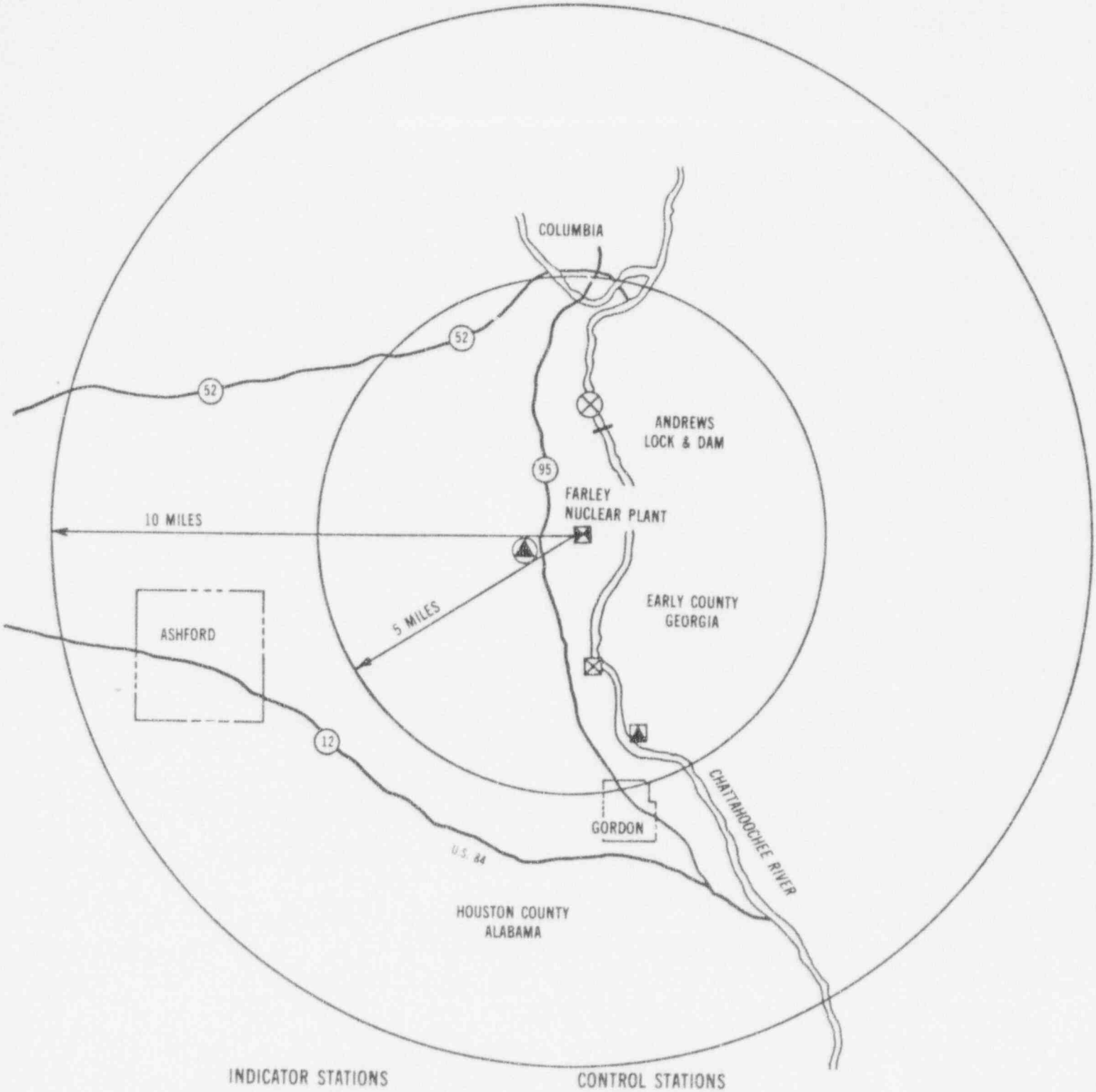
COMMUNITY (INDICATOR II) SAMPLING LOCATIONS FOR DIRECT RADIATION IN THE FARLEY NUCLEAR PLANT AREA.

FIGURE 2



CONTROL SAMPLING LOCATIONS FOR AIRBORNE/DIRECT ENVIRONMENTAL RADIOACTIVITY IN THE FARLEY NUCLEAR PLANT AREA

FIGURE 3



INDICATOR AND CONTROL SAMPLING LOCATIONS FOR WATERBORNE ENVIRONMENTAL RADIOACTIVITY IN THE FARLEY NUCLEAR PLANT AREA

FIGURE 4

TABLE 1

OUTLINE OF OPERATIONAL RADIOLOGICAL ENVIRONMENTAL
MONITORING PROGRAM FOR FARLEY NUCLEAR PLANT DURING 1993

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
AIRBORNE		
Particulates	Continuous operation of sampler with sample collection being performed once per 7 days.	Particulate sampler Analyze for gross beta radioactivity ≥ 24 hours following filter change. Perform gamma isotopic analysis on each sample when gross beta activity is >10 times the yearly mean of control samples. Perform gamma isotopic analysis on composite (by location) sample at least once per 92 days.
Indicator Stations: North Perimeter (N-0.8) South Perimeter (SSE-1.0) Plant Entrance (WSW-0.9) River Intake Structure (ESE-0.8)		
Community Stations: Columbia, AL. (N-5) Georgia Pacific Paper Co. (SSE-3) Ashford, AL. (WSW-8)		
Control Stations: Blakely, GA. (NE-15) Dothan, AL. (W-18) Neals Landing, FL. (SSE-18)		
Iodine	Continuous sampler operation with charcoal canister collection performed once per 7 days.	Radioiodine canister Analyze at least once per 7 days for I-131.
Indicator Stations: North Perimeter (N-0.8) South Perimeter (SSE-1.0) Plant Entrance - (WSW-0.9) River Intake Structure (ESE-0.8)		

TABLE 1 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
Community Stations: Georgia Pacific Paper Co. (SSE-3) Control Stations: Blakely, GA. (NE-15) Dothan, AL. (W-18) Neals Landing, FL. (SSE-18)		
Soil Indicator Stations: Seven Stations along the plant perimeter (NE-1.0, E-0.8, SSE-1.0, SSW-1.0, WSW-0.9, NNW-0.8 and N-0.8) Community Stations: Columbia, AL. (N-5) Georgia Pacific Paper Co.(SSE-3) Ashford, AL. (WSW-8) Control Stations: Blakely, GA. (NE-15) Dothan, AL. (W-18)	Annual in situ Ge(Li) gamma-ray spectroscopy measurements.	Gamma Isotopic Annually
DIRECT RADIATION	At least once per 92 days	Gamma dose Readout at least once per 92 days

TABLE 1 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
Indicator I Stations: Sixteen stations, one in each meteorological sector along the plant perimeter (N-0.8, NNE-0.9, NE-1.0, ENE-0.9, E-0.8, ESE-0.8, SE-1.1, SSE-1.0, S-1.0, SSW-1.0, SW-0.9, WSW-0.9, W-0.8, WNW-0.8, NW-1.1, and NNW-0.9). Indicator II (Community) Stations: Sixteen stations: At least one in each meteorological sector at a distance of 3-5 miles (NNE-4, NE-4, ENE-4, E-5, ESE-5, SE-5, SSE-3, S-5, SSW-4, SW-5, WSW-4, W-4, WNW-4, NW-4, NNW-4, and N-5). Special Interest Stations: Occupied residence nearest the plant site (SW-1.2) City of Ashford, AL (WSW-8.0) Control Stations: Blakely, GA. (NE-15) Neals Landing, FL. (SSE-18) Dothan, AL. (W-18) Dothan, AL. (W-15) Webb, AL. (WNW-11) Haleburg, AL. (N-12)		
WATERBORNE		
<u>Surface Water</u> Indicator Station: Paper Mill at Cedar Springs, GA (3 miles downstream of plant discharge, River Mile-40)	Composite taken with proportional semi-continuous sampler, having a minimum sampling frequency not exceeding two hours collected over a period ≤ 31 days.	Monthly gamma isotopic analysis of each composite sample. Tritium analysis of each composite sample at least once per 92 days.

TABLE 1 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
Control Station: Upstream of Andrews Lock and Dam (=3 miles upstream of plant intake, River Mile-47)		
Ground Water	Grab sample taken at least once per 92 days.	Gamma isotopic and tritium analyses of each sample once per quarter.
Indicator Station: Paper Mill at Cedar Springs, GA, Well (SSE-4)		
Control Station: Whatley Residence, Well (SW-1.2)		
River Sediment	Grab sample taken at least once per 184 days.	Gamma isotopic analysis of each sample twice per year.
Indicator Station: Downstream of plant discharge at Smith's Bend (River Mile - 41)		
Control Station: Upstream of plant discharge at Andrews Lock & Dam Reservoir (River Mile - 47)		

TABLE 1 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
INGESTION		
Milk		
Control Staton:		
Lewis Dairy Avon, AL. (WSW-14)	At least once per 16 days	Gamma isotopic and I-131 analysis of each bi-weekly sample when animals are on pasture.
Fish		
Indicator Station:	One sample each of the following species at least once per each season (March 15 - May 15 and September 15 - November 15) 1. Game Fish 2. Bottom Feeding Fish	Gamma isotopic analysis on edible portions once per season.
Downstream of plant discharge in vicinity of Smith's Bend (River Mile - 41)		
Control Station: Upstream of plant discharge in Andrews Lock & Dam Reservoir (River Mile - 47)		
Forage	Grab sample cut from green forage at least once per 31 days.	Gamma isotopic analysis (which includes I-131) of each monthly sample.
Indicator Station:		
North Perimeter (N-0.8) South Perimeter (SSE-1.0)		
Control Station:		
Dothan, AL. (W-18)		

TABLE 2

REQUIRED DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS
FOR FARLEY NUCLEAR PLANT

VALUES FOR THE MINIMUM DETECTABLE CONCENTRATION(MDC)[a,b]

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg. wet)	Milk (pCi/l)	Food Products (pCi/kg. wet)	Sediment (pCi/kg. dry)
Gross beta	4	0.01	NA	NA	NA	NA
H-3	2000	NA	NA	NA	NA	NA
Mn-54	15	NA	130	NA	NA	NA
Fe-59	30	NA	260	NA	NA	NA
Co-58, 60	15	NA	130	NA	NA	NA
Zn-65	30	NA	260	NA	NA	NA
Zr-95	30	NA	NA	NA	NA	NA
Nb-95	15	NA	NA	NA	NA	NA
I-131	1[c]	0.07	NA	1	60	NA
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-140	60	NA	NA	60	NA	NA
La-140	15	NA	NA	15	NA	NA

[a]The MDC is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$MDC = \frac{4.66\ S_b}{E \quad V \quad 2.22 \quad Y \quad \exp(-\lambda \Delta t)}$$

Where:

MDC is the "a priori" lower limit of detection as defined above (as picocurie per unit mass or volume).

S_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute).

E is the counting efficiency (as counts per transformation).

V is the sample size (in units of mass or volume).

2.22 is the number of transformations per minute per picocurie.

Y is the fractional radiochemical yield (when applicable).

λ is the radioactive decay constant for the particular radionuclide.

Δt is the elapsed time between sample collection (or end of the sample collection period) and time of counting (for environmental samples, not plant effluent samples).

The value of S_b used in the calculation of the MDC for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the MDC for a radionuclide determined by gamma-ray spectroscopy, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., Potassium-40 in milk samples). Typical values of E, V, Y and Δt shall be used in the calculations.

[b]The MDC's for Tritium, Gross beta, and Radioiodine were obtained using blank background (a priori), whereas, for gamma-ray spectroscopy actual sample backgrounds were used (a posteriori).

[c]MDC for drinking water.

TABLE 3

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg. wet)	Milk (pCi/l)	Food Products (pCi/kg. wet)
H-3	2×10^{4a}	NA	NA	NA	NA
Mn-54	1×10^{3}	NA	3×10^{4}	NA	NA
Fe-59	4×10^{2}	NA	1×10^{4}	NA	NA
Co-58	1×10^{3}	NA	3×10^{4}	NA	NA
Co-60	3×10^{2}	NA	1×10^{4}	NA	NA
Zn-65	3×10^{2}	NA	2×10^{4}	NA	NA
Zr/Nb-95	4×10^{2}	NA	NA	NA	NA
I-131	2×10^{0}	9×10^{-1}	NA	3×10^{0}	1×10^{2}
Cs-134	3×10^{1}	1×10^{1}	1×10^{3}	6×10^{1}	1×10^{3}
Cs-137	5×10^{1}	2×10^{1}	2×10^{3}	7×10^{1}	2×10^{3}
Ba/La-140	2×10^{2}	NA	NA	3×10^{2}	NA

[a]For drinking water samples.

Annual ENV Report/4(7)

TABLE 4

ENVIRONMENTAL MONITORING PROGRAM DEVIATIONS 1993

DATE/TIME	COMPONENT	CAUSE OF DEVIATION	RESOLUTION	REMARKS
02-23-93/1320	Air Monitor 0701	Loss of electrical power	Work Request 267409 submitted. Power restored 02-24-93/1230.	Monitor out of service for approximately 102 hours. Insufficient sample volume to meet Iodine-131 MDC.
07-06-93/1300	TLD Stake 0304	Destroyed by vandals	Replaced stake, instalied new TLD.	No second quarter TLD readings for this location.
07-07-93/2200	Air Monitor 1601	Loss of electrical power due to lighting strike on pole supplying power to monitor.	Damage repaired, power restored 07-08-93/0800.	Monitor out of service for approximately 10 hours.
07-27-93/1028	Air Monitor 0718	Overload circuit breaker tripped after approximately 79 hours operation.	Reset circuit breaker.	Monitor out of service for approximately 90 hours. Insufficient sample volume to meet Iodine-131 MDC.
08-24-93/0805	Air Monitor 1218	Exhaust filter cover vibrated loose and detached from pump assembly after 97.4 m^3 sample collected.	Replaced and secured cover. Inspected other monitors to preclude reoccurrence.	Insufficient sample volume to meet Iodine-131 MDC.
08-24-93/1207	Air Monitor 0215	Clogged particulate filter.	Replaced filter, inspected and returned monitor to service. Replace membrane filters with glass fiber filters.	Insufficient sample volume to meet Iodine-131 MDC.
08-24-93/1259	Air Monitor 1605	Clogged particulate filter.	Replaced filter, inspected and returned monitor to service. Replaced membrane filters with glass fiber filters.	Insufficient sample volume to meet Iodine-131 MDC.
08-24-93/1329	Air Monitor 1101	Clogged particulate filter.	Replace filter, inspected and returned monitor to service. Replaced membrane filters with glass fiber filters.	Insufficient sample volume to meet Iodine-131 MDC.

