Georgia Power

ENCLOSURE

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PREOPERATIONAL ENVIRONMENTAL MONITORING REPORT

GEORGIA POWER COMPANY
VOGTLE ELECTRIC GENERATING STATION
PREOPERATIONAL RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE REPORT
1981-1984

Georgia Power Company

Vogtle Electric Generating Station

Preoperational Radiological Environmental Surveillance Report

1981-1984

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1.0 Introduction and Program Overview

This report presents preoperational radiological environmental monitoring program results for the Vogtle Electric Generating Plant (VEGP) for the period 1981-1984. This report will be updated and presented in final form after conclusion of the preoperational stage of the radiological environmental monitoring program. The operational stage of the radiological environmental monitoring program will commence with initial criticality of Unit 1.

Vogle Electric Generating Plant will contain two PWR generating units, each with a capacity of about 1157 MWe. The 3169-acre site is located in the eastern sector of Burke County, Georgia, on the Savannah River at river mile 151, approximately 23 river miles upstream from the intersection of the Savannah River and U. S. Highway 301.

The purpose of the preoperational radiological environmental monitoring program is to measure the levels of background radiation and radioactivity, in the vicinity of VEGP. These background measurements can be compared with measurements to be taken during plant operation to assess the effects of the plant on levels of radiation and radioactivity in the area. The program provides measurements of radiation and radioactivity for those exposure pathways, and for those radionuclides, which are expected to produce the highest potential radiation doses to individuals as a result of plant operations. The general bases for establishing the radiological environmental monitoring program are set forth in reference 3 with additional guidance provided by references 2, 4, 5 and 6. Requirements for the preoperational phase of the radiological environmental monitoring program are presented in Chapter 6 of the VEGP Environmental Report - Operating License Stage (Reference 1). Requirements for the operational phase of the radiological environmental monitoring program will be established in the VEGP Radiological Effluent Technical Specifications.

In addition to obtaining background data, during the preoperational radiological environmental monitoring program procedures and techniques are developed, equipment is evaluated and calibrated, and personnel are trained.

Neither the operational radiological environmental monitoring program nor the preoperational program was designed to measure the amount of radioactivity discharged from the plant into the environment. This will be done before and during release of liquid effluent and gaseous effluent using sample analyses and effluent monitors. The preoperational and operational radiological environmental monitoring programs are concerned specifically with the impact of plant radiation and radioactive effluents on the surrounding region.

Some samples and monitoring points not expected to be affected by plant operations will be monitored during the preoperational period to establish baseline data. These samples and locations need not be monitored during operation until there is reason to believe that they may become sufficiently affected by plant operations to warrant monitoring.

In August 1981 preoperational monitoring began to be phased in. Periods of 6 months to 2 years, depending on the sample, are usually sufficient to provide an adequate data base for comparison with operational data and to provide experience which may improve the efficiency of the operating program. This period will be extended as feasible; however, the preoperational stage will be concluded at about the time of initial criticality of Unit 1, if not before.

Measurements are taken chiefly at two kinds of locations: indicator stations where long term or maximum radiological levels attributable to operation of the plant are anticipated; and control stations where radiological levels are not expected to be significantly influenced by plant activities. However, all of the indicator and control stations are susceptible to any radiological effects which might be attributed to the operation of neighboring nuclear facilities, as well as to fallout from nuclear weapons tests. These could confuse the proper comparison

of the radiological levels between the indicator and control stations or between the periods of operation and preoperation when attempting to show the effects of plant operation. Measurements may also be taken at locations of special interest, such as nearby institutions or towns, or residences.

Samples are collected and analyzed in accordance with table 1, which includes the basic radiological environmental monitoring program described in table 6.1-1 of VEGP Environmental Report - Operating License Stage as well as supplemental sample stations and sample media which have been added to the basic preoperational program to augment the preoperational environmental data base. The supplemental locations and/or media are designated as such by notation to table 1. All additions and changes to the basic program through 1984 are also discussed in section 4. The locations of the sampling stations are described in table 2 and are shown in figures 1 through 4. The number and locations of the sampling stations were determined largely by the guidance provided in reference 5. Site specific considerations such as accessibility also influenced some of the locations of the sampling stations.

Evaluation of the findings of the program provides the basis for program modification to ensure that the surveillance effort is sufficient and justified. Adjustments will be made as feasible with regard to sample type, sample location, analyses to be performed, collection equipment, sample collection and analysis frequencies, or detection capabilities. Such adjustments are normally much more extensive during preoperations, which is a time of trial and discovery. The operational program is expected generally to be a continuation of the program developed during preoperation.

Indicator stations for airborne particulates and radioiodine are placed near the site boundary; their azimuthal locations were selected upon meteorological considerations. Air sample stations are also placed in the nearest community and at a control location.

The thermoluminescent dosimeter locations for measuring the acquired dose from direct radiation are approximately as follows: an inner ring of stations in the general area of the site boundary and an outer ring in the 4- to 5-mile range from the plant with a station in each sector of each of the rings. The balance of the thermoluminescent dosimeters are placed at locations of special interest and at control locations.

River water sampling locations for control stations were placed upstream of VEGP and indicator stations were placed downstream of VEGP. Further, river water sampling locations were placed at specified locations to distinguish between VEGP and Savannah River Plant discharges, as well as to assess the effects of VEGP operations. River water is collected using automatic sampling equipment in which small quantities of river water are collected approximately hourly. The samples are retrieved monthly.

Drinking water indicator stations are placed at the only two known downstream locations where river water is used for drinking. The control drinking water station is the closest upstream location where river water is used for drinking. An annual survey of the Savannah River is performed to determine the nearest downstream location where river water is used for drinking.

Groundwater is sampled from both the local unconfined aquifer and the regional confined aquifer. However, because the concept of control and indicator stations does not apply well to the sampling of groundwater, groundwater sampling stations are categorized by the type of aquifer sampled rather than as control or indicator. Sample collections are made near the nuclear power block where any groundwater contamination would likely occur. The unconfined aquifer is also sampled at locations approximate to where any contaminated groundwater would more likely be eventually released to the public. Groundwater is not expected to be affected by normal plant operations.

Sediment samples are collected from an indicator station near the edge of the river at a downstream location with

potential for recreational use. Sediment samples are also collected from two control stations located upstream of VEGP.

Milk samples are collected at the nearest location to VEGP where cows are milked for human consumption. If sufficient milk samples are not available, results of grass sample analysis will be used to assess potential exposure via the milk consumption pathway.

Fish samples are collected at a control station located upstream of VEGP and at an indicator station located downstream of VEGP. Fish samples consist of species of fish which are normally consumed by humans.

Grass samples are collected from indicator stations located near the site boundary and at a control location not expected to be affected by VEGP operations. Grass is collected rather than leafy vegetation because: grass will be available almost year-round, whereas leafy vegetation is available only for about 6 months of the year; stations may be placed at desired locations with relative ease; and grass is a suitable collector of I-131 and other radionuclides.

Deviations are permitted from the sampling schedule stated in table 1 if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of sampling equipment and other justifiable reasons. All deviations from the required sampling schedule are discussed in section 3 of this report.

Appropriate analytical techniques are used to achieve the detection capabilities listed in table 3. Detection levels achieved during routine laboratory analyses are presented in table 4.

Contract laboratories and inhouse laboratories which perform required analyses participate in the Environmental Protection Agency environmental radioactivity laboratory intercomparison studies (crosscheck) program or an equivalent program. This participation includes all of the determinations (sample medium and analysis combination) that are offered by the Environmental Protection Agency and that are also included in the

monitoring program. Participation in the crosscheck program is discussed further in section 5 of this report.

A land use survey is conducted each year during the growing season to identify, within a distance of five miles from the plant, the location of the nearest milk animal, the nearest residence and the nearest garden, of greater than fifty square meters producing broad leaf vegetation, in each of the sixteen meteorological sectors. Results of the land use surveys are discussed in section 6 of this report.

2.0 Program Description and Results

In this section, the approach to monitoring or sampling of each medium is described. Results are presented in summary tables in the format recommended by the NRC Branch Technical Position on Radiological Monitoring (reference 5). For those media with sufficient positive measurement results to make trending feasible, sample analysis results are presented in graphic form to illustrate data trends over the period of the preoperational radiological environmental monitoring program. Trend graphs are based on data from indicator stations only. For radioactivity in groundwater, trend graphs are based on data from the local unconfined aquifer.

2.1 Media Affected by Discharges to the Atmosphere

2.1.1 Air

Airborne radioactivity was determined by collecting samples at three indicator locations near the site boundary, one special interest location in the community of Girard, and a control location in Waynesboro. In accordance with the basic program presented in table 1, airborne particulates and radioiodine were sampled at these locations. In addition, the basic program was supplemented by collecting samples of airborne tritium at three of these locations.

Airborne particulate and radioiodine samples were first collected at Hancock Landing (Station 16) and Waynesboro (Station 36) September 9, 1981; at the Meteorological Tower (Station 10) and the community of Girard (Station 35) September 22, 1981; and at the simulator building (Station 7) November 10, 1981.

Airborne tritium was first collected at Hancock Landing August 16, 1983; and at the simulator building and at Waynesboro August 14, 1984.

Aiborne particulates were collected on Gelman Type A/E glass fiber filters and airborne radioiodine was collected on

Scientific Applications, Inc. (SAI) CP-200, TEDA-treated, charcoal cartridges using low volume air samplers, with the charcoal cartridge in series with the air particulate filter. Air sample volumes were determined from air flow measurements and elapsed-time clocks. The samplers were operated continuously; particulate filters and charcoal cartridges were exchanged weekly.

Charcoal cartridges were analyzed for I-131 weekly following collection. Air particulate filters were analyzed weekly for gross beta. Air particulate filters were composited quarterly for each location and analyzed for gamma emitting radionuclides using gamma spectrometry.

Airborne tritium in water vapor was collected by pulling air through a cylinder filled with silica gel. The cylinders were collected and analyzed for tritium weekly.

Gross Beta in Air

For the period 1981-1984, gross beta radioactivity was present above detectable levels in 502 of the 504 air samples collected and analyzed for airborne radioactivity at indicator stations. The mean value for those samples containing detectable radioactivity was 0.022 pCi/m^3, with a range of 0.002 to 0.182 pCi/m^3.

For this same period, airborne gross beta was detected in 171 of 171 air samples collected at the control station in Waynesboro. For those samples collected at the control station, the mean value was 0.023 pCi/m^3, with a range of 0.007 to 0.149 pCi/m^3.

For the nearest community, Girard, during the period 1981-1984, gross beta was detected in 170 of 170 air samples collected. The mean concentration was 0.026 pCi/m^3, with a range of 0.006 to 0.496 pCi/m^3.

The maximum gross beta concentrations for all the stations occurred in the last week of September 1981.

Air particulate filter analysis results for gross beta are summarized in table 5. Average results for airborne beta radioactivity over the period of the preoperational program are shown graphically in figure 5 for indicator stations.

Radioiodine in Air

Charcoal cartridge analysis results for I-131 are summarized in table 6. As shown in the table, no airborne I-131 was detected during the period 1981-1984.

Gamma-emitting Radionuclides in Air

During the period 1981-1984, three man-made gamma-emitting radionuclides and seven naturally-occuring gamma emitters were found above detectable levels in air samples. The three man-made radionuclides detected were Nb-95, Cs-134 and Cs-137.

Nb-95 was present above detectable levels in 1 of 41 samples collected at indicator stations; radioactivity in the sample was 8.0E-04 pCi/m^3. At the control station, Nb-95 was detected in 1 of 14 samples analyzed at a level of 1.0E-3 pCi/m^3.

No Cs-134 was detected in the 14 samples collected at the control station. Cs-134 was detected in 2 of 41 samples collected at indicator stations with an average level of 1.5E-03 pCi/m^3, and a range of 1.0E-3 to 2.0E-3 pCi/m^3.

At the control station Cs-137 was detected in 2 of 14 samples collected; the average level of radioactivity was 1.0E-03 pCi/m^3. Cs-137 was detected in 6 of 41 samples collected at indicator stations; the average level of radioactivity was 1.0E-03 pCi/m^3. For the nearest community Girard, no man-made airborne particulate radioactivity was detected in any of the 14 samples collected during the period 1981-1984.

The results of gamma spectrometry analysis of air samples are summarized in table 7.

Tritium in Air

Sampling for tritium in air began at Station 16 in August 1983 and at stations 7 and 36 in August 1984. For the period August 1983 - December 1984, tritium was present at detectable levels in 92 of the 92 samples collected at indicator stations. The mean concentration of tritium was 150 pCi/m^3, with a range of 8 to 830 pCi/m^3.

For the control station in Waynesboro during this period, tritium was detected in all of the 21 samples collected. The mean concentration of tritium was 120 pCi/m^3, with a range of 9 to 450 pCi/m^3.

The maximum concentration for the indicator stations occurred the last week in September 1984 and for the control station the last week in October 1984.

Weekly tritium analysis results are summarized along with the results of the quarterly gamma spectrometry analysis of the particulate filter composites in table 7. Airborne tritium concentration trends over the period of the preoperational program are shown in figure 6.

2.1.2 Direct Radiation

Thermoluminescence dosimetry (TLD) has been used continuously to measure dose due to direct radiation in the vicinity of VEGP since August 5, 1981. TLD stations are located in each sector near the site boundary and at distances of 4 to 5 miles. Five of the 4 to 5 mile TLD stations are located on the Savannah River Plant site. TLD stations are also located at three control locations in the vicinity of Waynesboro. In addition, TLD stations are placed at locations of special interest which are the community of Girard, the Girard Elementary School, the Georgia Power Company Employee Recreation Area, and a nearby residence located SE of the plant at 3.3 miles. Locations were selected in accordance with guidance given in Reference 5. Exact locations of all TLD stations are shown in table 2.

Dosimeters were first installed at stations 1 through 36 during the third quarter 1981; at stations 37 and 38 during the fourth quarter 1983; and at station 43 during the second quarter 1984.

Two TLDs (LiF chips) were placed at each station, and were exchanged quarterly. After July 1, 1983, the TLDs were furnished and analyzed by Teledyne Isotopes Midwest Laboratory. Prior to July 1, 1983, TLDs were furnished and read by Hazleton Environmental Sciences, Inc. (HES), of Northbrook, Illinois. (Effective July 1, 1983, Teledyne Isotopes acquired HES and the Nuclear Science Department of HES began operation under the name of Teledyne Isotopes Midwest Laboratory.)

During the period 1981-1984, the mean direct radiation dose per quarter at site boundary stations was 15 mrem with a range of 8.8 to 25 mrem; and at four to five-mile radii 14 mrem, with a range of 8.2 to 24 mrem. For locations of special interest and control locations, doses were within the same range as those reported for the site boundary and four to five-mile radii stations.