AIRBORNE: PARTICULATES - OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA

SUMMARY REPORT FROM 10193 TO 123193 (A)

AIR PARTICULATES (PCI/Cubic Meter)

TYPE And TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
		MEAN	MIN (C)	MAX (D)	NAME DISTANCE And DIRECTION	MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)
BE-7 40	0.011	0.0575	0.042 16	0.069 16	SSE PERIM. 1.0 MI. SSE	0.0598	0.054 4	0.065 4	0.0640	0.05 12	0.09 12	0.0612	0.042 12	0.076 12
BETA 520	0.002	0.0191	0.004 208	0.063 208	SSE PERIM. 1.0 MI. SSE	0.0218	0.005 52	0.063 52	0.0224	0.006 156	0.054 156	0.0223	0.005 156	0.094 156
CS-134 40	0.002	<MDC	NA 0	NA 16	NA	<MDC	NA 0	NA 0	<MDC	NA 0	NA 12	<MDC	NA 0	NA 12
CS-137 40	0.001	<MDC	NA 0	NA 16	NA	<MDC	NA 0	NA 0	<MDC	NA 0	NA 12	<MDC	NA 0	NA 12
I-131 40	0.001	<MDC	NA 0	NA 16	NA	<MDC	NA 0	NA 0	<MDC	NA 0	NA 12	<MDC	NA 0	NA 12

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

AIRBORNE: IODINE - OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA

SUMMARY REPORT FROM 10193 TO 123193 (A)

AIR IODINE (PCI/Cubic Meter)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
					NAME DISTANCE And DIRECTION									
		MEAN	MIN (C)	MAX (D)		MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)
I-131 416	0.040	<MDC	NA 0	NA 208	NA	<MDC	NA 0	NA 0	<MDC	NA 0	NA 52	<MDC	NA 0	NA 156

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

EXTERNAL RADIATION: OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 10193 TO 123193 (A)

DOSE (MREM)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
		MEAN	MIN (C)	MAX (D)	NAME DISTANCE And DIRECTION	MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)
ANNUAL 40	NA	59.3063	44.5 16	94.9 16	PLANT PERIM. 0.8 MI. E	94.9000	94.9 1	94.9 1	51.6722	34.7 18	82.1 18	51.5167	43.8 6	63.1 6
QUARTER 159	NA	17.3906	10.8 64	29.6 64	PLANT PERIM. 0.8 MI. E	23.8250	18.8 4	26.4 4	15.6113	9.2 71	32.4 71	15.9250	9.1 24	27.4 24
SUM (E) 40	NA	69.5625	55.7 16	95.3 16	PLANT PERIM. 0.8 MI. E	95.3000	95.3 1	95.3 1	62.4722	52.1 18	76 18	63.7000	52.5 6	78.6 6

Mean - Determined From Measurements With Detectable Activity Only.
(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.
(C) Number of Measurements With Detectable Activity Only.
(D) Total Number of Measurements Taken.
(E) Sum of the Four Quarters

MILK: OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA

SUMMARY REPORT FROM 10193 TO 123193 (A)

MILK (PCI/L)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
		MEAN	MIN	MAX	NAME DISTANCE And DIRECTION	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX
			C	D			C	D		C	D		C	D
BA-140 26	47.308	NA	NA 0	NA 0	NA	NA	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 26
CS-134 26	13.462	NA	NA 0	NA 0	NA	NA	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 26
CS-137 26	11.769	NA	NA 0	NA 0	NA	NA	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 26
I-131 26	0.243	NA	NA 0	NA 0	NA	NA	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 26
K-40 26	102.423	NA	NA 0	NA 0	NA	NA	NA 0	NA 0	NA	NA 0	NA 0	1336.15	1090 26	1530 26
LA-140 26	9.962	NA	NA 0	NA 0	NA	NA	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 26

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

VEGETATION: FORAGE - OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA

SUMMARY REPORT FROM 10193 TO 123193 (A)

FORAGE (E) (PCI/KG-WET)

TYPE And TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
		MEAN	MIN	MAX	NAME DISTANCE And DIRECTION	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX
			C	D			C	D		C	D		C	D
BE-7 39	87.179	694.807	99 26	2090 26	SSE PERIM. 1.0 MI. SSE	710.769	337 13	1920 13	NA	NA 0	NA 0	672.153	172 13	1960 13
CS-134 39	14.744	<MDC	NA 0	NA 26	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
CS-137 39	11.949	<MDC	NA 0	NA 26	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	24.0000	24 1	24 13
I-131 39	14.795	<MDC	NA 0	NA 26	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
K-40 39	112.128	4812.30	2330 26	6920 26	NORTH PERIM. 0.8 MI. N	5010.76	3200 13	6920 13	NA	NA 0	NA 0	4920.76	3080 13	6310 13
AC-228 2	42.000	54.0000	39 2	69 2	SSE PERIM. 1.0 MI. SSE	69.0000	69 1	69 1	NA	NA 0	NA 0	NA	NA 0	NA 0

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

(E) Mean Wet/Dry Ratio for 1993 was 5.19

TABLE 1993-5

SOIL: OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA

SUMMARY REPORT FROM 10193 TO 123193 (A)

SOIL (IN SITU) (PCI/KG-DRY)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
					NAME									
		MEAN	MIN	MAX	DISTANCE And DIRECTION	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX
			(C)	(D)			(C)	(D)		(C)	(D)		(C)	(D)
AC-228 12	145.417	1569.57	954 7	2850 7	PLANT PERIM. 0.8 MI. E	2850.00	2850 1	2850 1	1098.666	936 3	1180 3	1575.00	1240 2	1910 2
BI-212 10	340.000	1018.33	611 6	1650 6	NE PERIM. 1.0 MI. NE	1650.00	1650 1	1650 1	715.0000	715 1	715 2	838.500	741 2	936 2
BI-214 12	101.750	1684.28	1070 7	2620 7	PLANT PERIM. 0.8 MI. E	2620.00	2620 1	2620 1	1236.333	959 3	1440 3	1410.00	1140 2	1680 2
CS-137 12	22.083	113.142	56 7	262 7	PLANT PERIM. 0.8 MI. WNW	262.000	262 1	262 1	134.6667	80 3	227 3	161.500	154 2	169 2
K-40 12	228.083	5380.00	1020 7	14900 7	PLANT PERIM. 0.8 MI. E	14900.0	14900 1	14900 1	1570.000	1070 2	2070 3	1905.00	1070 2	2740 2
PB-212 12	123.750	1072.14	583 7	1930 7	NE PERIM. 1.0 MI. NE	1930.00	1930 1	1930 1	661.0000	588 3	773 3	1019.50	749 2	1290 2
PB-214 12	149.000	1810.00	1190 7	2670 7	PLANT PERIM. 0.8 MI. E	2670.00	2670 1	2670 1	1360.000	1040 3	1580 3	1690.00	1440 2	1940 2
RA-226 3	539.000	619.000	619 1	619 1	PLANT PERIM. 0.9 MI. WSW	619.000	619 1	619 1	659.0000	659 1	659 1	635.000	635 1	635 1
TL-208 12	53.000	586.571	334 7	1080 7	NE PERIM. 1.0 MI. NE	1080.00	1080 1	1080 1	362.3333	331 3	386 3	506.500	399 2	614 2

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

WATERBORNE: SURFACE WATER - OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA

SUMMARY REPORT FROM 10193 TO 123193 (A)

SURFACE WATER (PCI/L)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
		MEAN	MIN (C)	MAX (D)	NAME DISTANCE And DIRECTION	MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)
BA-140 26	18.615	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
CO-58 26	3.962	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
CO-60 26	3.962	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
CS-134 26	4.885	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
CS-137 26	4.038	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
FE-59 26	8.462	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
LA-140 26	3.769	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
MN-54 26	4.000	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
NB-95 26	4.269	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
TRITIUM 8	100.000	388.750	229 4	569 4	GPPC RIV. MI. 40	388.750	229 4	569 4	NA	NA 0	NA 0	<MDC	NA 0	NA 4
ZN-65 26	8.846	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13
ZR-95 26	7.346	<MDC	NA 0	NA 13	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 13

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

WATERBORNE: GROUND WATER - OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA

SUMMARY REPORT FROM 10193 TO 123193 (A)

GROUND WATER (WELL) (PCI/L)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
					NAME DISTANCE And DIRECTION									
		MEAN	MIN (C)	MAX (D)		MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)	MEAN	MIN (C)	MAX (D)
BA-140 8	18.125	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
CO-58 8	3.750	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
CO-60 8	4.125	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
CS-134 8	4.375	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
CS-137 8	4.125	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
FE-59 8	7.875	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
I-131 8	0.296	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
LA-140 8	3.250	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
MN-54 8	3.875	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
NB-95 8	4.000	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
TRITIUM 8	100.000	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
ZN-65 8	8.875	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4
ZR-95 8	6.875	<MDC	NA 0	NA 4	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 4

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

SEDIMENT: RIVER - OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA

SUMMARY REPORT FROM 10193 TO 123193 (A)

SEDIMENT (RIVER) (PCI/KG-DRY)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED		NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
			MEAN	MIN	MAX	NAME DISTANCE And DIRECTION	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX
				C	D			C	D		C	D		C	D
AC-228	4	128.000	1014.50	909	1120	SMITH'S BEND	1014.50	909	1120	NA	NA	NA	1935.00	1690	2180
				2	2	RIV. MI. 41		2	2		0	0		2	2
BI-212	4	620.500	1235.00	1190	1280	SMITH'S BEND	1235.00	1190	1280	NA	NA	NA	2135.00	1850	2420
				2	2	RIV. MI. 41		2	2		0	0		2	2
BI-214	4	79.750	564.500	539	590	SMITH'S BEND	564.500	539	590	NA	NA	NA	1000.00	900	1100
				2	2	RIV. MI. 41		2	2		0	0		2	2
CS-134	4	41.500	94.0000	94	94	SMITH'S BEND	94.0000	94	94	NA	NA	NA	105.000	105	105
				1	2	RIV. MI. 41		1	1		0	0		1	2
CS-137	4	42.250	<MDC	NA	NA	NA	<MDC	NA	NA	NA	NA	NA	<MDC	NA	NA
				0	2			0	0		0	0		0	2
K-40	4	316.500	2555.00	2530	2580	SMITH'S BEND	2555.00	2530	2580	NA	NA	NA	2645.00	1760	3530
				2	2	RIV. MI. 41		2	2		0	0		2	2
PB-212	4	78.250	955.500	881	1030	SMITH'S BEND	955.500	881	1030	NA	NA	NA	1825.00	1490	2160
				2	2	RIV. MI. 41		2	2		0	0		2	2
PB-214	4	82.500	579.500	562	597	SMITH'S BEND	579.500	562	597	NA	NA	NA	1093.00	976	1210
				2	2	RIV. MI. 41		2	2		0	0		2	2
RA-226	4	588.250	894.000	894	894	SMITH'S BEND	894.000	894	894	NA	NA	NA	1335.00	1160	1510
				1	2	RIV. MI. 41		1	1		0	0		2	2
TL-208	4	44.250	363.500	352	375	SMITH'S BEND	363.500	352	375	NA	NA	NA	719.000	645	793
				2	2	RIV. MI. 41		2	2		0	0		2	2

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

FISH: RIVER (GAME) - OPERATIONAL RADIOACTIVITY SUMMARY
JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 10193 TO 123193 (A)

FISH (GAME) (PCI/KG WET TISSUE)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
		MEAN	MIN C	MAX D	NAME DISTANCE And DIRECTION	MEAN	MIN C	MAX D	MEAN	MIN C	MAX D	MEAN	MIN C	MAX D
CO-58 4	24.000	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
CO-60 4	30.250	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
CS-134 4	28.250	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
CS-137 4	23.500	34.0000	34 1	34 2	SMITH'S BEND RIV. MI. 41	34.0000	34 1	34 1	NA	NA 0	NA 0	<MDC	NA 0	NA 2
FE-59 4	59.250	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
K-40 4	195.250	2900.00	2630 2	3170 2	SMITH'S BEND RIV. MI. 41	2900.00	2630 2	3170 2	NA	NA 0	NA 0	2645.00	2160 2	3130 2
MN-54 4	25.000	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
ZN-65 4	60.500	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2

Mean - Determined From Measurements With Detectable Activity Only.
(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.
(C) Number of Measurements With Detectable Activity Only.
(D) Total Number of Measurements Taken.

FISH: RIVER (BOTTOM FEEDING) - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT

LICENSE NOS. NPF-2 AND NPF-8, [illegible] COUNTY ALABAMA

SUMMARY REPORT FROM 1[illegible] 123193 (A)

FISH (BOTTOM FEEDING) (PCI/KG WET TISSUE)

TYPE And TOTAL NUMBERS Of ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS			INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN				COMMUNITY LOCATIONS			CONTROL LOCATIONS		
		MEAN	MIN	MAX	NAME DISTANCE And DIRECTION	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX
			C	D			C	D		C	D		C	D
CO-58 4	24.000	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
CO-60 4	26.750	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
CS-134 4	27.250	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
CS-137 4	23.250	208.000	208 1	208 2	SMITH'S BEND RIV. MI. 41	208.000	208 1	208 1	NA	NA 0	NA 0	<MDC	NA 0	NA 2
FE-59 4	66.750	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
K-40 4	182.000	2590.00	2550 2	2630 2	SMITH'S BEND RIV. MI. 41	2590.00	2550 2	2630 2	NA	NA 0	NA 0	2460.00	2400 2	2520 2
MN-54 4	21.500	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2
ZN-65 4	57.500	<MDC	NA 0	NA 2	NA	<MDC	NA 0	NA 0	NA	NA 0	NA 0	<MDC	NA 0	NA 2

Mean - Determined From Measurements With Detectable Activity Only.

(A) No Nonroutine Anomalous Measurements Reported During This Period.

(B) Mean Minimum Detectable Concentration Calculated Per Table 2 of This Report.

(C) Number of Measurements With Detectable Activity Only.

(D) Total Number of Measurements Taken.

ATTACHMENT 1

JOSEPH M. FARLEY NUCLEAR PLANT
LAND USE CENSUS

JUNE 21, 1993

I. PURPOSE

As required by FNP Technical Specifications 3.12.2 and 4.12.2, the annual land use census was completed on June 21, 1993. The purpose of the census was:

A. To identify, within a five mile radius of FNP, the location of the resident nearest the plant site in each sector. As used in the Land Use Census report, the terms "FNP" and "plant site" are interchangeable, and are defined as the point midway between the Unit One and Unit Two plant vent stacks.

B. To identify within a five mile radius of FNP, the number and location of milk animals in each sector. As used in the Land Use Census report, the term "milk animal" is defined as a cow or goat whose milk is obtained for human consumption.

C. To determine, using results obtained in parts A and B above, if changes to the Offsite Dose Calculation Manual (ODCM) and/or the milk sampling program are necessary.

II. METHOD

Using topographic maps obtained from the U. S. Geological Survey (USGS) and highway maps obtained from the Alabama Highway Department and the Georgia Department of Transportation, field surveys were conducted in each sector out to five miles from the plant site. Information gained from residents interviewed during the surveys was used to establish or confirm the location of the resident nearest the plant site in each sector, and to determine whether milk animals were present in any sector within five miles of the plant site. The Houston County, Alabama, livestock agent and the Early County, Georgia, extension agent were contacted for assistance in locating commercial dairy farms or privately owned milk animals within five miles of the plant site. The results of the surveys are shown in Table 1.

III. RESULTS

A. NEAREST RESIDENT LOCATIONS

The location of the resident nearest the plant site in each sector is plotted on a USGS topographic map maintained by the environmental staff. The 1993 surveys revealed one change from the 1992 surveys. The residence identified in the 1992 surveys as nearest the plant site in sector six was unoccupied during the 1993 surveys. The 1993 surveys identified a trailer approximately 300 feet north of the 1992 location and the same linear distance from the plant site as the nearest occupied residence in sector six.

B. MILK ANIMAL SURVEY

Mr. Mickey Fourakers, Early County, Georgia, Extension Agent stated that there are no commercial dairy farms in Early County, and that he knew of no privately owned milk animals within five miles of the plant site. Field surveys conducted along Georgia Highways 62, 370, 273 and 363, and Early County Roads 26, 103, 28, 270, 81 and 248 produced no evidence of milk animals.

Mr. Ricky Hudson, Houston County, Alabama Livestock Agent, provided a list of commercial dairy farms in Houston County, and stated that he knew of no privately owned milk animals within five miles of the plant site. Field surveys conducted along Alabama highways 52 and 95, and Houston County, Roads 75, 33, 42 and interconnecting secondary roads produced no evidence of milk animals.

There are three commercial dairy farms, all more than 5 miles from the plant site, in the vicinity of FNP:

Ray Lewis Dairy
Rt. 1
Ashford, AL

14 miles west southwest of the plant site; Ray Lewis, owner

Green Valley Farms
Webb, AL

12 miles west of the plant site; Bruce Ivey, owner

Robert Weir and Sons Dairy
Seminole County, GA

14 miles south southeast of the plant site; Robert Weir, owner

The current milk control sample location is Ray Lewis Dairy. Since milk animals have not been located within five miles of the plant site, no milk indicator sample is collected.

Although milk animals have not been found within five miles of the plant site, the following items have been noted:

1. As reported in 1992 and previous surveys, Mr. Thomas Dean of Gordon, Alabama, keeps milk goats for his personal use at his residence six miles south of the plant site. Mr. Dean was interviewed and the location of his residence and the presence of the goats confirmed.

2. A Holstein bull reported approximately 1.2 miles west southwest of the plant site in the 1992 surveys has been removed.

3. A mixed-breed Guernsey cow observed in 1992 at the residence of Mrs. Mary Esther Allums in Early County, Georgia, three miles east southeast of the plant site has been removed.

4. A herd of approximately 20 goats observed in Gordon, Alabama, 5.1 miles south of the plant site were removed in July 1992.

IV. CONCLUSIONS

A. There is no occupied residence in any sector closer to the plant site than currently assessed by the ODCM.

B. In sector 6, although the location of the resident nearest the plant site has changed, the linear distance from the plant site to the nearest resident is the same as that reported in 1992.