Direct radiation measurement results are summarized in table 8. Average values for site boundary TLDs, over the preoperational program thus far, are shown by the graph in figure 7.

2.1.3 Milk

Milk samples were collected biweekly at the location of the closest milking animal, which was the W. C. Dixon Dairy located SE of the plant at 9.8 miles. Milk Samples were first collected at this station on August 25, 1981. The milking animals at this location were cows. In accordance with table 1, milk samples were collected biweekly and analyzed for I-131 and gamma isotopics. These analyses are performed by the Center for Applied Isotope Studies, University of Georgia, Athens, Georgia.

Another dairy was in operation briefly during the spring of 1984 at a location approximately 4.5 miles SE of VEGP. Milk sampling was initiated and milk samples were collected May 22, 1984, at this location. Prior to the next sample collection date, the dairy operation was discontinued. No radioiodine was detected in this milk sample; the only gamma emitter detected was the naturally-occuring K-40.

No I-131 was detected in the 84 milk samples analyzed for radioiodine during the period 1981 through 1984.

Cesium-137 was detected in 6 of 85 samples analyzed for gamma-emitting radionuclides. The mean value was 18 pCi/liter, for those samples containing detectable Cs-137, with a range of 9 to 27 pCi/liter. The highest concentrations of Cs-137 were detected in December 1981.

Niobium-95 was detected in 1 of 85 samples at a concentration of 11 pCi/liter.

Milk sample analysis results are summarized in table 9, for the W. C. Dixon dairy.

2.1.4 Vegetation

Grass sampling stations include two indicator locations on the plant site and a control station near Waynesboro. Exact locations are given in table 2 and shown in figures 1 and 3.

Grass samples were collected initially at Waynesboro and at the simulator building December 29, 1981; and at Hancock Landing April 27, 1982.

The grass sample plot at Waynesboro has been located at the substation on the north side of Georgia highway 80, on the western outskirts of town, since sampling began in December 1981. Prior to the fourth quarter 1983, this location was included under station number 36, which was the general station number for Waynesboro. However, in the fourth quarter 1983, two additional stations were established in the Waynesboro vicinity, primarily as TLD locations. One of these additional locations was at the electrical substation, very near the grass plot; this location was designated station 37. Therefore, since the fourth quarter 1983, the Waynesboro grass plot has been considered to be located at station 37.

Grass is collected rather than leafy vegetation because: grass is available almost year-round, whereas leafy vegetation is available only for about six months of the year; stations may be placed at desired locations with relative ease; and grass is a suitable collector of I-131 and other radionuclides.

Grass samples were collected monthly and dried grass samples were analyzed by gamma spectrometry for gamma emitting radionuclides in accordance with table 1. Beginning in January 1984, grass samples were also analyzed for tritium.

Analyses were performed by the Center for Applied Isotope Studies, University of Georgia, Athens, Georgia.

Grass sample analysis results are summarized in table 10. Average results over the period of the preoperational program are illustrated in figure 8 for tritium and in figure 9 for Cs-137, which was selected to represent gamma emitting radionuclides.

During the period 1981-1984, Cs-134, Cs-137 and Nb-95 were the only man-made gamma-emitting radionuclides detected in grass samples.

Niobium-95 was detected in 1 of 54 samples collected at indicator stations at a concentration of 15 pCi/Kg(wet). No Nb-95 was detected at the control location.

No Cs-134 was detected at indicator stations. Cesium-134 was detected in 1 of 31 samples collected at the control station at a level of 70 pCi/Kg(wet).

Cesium-137 was detected in 44 of 54 samples collected at indicator stations. The mean concentration of the 44 samples with detectable activity was 51 pCi/Kg(wet), with a range of 8 to 180 pCi/Kg(wet).

At the control station, Cs-137 was detected in 7 of 31 samples analyzed, with a mean concentration of 36 pCi/Kg(wet) and a range of 14 to 65 pCi/Kg(wet).

In January 1984, analysis of grass samples for tritium was initiated. During 1984, tritium was detected in 21 of 21 grass samples collected at indicator stations. The mean concentration of tritium was 9.7 E3 pCi/Kg(wet), with a range of 1.7E2 to 1.2E5 pCi/Kg(wet). The highest concentration at indicator stations occurred in February 1984.

During 1984, tritium was detected in 9 of 10 grass samples collected at the control station. The mean concentration for the samples in which tritium was detected was 7.8E2 pCi/Kg(wet), with a range of 1.5E2 to 2.3E3 pCi/Kg(wet). The highest concentration at the control station occurred in August of 1984.

2.2 Media Affected by Discharges to the River

2.2.1 River Water

Water samples were collected from the Savannah River in accordance with table 1 using automatic sampling equipment. Samples were collected at two control stations located upstream of the point where VEGP liquid effluent discharges into the Savannah River, and at three indicator stations located downstream of the discharge point. Sampling locations are presented in table 2 and are shown in figure 2. River water sampling stations were placed at the specified locations to distinguish between VEGP and Savannah River Plant liquid discharges, as well as to assess the effects of VEGP operations. River water samples were initially collected from stations 81, 82, 83 and 84 on September 18, 1981; and from station 85 on May 4, 1982.

River water was collected using automatic sampling equipment in which small quantities of river water were collected approximately hourly. The samples were retrieved from the collectors monthly. Monthly samples were analyzed for gamma emitting radionuclides by gamma spectrometry. Quarterly composites, prepared from the monthly samples by station, were analyzed for tritium.

River water samples were analyzed by the Center for Applied Isotope Studies, University of Georgia, Athens, Georgia.

During the period 1981-1984, six man-made radionuclides were detected in samples of river water: H-3, Zr-95, Nb-95, I-131, Cs-134, and Cs-137.

At indicator stations Cs-134 was detected in 5 of 115 river water samples analyzed. The mean concentration of the 5 samples containing measurable levels of Cs-134 was 4.2 pCi/l, with a range of 3 to 7 pCi/l. For control stations, Cs-134 was detected in 2 of 82 samples analyzed. The mean concentration was 9.9 pCi/l for the two samples containing detectable levels of Cs-134 with a range of 4 to 16 pCi/l.

Cesium-137 was detected in 11 of 115 samples collected at indicator stations. The mean concentration of the 11 samples containing detectable Cs-137 was 5.3 pCi/l, with a range of 3 to 17 pCi/l. At the control stations, Cs-137 was detected in 10 of 82 samples. For the 10 samples containing detectable Cs-137, the mean concentration was 4.9, with a range of 3 to 13 pCi/l.

Tritium was detected in all 39 river water samples collected at indicator stations and analyzed for tritium. The mean concentration was 1.5E3 pCi/l, with a range of 3.3E2 to 4.3E3 pCi/l. At control stations, tritium was detected in all 28 samples analyzed for tritium. The mean concentration was 5.8E2 pCi/l, with a range of 3.1E2 to 1.1E3 pCi/l.

For control and indicator stations the highest tritium concentrations in river water were found in river water samples composited over the third quarter 1983.

Iodine-131 was detected in 1 of 115 samples collected at indicator stations at a concentration of 5 pCi/l. No I-131 was detected in samples collected at control stations.

Niobium-95 was detected in 1 of 115 samples collected at indicator stations at a concentration of 4 pCi/l. No Nb-95 was detected in samples collected at control stations.

Zirconium-95 was detected in 3 of 115 samples collected at indicator stations at a mean concentration of 6.3 pCi/l and a range of 6 to 7 pCi/l. No Zr-95 was detected at control stations.

River water sample analysis results are summarized in table 11. Average results over the period of the preoperational program are illustrated in figures 10 and 11 for H-3 and Cs-137.

2.2.2 Drinking Water

Raw drinking water taken from the Savannah River and finished drinking water taken from the water treatment plants, after processing, were sampled in accordance with table 1. Raw drinking water samples were collected monthly from the supplies to the Cherokee Hill Water Treatment Plant (Port Wentworth,

Georgia) and Beaufort-Jasper County Water Treatment Plant (Beaufort, South Carolina), which are the two indicator stations, and from the North Augusta Water Treatment Plant (North Augusta, South Carolina), which is the control station. These samples were obtained using automatic sampling equipment which collected aliquots of water approximately hourly. Finished drinking water was sampled by collecting grab samples of finished drinking water monthly at each of these three locations. These are the three nearest locations to VEGP where drinking water is taken from the Savannah River. Sampling locations are presented in table 2 and are shown in figure 4.

Utilizing automatic sampling equipment, composite raw drinking water samples were first collected at North Augusta, South Carolina, November 2, 1983; and at Port Wentworth, Georgia and Beaufort, South Carolina, January 4, 1984.

Finished drinking water samples were first collected at Port Wentworth, Georgia, November 10, 1981; at North Augusta, South Carolina, January 4, 1983; and at Beaufort, South Carolina, January 4, 1984.

Annual river surveys were conducted to confirm that these locations were the nearest locations where drinking water was taken from the Savannah River. Dates of the annual river surveys are given in table 24.

Monthly composites and grab samples were analyzed for gross beta, I-131, and gamma isotopics. Quarterly composites were analyzed for tritium. Quarterly composites were prepared from the monthly samples by station.

Drinking water sample analyses were performed by the Center for Applied Isotope Studies, University of Georgia, Athens, Georgia.

Raw Drinking Water

Raw drinking water samples were analyzed for gross beta, I-131, tritium, and gamma-emitting radionuclides. (Tritium analysis of raw drinking water did not begin until January 1984.)

At the indicator stations gross beta was detected in 20 of 26 samples analyzed. For the 20 samples containing detectable

beta activity, the mean concentration was 2.7 pCi/l, with a range of 1.5 to 5.5 pCi/l. At the control station, beta activity was detected in 10 of 13 samples analyzed. The mean concentration of the 10 samples containing detectable beta activity was 1.9 pCi/l, with a range of 1.4 to 2.5 pCi/l.

Tritium was detected in all 8 of the composite samples collected at indicator stations and in all 4 of those collected at the control station. At the indicator stations the mean tritium concentration was 2.3E3 pCi/l, with a range of 9.7E2 to 3.6E3 pCi/l. At the control station, the mean tritium concentration was 4.0E2 pCi/l, with a range of 3.6E2 to 4.3E2 pCi/l.

Cesium-134 was detected in 3 of 26 samples collected at indicator stations and none of 13 at the control station. For the 3 samples containing Cs-134 the mean concentration was 7.0 pCi/l, with a range of 5.0 to 9.0 pCi/l.

Cesium-137 was detected in 1 of 26 samples collected at indicator stations and 1 of 13 at the control station, at concentrations of 7.0 pCi/l and 8.0 pCi/l, respectively.

Thirteen samples collected at the control station and 26 samples collected at indicator stations were analyzed specifically for I-131. None was detected.

Raw drinking water sample analysis results are summarized in table 12. Average results over the period of the preoperational program are illustrated in figures 12 through 14 for gross beta, tritium, and Cs-137, which was selected to represent gamma emitting radionuclides.

Finished Drinking Water

Finished drinking water samples were also analyzed for gross beta, I-131, tritium, and gamma emitting radionuclides.

At the indicator stations, gross beta activity was detected in 45 of 51 samples. The mean concentration of the 45 samples containing gross beta activity was 2.9 pCi/l, with a range of 1.3 to 34 pCi/l. At the control station, gross beta activity was detected in 18 of 26 samples. For the 18 samples containing detectable gross beta activity, the mean concentration was 1.8 pCi/l, with a range of 1.3 to 2.3 pCi/l.

Tritium was detected in all 18 samples from indicator stations and in all 9 samples from the control station. The mean concentration of tritium at indicator stations was 2.9E3 pCi/l with a range of 1.0E3 to 5.2E3 pCi/l. At the control station the mean concentration was 3.8E2 pCi/l, with a range of 2.4E2 to 5.2E2 pCi/l.

Cs-134 was detected in 3 of 51 samples at indicator stations at a mean value of 1.9E1 pCi/l with a range of 5 to 4.5E1 pCi/l. At the control station Cs-134 was detected in 2 of 26 samples at a mean concentration of 7.5 pCi/l with a range of 6 to 9 pCi/l.

Cs-137 was detected in 3 of 51 samples at indicator stations at a mean value of 2.3E1 pCi/l with a range of 6 to 5.6E1 pCi/l at the control station, Cs-137 was detected in 3 of 26 samples set a mean concentration of 5.7 pCi/l with a range of 4 to 7 pCi/l.

I-131 was detected in 1 of 45 samples at indicator stations at a level of 7.7E-1 pCi/l. No I-131 was detected in the 26 samples collected at the control station.

Finished drinking water sample analyses results are summarized in table 13. Average results over the period of the preoperational program are illustrated in figures 15 through 17 for gross beta, tritium, and Cs-137, which was selected to represent gamma-emitting radionuclides.

2.2.3 Sediment

Sediment samples were collected from the Savannah River in accordance with table 1. Samples were collected at two control stations located upstream of the point where VEGP liquid effluent discharges into the Savannah River, and at one indicator station located downstream of the discharge point. Sediment sampling locations are presented in table 2 and are shown in figure 2. Sediment sampling stations were placed at the specified locations to distinguish between VEGP and Savannah River Plant effects on sediment as well as to assess the effects of VEGP operations.

Sediment samples were first collected in the vicinity of station 82 and in the vicinity of station 84 August 26, 1981; and in the vicinity of station 81 October 4, 1982.

Sediment samples were collected semiannually. These samples were analyzed for gamma isotopics by the Center for Applied Isotope Studies, University of Georgia, Athens, Georgia.

During the period 1981-1984, Cs-137 was detected in 4 of 5 samples collected at the indicator station. The mean level of radioactivity was 3.2E2 pCi/kg with a range of 6.1E1 to 7.8E2 pCi/kg. At the control stations Cs-137 was detected in 8 of 8 samples collected; the mean level of radioactivity was 1.5E2 pCi/kg with a range of 4.3E1 to 3.4E2 pCi/kg.

Cs-134 was detected in none of the five samples collected at indicator stations and in 1 of 8 samples collected at control stations at a concentration of 9.3E1 pCi/kg.

Ce-141 was detected in none of the five samples collected at indicator stations and in 1 of 8 samples collected at control stations at a concentration of 8.5E1 pCi/kg.

Nb-95 was detected in 1 of 5 samples collected at indicator stations and 1 of 8 samples collected at control stations at concentrations of 8.2E1 and 6.8E1 pCi/kg respectively.

Zr-95 was detected in none of the five samples collected at indicator stations and in 1 of 8 samples collected at control stations at a concentration of 1.0E2 pCi/kg.

Results of sediment sample analyses are summarized in table 14. Average results over the period of the preoperational program are illustrated in figure 18 for Cs-137, which was selected to represent gamma emitting radionuclides.

2.2.4 Fish

Beginning in August 1981, samples of commercially or recreationally important species of fish were collected semiannually from a control station located upstream of the point where VEGP liquid effluent is discharged into the Savannah River and from an indicator station located downstream of the discharge

point. Fish sampling stations are presented in table 2 and are shown in figure 2. However, these are approximate locations for fish sampling; it is generally necessary to cover a stretch of river up to five miles to obtain an adequate fish sample.

Fish samples were collected using electro-fishing techniques. Samples were prepared for analysis by filleting the fish; only edible portions of the fish were analyzed.

Fish samples were analyzed for gamma isotopics by the Center for Applied Isotope Studies, University of Georgia, Athens, Georgia.

During the period 1981-1984, Cs-137 was detected in 15 of 15 samples collected at the indicator station and 12 of 17 samples collected at the control station. The mean level of Cs-137 in samples collected at the indicator station was 5.9E2 pCi/kg with a range of 6.3E1 to 3.4E3 pCi/kg. At the control station the mean level of Cs-137 was 3.4E2 pCi/kg with a range of 6.4E1 to 1.5E3 pCi/kg, for those samples containing detectable levels of Cs-137.

Cs-134 was detected in none of the 15 samples from indicator stations and in 2 of 17 samples collected from control stations at a mean concentration of 1.0E2 pCi/kg with a range of 2.3E1 to 1.9E2 pCi/kg.

Nb-95 was detected in none of the 15 samples collected at indicator stations and in 1 of 17 samples collected at control stations at a concentration of 3.4E1 pCi/kg.

Results of fish sample analyses are summarized in table 15. Average results over the period of the preoperational program are illustrated in figure 19 for Cs-137, which was selected to represent gamma emitting radionuclides.

2.3 Groundwater

Groundwater is being monitored as part of the preoperational radiological environmental monitoring program. However, liquid releases from VEGP will only be made to the Savannah River via the discharge canal and groundwater is not expected to be affected by normal plant operations.

Groundwater sampling locations are presented in table 2 and shown in figure 1. Due to the characteristics of groundwater flow, it is inappropriate to apply the concept of control and indicator stations to groundwater sampling locations. Groundwater sampling locations are categorized in accordance with the aquifer sampled.

At VEGP, groundwater is sampled from both the local unconfined aquifer and the regional confined aquifer. Collections are made near the nuclear power block where any groundwater contamination would likely occur. The unconfined aquifer is also sampled at locations approximate to where any contamination would more likely be eventually released to the public.

Groundwater sample collection began at sample locations 51, 61, and 62 in August 1982, and at location 63 in July 1983. Changes made in groundwater sampling locations prior to December 31, 1984, are discussed in Section 4 of this report.

Groundwater samples were collected and analyzed in accordance with table 1. Grab samples were collected quarterly at each of the groundwater sampling stations. These samples were analyzed for tritium and gamma isotopics by the Center for Applied Isotope Studies, University of Georgia, Athens, Georgia.

During the period 1982-1984, tritium was detected in 14 of 14 samples collected from the local unconfined aguifer and analyzed for tritium. The mean tritium level was 2.3E3 pCi/l, with a range of 1.3E3 to 3.8E3 pCi/liter. Tritium was detected 2 of 13 samples collected from the regional confined aquifer; the mean value was 2.6E2 pCi/l with a range of 2.4E2 to 2.8E2 pCi/l.

Cs-137 was detected in 2 of 17 groundwater samples taken from the local unconfined aquifer and analyzed by gamma spectrometry; the mean value was 3.5 pCi/l with a range of 3.0 to 4.0 pCi/l.

Cs-137 was detected in 2 of 13 samples taken from the regional confined aquifer. The mean value was 5.5 pCi/l with a range of 3.0 to 8.0 pCi/l.

Cs-134 was detected in 1 of 13 sampled collected from the regional confined aquifer at a concentration of 5.0 pCi/l. Cs-134 was detected in none of the 17 samples taken from the local unconfined aquifer.

Results of groundwater samples analyses are summarized in table 16. Average results over the period of the preoperational program are shown in figure 20 for tritium and figure 21 for Cs-137, which was selected to represent gamma-emitting radionuclides.

3.0 Deviations from the Program

3.1 Deviations During 1981

Medium	Date	Deviation
Air	11/23/81	Sample was not collected at Station 36 due to sample pump malfunction.
TLD	Third Quarter/81	Dosimeter at Station 23 was lost in the field.
Milk	11/10/81	Sample was not available from supplier at Station 98.

3.2 Deviations During 1982

Medium	Date	Deviation
Air	3/1/82	Electrical power was lost at Station 16. Therefore neither gross beta nor I-131 samples were available.
Air	7/6/82	Air particulate filter was reported missing by the contract laboratory for Station 7.
Air	8/31/82	Neither air particulate sample nor I-131 was collected at Station 7 due to sampling system malfunction.

Medium	Date	Deviation
TLD	First Quarter/82	Dosimeter at Station 1 was lost in the field.
TLD	First Quarter/82	Dosimeter at Station 23 was lost in the field.
Milk	4/27/82	Sample not available from supplier at Station 98.
Grass	1/82	Insufficient grass on plots at Station 7 and 36.
Grass	3/82	Insufficient grass on plots at Station 7 and 36.
Grass	5/82	Insufficient grass on plot at Station 7.
Grass	6/82	Insufficient grass on plot at Station 7.
Grass	11/82	Insufficient grass on plots at Station 7, 16, and 36.
Grass	12/82	Insufficient grass on plots at Station 7 and 16.
Drinking Water (Finished)	11/10/81 through 4/13/82	Although sample collection began at Port Wentworth on 11/10/81, I-131 analysis was not initiated until May 1982.

Medium	Date	Deviation
Drinking Water (Finished)	10/12-82	Sample was lost in processing by vendor laboratory prior to I-131 analysis.
Sediment	1/6/82	No sediment sample was collected at Stations 81, 82, and 84.
Groundwater	Fourth Quarter/82	No samples were collected at Stations 51, 61, and 62. Sampling locations were being reevaluated.

3.3 Deviation During 1983

Medium	Date	Deviation
Air	1/3/84	Environmental sampling program vehicle was burglarized and air particulate and I-131 samples stolen for Stations 7, 10, 16, 35, and 36. Tritium samples for station 16 were also stolen. (These were samples collected during the last sampling period of 1983.)
Air	8/16/83	New iodine collecting cartridges did not fit sample holders. Therefore the same cartridges were

Medium	Date	Deviation
		left in place to cover a two-week sampling period for Stations 7, 10, 16, 35, and 36.
Air	2/1/83	No air particulate filter nor I-131 sample was collected at Station 35 due to sample pump malfunction.
Air	8/16/83 and 8/23/83	Break through occurred with the sample collecting medium for Station 16, therefore sample analysis results were invalid.
TLD	First Quarter/83	Dosimeter for Station 28 was lost in the field.
TLD	Fourth Quarter/83	Dosimeter for Station 22 was lost in the field.
Milk	4/25/83	No analysis for I-131 was performed due to lack of preservative in milk sample.
Grass	1/83	Insufficient grass on plots at Stations 7, 16, and 36.
Grass	2/83	Insufficient grass on plots at Stations 7 and 16.

Medium	Date	Deviation
Grass	5/83	Insufficient grass on plot at Station 7.
Drinking Water-Raw	Fourth Quarter/83	Contract laboratory inadvertently combined the Fourth Quarter 83 with the First Quarter 84 composite for Station 80.
Sediment	1/6/83	No sediment samples were collected for the first half of 1983 from Stations 81, 82, and 84.
Groundwater	First and Second Quarter/ 83	No groundwater samples were collected from Stations 51, 61, and 62. Sampling locations were being reevaluated.

3.4 Deviations During 1984

Medium	Date	Deviation
Air	7/31/84	Both air filter and I-131 sample was lost from Station 10.
Air	9/18/84	Air filter was lost from Station 36.
Air	9/25/84	Sample results not available for Station 16 due to sample pump malfunction.

Medium	Date	Deviation
TLD	First Quarter/84	Dosimeter at Station 16 was melted by brushfire in the area.
Grass	1/84	Insufficient grass on plots at Stations 7, 16, and 36.
Grass	3/84	Insufficient grass on plots at Station 16.
Grass	12/84	Insufficient grass on plots at Station 36.

4.0 Program Changes

During 1981-1984 changes were made as necessary to improve and/or enhance the VEGP preoperational radiological environmental monitoring program. In some cases stations were relocated due to sampling difficulties. However, the most significant changes involved expansion of the basic program to include supplemental media, locations, and analyses in response to continual review and assessment of program needs and results.

4.1 Air Sampling

Tritium samplers were added at station 16 (Hancock Landing Road) in August 1983; and at stations 7 and 36 (simulator building and Waynesboro) in August 1984.

4.2 Direct Radiation

TLD stations 37 and 38 were added in Waynesboro as control stations fourth quarter 1983. TLD station 43 was added at the Employee Recreation Area second quarter 1984.

4.3 River Water

The locations of water sampling stations 82 and 83 did not actually change but the location description changed slightly. The location description of station 82 was changed from river mile 150.9 to 151.2; the location description of station 83 was changed from 150.4 to 150.6

4.4 Grass

The location of the grass plot in Waynesboro did not change but the station identification number for the grass plot was changed from 36 to 37 when station 37 was established fourth quarter 1983.

4.5 Groundwater

The location of groundwater station 62 was changd from the bluff near river mile 150 to a spring near the combustion turbine facility, with both locations sampled on October 4, 1983 and January 3, 1984. However, a more suitable spring was located near the discharge structure and groundwater sampling began at this location on April 3, 1984. This location was then designated station 62 and groundwater sampling continued through 1984.

Sampling of groundwater from Construction Well Number 1 (Station 63) was discontinued in October 1984.

5.0 EPA Intercomparison Studies (Crosscheck) Program

The laboratory which performed the analyses included in table 1, the Center for Applied Isotope Studies, University of Georgia, participated in EPA's Environmental Radioactivity Laboratory Intercomparison Studies (Crosscheck) Program conducted by the Environmental Monitoring and Support Laboratory, Las Vegas, Nevada. Not all of the sample media/analysis combinations listed in table 1 are covered by the Crosscheck Program. Relevant participation is considered to consist of those analyses of sample media covered by the EPA Crosscheck Program which are the same as those found in table 1. For VEGP those sample analyses are gross beta, I-131, gamma emitting radionuclides, and tritium in water; gross beta and Cs-137 in air filters; and I-131 and gamma emitting radionuclides in milk.

Reported in tables 17 through 28 are the results of relevant participation in the crosscheck program for 1981-1984. Terms used in the column headings of these tables are defined as follows: "Date" means the collection date given by the EPA, "Known" refers to the EPA known value ± one standard deviation, s; "Resolution" is determined by dividing the known value by its s value; "Result" is the value determined by the participating laboratory; "Ratio" equals the "result" divided by the "Known".

Agreement or disagreement between the "known" and the "result" is determined by referring to the NRC's "Criteria for Comparing Analytical Measurements", which is reproduced in table 29. It should be noted that whenever the EPA known value is zero or the laboratory result is a "less than" value, no comparison can be made by the NRC criteria since the ratio cannot be determined.

For the water sample dated 6/3/83, gamma spectroscopic analysis for Zn-65 resulted in "No Agreement" as defined in table 29. This analysis result is shown in table 25. Following recalibration of the gamma spectroscopic instrumentation, the water sample was reanalyzed; results of reanalysis are also shown in table 25.

6.0 Land Use Surveys and River Surveys

Surveys were performed annually 1981 through 1984 in the vicinity of VEGP to determine, in each of the sixteen sectors and out to a distance of five miles, the locations of the nearest residence, the nearest milk animal, the nearest meat animal, and the nearest Vegetable garden. Results of these surveys are presented in tables 30 through 33.

Surveys of the Savannah River were performed in December 1981, August 1983, and October 1984 to confirm that the nearest drinking water users were those reported in the VEGP Environmental Report - Operating License Stage and currently being sampled.

7.0 Conclusions

At this point in the preoperational radiological environmental monitoring program no attempt to draw conclusions has been made.

References

1. Vogtle Electric Generating Plant, Unit 1 and Unit 2, Environmental Report - Operating License Stage, Georgia Power Company.

2. U.S. Nuclear Regulatory Commission, Standard Radiological Effluent Technical Specifications for Pressurized Water Reactors, NUREG 0472, Revision 3 (Draft), January 1983.

3. U.S. Nuclear Regulatory Commission, Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants, Regulatory Guide 4.1, Revision 1, April 1975.

4. U.S. Environmental Protection Agency, Office of Radiation Programs, Environmental Radioactivity Surveillance Guides, ORP/SID 72-2, June 1982.

5. U.S. Nuclear Regulatory Commission, Radiological Assessment Branch, Branch Technical Position on Radiological Monitoring Program, Revision 1, November 1979.

6. U. S. Nuclear Regulatory Commission, Environmental Technical Specifications for Nuclear Power Plants, Regulatory Guide 4.8, for comment, December 1975.