C. There are currently no milk animals within five miles of the plant site.

D. No changes to ODCM are required.

E. No change to the milk sampling program is necessary.

TABLE 1 OF ATTACHMENT 1
JOSEPH M. FARLEY NUCLEAR PLANT
LAND USE CENSUS AND MILK ANIMAL SURVEY

JUNE 21, 1993

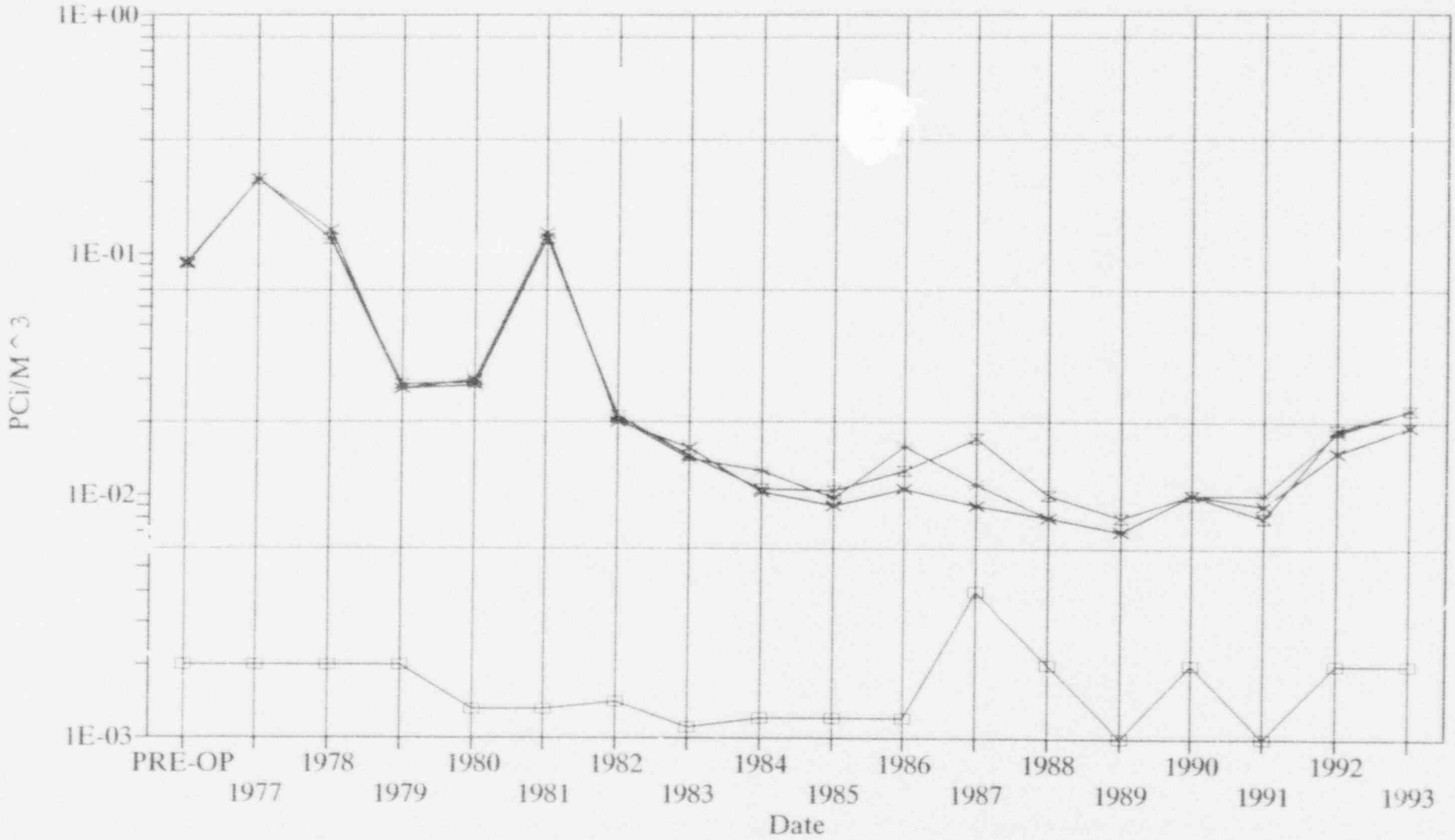
RADIAL SECTORS 22.5 DEGREES EACH	DISTANCE IN MILES TO NEAREST RESIDENT 1992	RESIDENT 1993	MILK ANIMAL 1992	ANIMAL 1993	REASON FOR CHANGE	INDIVIDUALS INTERVIEWED
North Northeast (01)	2.5	2.5	>5	>5	N/A	*Mrs. C. H. Freeman Ms. Susan Herring
Northeast (02)	2.4	2.4	>5	>5	N/A	Mrs. Barbara Kirkpatrick *Mr. Judson Freeman
East Northeast (03)	2.4	2.4	>5	>5	N/A	*Mr. Jim Donaldson
East (04)	2.8	2.8	>5	>5	N/A	*Mr. Booker T. Spivey
East Southeast (05)	2.8	3.0	>5	>5	N/A	*Mrs. Mary Esther Allums
Southeast (06)	3.4	3.4	>5	>5	Note 1	*Ms. Kathryn Smith Mrs. David Smith Mr. Harold Smith
South Southeast (07)	>5	>5	>5	>5	N/A	Note 2
South (08)	4.3	4.3	>5	>5	N/A	*Mrs. Francha Brown Mrs. Thomas Dean
South Southwest (09)	2.9	2.9	>5	>5	N/A	*Ms. Pricilla Wilson Ms. Lula Mae McGriff
Southwest (10)	1.2	1.2	>5	>5	N/A	*Mr. Maurice Gilbert
West Southwest (11)	2.4	2.4	>5	>5	N/A	*Mr. Jimmy Daughtry Mr. Ray Lewis
West (12)	1.3	1.3	>5	>5	N/A	*Mr. Tommy Respress Mr. Lester Smith
West Northwest (13)	2.1	2.1	>5	>5	N/A	*Mr. William Coulson
Northwest (14)	1.5	1.5	>5	>5	N/A	*Mrs. Amanda Ryals Mr. Blake Jernigan
North Northwest (15)	2.0	3.3	>5	>5	N/A	*Mrs. Thomas Steely
North (16)	2.6	2.6	>5	>5	N/A	*Mr. Tony Knighton

*Nearest Resident in Sector
Note 1: New location. 1992 location unoccupied.
Note 2: No resident within 5 miles in sector 7. Georgia Pacific Paper Co. (GPPC) located in sector 7, 3.9 miles from plant site. Air sampler, surface water sampler TLD located on GPPC plant site.

J. M. Farley
Nuclear
Plant

Annual Environmental Operating Report

Mean Annual Air Gross Beta



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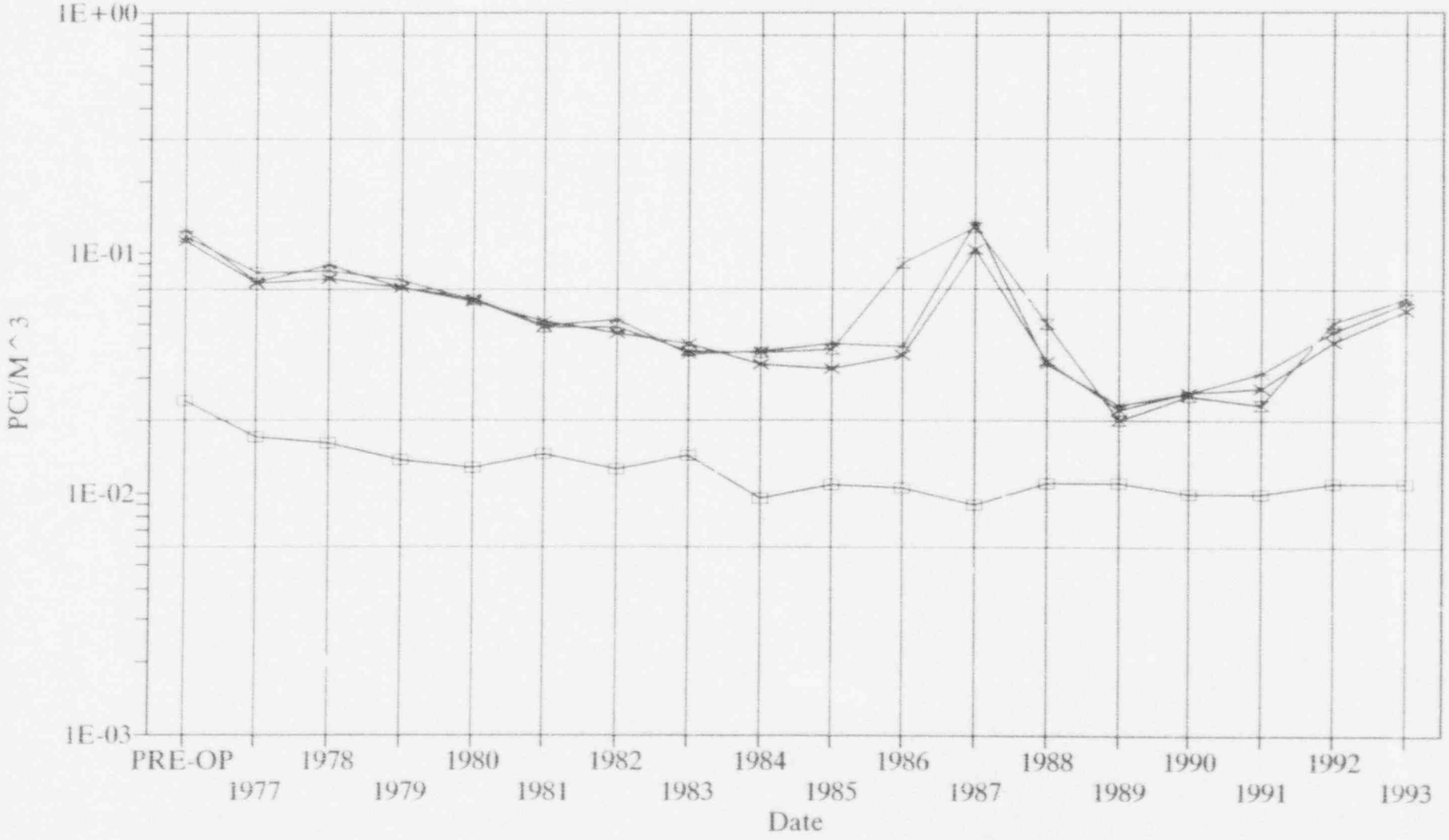
Annual Environmental Operating Report

Mean Annual Air Gross BE-7



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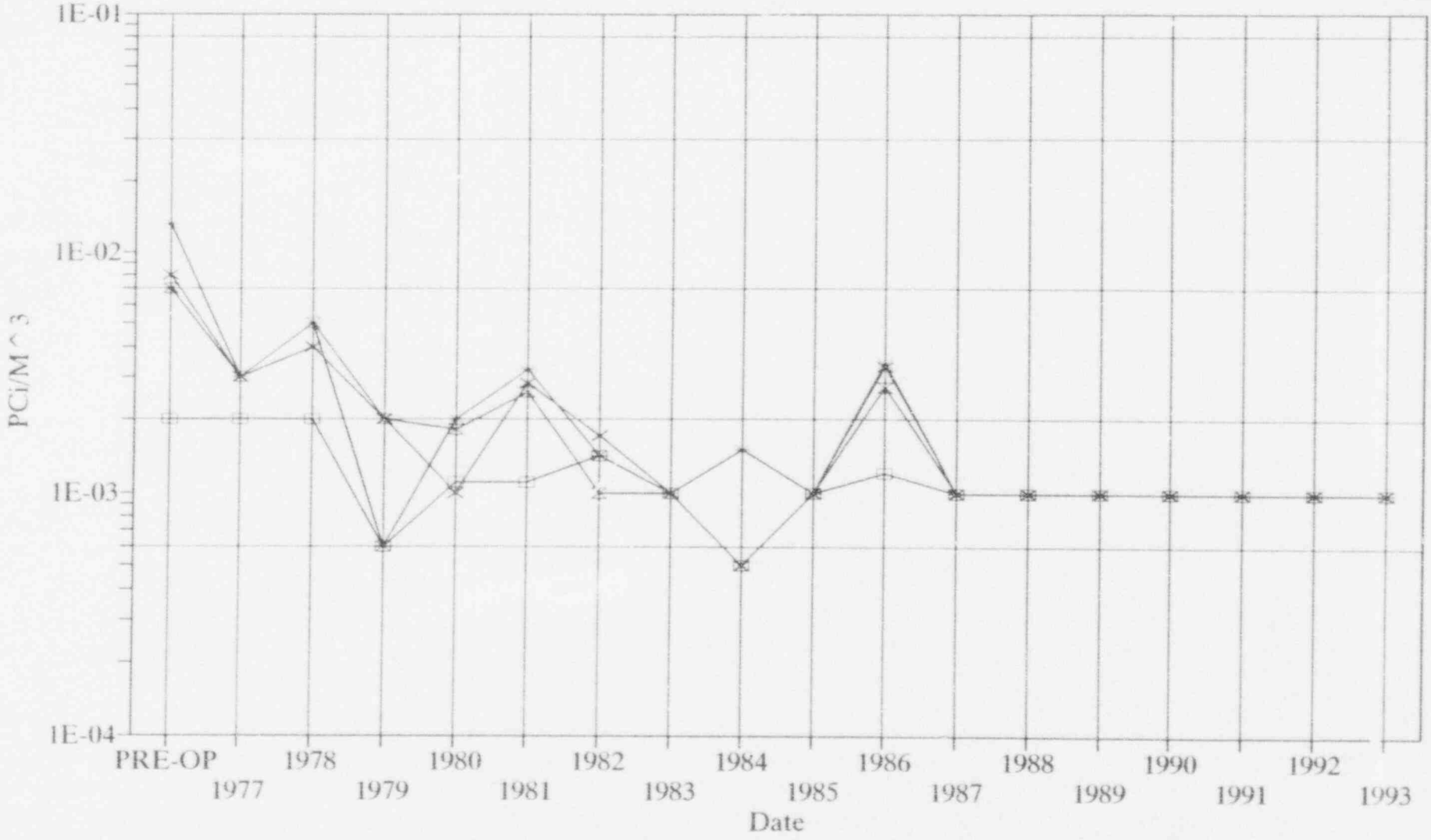
Annual Environmental Operating Report

Mean Annual Air Gross CS-137



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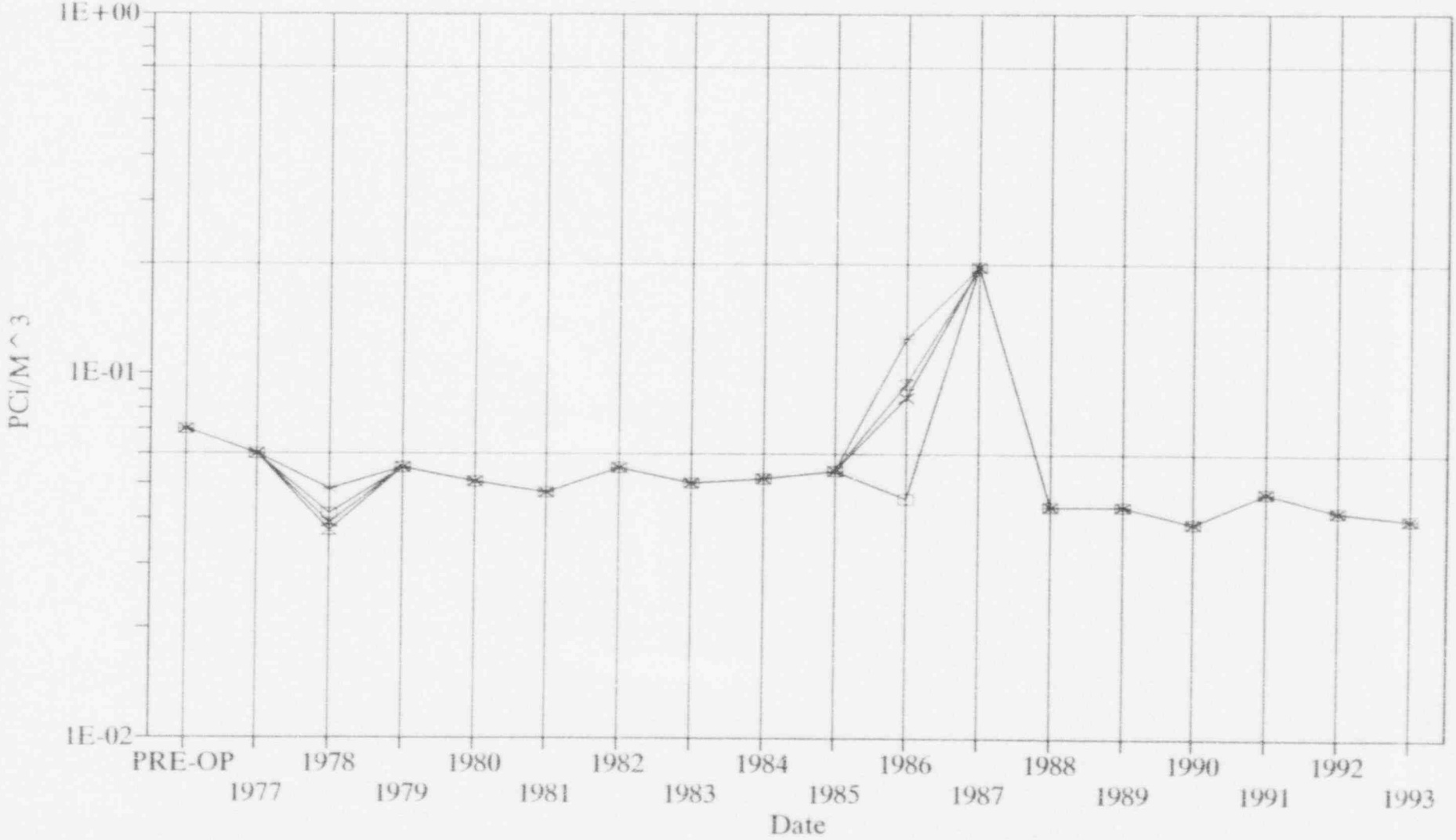
Annual Environmental Operating Report