TABLE 1
(SHEET 1 OF 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Sample Medium and Location	Frequency	Analysis
Airborne particulates radioiodine, and tritium(b)	Continual sampler operation with sample collection weekly	Radioiodine cannister: I-131
Indicator stations		
7 - Simulator building (1.5 miles SE)		Particulate sampler: gross beta activity following filter change; (a) composite by location) for gamma isotopic quarterly, tritium (b)
10 - Meteorological tower (1.1 miles SSW)		
16 - Hancock Landing Road (1.4 miles NNW)		
Nearest community		
35 - Girard (6.6 miles SSE)		
Control station		
36 - Waynesboro (15 miles WSW)		
Direct radiation	Quarterly	Gamma dose
Thermoluminescent dosimeters		
(See table 2 for exact locations)		
Indicator Stations		
1-16 Site boundary		
17-32 4 to 5 mile ring		
Locations of Special Interest		
33 Nearby residence		
34 Girard Elementary School		
35 Girard		
43 Employee recreation area		

TABLE 1
(SHEET 2 of 4)

Sample Medium and Location	Frequency	Analysis
Control Stations		
36 Waynesboro 37 Substation (Waynesboro) (North side of road) 38 Substation (Waynesboro) South side of road)		
River water	Composite sample over monthly period	Gamma isotopic monthly; composite for tritium quarterly
Control stations		
81 - River mile 153.1		
82 - River mile 151.2		
Indicator stations		
83 - River mile 150.6		
84 - River mile 149.5		
85 - River mile 146.7		
Drinking water	Monthly	Gross beta, I-131, and gamma isotopic monthly; composite for tritium quarterly
Control station		
80 - North Augusta Water Treatment Plant		
Indicator stations		
87 - Jasper Water Treatment Plant (Beaufort, SC)		
88 - Cherokee Hill Water Treatment Plant (Port Wentworth, GA)		

TABLE 1
(SHEET 3 of 4)

Sample Medium and Location	Frequency	Analysis
Sediment from shoreline	Semiannually	Gamma isotopic
Control stations		
81 - River miles 153 to 154		
82 - River miles 151 to 152		
Indicator station		
84 - River miles 148.5 to 150.5		
Milk	Biweekly	Gamma isotopic and I-131
98 - W. C. Dixon Dairy (9.8 miles SE)		
Grass	Monthly	Gamma isotopic
Indicator stations		
7 - Simulator building (1.5 miles SE)		
15 - Hancock Landing Landing Road (1.5 miles NW)		
Control station		
37 - Waynesboro (15 miles WSW)		

TABLE 1
(SHEET 4 of 4)

Sample Medium and Location	Frequency	Analysis
Fish	Annually	Gamma isotopic on edible portions of composites of any commercial or recreationally important species, such as bream or catfish
Control Station		
81 - River miles 153 to 158		
Indicator station		
85 - River miles 144 to 149.4		
Groundwater	Quarterly	Gamma isotopic and tritium analyses
Regional confined aquifer		
51 - Makeup well number 1 (0.4 miles N)		
63 - Construction Well number 1 (0.4 miles SW)		
Local unconfined aquifer		
61 - Spring water from upper end of Mallards Pond (0.8 miles NW)		
62 - Spring water from bluff near river mi 150 (1.1 miles E)		

(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 is greater than ten times the mean of control sample for any medium, gamma isotopic analysis should be performed on that individual sample.

(b) Tritium samplers are located at stations 7, 16, and 36 and are exchanged weekly.

TABLE 2
(SHEET 1 OF 3)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

LOCATION NUMBER	DESCRIPTIVE LOCATION	DIRECTION	DISTANCE (MILES)	SAMPLE TYPE
1	Hancock Landing Road	N	1.1	D
2	River Bank	NNE	0.8	D
3	River Bank	NE	0.7	D
4	River Bank	ENE	0.8	D
5	River Bank	E	1.0	D
6	Plant Wilson	ESE	1.1	D
7	Simulator Building	SE	1.5	D,V,A
8	River Road	SSE	1.1	D
9	River Road	S	1.1	D
10	Met Tower	SSW	0.8	A
	River Road		1.1	D
11	River Road	SW	1.2	D
12	River Road	WSW	1.1	D
13	River Road	W	1.3	D
14	River Road	WNW	1.8	D
15	Hancock Landing Road	NW	1.5	D,V
16	Hancock Landing Road	NNW	1.4	D,A
17	Savannah River Plant River Road	N	5.4	D
18	Savannah River Plant D Area	NNE	5.0	D
19	Savannah River Plant Road A.13	NE	4.6	D
20	Savannah River Plant Road A.13.1	ENE	4.8	D
21	Savannah River Plant Road A.17	E	5.3	D
22	River Bank Downstream of Buxton Landing	ESE	5.2	D
23	River Road	SE	4.7	D
24	Chance Road	SSE	4.9	D
25	Chance Road and Highway 23	S	5.2	D
26	Highway 23, mile 15.5	SSW	4.6	D
27	Highway 23, mile 17	SW	4.8	D
28	Claybon Road	WSW	5.0	D
29	Claxton-Lively Road	W	5.0	D
30	Ben Hatcher Road	WNW	4.7	D
31	River Road at Allen's Church Fork	NW	5.0	D
32	River Bank	NNW	4.8	D
33	Nearby Residence	SE	3.3	D
34	Girard Elementary School	SSE	6.3	D
35	Girard	SSE	6.6	D,A
36	Waynesboro	WSW	15.0	D,A

TABLE 2
(SHEET 2 OF 3)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

LOCATION NUMBER	DESCRIPTIVE LOCATION	DIRECTION	DISTANCE (MILES)	SAMPLE TYPE
37	Substation (Waynesboro) (North Side of Road)	WSW	17.5	D,V
38	Substation (Waynesboro) (South Side of Road)	WSW	17.5	D
43	Employees Recreation Area	SW	2.2	D
51	Makeup well number 1	N	0.4	G
61	Springwater from upper end of Mallards Pond	NW	0.8	G
62	Spring Water from bluff near river mile 150	E	1.1	G
63	Construction Well number 1	SW	0.4	G
80	North Augusta Water Treatment Plant	Upstream	51	W
81	Savannah River (mile 153.1)	Upstream	2.2	R,F(2), S(3)
82	Savannah River (mile 151.2)	Upstream	0.2	R,S(3)
83	Savannah River (mile 150.4)	Downstream	0.6	R
84	Savannah River (mile 149.5)	Downstream	1.5	R,S(3)
85	Savannah River (mile 146.7)	Downstream	4.3	R,F(2)
87	Beaufort-Jasper Water Treatment Plant; Beaufort, S.C.	Downstream	112	W
88	Cherokee Hill Water Treatment Plant; Port Wentworth, Ga.	Downstream	122	W
98	W. C. Dixon Dairy	SE	9.8	M

TABLE 2
(SHEET 3 OF 3)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

TABLE NOTATION:

(1) Sample Types

A - Airborne Radioactivity

D - Direct Radiation

F - Fish

G - Groundwater

M - Milk

R - River Water

S - River Shoreline Sediment

V - Vegetation

W - Drinking Water (at water treatment plant)

(2) These are approximate locations for fish sampling. It is generally necessary to cover a stretch of river up to five miles to obtain an adequate fish sample.

(3) These are approximate locations for sediment sampling. High water may sometimes cause an otherwise suitable location for sediment sampling to be unavailable.

TABLE 3
(SHEET 1 OF 3)

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSES
(Lower Limit of Detection)

ANALYSIS	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg) (wet)	Milk (pCi/l)	Grass (pCi/kg) (wet)	Sediment (pCi/kg) (dry)
Gross beta	4	0.01	-	-	-	-
H-3	2000	-	-	-	-	-
Mn-54	20	-	100	-	-	-
Fe-59	30	-	300	-	-	-
Co-58	20	-	100	-	-	-
Co-60	20	-	100	-	-	-
Zn-65	30	-	300	-	-	-
Zr-95	30	-	-	-	-	-
Nb-95	20	-	-	-	-	-
I-131	20 (b)	0.07	-	1	60	-
Cs-134	20	0.05	100	20	60	200
Cs-137	20	0.06	200	20	80	200
Ba-140	60	-	-	60	-	-
La-140	20	-	-	20	-	-

a. The lower limit of detection (LLD) is the smallest concentration of radioactive material in a sample that will be detected with 95 percent probability, with 5 percent probability of falsely concluding that a blank observation represents a "real" signal.

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

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

where:

LLD = The *a priori* lower limit of detection as defined above (as pCi per unit mass or volume).

s_b = The standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per min).

E = The counting efficiency (as counts per transformation).

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

2.22 = The number of transformations per minute per pCi.

Y = The fractional radiochemical yield (when applicable).

λ = The radioactive decay constant for the particular radionuclide.

Δt = The 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 LLD 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 spectrometry, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., K-40 in milk samples).

TABLE 3
(SHEET 3 of 3)

Typical values of E, V, Y and Δt should be used in the evaluation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit, representing the capability of a measurement system and not an a posteriori (after the fact) limit for a particular measurement.

b. The LLD for I-131 is 1 pCi/l for drinking water samples.

TABLE 4

DETECTION LEVELS ROUTINELY ACHIEVED FOR
ENVIRONMENTAL SAMPLE ANALYSES
(Lower Limit of Detection (LLD))

	WATER (pCi/l)	AIR PARTICULATE (pCi/m^3)	FISH (pCi/kg-wet)	MILK (pCi/l)	GRASS (pCi/kg-wet)	SEDIMENT (pCi/kg-dry)
Gross beta	1.5(a)	1E-2(e)				
H-3	100(b)					
Mn-54	10(c)		40(g)			
Co-58	10(c)		50(g)			
Fe-59	18(c)		100(g)			
Co-60	10(c)		50(g)			
Zn-65	20(c)		100(g)			
Zr-95	20(c)					
Nb-95	10(c)					
I-131	15(c)	4E-2(f)		25(h)	25(j)	
I-131	0.4(d)			0.3(i)		
Cs-134	15(c)	1.5E-3(f)	50(g)	20(h)	25(j)	30(k)
Cs-137	10(c)	1.2E-3(f)	40(g)	16(h)	20(j)	30(k)
Ba-140	50(c)			90(h)		
La-140	15(c)			20(h)		

	Sample Size	Count Time (min)	Background Rate (cpm)
(a)	500 ml	50	1.1
(b)	25 ml	800	3.95
(c)	1.0 l	100	
(d)	1.5 l	333	4.5E-3
(e)	600 m^3	100	1.1
(f)	7800 m^3	100	
(g)	0.75 kg	100	
(h)	1.0 l	333	
(i)	2.0 l	333	4.5E-3
(j)	1.0 kg(wet)	167	
(k)	0.75 kg	100	

Table 05

Summary of Gross Beta Activity Detected in Airborne Particulates
Gross Beta (pCi/M3)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Location	N/No	Mean ± Std	Min	Max	LLD	Location with Highest Annual Mean	Number of Non-Routine Observations
Control Location	171/171	0.023 ± 0.015	0.007	0.149	**	Waynesboro 15.0 Miles WSW	*
Indicator Stations	502/504	0.022 ± 0.013	0.002	0.182	**	Hancock Landing 1.5 Miles NNW	*
Nearest Community	170/170	0.026 ± 0.042	0.006	0.496	**	Girard 6.6 Miles SSW	*

NOTE:
Asterisk for all values indicates radionuclide not detected insamples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 06

Summary of Iodine 131 Activity Detected in Air Cartridge Filters
Iodine 131 (pCi/M3)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility Waynesboro Georgia Reporting Period - 1981-84

Location	N/No	Mean ± Std	Min	Max	LLD	Location with Highest Annual Mean	Number of Non-Routine Observations
Control Location	0 /170	<0.044 ± <0.051	<0.017-<0.657		**	No Location had Activity > LLD	*
Indicator Stations	0 /502	<0.041 ± <0.048	<0.017-<0.674		**	No Location had Activity > LLD	*
Nearest Community	0 /169	<0.041 ± <0.049	<0.017-<0.609		**	No Location had Activity > LLD	*

NOTE:
Asterisk for all values indicates radionuclide not detected insamples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 07

Annual Summary for Specific Radionuclides in Air Samples

(Activity - pCi/M3)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Man made						
Cs-134	**	1.5E-03 ± 7.1E-04 1.0E-03 - 2.0E-03 (2/41)	Simulator 1.5 Miles SE	2.0E-03 ± * 2.0E-03 - 2.0E-03 (1/13)	* ± * * - * (0/14)	None
Cs-137	**	1.0E-03 ± 0.0E+00 1.0E-03 - 1.0E-03 (6/41)	Met Tower .75 Miles SSW	1.0E-03 ± 0.0E+00 1.0E-03 - 1.0E-03 (3/14)	1.0E-03 ± 0.0E+00 1.0E-03 - 1.0E-03 (2/14)	None
H-3	**	1.5E+02 ± 1.5E+02 8.0E+00 - 8.3E+02 (92/92)	Simulator 1.5 Miles SE	2.4E+02 ± 2.4E+02 8.0E+00 - 8.3E+02 (21/21)	1.2E+02 ± 1.1E+02 9.0E+00 - 4.5E+02 (21/21)	None
Nb-95	**	8.0E-04 ± * 8.0E-04 - 8.0E-04 (1/41)	Met Tower .75 Miles SSW	8.0E-04 ± * 8.0E-04 - 8.0E-04 (1/14)	1.0E-03 ± * 1.0E-03 - 1.0E-03 (1/14)	None
Natural						
Ac-228	**	2.0E-03 ± * 2.0E-03 - 2.0E-03 (1/41)	Simulator 1.5 Miles SE	2.0E-03 ± * 2.0E-03 - 2.0E-03 (1/13)	3.0E-03 ± 0.0E+00 3.0E-03 - 3.0E-03 (2/14)	None
Be-7	**	5.4E-02 ± 2.1E-02 3.2E-02 - 1.3E-01 (41/41)	Met Tower .75 Miles SSW	5.5E-02 ± 2.6E-02 3.2E-02 - 1.3E-01 (14/14)	5.7E-02 ± 2.5E-02 2.7E-02 - 1.3E-01 (14/14)	None
Bi-214	**	4.5E-03 ± 2.1E-03 3.0E-03 - 6.0E-03 (2/41)	Hancock Landin 1.5 Miles NW	6.0E-03 ± * 6.0E-03 - 6.0E-03 (1/14)	3.0E-03 ± * 3.0E-03 - 3.0E-03 (1/14)	None

Continued on next page

Table 07

Annual Summary for Specific Radionuclides in Air Samples

(Activity - pCi/M3)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	Location with Highest Annual Mean Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
K-40	**	2.1E-02 ± 4.7E-03 1.7E-02 - 2.8E-02 (4/41)	Met Tower .75 Miles SSW	2.8E-02 ± * 2.8E-02 - 2.8E-02 (1/14)	3.2E-02 ± 1.8E-02 1.9E-02 - 4.5E-02 (2/14)	None
Pb-212	**	* ± * * - * (0/41)		* ± * * - * (0/ 0)	* ± * * - * (0/14)	None
Pb-214	**	* ± * * - * (0/41)		* ± * * - * (0/ 0)	* ± * * - * (0/14)	None
Tl-208	**	3.0E-03 ± 3.5E-03 1.0E-03 - 7.0E-03 (3/41)	Met Tower .75 Miles SSW	4.0E-03 ± 4.2E-03 1.0E-03 - 7.0E-03 (2/14)	* ± * * - * (0/14)	None

NOTE:
Asterisk for all values indicates radionuclide not detected insamples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 07

Annual Summary for Specific Radionuclides in Air Samples
Results for Nearest Community
(Activity - pCi/M3)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	Nearest Community Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Man made				
Cs-134	**	* ± *	* ± *	None
		* - *	* - *	
		(0/14)	(0/14)	
Cs-137	**	* ± *	1.0E-03 ± 0.0E+00	None
		* - *	1.0E-03 - 1.0E-03	
		(0/14)	(2/14)	
H-3	**	* ± *	1.2E+02 ± 1.1E+02	None
		* - *	9.0E+00 - 4.5E+02	
		(0/ 0)	(21/21)	
Nb-95	**	* ± *	1.0E-03 ± *	None
		* - *	1.0E-03 - 1.0E-03	
		(0/14)	(1/14)	
Natural				
Ac-228	**	* ± *	3.0E-03 ± 0.0E+00	None
		* - *	3.0E-03 - 3.0E-03	
		(0/14)	(2/14)	
Be-7	**	5.8E-02 ± 3.1E-02	5.7E-02 ± 2.5E-02	None
		2.8E-02 - 1.5E-01	2.7E-02 - 1.3E-01	
		(14/14)	(14/14)	
Bi-214	**	4.0E-03 ± 1.0E-03	3.0E-03 ± *	None
		3.0E-03 - 5.0E-03	3.0E-03 - 3.0E-03	
		(3/14)	(1/14)	

Continued on next page

Table 07

Annual Summary for Specific Radionuclides in Air Samples
Results for Nearest Community
(Activity - pCi/M3)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	Nearest Community Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
K-40	**	1.3E-02 ± * 1.3E-02 - 1.3E-02 (1/14)	3.2E-02 ± 1.8E-02 1.9E-02 - 4.5E-02 (2/14)	None
Pb-212	**	3.1E-02 ± * 3.1E-02 - 3.1E-02 (1/14)	* ± * * - * (0/14)	None
Pb-214	**	7.0E-03 ± 4.2E-03 4.0E-03 - 1.0E-02 (2/14)	* ± * * - * (0/14)	None
Tl-208	**	1.2E-02 ± * 1.2E-02 - 1.2E-02 (1/14)	* ± * * - * (0/14)	None

NOTE:
Asterisk for all values indicates radionuclide not detected insamples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 08

Annual Summary of Dosages Aquired by Thermo-Luminescent Dosimeters
Exposure (mr/91 days)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981 94

Location	N/No	Mean ± Std	Min - Max	Location with Highest Annual Mean	Mean ± Std Min - Max	Number of Non-Routine Reported Observations
Plant Boundary	221/221	1.5E+01 ± 2.7E+00	8.8E+00 - 2.5E+01	T.L.D. #1 1.1 Miles N	1.7E+01 ± 2.7E+00 1.1E+01 - 2.1E+01	*
Five Mile Radius	220/220	1.4E+01 ± 2.9E+00	8.2E+00 - 2.4E+01	T.L.D. #21 5.3 Miles E	1.9E+01 ± 3.2E+00 1.3E+01 - 2.4E+01	*
Nearest Residence	14 /14	1.5E+01 ± 2.2E+00	1.1E+01 - 2.0E+01		* ± * * - *	*
Girard Elementary	14 /14	1.4E+01 ± 2.1E+00	1.0E+01 - 1.8E+01		* ± * * - *	*
Girard	14 /14	1.5E+01 ± 2.3E+00	1.0E+01 - 1.9E+01		* ± * * - *	*
Waynesboro	14 /14	1.7E+01 ± 2.4E+00	1.3E+01 - 2.1E+01		* ± * * - *	*
N.W. Waynesboro	3 /3	1.6E+01 ± 2.6E+00	1.3E+01 - 1.8E+01		* ± * * - *	*
S.E. Waynesboro	3 /3	1.7E+01 ± 2.7E+00	1.4E+01 - 1.8E+01		* ± * * - *	*
Recreation Area	1 /2	2.5E+01 ± *	2.5E+01 - 2.5E+01		* ± * * - *	*

Note:
Asterisk for all values indicates radionuclide not detected in samples

(N/No) Fraction denotes number of positive results over number of analyses performed

Table 09

Summary of Specific Radionuclides Detected in Milk Samples
(Activity - pCi/l)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Man-Made						
Cs-137	**	1.8E+01 ± 7.6E+00 9.0E+00 - 2.7E+01 (6/85)	Dixon's Dairy 9.8 Miles SE	1.8E+01 ± 7.6E+00 9.0E+00 - 2.7E+01 (6/85)	* ± * * - * (0/ 0)	*
I-131	**	< 2.0E-01 ±< 8.0E-02 < 1.1E-01 -< 6.7E-01 (0/84)		* ± * * - * (0/ 0)	* ± * * - * (0/ 0)	*
Nb-95	**	1.1E+01 ± * 1.1E+01 - 1.1E+01 (1/85)	Dixon's Dairy 9.8 Miles SE	1.1E+01 ± * 1.1E+01 - 1.1E+01 (1/85)	* ± * * - * (0/ 0)	*
Natural						
Bi-214	**	3.3E+01 ± 9.1E+00 2.5E+01 - 4.6E+01 (4/85)	Dixon's Dairy 9.8 Miles SE	3.3E+01 ± 9.1E+00 2.5E+01 - 4.6E+01 (4/85)	* ± * * - * (0/ 0)	*
K-40	**	1.1E+03 ± 3.4E+02 3.7E+02 - 2.0E+03 (85/85)	Dixon's Dairy 9.8 Miles SE	1.1E+03 ± 3.4E+02 3.7E+02 - 2.0E+03 (85/85)	* ± * * - * (0/ 0)	*
Pb-214	**	3.1E+01 ± * 3.1E+01 - 3.1E+01 (1/85)	Dixon's Dairy 9.8 Miles SE	3.1E+01 ± * 3.1E+01 - 3.1E+01 (1/85)	* ± * * - * (0/ 0)	*

NOTE:
Asterisk for all values indicates radionuclide not detected in samples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 10

Annual Summary for Specific Radionuclides in Grass Samples
(Activity - pCi/kg Wet)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	Location with Highest Annual Mean Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Man-Made						
Cs-134	**	< 1.8E+01 ±< 7.9E+00 < 6.0E+00 -< 5.0E+01 (0/54)		* ± * * - * (0/ 0)	7.0E+01 ± * 7.0E+01 - 7.0E+01 (1/31)	None
Cs-137	**	5.1E+01 ± 3.9E+01 8.0E+00 - 1.8E+02 (44/54)	Simulator 1.5 Miles SE	5.2E+01 ± 4.3E+01 8.0E+00 - 1.8E+02 (25/27)	3.6E+01 ± 1.5E+01 1.4E+01 - 3.5E+01 (7/31)	None
H-3	**	9.7E+03 ± 2.7E+04 1.7E+02 - 1.2E+05 (21/21)	Simulator 1.5 Miles SE	1.4E+04 ± 3.7E+04 1.7E+02 - 1.2E+05 (11/11)	7.8E+02 ± 6.8E+02 1.5E+02 - 2.3E+03 (9/10)	None
I-131	**	< 2.0E+01 ±< 1.2E+01 < 7.0E+00 -< 6.8E+01 (0/54)		* ± * * - * (0/ 0)	< 1.8E+01 +< * < 7.0E+00 -< 4.9E+01 (0/31)	None
Nb-95	**	1.5E+01 ± * 1.5E+01 - 1.5E+01 (1/54)	Simulator 1.5 Miles SE	1.5E+01 ± * 1.5E+01 - 1.5E+01 (1/27)	* ± * * - * (0/31)	None
Natural						
Ac-228	**	9.6E+01 ± 3.0E+01 5.2E+01 - 1.4E+02 (11/54)	Simulator 1.5 Miles SE	1.0E+02 ± 3.4E+01 5.2E+01 - 1.4E+02 (7/27)	5.5E+01 ± 1.5E+01 3.4E+01 - 6.7E+01 (4/31)	None
Be-7	**	1.3E+03 ± 1.8E+03 5.3E+01 - 9.1E+03 (54/54)	Hancock Landing 1.5 Miles NW	1.5E+03 ± 2.0E+03 2.5E+02 - 7.8E+03 (27/27)	8.9E+02 ± 6.9E+02 1.1E+02 - 2.6E+03 (31/31)	None
Bi-212	**	2.4E+02 ± 2.3E+01 2.3E+02 - 2.6E+02 (2/54)	Hancock Landing 1.5 Miles NW	2.6E+02 ± * 2.6E+02 - 2.6E+02 (1/27)	* ± * * - * (0/31)	None

Continued on next page

Table 10

Annual Summary for Specific Radionuclides in Grass Samples
(Activity - pCi/kg Wet)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Bi-214	**	8.6E+01 ± 7.2E+01 2.1E+01 - 2.7E+02 (23/54)	Hancock Landing 1.5 Miles NW	9.5E+01 ± 6.6E+01 2.9E+01 - 2.1E+02 (9/27)	1.3E+02 ± 2.6E+02 1.6E+01 - 8.2E+02 (9/31)	None
K-40	**	4.4E+03 ± 1.6E+03 1.2E+03 - 8.8E+03 (54/54)	Simulator 1.5 Miles SE	4.6E+03 ± 1.8E+03 1.2E+03 - 8.8E+03 (27/27)	5.3E+03 ± 1.7E+03 1.8E+03 - 9.3E+03 (31/31)	None
Pb-212	**	5.4E+01 ± 2.7E+01 1.6E+01 - 1.1E+02 (13/54)	Hancock Landing 1.5 Miles NW	6.5E+01 ± 2.5E+01 4.6E+01 - 1.1E+02 (6/27)	7.1E+01 ± 7.5E+01 2.3E+01 - 2.4E+02 (8/31)	None
Pb-214	**	8.0E+01 ± 5.1E+01 2.8E+01 - 1.8E+02 (18/54)	Simulator 1.5 Miles SE	8.8E+01 ± 6.2E+01 2.8E+01 - 1.8E+02 (9/27)	1.1E+02 ± 1.5E+02 3.0E+01 - 4.5E+02 (7/31)	None
Tl-208	**	2.1E+01 ± 9.3E+00 1.0E+01 - 4.4E+01 (11/54)	Hancock Landing 1.5 Miles NW	2.5E+01 ± 1.2E+01 1.2E+01 - 4.4E+01 (5/27)	4.1E+01 ± 3.6E+01 1.4E+01 - 1.0E+02 (5/31)	None

NOTE:
Asterisk for all values indicates radionuclide not detected in samples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 11

Annual Summary for Specific Radionuclides in River Water Samples

(Activity - pCi/l)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	 Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Man made						
Cs-134	**	4.2E+00 ± 1.8E+00 3.0E+00 - 7.0E+00 (5/115)	R.M. 146.7	5.0E+00 ± 2.8E+00 3.0E+00 - 7.0E+00 (2/ 33)	9.9E+00 ± 8.3E+00 4.0E+00 - 1.6E+01 (2/ 82)	None
Cs-137	**	5.3E+00 ± 3.9E+00 3.0E+00 - 1.7E+01 (11/115)	R.M. 149.5	6.4E+00 ± 5.9E+00 3.0E+00 - 1.7E+01 (5/ 41)	1.9E+00 ± 2.8E+00 3.0E+00 - 1.3E+01 (10/ 82)	None
H-3	**	1.5E+03 ± 9.0E+02 3.3E+02 - 4.3E+03 (39/ 39)	R.M. 146.7	2.0E+03 ± 8.5E+02 7.4E+02 - 3.9E+03 (11/ 11)	5.8E+02 ± 2.1E+02 3.1E+02 - 1.1E+03 (28/ 28)	None
I-131	**	5.0E+00 ± * 5.0E+00 - 5.0E+00 (1/115)	R.M. 146.7	5.0E+00 ± * 5.0E+00 - 5.0E+00 (1/ 33)	* ± * * - * (0/ 82)	None
Nb-95	**	4.0E+00 ± * 4.0E+00 - 4.0E+00 (1/115)	R.M. 149.5	4.0E+00 ± * 4.0E+00 - 4.0E+00 (1/ 41)	* ± * * - * (0/ 82)	None
Zr-95	**	6.3E+00 ± 5.8E-01 6.0E+00 - 7.0E+00 (3/115)	R.M. 150.6	7.0E+00 ± * 7.0E+00 - 7.0E+00 (1/ 41)	* ± * * - * (0/ 82)	None
Natural						
Ac-228	**	1.1E+01 ± 4.5E+00 5.0E+00 - 1.7E+01 (5/115)	R.M. 149.5	1.7E+01 ± * 1.7E+01 - 1.7E+01 (1/ 41)	1.7E+01 ± 1.2E+01 8.0E+00 - 4.1E+01 (6/ 82)	None

Continued on next page

Table 11

Annual Summary for Specific Radionuclides in River Water Samples

(Activity - pCi/l)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	 Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Be-7	**	3.4E+01 ± 2.8E+00 3.2E+01 - 3.6E+01 (2/115)	R.M. 149.5	3.6E+01 ± * 3.6E+01 - 3.6E+01 (1/ 41)	* ± * * - * (0/ 82)	None
Bi-212	**	5.4E+01 ± 2.9E+00 5.1E+01 - 5.6E+01 (3/115)	R.M. 150.6	5.4E+01 ± 2.9E+00 5.1E+01 - 5.6E+01 (3/ 41)	5.1E+01 ± 1.4E+01 4.1E+01 - 6.1E+01 (2/ 82)	None
Bi-214	**	1.3E+01 ± 8.1E+00 8.0E+00 - 2.9E+01 (6/115)	R.M. 150.6	2.9E+01 ± * 2.9E+01 - 2.9E+01 (1/ 41)	9.5E+00 ± 7.1E-01 9.0E+00 - 1.0E+01 (2/ 82)	None
K-40	**	1.3E+02 ± 7.4E+01 6.2E+01 - 2.1E+02 (3/115)	R.M. 150.6	1.3E+02 ± 1.0E+02 6.2E+01 - 2.1E+02 (2/ 41)	5.8E+01 ± 4.2E+00 5.5E+01 - 6.1E+01 (2/ 82)	None
Tl-208	**	6.5E+00 ± 4.9E+00 3.0E+00 - 1.0E+01 (2/115)	R.M. 150.6	1.0E+01 ± * 1.0E+01 - 1.0E+01 (1/ 41)	3.5E+00 ± 7.1E-01 3.0E+00 - 4.0E+00 (2/ 82)	None

NOTE:

Asterisk for all values indicates radionuclide not detected insamples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 12