Mean Annual Air I-131



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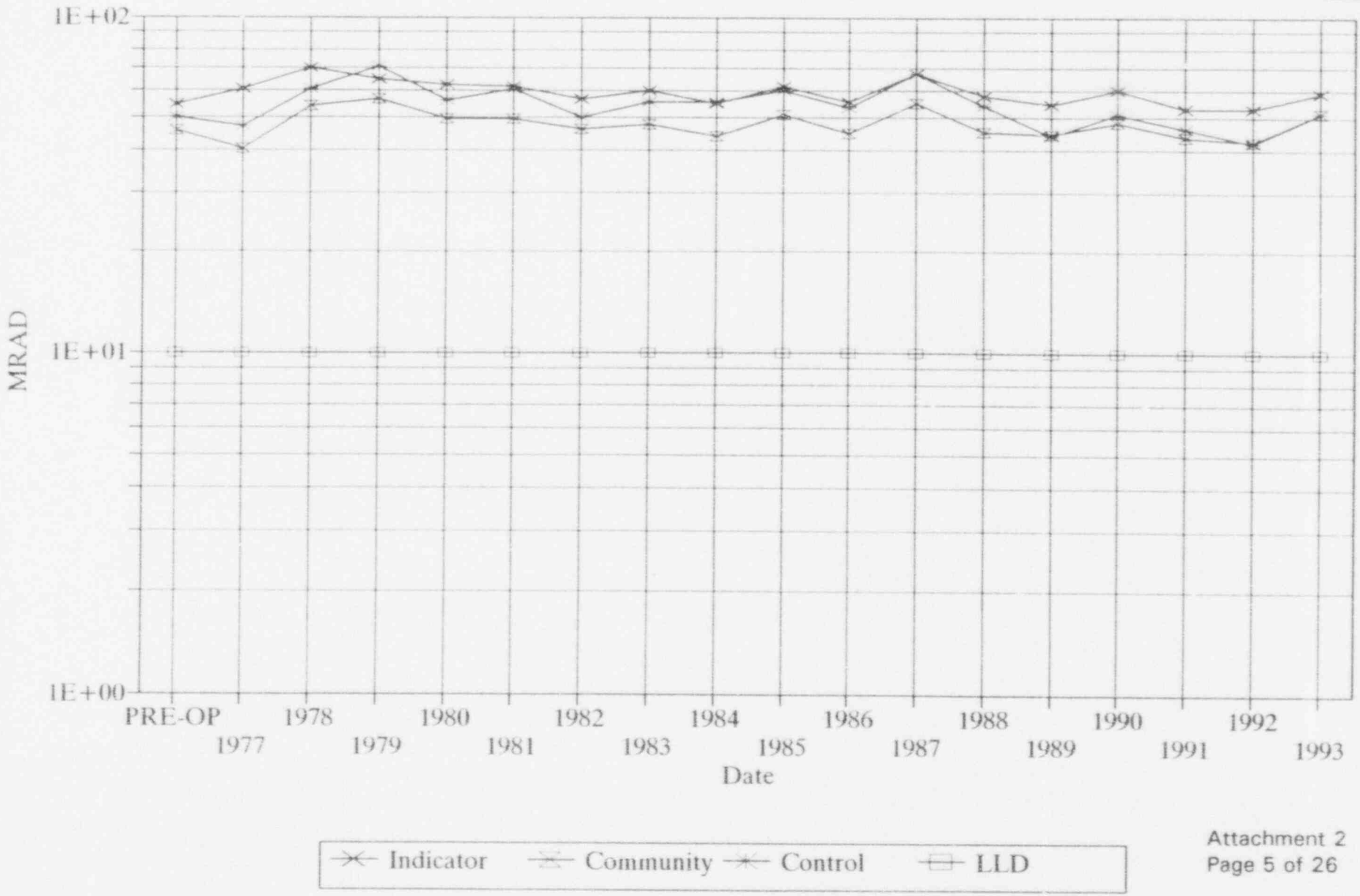
Annual Environmental Operating Report
Mean Annual External Gamma



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Annual Environmental Operating Report
Mean Annual Milk Concentration

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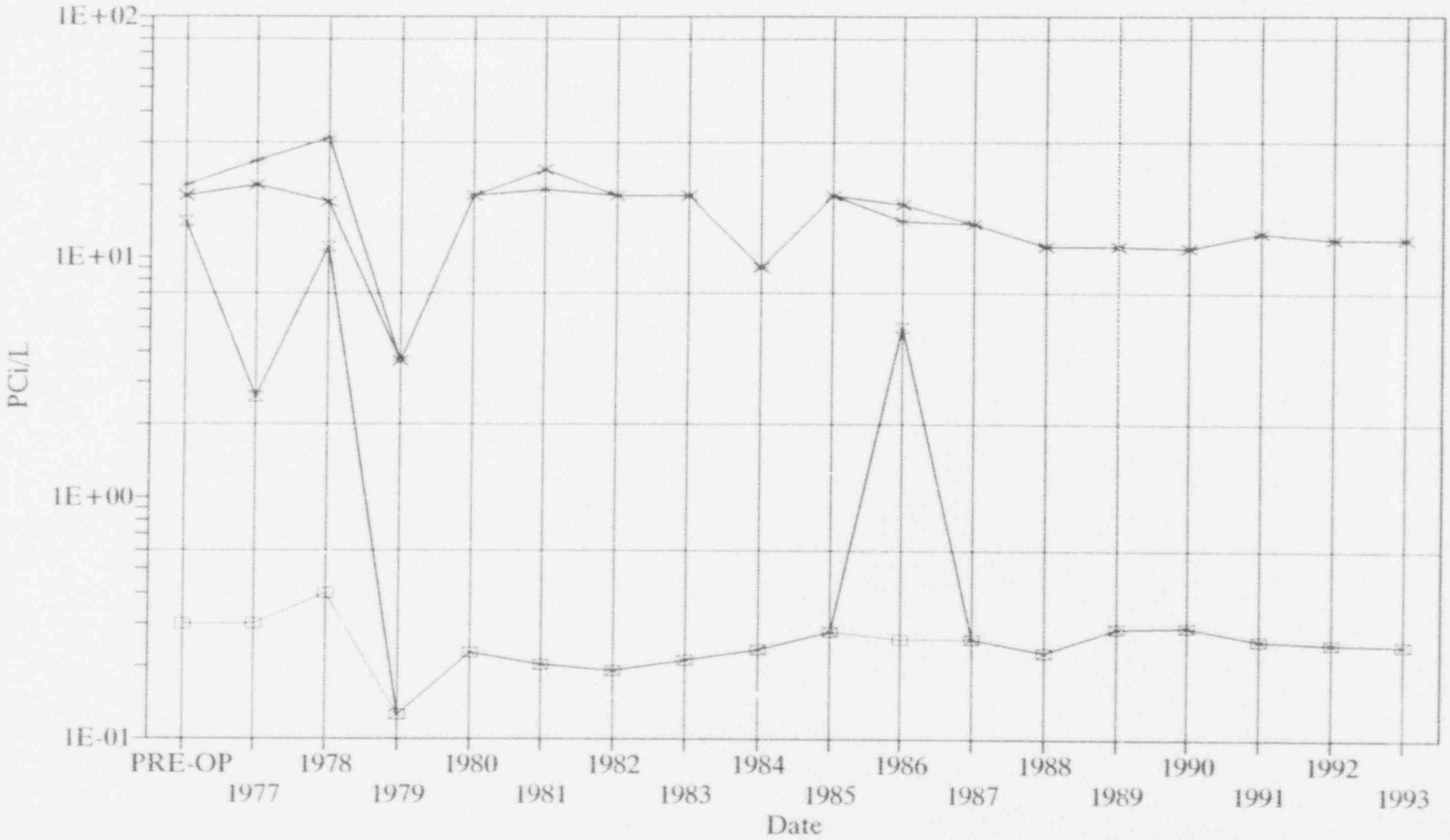
Annual Environmental Operating Report
Mean Annual Milk Concentration



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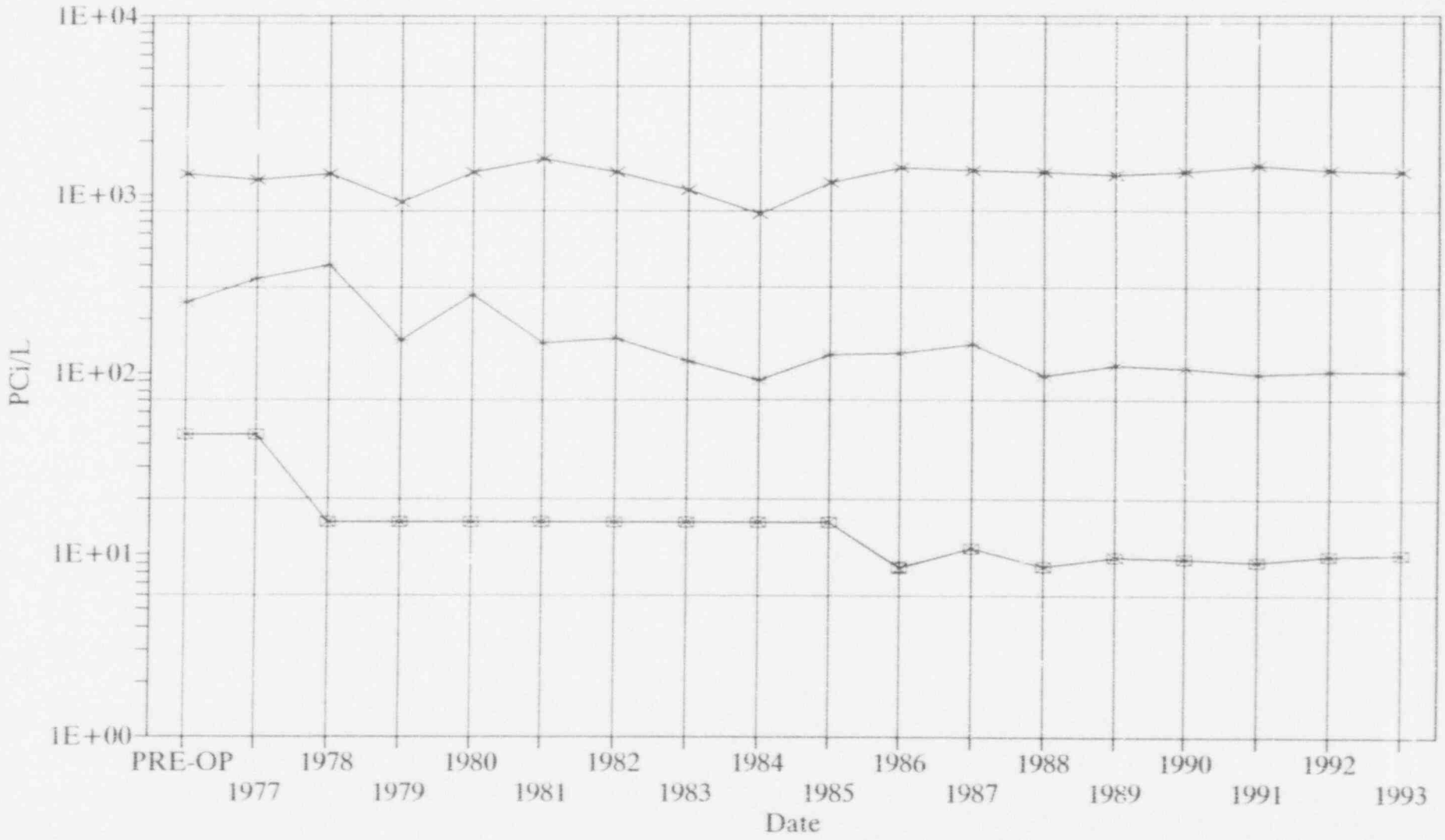
Annual Environmental Operating Report

Mean Annual Milk Concentration



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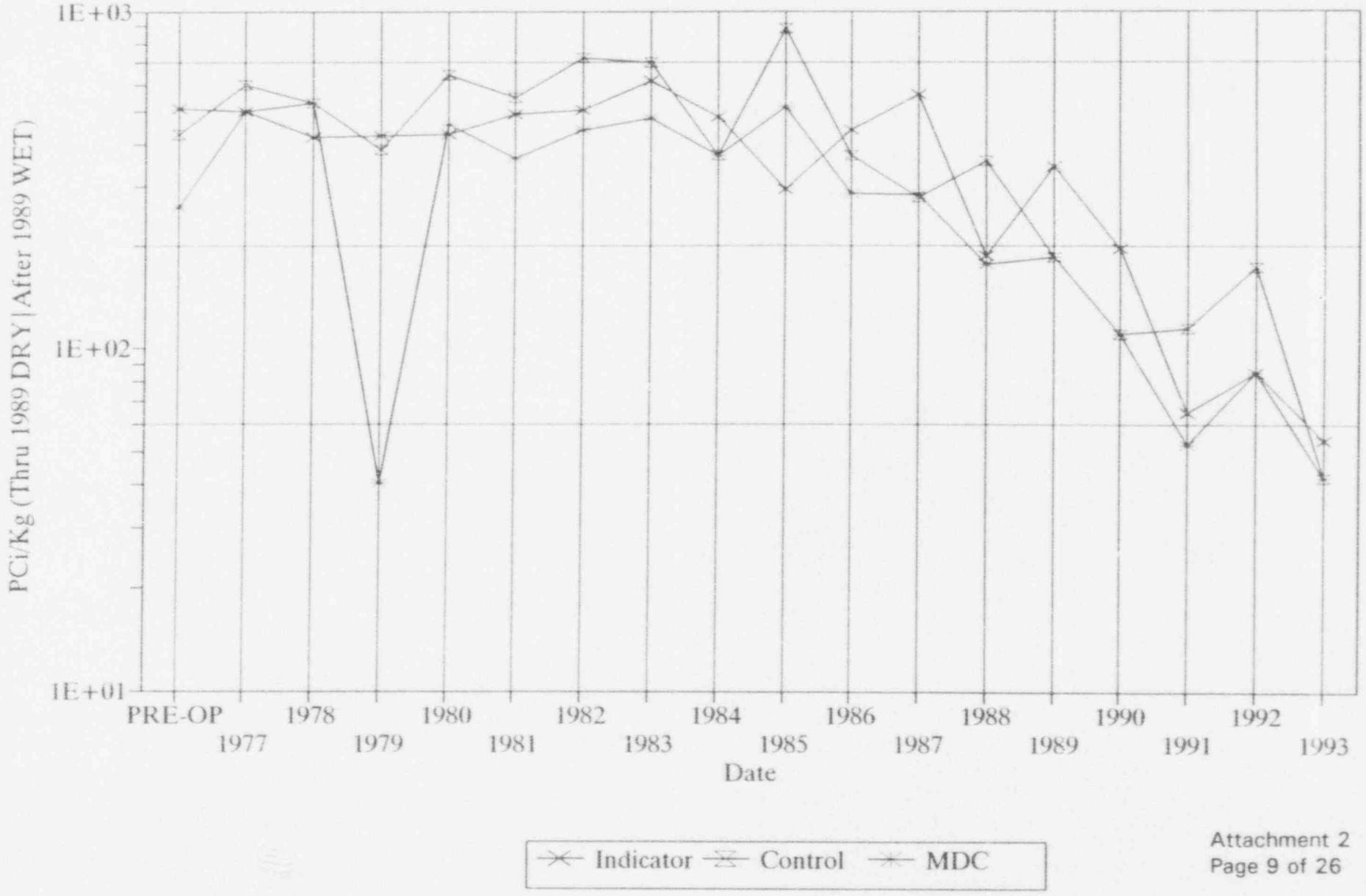
Annual Environmental Operating Report
Mean Annual Forage Concentration AC-228