Annual Summary for Specific Radionuclides in Drinking Water Samples
Raw Water

(Activity - pCi/l)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	Location with Highest Annual Mean Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Gross Beta						
Beta	**	2.7E+00 ± 1.1E+00 1.5E+00 - 5.5E+00 (20/ 26)	Beaufort	3.1E+00 ± 1.3E+00 1.7E+00 - 5.5E+00 (11/ 13)	1.9E+00 ± 3.9E-01 1.4E+00 - 2.5E+00 (10/ 13)	None
Man-made						
Cs-134	**	7.0E+00 ± 2.0E+00 5.0E+00 - 9.0E+00 (3/ 26)	Port Wentworth	9.0E+00 ± * 9.0E+00 - 9.0E+00 (1/ 13)	* ± * * - * (0/ 13)	None
Cs-137	**	7.0E+00 ± * 7.0E+00 - 7.0E+00 (1/ 26)	Beaufort	7.0E+00 ± * 7.0E+00 - 7.0E+00 (1/ 13)	8.0E+00 ± * 8.0E+00 - 8.0E+00 (1/ 13)	None
H-3	**	2.3E+03 ± 8.4E+02 9.7E+02 - 3.6E+03 (8/ 8)	Port Wentworth	2.7E+03 ± 6.4E+02 2.2E+03 - 3.6E+03 (4/ 4)	4.0E+02 ± 3.1E+01 3.6E+02 - 4.3E+02 (4/ 4)	None
I-131	**	< 3.4E-01 +< 5.1E-02 < 2.5E-01 -< 5.0E-01 (0/ 26)		* ± * * - * (0/ 0)	< 3.0E-01 +< 3.0E-01 < 2.2E-01 -< 4.8E-01 (0/ 13)	None
Natural						
Ac-228	**	1.6E+01 ± 4.0E+00 1.4E+01 - 2.1E+01 (3/ 26)	Port Wentworth	2.1E+01 ± * 2.1E+01 - 2.1E+01 (1/ 13)	* ± * * - * (0/ 13)	None
Be-7	**	5.0E+01 ± * 5.0E+01 - 5.0E+01 (1/ 26)	Beaufort	5.0E+01 ± * 5.0E+01 - 5.0E+01 (1/ 13)	8.0E+01 ± * 8.0E+01 - 8.0E+01 (1/ 13)	None

Continued on next page

Table 12

Annual Summary for Specific Radionuclides in Drinking Water Samples
Raw Water

(Activity - pCi/l)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	 Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Bi-212	**	9.1E+01 ± 1.3E+01 7.8E+01 - 1.1E+02 (4/ 26)	Beaufort	9.6E+01 ± 1.2E+01 8.3E+01 - 1.1E+02 (3/ 13)	* ± * * - * (0/ 13)	None
Bi-214	**	2.5E+01 ± * 2.5E+01 - 2.5E+01 (1/ 26)	Beaufort	2.5E+01 ± * 2.5E+01 - 2.5E+01 (1/ 13)	1.6E+01 ± 1.4E+00 1.5E+01 - 1.7E+01 (2/ 13)	None
K-40	**	* ± * * - * (0/ 26)		* ± * * - * (0/ 0)	1.6E+02 ± * 1.6E+02 - 1.6E+02 (1/ 13)	None
Tl-208	**	7.0E+00 ± * 7.0E+00 - 7.0E+00 (1/ 26)	Beaufort	7.0E+00 ± * 7.0E+00 - 7.0E+00 (1/ 13)	5.0E+00 ± * 5.0E+00 - 5.0E+00 (1/ 13)	None

NOTE:
Asterisk for all values indicates radionuclide not detected in samples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 13

Annual Summary for Specific Radionuclides in Drinking Water Samples
Finished Water

(Activity - pCi/l)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	 Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Gross Beta						
Beta	**	2.9E+00 ± 4.9E+00 1.3E+00 - 3.4E+01 (45/ 51)	Port Wentworth	3.1E+00 ± 5.4E+00 1.3E+00 - 3.4E+01 (36/ 38)	1.8E+00 ± 3.3E-01 1.3E+00 - 2.3E+00 (18/ 26)	None
Man-made						
Cs-134	**	1.9E+01 ± 2.3E+01 5.0E+00 - 4.5E+01 (3/ 51)	Port Wentworth	2.5E+01 ± 2.7E+01 7.0E+00 - 4.5E+01 (2/ 38)	7.5E+00 ± 2.1E+00 6.0E+00 - 9.0E+00 (2/ 26)	None
Cs-137	**	2.3E+01 ± 2.9E+01 6.0E+00 - 5.6E+01 (3/ 51)	Port Wentworth	2.3E+01 ± 2.9E+01 6.0E+00 - 5.6E+01 (3/ 38)	5.7E+00 ± 1.5E+00 4.0E+00 - 7.0E+00 (3/ 26)	None
H-3	**	2.9E+03 ± 1.1E+03 1.0E+03 - 5.2E+03 (18/ 18)	Port Wentworth	3.2E+03 ± 9.3E+02 2.1E+03 - 5.2E+03 (14/ 14)	3.8E+02 ± 7.6E+01 2.4E+02 - 5.2E+02 (9/ 9)	None
I-131	**	7.7E-01 ± * 7.7E-01 - 7.7E-01 (1/ 47)	Port Wentworth	7.7E-01 ± * 7.7E-01 - 7.7E-01 (1/ 34)	< 2.6E-01 ±< 2.6E-01 < 1.2E-01 -< 5.3E-01 (0/ 26)	None
Natural						
Ac-228	**	3.8E+01 ± 3.4E+01 1.6E+01 - 7.7E+01 (3/ 51)	Port Wentworth	4.6E+01 ± 4.3E+01 1.6E+01 - 7.7E+01 (2/ 38)	1.8E+01 ± 4.2E+00 1.5E+01 - 2.1E+01 (2/ 26)	None
Be-7	**	* ± * * - * (0/ 51)		* ± * * - * (0/ 0)	6.6E+01 ± 3.8E+00 6.3E+01 - 7.0E+01 (3/ 26)	None

Continued on next page

Table 13

Annual Summary for Specific Radionuclides in Drinking Water Samples
Finished Water

(Activity - pCi/l)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	 Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Bi-212	**	8.3E+01 ± * 8.3E+01 - 8.3E+01 (1/ 51)	Port Wentworth	8.3E+01 ± * 8.3E+01 - 8.3E+01 (1/ 38)	8.8E+01 ± 7.8E+00 8.2E+01 - 9.3E+01 (2/ 26)	None
Bi-214	**	* ± * * - * (0/ 51)		* ± * * - * (0/ 0)	7.0E+00 ± * 7.0E+00 - 7.0E+00 (1/ 26)	None
Tl-208	**	* ± * * - * (0/ 51)		* ± * * - * (0/ 0)	6.0E+00 ± * 6.0E+00 - 6.0E+00 (1/ 26)	None

NOTE:
Asterisk for all values indicates radionuclide not detected insamples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 14

Annual Summary for Specific Radionuclides in Sediment Samples
(Activity - pCi/kg)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location With Highest Annual Mean Name Distance and Direction	Location With Highest Annual Mean Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Man-made						
Ce-141	**	* ± * / * - * (0/ 5)		* ± * / * - * (0/ 0)	8.5E+01 ± * / 8.5E+01 - 8.5E+01 (1/ 8)	None
Cs-134	**	< 4.3E+01 ±< * / < 4.3E+01 -< 4.3E+01 (0/ 5)		* ± * / * - * (0/ 0)	9.3E+01 ± * / 9.3E+01 - 9.3E+01 (1/ 8)	None
Cs-137	**	3.2E+02 ± 3.2E+02 / 6.1E+01 - 7.8E+02 (4/ 5)	Station 84 R.M. 148-150	3.2E+02 ± 3.2E+02 / 6.1E+01 - 7.8E+02 (4/ 5)	1.5E+02 ± 9.6E+01 / 4.3E+01 - 3.4E+02 (8/ 8)	None
Nb-95	**	8.2E+01 ± * / 8.2E+01 - 8.2E+01 (1/ 5)	Station 84 R.M. 148-150	8.2E+01 ± * / 8.2E+01 - 8.2E+01 (1/ 5)	6.8E+01 ± * / 6.8E+01 - 6.8E+01 (1/ 8)	None
Zr-95	**	* ± * / * - * (0/ 5)		* ± * / * - * (0/ 0)	1.0E+02 ± * / 1.0E+02 - 1.0E+02 (1/ 8)	None
Natural						
Ac-228	**	1.0E+03 ± 4.5E+02 / 6.2E+02 - 1.7E+03 (5/ 5)	Station 84 R.M. 148-150	1.0E+03 ± 4.5E+02 / 6.2E+02 - 1.7E+03 (5/ 5)	1.3E+03 ± 4.9E+02 / 4.5E+02 - 2.1E+03 (8/ 8)	None
Be-7	**	5.8E+02 ± * / 5.8E+02 - 5.8E+02 (1/ 5)	Station 84 R.M. 148-150	5.8E+02 ± * / 5.8E+02 - 5.8E+02 (1/ 5)	5.0E+02 ± 1.2E+02 / 4.1E+02 - 5.8E+02 (2/ 8)	None
Bi-212	**	1.4E+03 ± 7.7E+02 / 7.7E+02 - 2.3E+03 (3/ 5)	Station 84 R.M. 148-150	1.4E+03 ± 7.7E+02 / 7.7E+02 - 2.3E+03 (3/ 5)	1.3E+03 ± 5.6E+02 / 6.4E+02 - 2.1E+03 (6/ 8)	None

Continued on next page

Table 14

Annual Summary for Specific Radionuclides in Sediment Samples
(Activity - pCi/kg)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location With Highest Annual Mean Name Distance and Direction	Location With Highest Annual Mean Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Bi-214	**	9.8E+02 ± 3.1E+02 6.4E+02 - 1.4E+03 (5/ 5)	Station 84 R.M. 148-150	9.8E+02 ± 3.1E+02 6.4E+02 - 1.4E+03 (5/ 5)	1.1E+03 ± 3.9E+02 4.7E+02 - 1.8E+03 (8/ 8)	None
K-40	**	1.2E+04 ± 2.8E+03 9.8E+03 - 1.7E+04 (5/ 5)	Station 84 R.M. 148-150	1.2E+04 ± 2.8E+03 9.8E+03 - 1.7E+04 (5/ 5)	1.3E+04 ± 2.0E+03 9.2E+03 - 1.5E+04 (8/ 8)	None
Pb-212	**	1.1E+03 ± 5.4E+02 6.0E+02 - 2.0E+03 (5/ 5)	Station 84 R.M. 148-150	1.1E+03 ± 5.4E+02 6.0E+02 - 2.0E+03 (5/ 5)	1.1E+03 ± 5.1E+02 4.0E+02 - 1.8E+03 (8/ 8)	None
Pb-214	**	1.1E+03 ± 3.4E+02 6.6E+02 - 1.6E+03 (5/ 5)	Station 84 R.M. 148-150	1.1E+03 ± 3.4E+02 6.6E+02 - 1.6E+03 (5/ 5)	1.2E+03 ± 4.5E+02 5.0E+02 - 2.0E+03 (8/ 8)	None
Ra-226	**	1.7E+03 ± 8.0E+02 7.4E+02 - 2.9E+03 (5/ 5)	Station 84 R.M. 148-150	1.7E+03 ± 8.0E+02 7.4E+02 - 2.9E+03 (5/ 5)	2.0E+03 ± 8.4E+02 1.0E+03 - 3.4E+03 (8/ 8)	None
Tl-208	**	3.8E+02 ± 1.4E+02 2.2E+02 - 5.7E+02 (5/ 5)	Station 84 R.M. 148-150	3.8E+02 ± 1.4E+02 2.2E+02 - 5.7E+02 (5/ 5)	4.2E+02 ± 1.4E+02 1.6E+02 - 6.5E+02 (8/ 8)	None

NOTE:
Asterisk for all values indicates radionuclide not detected in samples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 15

Annual Summary for Specific Radionuclides in Fish Samples
(Activity - pCi/kg)

Name of Facility - Vogtle Docket No. 50-424,425

Location of Facility - Waynesboro Georgia Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	Location with Highest Annual Mean Mean ± Std Min - Max (N/No)	Control Locations Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Man-made						
Cs-134	**	< 3.2E+01 ± < * < 3.2E+01 - < 3.2E+01 (0/ 15)		* ± * * - * (0/ 0)	1.0E+02 ± 1.2E+02 2.3E+01 - 1.9E+02 (2/ 17)	None
Cs-137	**	5.9E+02 ± 1.0E+03 6.3E+01 - 3.4E+03 (15/ 15)	Station 85 R.M. 144-150	5.9E+02 ± 1.0E+03 6.3E+01 - 3.4E+03 (15/ 15)	3.4E+02 ± 4.1E+02 6.4E+01 - 1.5E+03 (12/ 17)	None
Nb-95	**	* ± * * - * (0/ 15)		* ± * * - * (0/ 0)	3.4E+01 ± * 3.4E+01 - 3.4E+01 (1/ 17)	None
Natural						
Bi-214	**	1.4E+02 ± * 1.4E+02 - 1.4E+02 (1/ 15)	Station 85 R.M. 144-150	1.4E+02 ± * 1.4E+02 - 1.4E+02 (1/ 15)	* ± * * - * (0/ 17)	None
K-40	**	3.5E+03 ± 1.0E+03 2.0E+03 - 6.0E+03 (15/ 15)	Station 85 R.M. 144-150	3.5E+03 ± 1.0E+03 2.0E+03 - 6.0E+03 (15/ 15)	3.4E+03 ± 9.7E+02 1.4E+03 - 5.1E+03 (17/ 17)	None

NOTE:
Asterisk for all values indicates radionuclide not detected in samples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

Table 16

Annual Summary For Specific Radionuclides in Ground Water Samples
(Activity - pCi/l)

Name of Facility - Vogtle

Docket No. 50-424,425

Location of Facility - Waynesboro Georgia

Reporting Period - 1981-84

Type of Analysis Performed	Lower Limit of Detection (LLD)	All Local Unconfined Aquifer Mean ± Std Min - Max (N/No)	Location with Highest Annual Mean Name Distance and Direction	Mean ± Std Min - Max (N/No)	Regional Confined Aquifer Mean ± Std Min - Max (N/No)	Number of Non-Routine Reported Measurements
Man-made						
Cs-134	**	* ± * * - * (0/ 17)		* ± * * - * (0/ 0)	5.0E+00 ± * 5.0E+00 - 5.0E+00 (1/ 13)	None
Cs-137	**	3.5E+00 ± 7.1E-01 3.0E+00 - 4.0E+00 (2/ 17)	Blue Bluff	4.0E+00 ± * 4.0E+00 - 4.0E+00 (1/ 1)	5.5E+00 ± 3.5E+00 3.0E+00 - 8.0E+00 (2/ 13)	None
H-3	**	2.3E+03 ± 6.9E+02 1.3E+03 - 3.8E+03 (14/ 14)	Spring near Discharge	2.?E+03 ± 5.0E+02 2.5E+03 - 3.3E+03 (3/ 3)	2.6E+02 ± 3.1E+01 2.4E+02 - 2.8E+02 (2/ 13)	None
Natural						
Be-7	**	* ± * * - * (0/ 17)		* ± * * - * (0/ 0)	* ± * * - * (0/ 13)	None
Bi-212	**	4.9E+01 ± * 4.9E+01 - 4.9E+01 (1/ 17)	Spring near Discharge	4.9E+01 ± * 4.9E+01 - 4.9E+01 (1/ 3)	5.9E+01 ± * 5.9E+01 - 5.9E+01 (1/ 13)	None
Bi-214	**	* ± * * - * (0/ 17)		* ± * * - * (0/ 0)	9.0E+00 ± * 9.0E+00 - 9.0E+00 (1/ 13)	None
K-40	**	1.4E+02 ± 6.4E+01 9.5E+01 - 1.8E+02 (2/ 17)	Station 61 0.8 Miles NW	1.8E+02 ± * 1.8E+02 - 1.8E+02 (1/ 7)	* ± * * - * (0/ 13)	None

NOTE:
Asterisk for all values indicates radionuclide not detected in samples

(N/No) fraction denotes number of positive results over number of analyses performed

** - Lower Limits of Detection are listed in Table 4

TABLE 17

CROSSCHECK PROGRAM RESULTS

Air Filter 1981

pCi/filter

Date	Known	Result	Resolution	Ratio
		Gross Beta		
3/27/81	50±5	53±1	10.0	1.06
6/26/81	54±5	60±1	10.8	1.11
9/25/81	51±5	58±2	10.2	1.14
		Cs-137		
3/27/81	14±5	14±2	2.8	1.00
6/26/81	16±5	23±2	3.2	1.44
9/25/81	19±5	24±3	3.8	1.26

TABLE 19

CROSSCHECK PROGRAM RESULTS

		Milk pCi/liter		1981
Date	Known	Result	Resolution	Ratio
		I-131		
01/30/81	26±10	24	*	*
05/15/81	26±6	49±0	4.3	1.88
07/24/81	0.01±0.001	19	*	*
10/23/81	52±6	55±13	8.7	1.06
		Cs-137		
01/30/81	43±9	42±4	4.8	0.98
05/15/81	22±5	24±4	4.4	1.09
07/24/81	31±5	37±3	6.2	1.19
10/23/81	25±5	28±7	5.0	1.12

* If the known value is zero or if the result is a "less than" value, no comparison can be made by the NRC criteria since the ratio cannot be determined.

TABLE 19

(Sheet 1 of 2)

CROSSCHECK PROGRAM RESULTS

1981

Water

pCi/liter

Date	Known	Result	Resolution	Ratio
		H-3		
02/13/81	1760±341	1927±103	5.16	1.09
04/10/81	2710±355	3220±70	7.63	1.19
06/12/81	1950±344	2146±0	5.67	1.10
08/07/81	2630±354	2977±179	7.43	1.13
10/09/81	2210±348	2926±144	6.35	1.32
12/11/81	2700±355	2999±85	7.61	1.11
		Cr-51		
06/05/81	0.0	184	*	*
10/ /81	34±5	31	*	*
		Co-60		
06/05/81	17±5	22±2	3.4	1.29
10/ /81	22±5	31	4.4	1.40
		Zn-65		
06/05/81	0.0	24	*	*
10/ /81	24±5	29	*	*
		Ru-106		
06/05/81	15±5	110	*	*
10/ /81	0.0	137	*	*
		Cs-134		
06/05/81	21±5	26±5	4.2	1.24
10/ /81	21±5	28	4.2	1.33

TABLE 19
(Sheet 2 of 2)
CROSSCHECK PROGRAM RESULTS

Water (Cont'd) 1981

pCi/liter

Date	Known	Result	Resolution	Ratio
		Cs-137		
06/05/81	31±5	36±2	6.2	1.16
10/ /81	32±5	36	6.4	1.13

* If the known value is zero or if the result is a "less than" value, no comparison can be made by the NRC criteria since the ratio cannot be determined.

TABLE 20

CROSSCHECK PROGRAM RESULTS

1982

Air Filter
pCi/filter

Date	Known	Result	Resolution	Ratio
		Gross Beta		
03/26/82	55±5	59±1	11.0	1.07
09/24/82	67±3	65±2	22.3	0.97
11/26/82	59±5	72±1	11.8	1.22
		Cs-137		
03/26/82	23±5	24±2	4.6	1.04
09/24/82	27±5	21±2	5.4	0.78
11/26/82	27±5	31±1	5.4	1.15

TABLE 21

CROSSCHECK PROGRAM RESULTS

1982

Milk
pCi/liter

Date	Known	Result	Resolution	Ratio
		I-131		
07/23/82	5.4±0.8	3.7±0.6	6.75	0.69
10/22/82	42±6	28±3	7.0	0.67
		Co-60		
04/23/82	30±5	33±1	6.0	1.1
		Cs-137		
04/23/82	28±5	34±2	5.6	1.2
10/22/82	34±5	25±2	6.8	0.74
		Ba-140		
04/23/82	0	66	*	*

* If the known value is zero or if the result is a "less than" value, no comparison can be made by the NRC criteria since the ratio cannot be determined.

TABLE 22
(SHEET 1 of 2)
CROSSCHECK PROGRAM RESULTS

1982

Water
pCi/liter

Date	Known	Result	Resolution	Ratio
		H-3		
02/12/82	1820±342	2277±127	5.3	1.25
04/09/82	2860±360	3159±68	7.9	1.10
06/11/82	1830±197	1529±46	9.3	0.84
08/13/82	2890±390	**		
10/01/82	2560±204	**		
12/10/82	1990±345	2339+37	5.8	1.18
		Cr-51		
02/05/82	0.0	216	*	*
06/04/82	23±5	150	*	*
10/01/82	51±5	194	*	*
		Co-60		
02/05/82	20±5	21±1	4.0	1.05
06/04/82	29±5	33±2	5.8	1.14
10/01/82	20±5	18±1	4.0	0.90
		Zn-65		
02/05/82	15±5	30	*	*
06/04/82	26±5	34	*	*
10/01/82	24±5	32±2	4.8	1.33
		I-131		
06/25/82	4.4±6	3±0	0.73	0.68

TABLE 22
(SHEET 2 OF 2)
CROSSCHECK PROGRAM RESULTS

Water (Cont'd) 1982

pCi/liter

Date	Known	Result	Resolution	Ratio
		Ru-106		
02/05/82	20±5	131	*	*
06/04/82	0.0	122	*	*
10/01/82	30±5	119	*	*
		Cs-134		
02/05/82	22±5	22±1	4.4	1.0
06/04/82	35±5	33±4	7.0	0.94
10/01/82	19±5	23±1	3.8	1.21
		Cs-137		
02/05/82	23±5	19±3	4.6	0.83
06/04/82	25±5	27±3	5.0	1.08
10/01/82	20±5	22±2	4.0	1.10

* If the known value is zero or if the result is a "less than" value, no comparison can be made by the NRC criteria since the ratio cannot be determined.

** These samples not analyzed.

TABLE 23

CROSSCHECK PROGRAM RESULTS

1983

Air Filter

pCi/filter

Date	Known	Result	Resolution	Ratio
		Gross Beta		
03/25/83	68±5	59±1	13.6	0.87
08/26/83	36±5	33	7.2	0.92
11/25/83	50±5	49	10.0	0.98
		Cs-137		
03/25/83	27±5	27±1	5.4	1.00
08/26/83	15±5	**		
11/25/83	20±5	20	4.0	1.00

** This sample was not analyzed.

TABLE 24

CROSSCHECK PROGRAM RESULTS

1983

Milk

pCi/liter

Date	Known	Result	Resolution	Ratio
		I-131		
06/10/83	30±6	25±4	5.0	0.83
10/28/83	40±6	54	6.7	1.35
		Cs-137		
06/10/83	47±5	41±1	8.4	0.87
10/28/83	33±5	24	6.6	0.73

TABLE 25
(SHEET 1 of 2)
CROSSCHECK PROGRAM RESULTS

1983

Water
pCi/liter

Date	Known	Result	Resolution	Ratio
		H-3		
02/11/83	2560±353	2776±8	7.25	1.08
04/08/83	3330±362	2231±42	9.20	0.67
06/10/83	1529±337	1915±12	4.53	1.25
08/12/83	1836±342	2363±104	5.37	1.29
10/14/83	1210±329	1330±56	3.68	1.10
12/ /83	2389±351	2510	6.80	1.05
		Cr-51		
02/04/83	45±5	105	*	*
06/03/83	60±5	100	*	*
10/07/83	51±5	97	*	*
06/03/83	60±5	138	*	*;***
		Co-60		
02/04/83	22±5	25±1	4.4	1.14
06/03/83	13±5	11±1	2.6	0.85
10/07/83	19±5	17	3.8	0.89
06/03/83	13±5	14±1	2.6	1.08***
		Zn-65		
02/04/83	21±5	19±3	4.2	0.90
06/03/83	36±5	10±2	7.2	0.28**
10/07/83	40±5	31	*	*
06/03/86	36±5	32±7	7.2	0.89***

TABLE 26

CROSSCHECK PROGRAM RESULTS

1984

Air Filter
pCi/filter

Date	Known	Result	Resolution	Ratio
		Gross Beta		
03/23/84	51±5	58±2	10.2	1.14
08/24/84	51±5	54±2	10.2	1.06
11/23/84	52±5	52±1	10.4	1.00
		Cs-137		
03/23/84	10±5	11±1	2.0	1.10
08/24/84	15±5	12±0	3.0	0.80
11/23/84	10±5	12±2	2.0	1.20

TABLE 27

CROSSCHECK PROGRAM RESULTS

Milk 1984

pCi/liter

Date	Known	Result	Resolution	Ratio
		I-131		
06/22/84	43±6	21±1	7.2	0.49
10/26/84	42±6	47±3	7.0	1.12
		Cs-137		
06/22/84	35±5	31±5	7.0	0.89
10/26/84	32±5	36±3	6.4	1.13

TABLE 28
(SHEET 1 of 2)
CROSSCHECK PROGRAM RESULTS

1984

Water
pCi/liter

Date	Known	Result	Resolution	Ratio
		H-3		
02/10/84	2383±351	2640±60	6.79	1.11
04/13/84	3508±364	3423±12	9.64	0.98
06/08/84	3051±359	3120±61	8.50	1.02
08/07/84	2817±356	2927±142	7.91	1.04
10/12/84	2810±356	2673±71	7.89	0.95
12/14/84	3182±360	3290±36	8.83	1.03
		Cr-51		
02/03/84	40±5	103	*	*
06/01/84	66±5	62±9	13.2	0.94
10/05/84	40±5	76	*	*
		Co-60		
02/03/84	10±5	16±2	2.0	1.6
06/01/84	31±5	27±1	6.2	0.87
10/05/84	20±5	19±1	4.0	0.95
		Zn-65		
02/03/84	50±5	36±6	10.0	0.72
06/01/84	63±5	55±3	12.6	0.87
10/05/84	147±7	146±9	19.9	0.99
		Ru-106		
02/03/84	61±5	77	*	*
06/01/84	29±5	49	*	*
10/05/84	47±5	50	*	*

TABLE 28
(SHEET 2 of 2)
CROSSCHECK PROGRAM RESULTS

Water (Cont'd) 1984

pCi/liter

Date	Known	Result	Resolution	Ratio
		Cs-134		
02/03/84	31±5	22±4	6.2	0.71
06/01/84	47±5	39±1	9.4	0.83
10/05/84	31±5	30±1	6.2	0.97
		Cs-137		
02/03/84	16±5	9	*	*
06/01/84	37±5	32±1	7.4	0.86
10/05/84	24±5	25±2	4.8	1.04
		I-131		
04/06/84	6±6	7±1	1.0	1.17
		Gross Beta		
05/18/84	6±5	3±1	1.2	0.5
11/16/84	20±5	20±1	4.0	1.0

* If the known value is zero or if the result is a "less than" value, no comparison can be made by the NRC criteria since the ratio cannot be determined.

Table 29

CRITERIA FOR COMPARING ANALYTICAL MEASUREMENTS

This table provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In these criteria, the judgment limits are variable in relation to the comparison of the Reference Laboratory's value to its associated one sigma uncertainty. As this comparison, referred to as "Resolution" increases, the acceptability of a licensee's measurement should be more selective. Conversely, poorer agreement should be considered acceptable as the resolution decreases. The values in the ratio criteria may be rounded to fewer significant figures to maintain statistical consistency with the number of significant figures reported by the Reference Laboratory, unless such rounding will result in a narrowed category of acceptance. The acceptance category reported will be the narrowest into which the ratio fits for the resolution being used.

RESOLUTION	RATIO = LICENSEE VALUE/REFERENCE VALUE		
	Agreement	Possible Agreement "A"	Possible Agreement "B"
3	No Comparison	No Comparison	No Comparison
3 and 4	0.4 - 2.5	0.3 - 3.0	No Comparison
4 and 8	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
8 and 16	0.6 - 1.67	0.5 - 2.0	0.4 - 2.5
16 and 51	0.75 - 1.33	0.6 - 1.67	0.5 - 2.0
51 and 200	0.80 - 1.25	0.75 - 1.33	0.6 - 1.67
200	0.85 - 1.18	0.80 - 1.25	0.75 - 1.33

"A" criteria are applied to the following analyses:

Gamma spectrometry where principal gamma energy used for identification is greater than 250 keV.

Tritium analyses of liquid samples

"B" criteria are applied to the following analyses:

Gamma spectrometry where principal gamma energy used for identification is less than 250 keV.

Sr-89 and Sr-90 determination.

Gross beta where samples are counted on the same date using the same reference nuclide.