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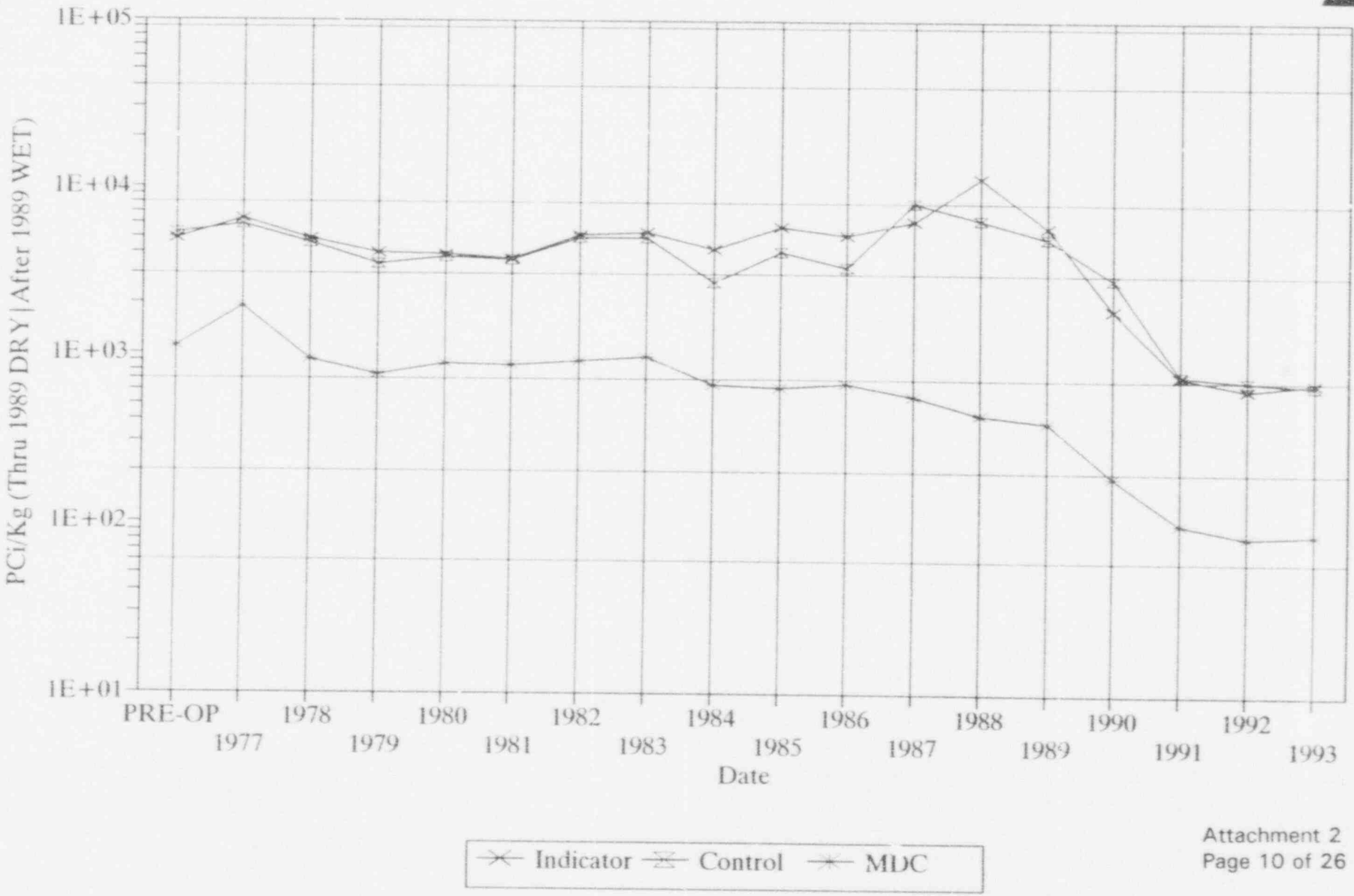
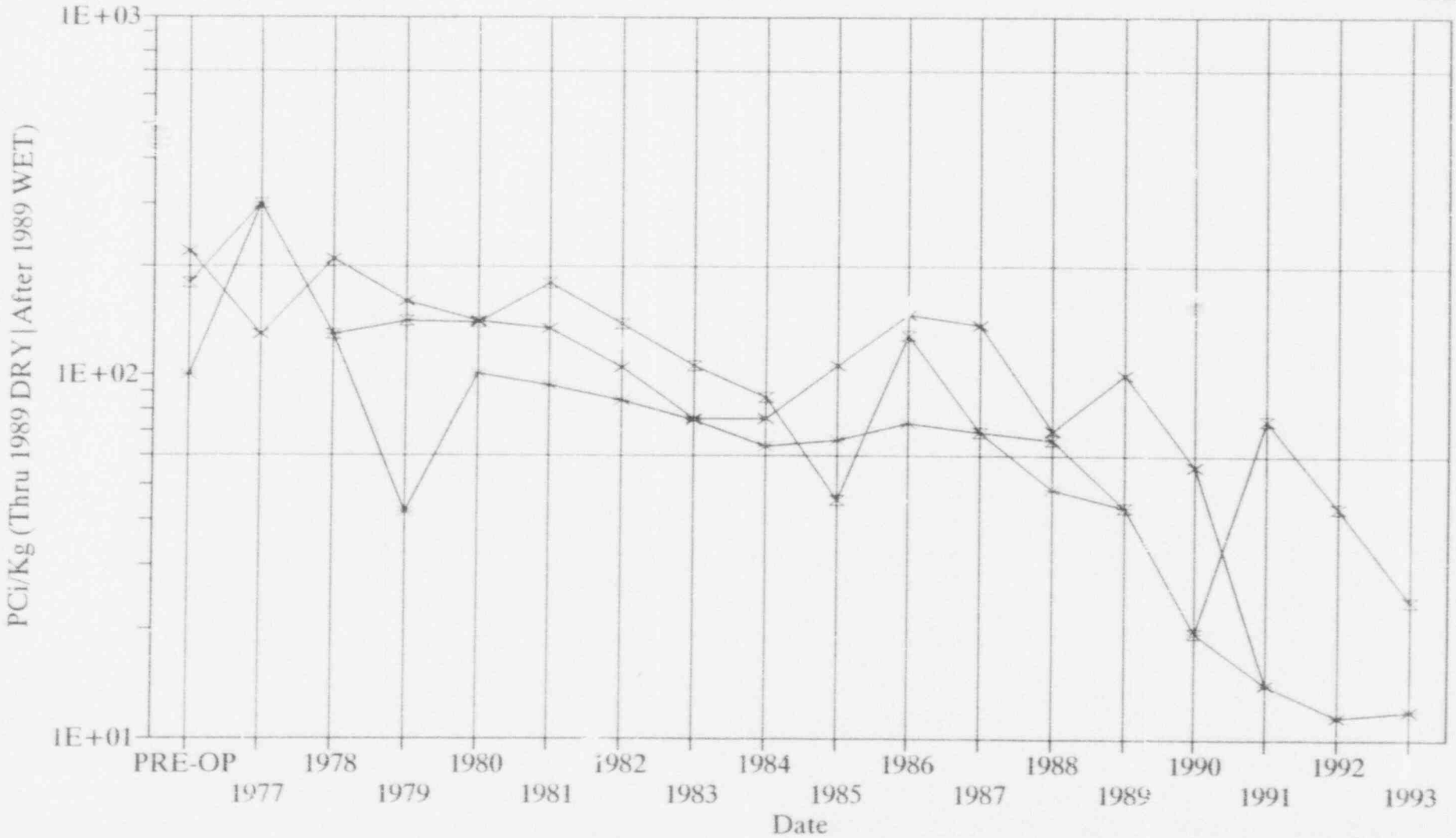
Annual Environmental Operating Report
Mean Annual Forage Concentration BE-7



Annual Environmental Operating Report

Mean Annual Forage Concentration CS-137



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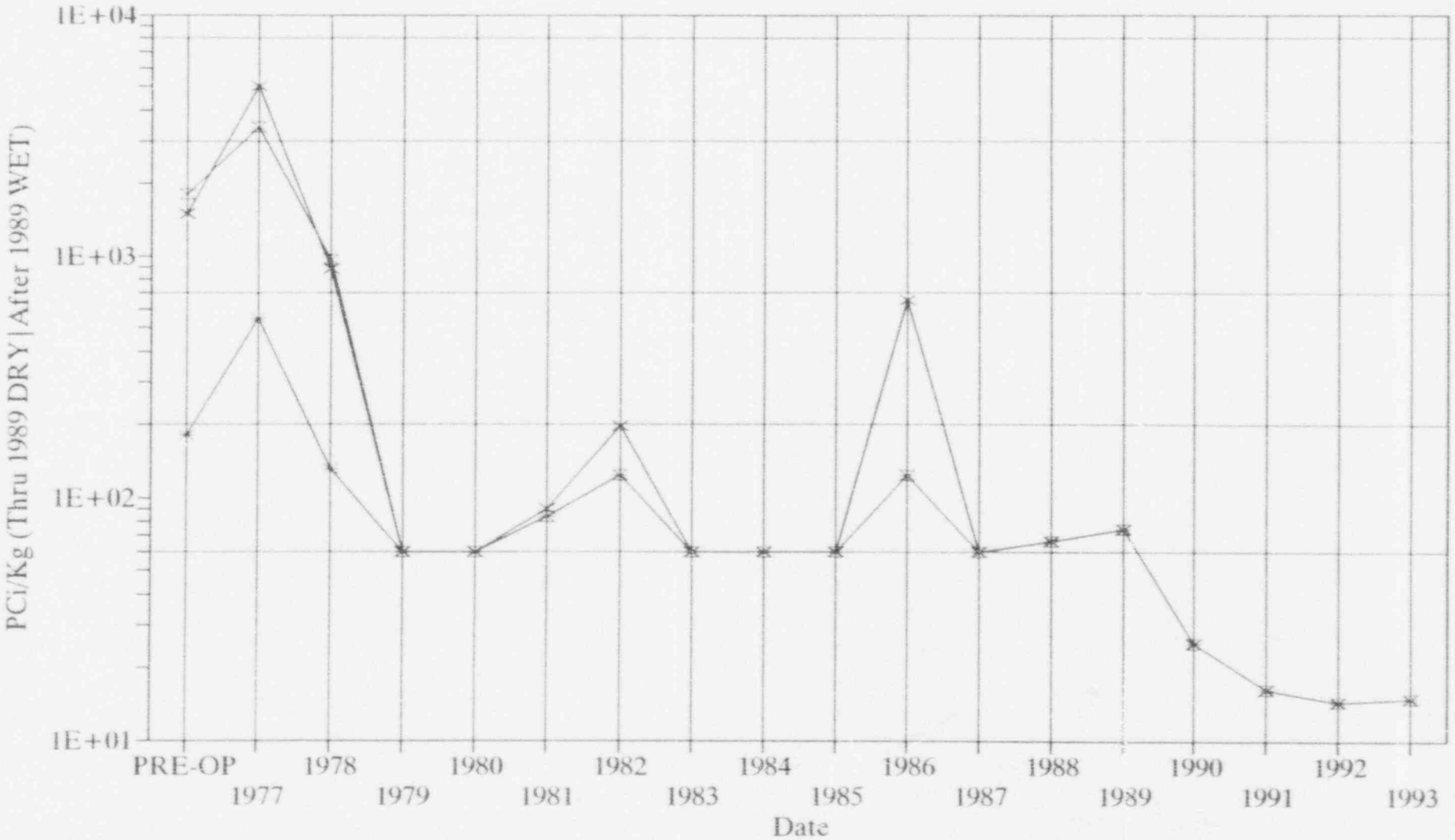
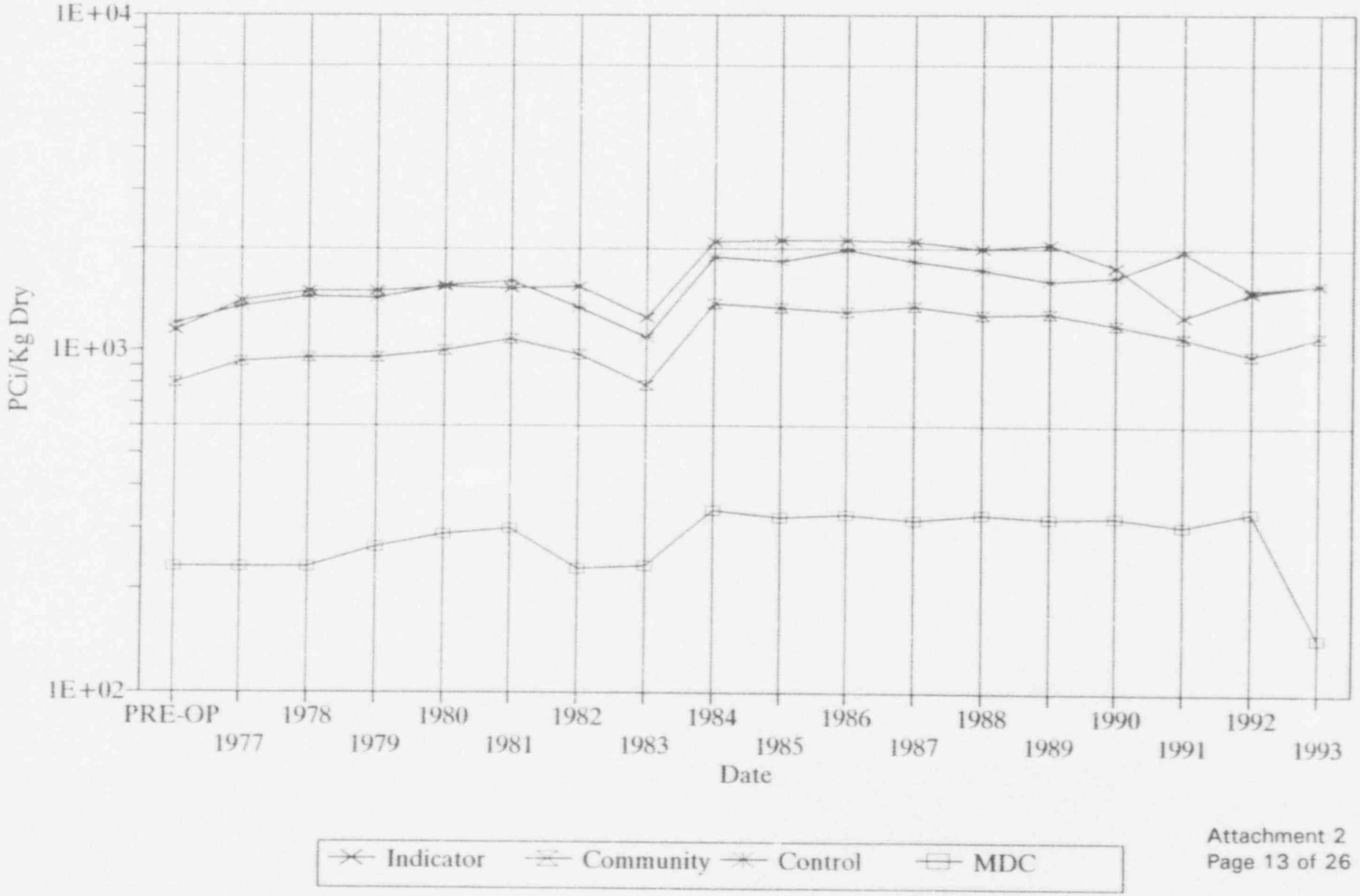
Annual Environmental Operating Report

Mean Annual Forage Concentration I-131



Annual Environmental Operating Report

Mean Annual Soil In Situ AC-228



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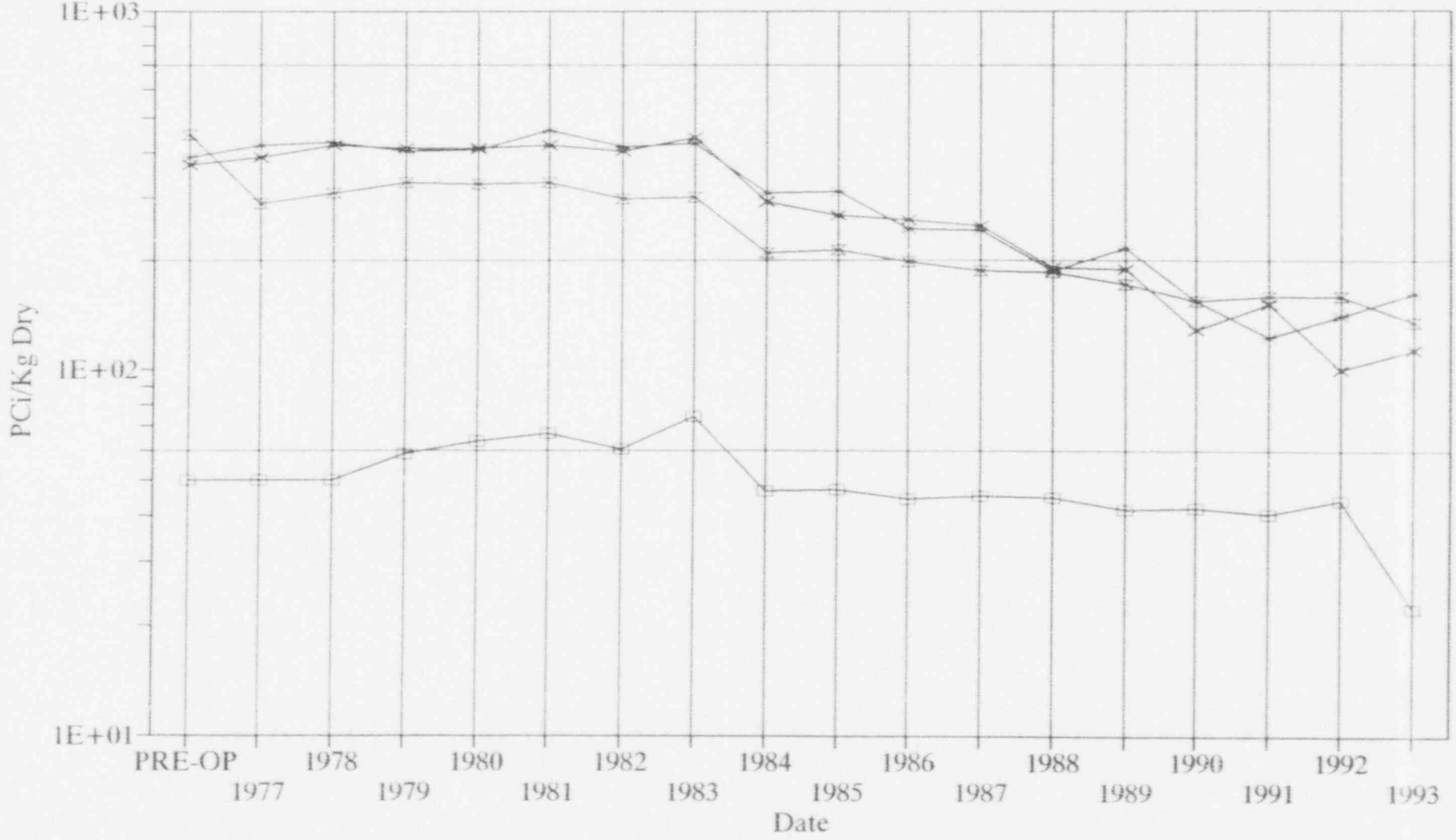
Annual Environmental Operating Report

Mean Annual Soil In Situ CS-137



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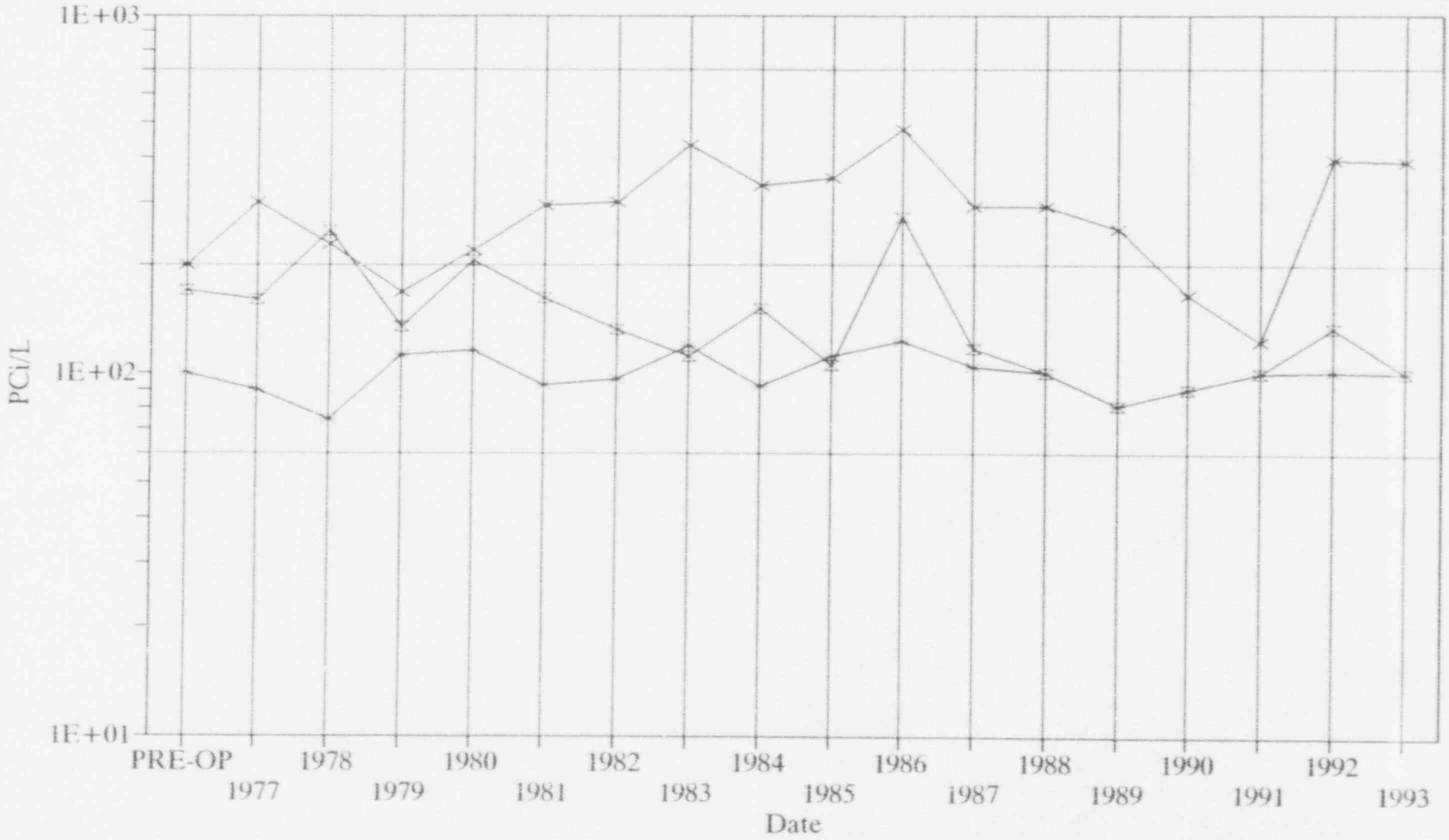
Annual Environmental Operating Report

Mean Annual River Water Conc. Tritium



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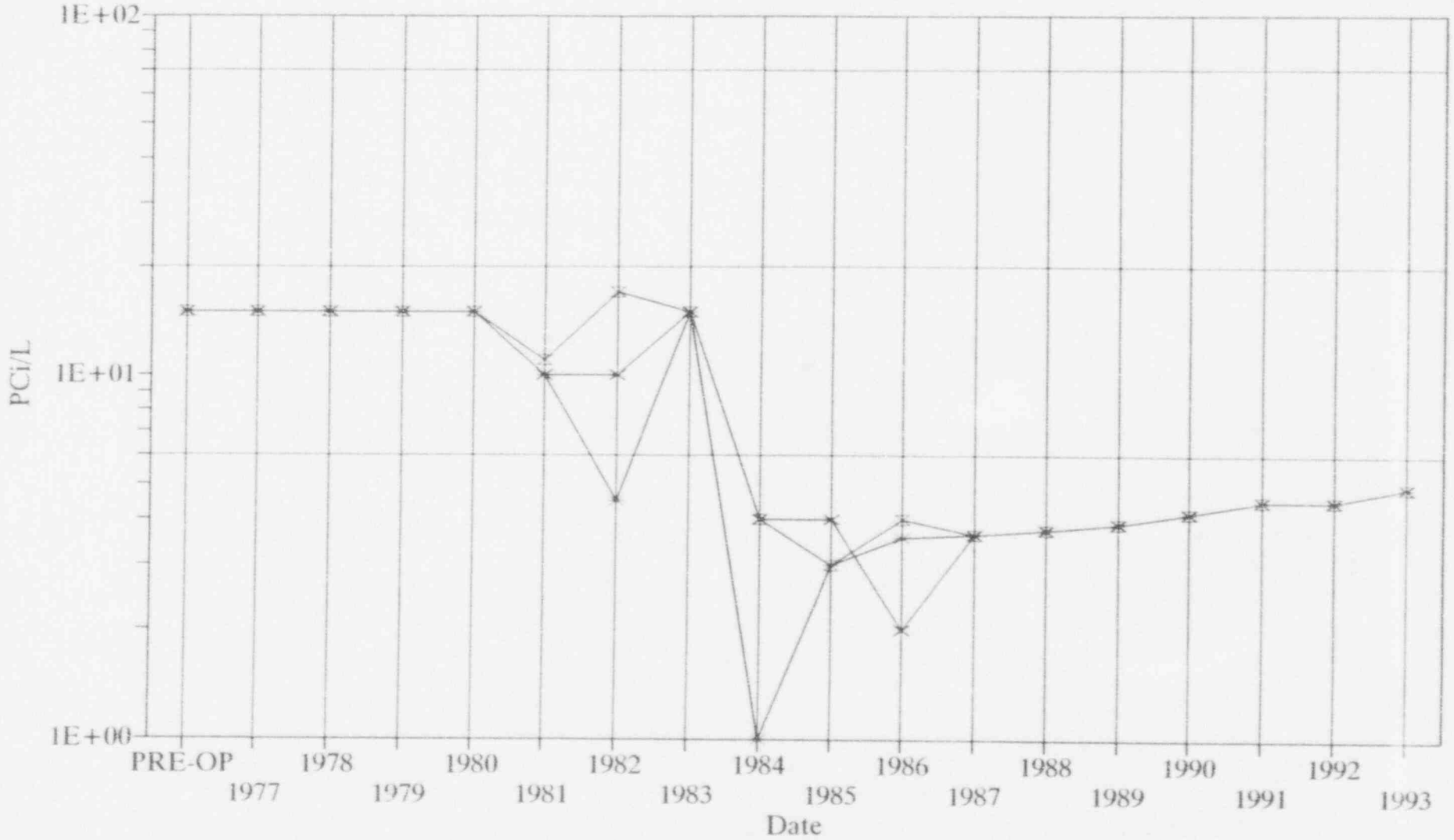
Mean Annual River Water Conc. CS-134



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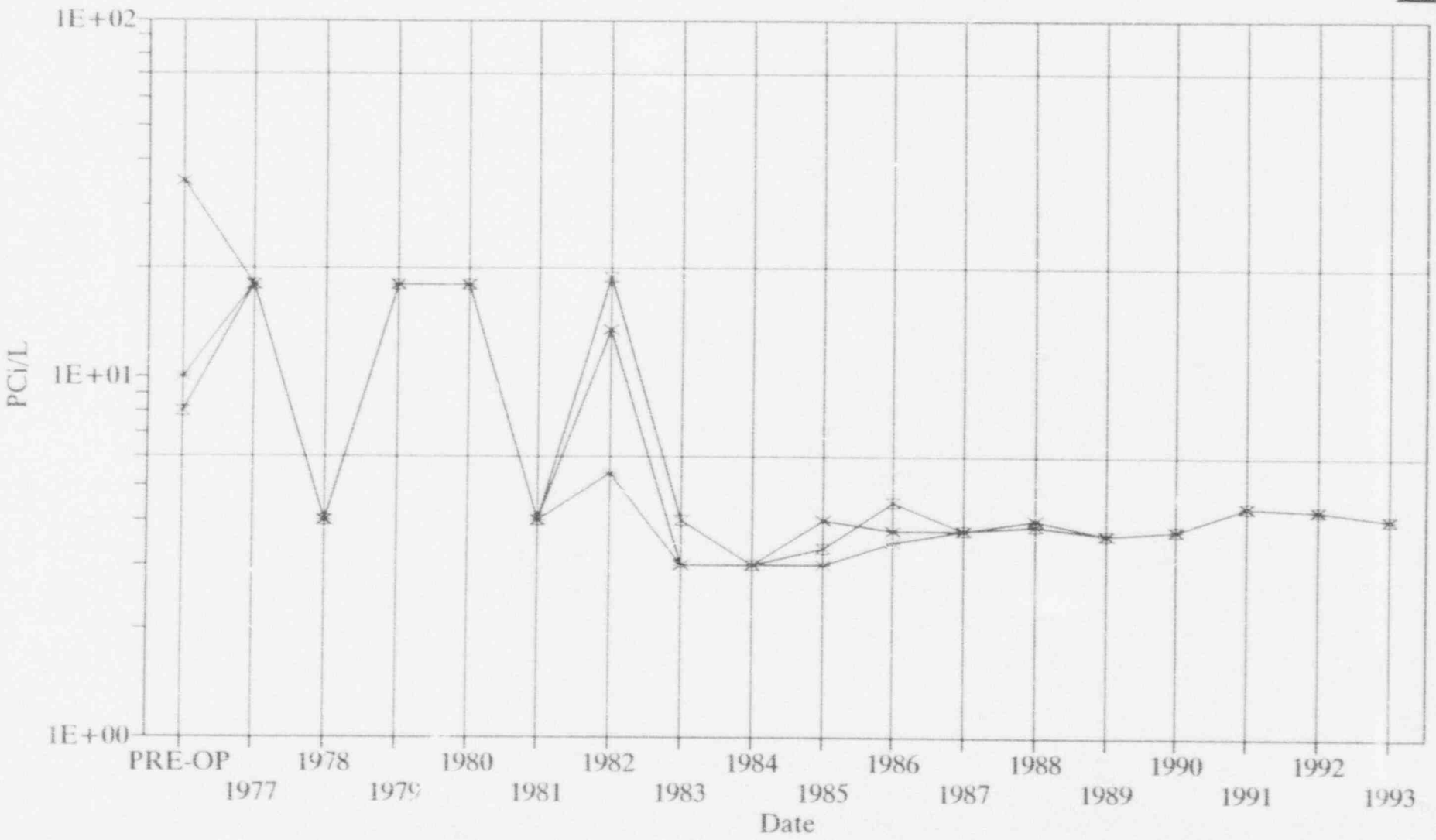
Mean Annual River Water Conc. CS-137



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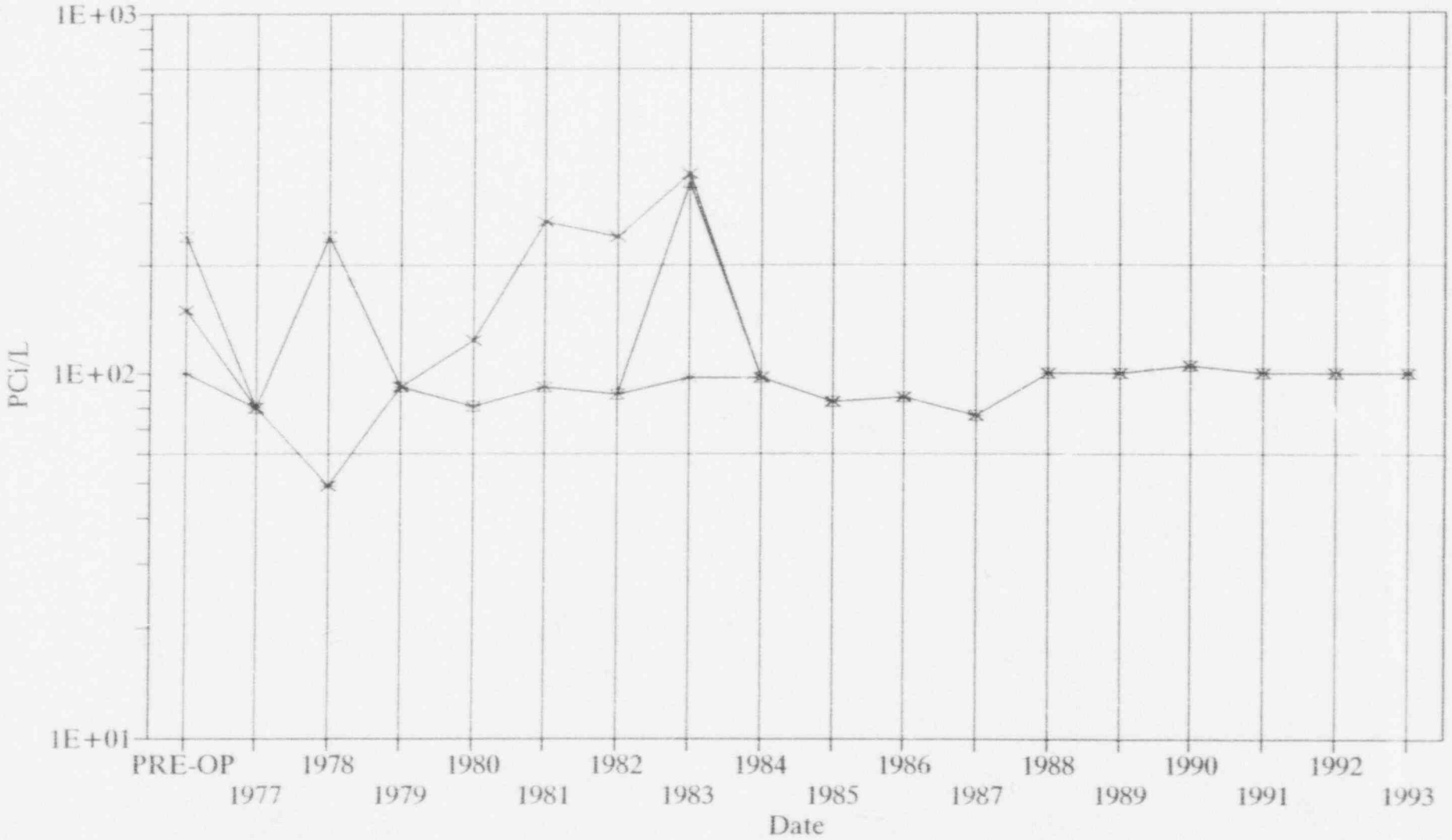
Mean Annual Ground Water Conc. Tritium



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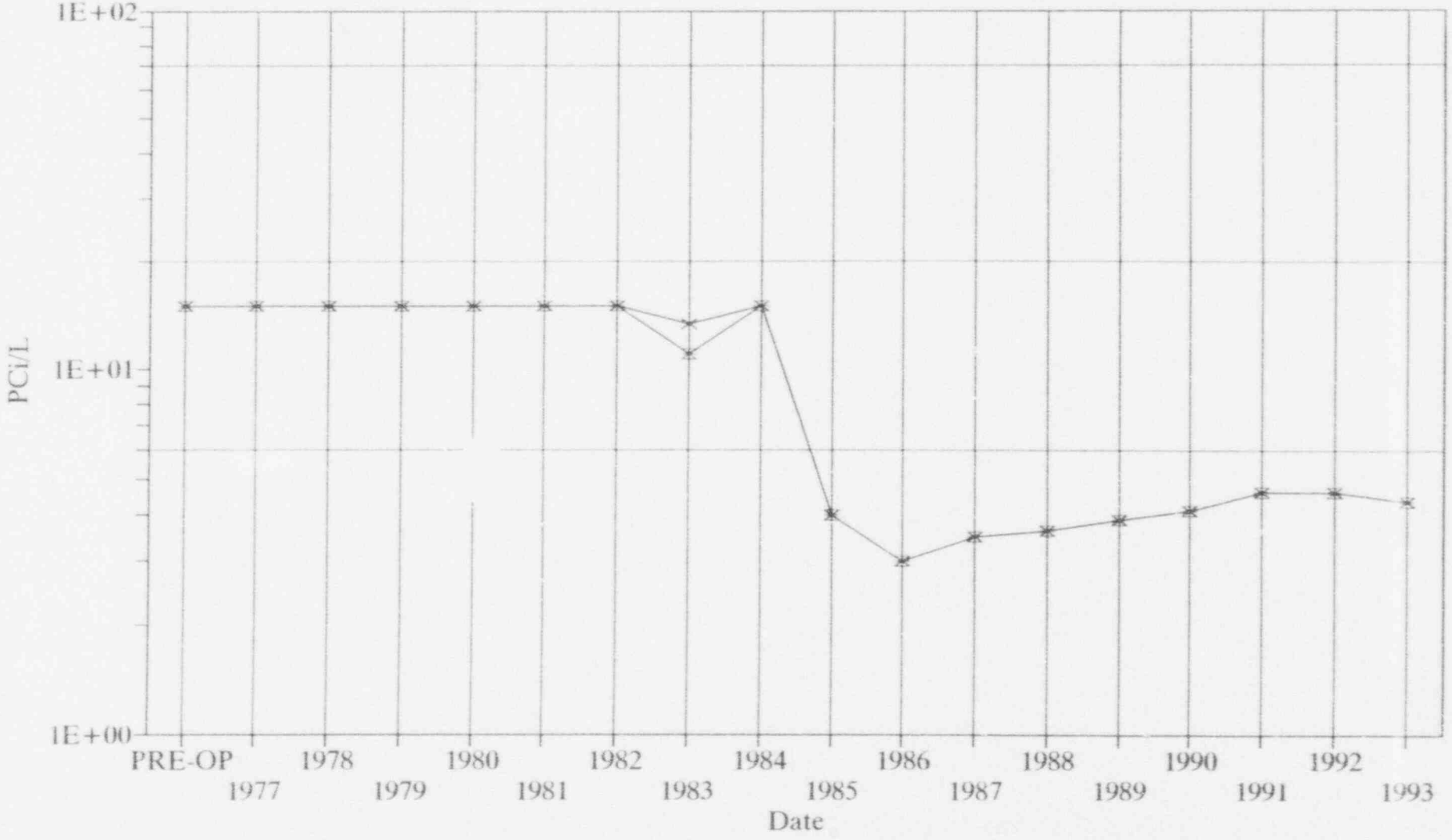
Mean Annual Ground Water Conc. CS-134



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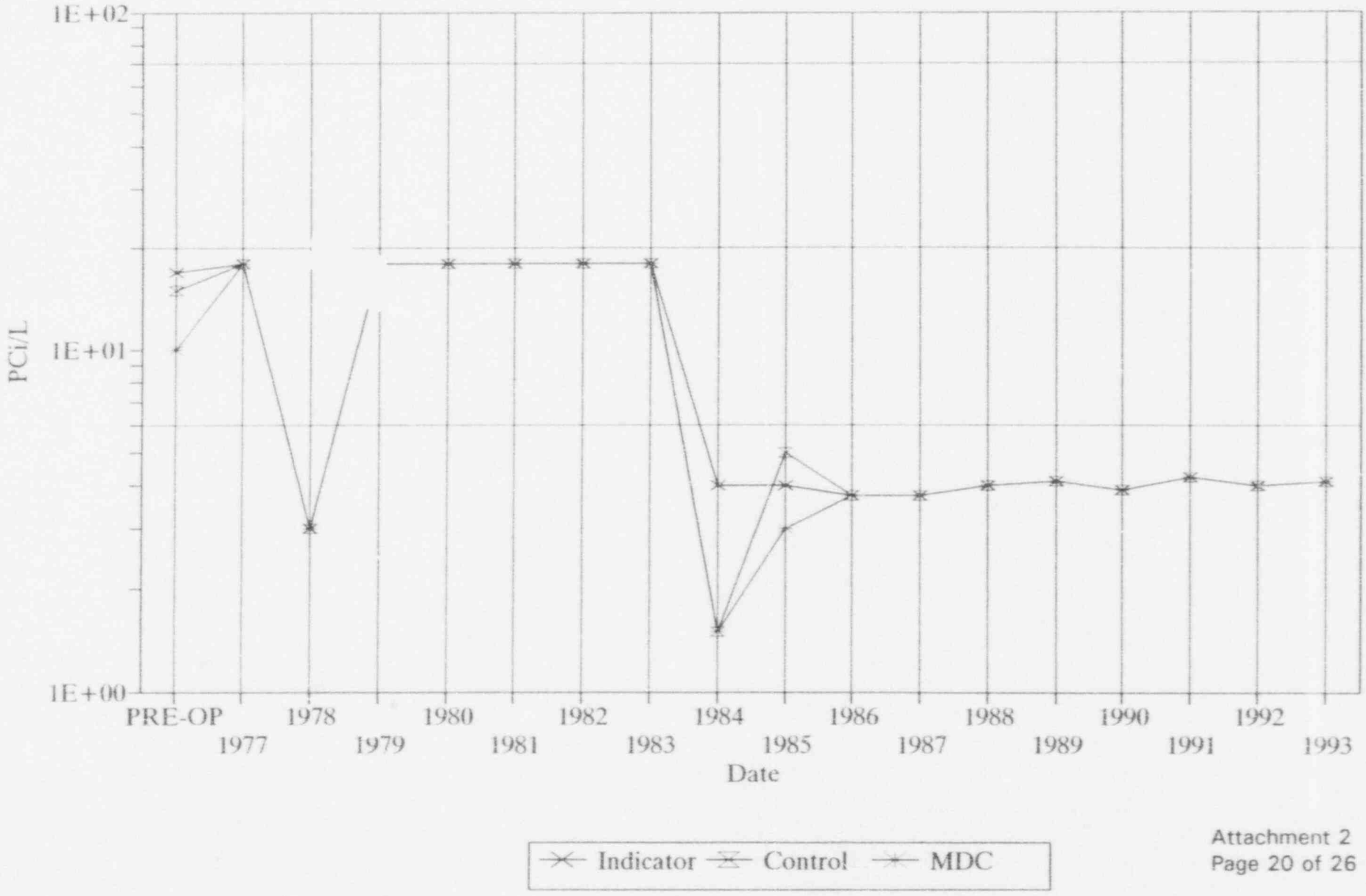
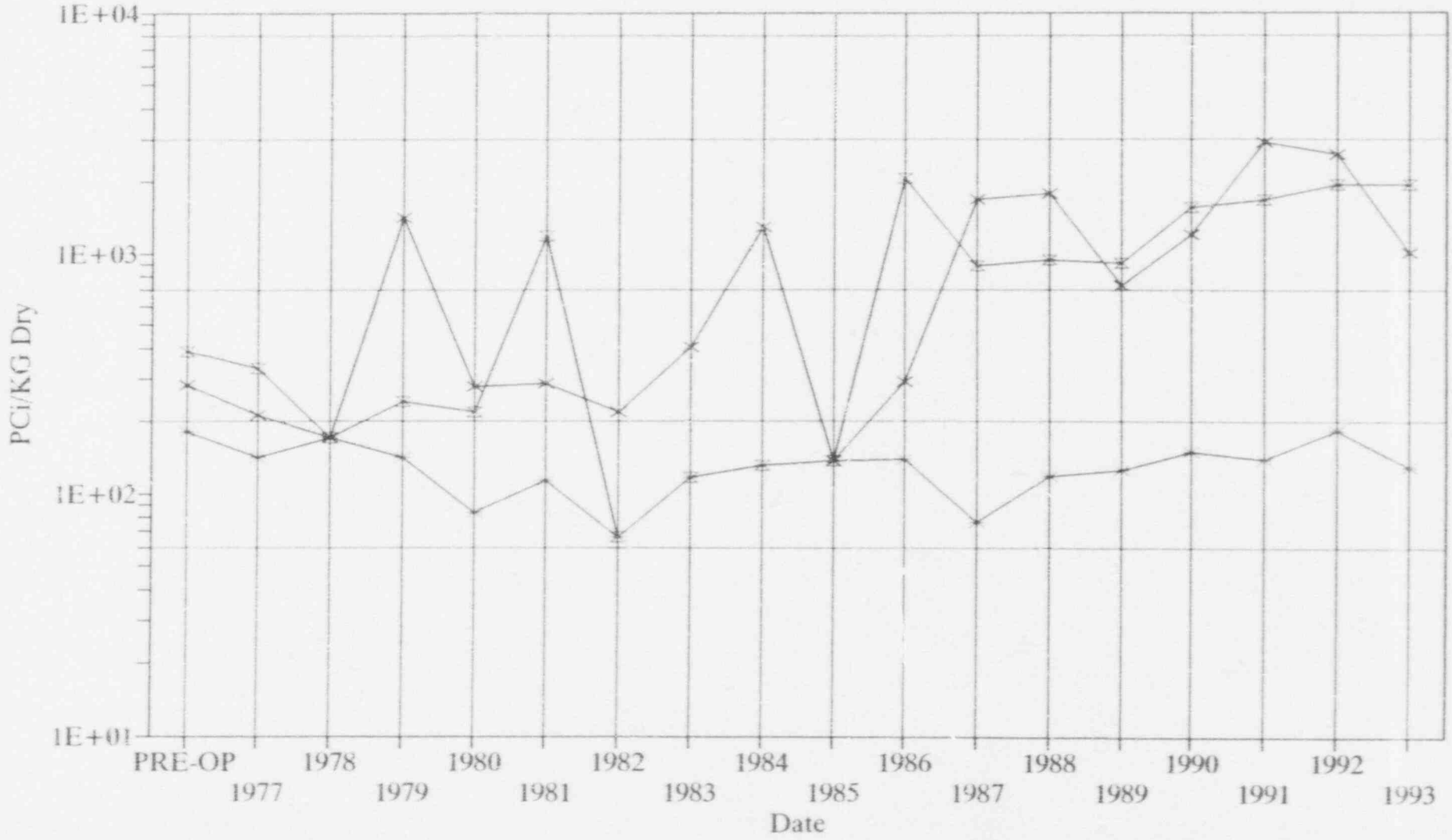
Mean Annual Ground Water Conc. CS-137

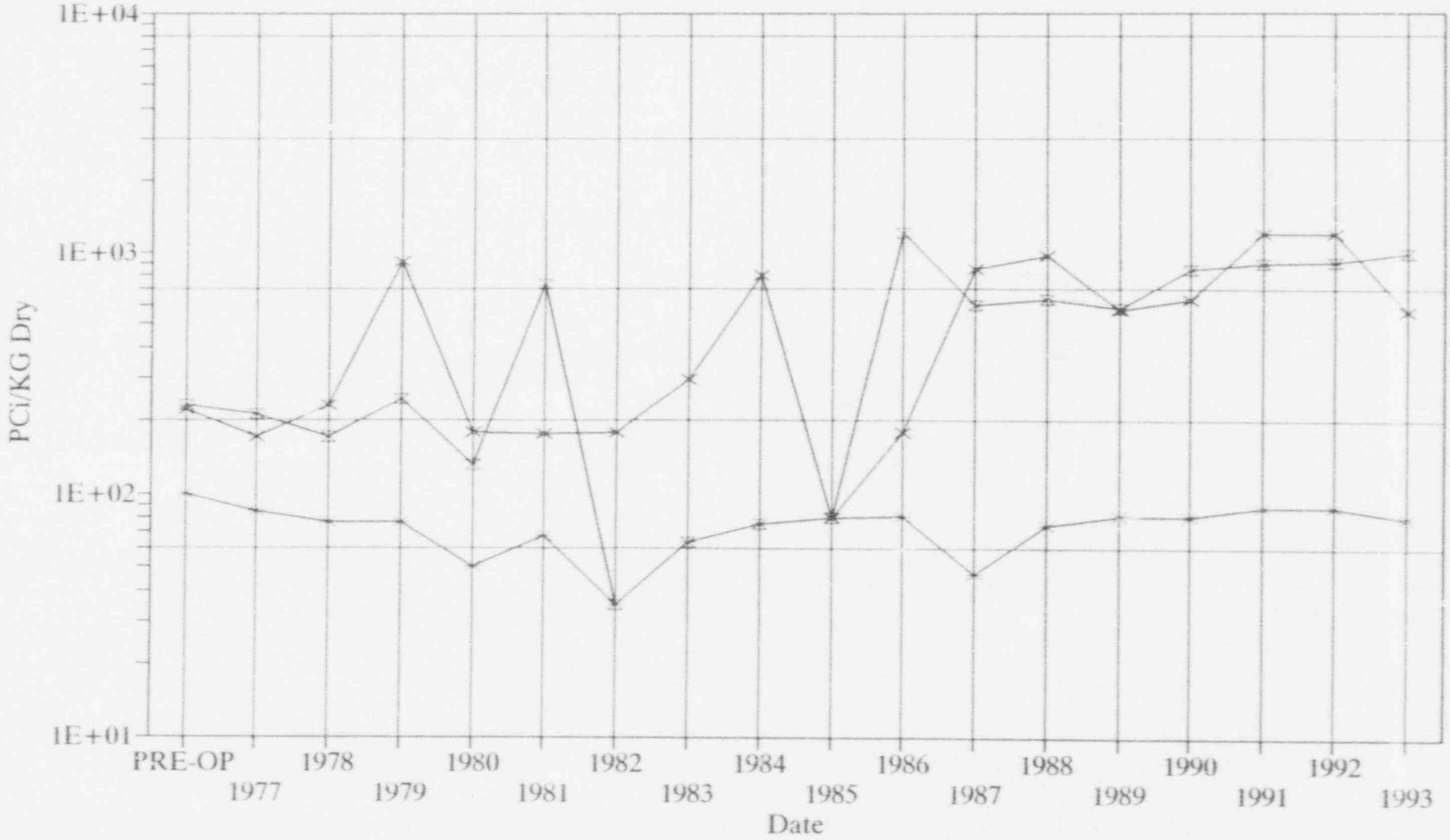


Annual Environmental Operating Report
Mean Annual River Sediment AC-228



Annual Environmental Operating Report

Mean Annual River Sediment BI-214



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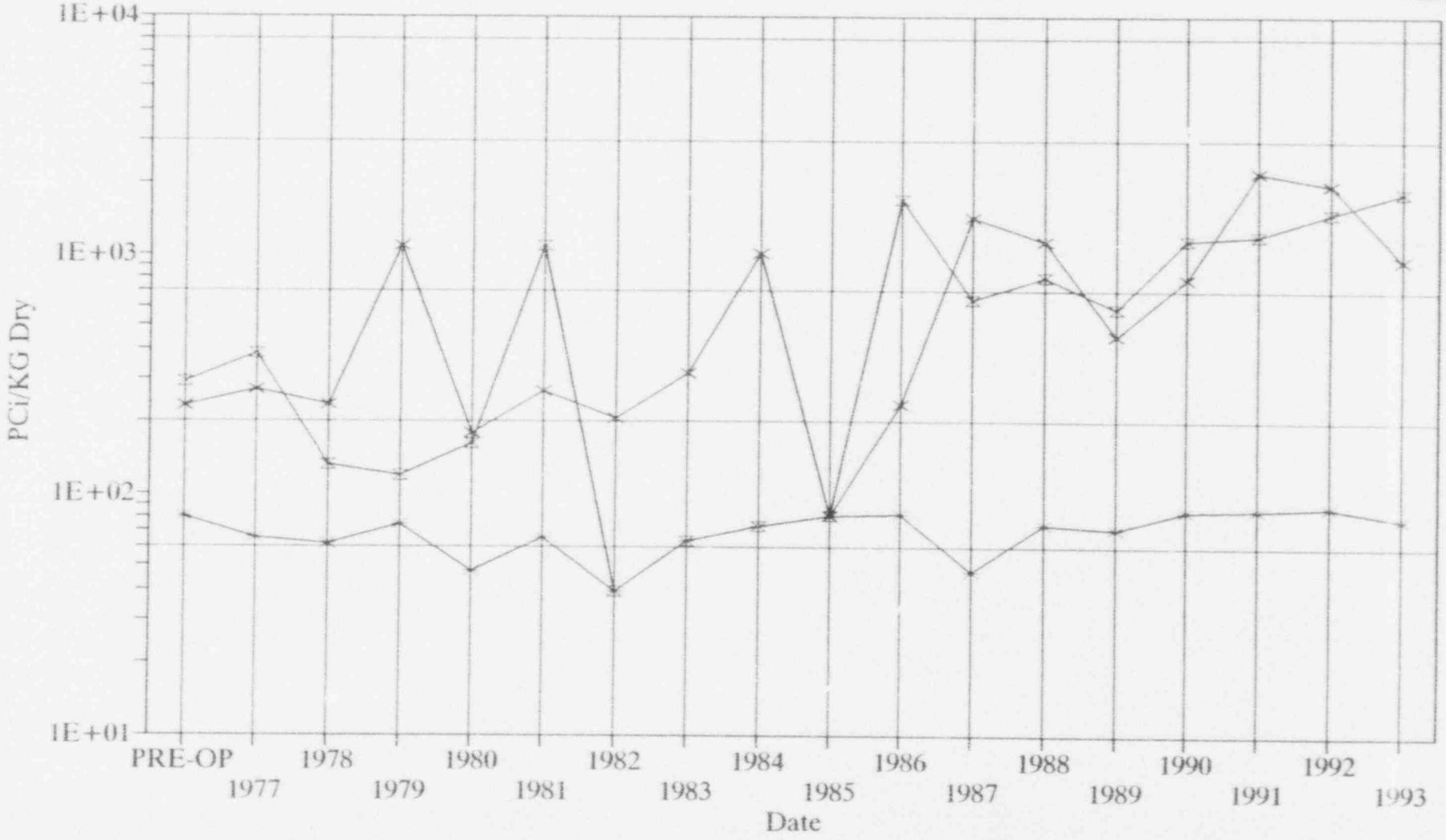
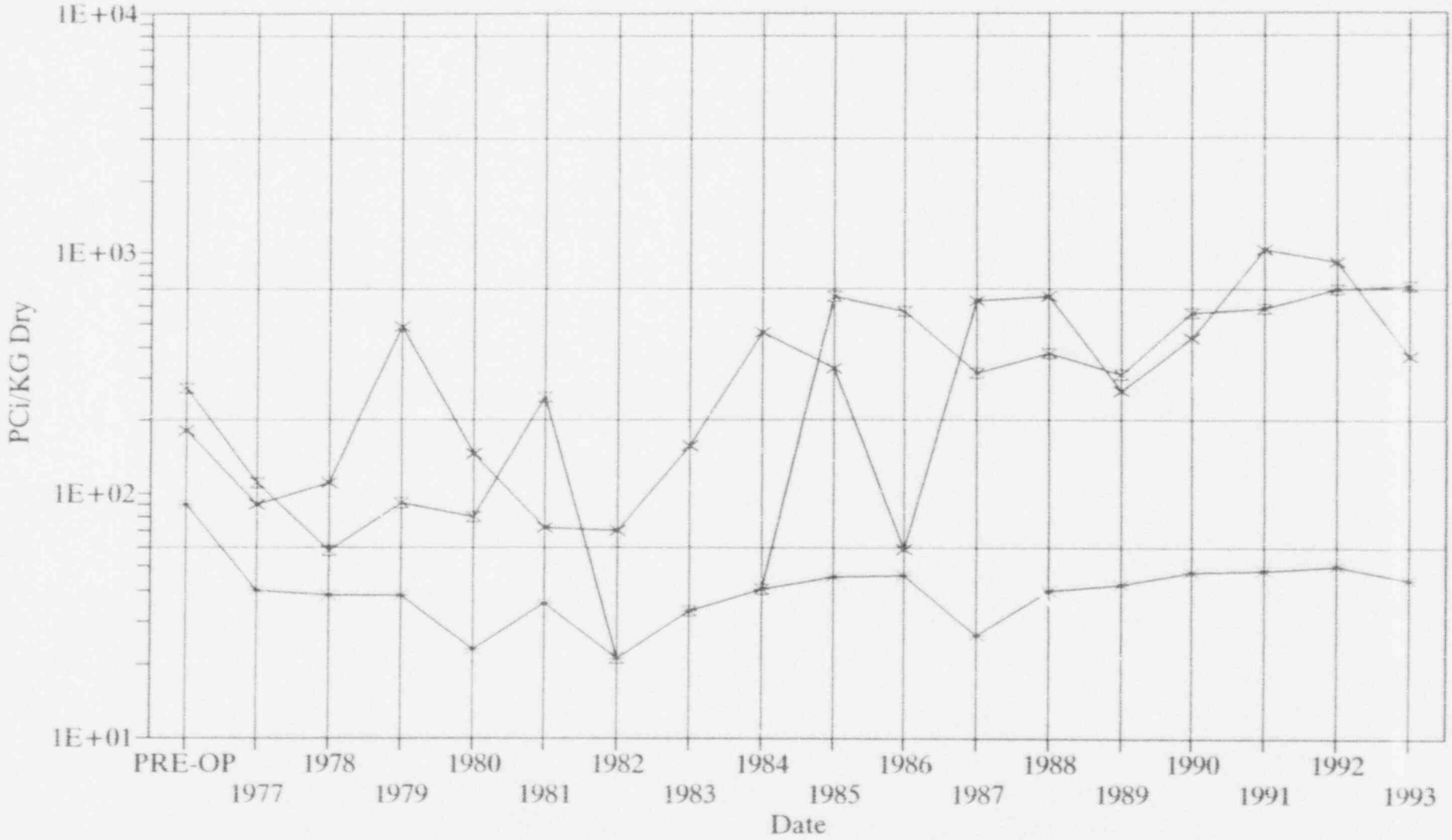
Annual Environmental Operating Report

Mean Annual River Sediment PB-212



Annual Environmental Operating Report
Mean Annual River Sediment TL-208



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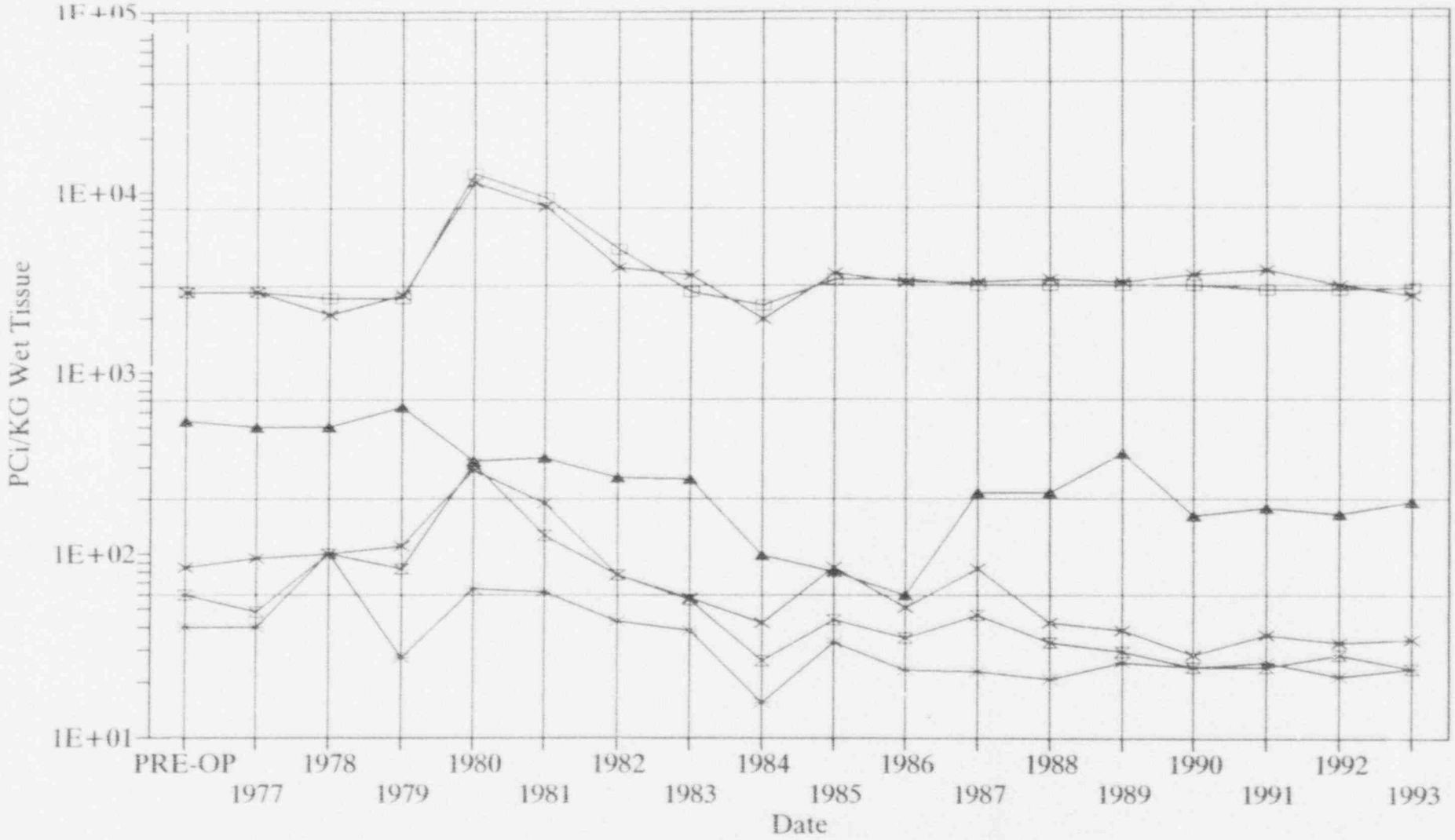
Annual Environmental Operating Report
Mean Annual Game Fish Concentrations



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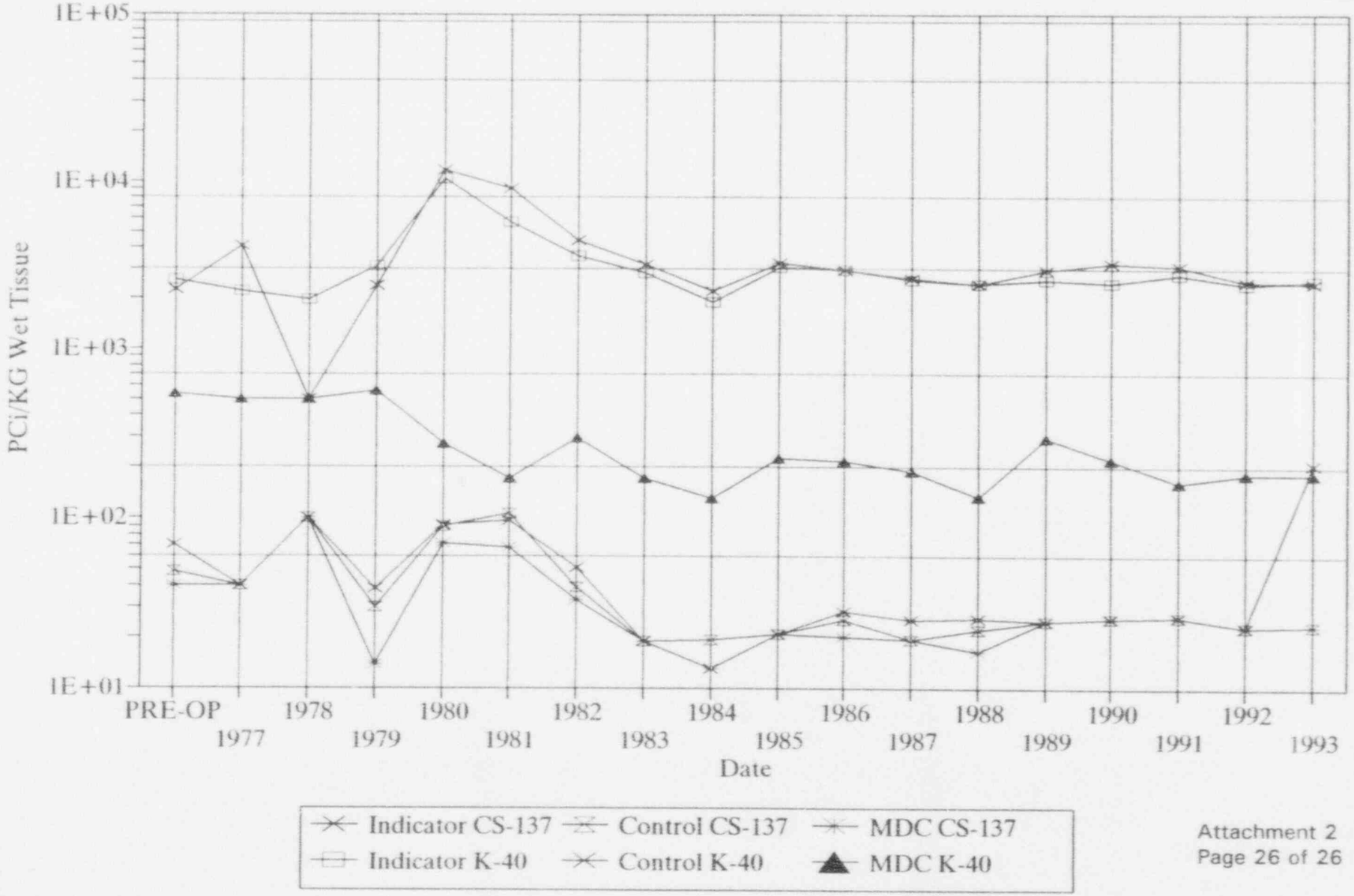
Annual Environmental Operating Report
Mean Annual Bottom-Feeding Fish Conc.



ENCLOSURE 2