TABLE 30

LAND USE SURVEY (1981)

Distance to Permanent Residence, Meat Animal,
Milk Producing Cow/Goal, Vegetable Garden
Within 8000 Meters of Plant Vogtle During 1981

	Milk Cow or Goat	First Residence	Second Residence	First Meat Animal	Second Meat Animal	First Garden	Second Garden
N	-	-	-	-	-	-	-
NNE	-	-	-	-	-	-	-
NE	-	-	-	-	-	-	-
ENE	-	-	-	-	-	-	-
E	-	-	-	-	-	-	-
ESE	-	-	-	-	-	-	-
SE	-	5150	6920	6920	-	5150	6920
SSE	-	7723	-	-	-	7723	-
S	-	7242	7242	7242	7242	7242	-
SSW	-	7483	7483	7483	7483	7483	-
SW	-	3540	4344	7723	-	7725	7800
WSW	-	2092	3862	7401	7562	4344	7562
W	-	2735	3701	2735	5471	2735	3701
WNW	-	3701	4184	4184	6114	3701	4184
NW	-	3540	3701	3701	7723	3701	7723
NNW	-	-	-	-	-	-	-

TABLE 31

LAND USE SURVEY (1982)

Distance to Permanent Residence, Meat Animal, Milk Producing Cow/Goal, Vegetable Garden Within 8000 Meters of Plant Vogtle During 1981

	Milk Cow or Goat	First Residence	Second Residence	First Meat Animal	Second Meat Animal	First Garden	Second Garden
N	-	1890	-	-	-	1890	-
NNE	-	-	-	-	-	-	-
NE	-	-	-	-	-	-	-
ENE	-	-	-	-	-	-	-
E	-	-	-	-	-	-	-
ESE	-	-	-	-	-	-	-
SE	-	5304	6888	7864	-	5304	6888
SSE	-	7925	7986	-	-	7925	7986
S	-	7254	7284	7254	-	7254	7284
SSW	-	7315	7498	7315	-	7315	7498
SW	-	3536	4206	7681	-	4206	6828
WSW	-	2012	4084	-	-	4084	5182
W	-	2560	2926	2560	-	2560	2926
WNW	-	3414	4328	7132	-	3414	4877
NW	-	2865	3536	3719	4206	4206	6218
NNW	-	-	-	-	-	-	-

TABLE 32

LAND USE SURVEY (1983)

DISTANCE (METERS) TO NEAREST PERMANENT RESIDENCE, MEAT ANIMAL (PIG OR CATTLE), MILK PRODUCING COW OR GOAT AND VEGETABLE GARDEN WITHIN 8000 METERS OF PLANT VOGTLE DURING 1983

	Milk Cow or Goat	Permanent Residence	Meat Animal	Garden
N	-	-	-	-
NNE	-	-	-	-
NE	-	-	-	-
ENE	-	-	-	-
E	-	-	-	-
ESE	-	-	-	-
SE	7321	5390 (possible) 6959 (definite)	7965	6959
SSE	-	7482	-	-
S	-	7160	7965	-
SSW	-	7643	7401	-
SW	-	4545	7562	7723
WSW	-	1531	7723	2011
W	-	2494	-	2977
WNW	-	3057	4425	6838
NW	-	3379	6315	-
NNW	-	-	-	-

TABLE 33

LAND USE SURVEY (1984)

DISTANCE (METERS) TO NEAREST PERMANENT RESIDENCE, META ANIMAL (PIG OR CATTLE), MILK PRODUCING COW OR GOAL AND VEGETABLE GARDEN WITHIN 8000 METERS OF PLANT VOGTLE DURING 1984

Sector	Milk Cow	Meat Animal	Resident	Vegetable Garden
N	-	-	-	-
NNE	-	-	-	-
NE	-	-	-	-
ENE	-	-	-	-
E	-	-	-	-
ESE	-	-	-	-
SE	7403	6920	5310	5310
SSE	-	-	-	-
S	-	8046	7240	-
SSW	-	7403	7562	-
SW	-	4989	4506	4828
WSW	-	7724	1931	2253
W	-	-	2414	2897
WNW	-	-	3058	5471
NW	-	6276	3379	3862
NNW	-	-	-	-

FIGURE 1

Terrestrial Stations Near Site Boundary

and Groundwater Stations

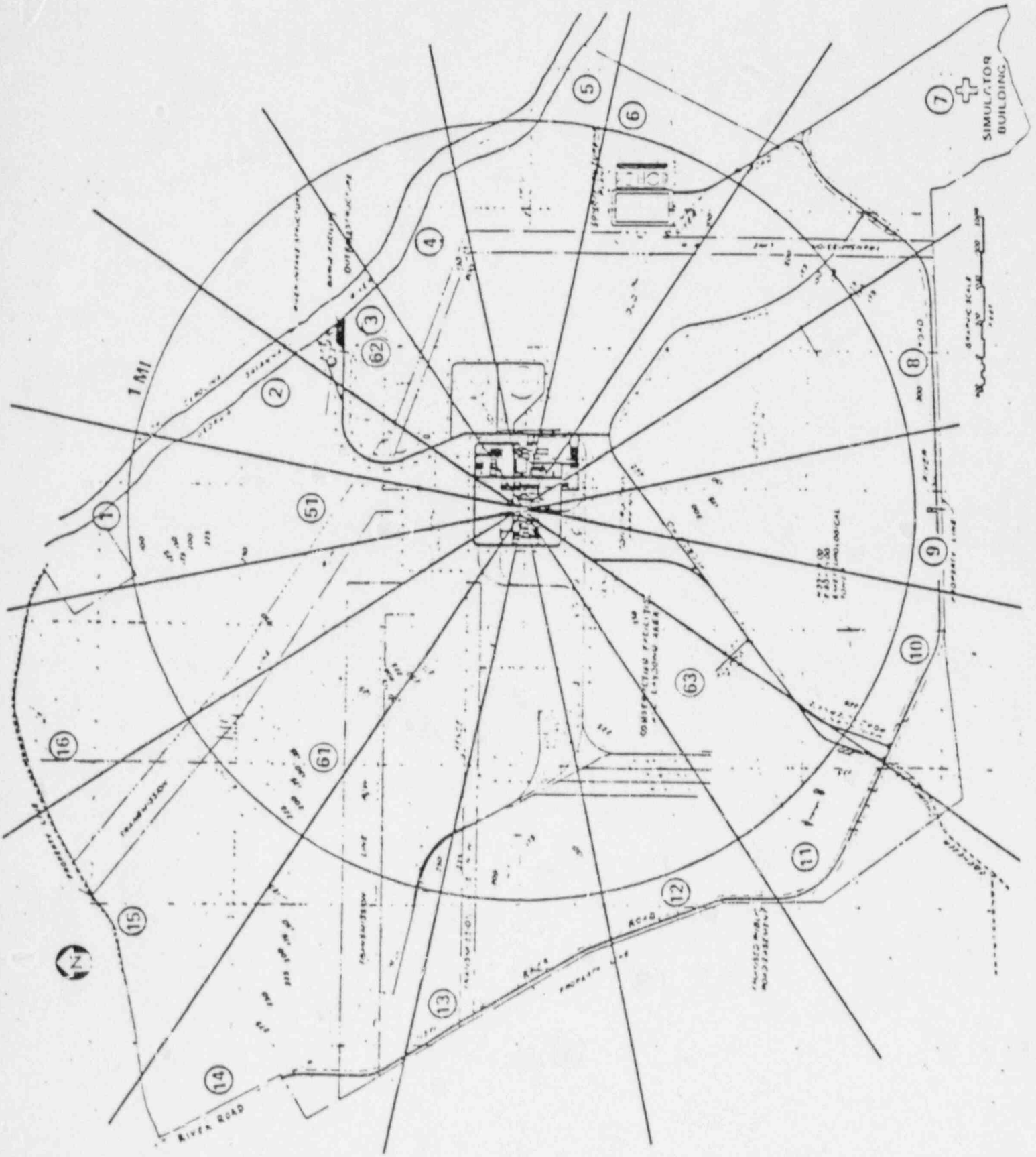

FIGURE 2

Terrestrial Stations beyond Site Boundary out to Approximately Five Miles and River Water Stations

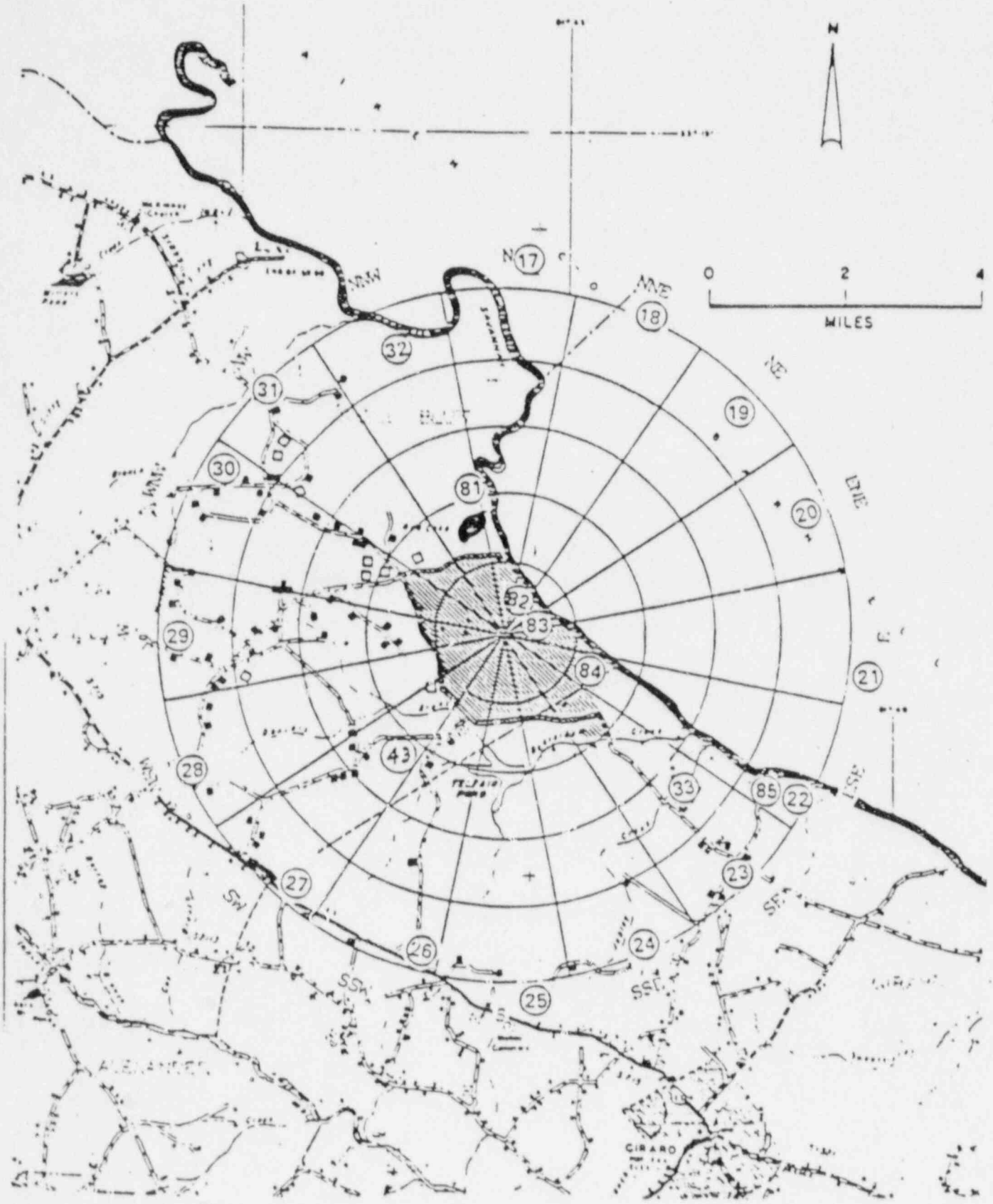

FIGURE 3

Terrestrial Stations beyond Five Miles

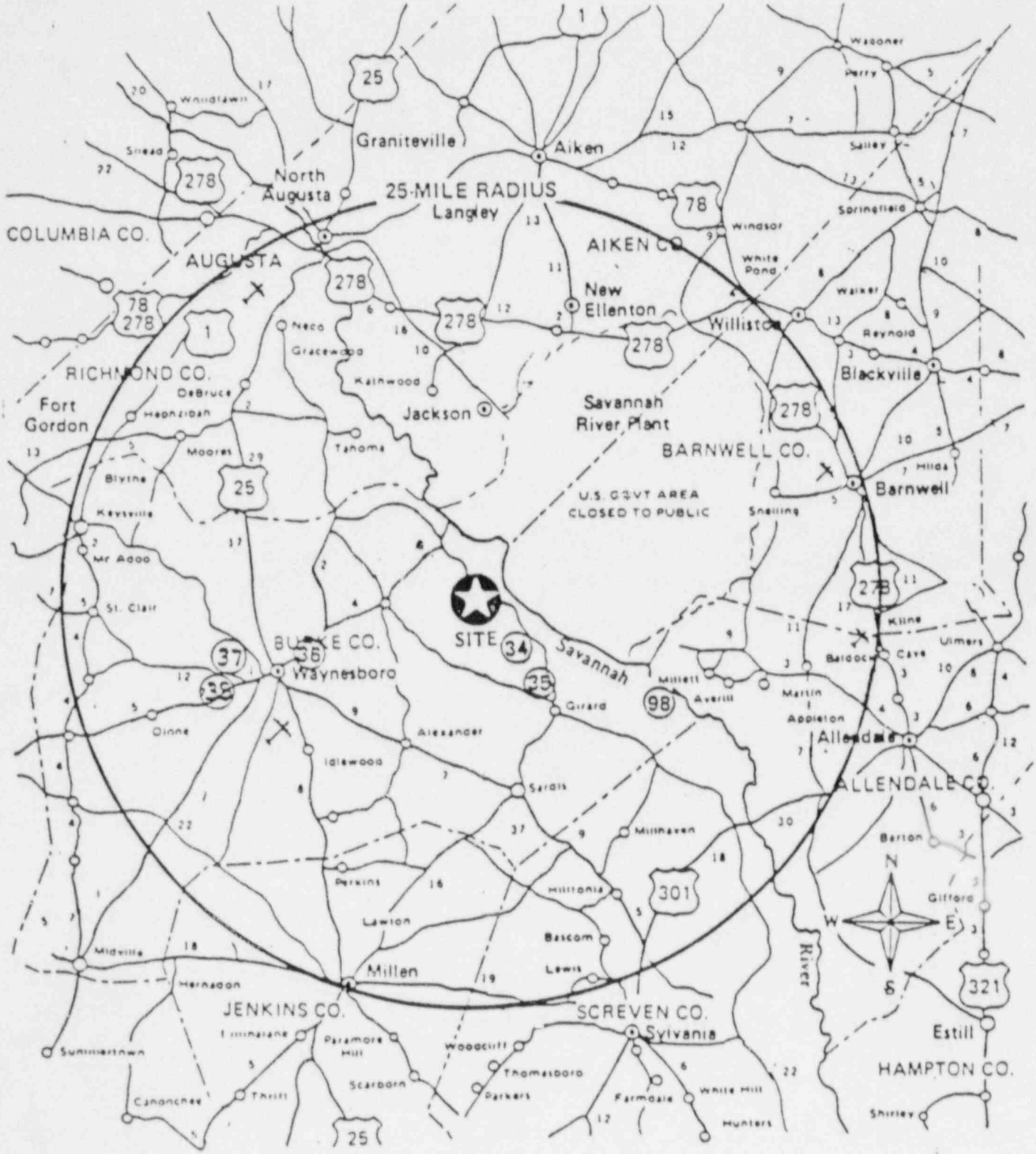

FIGURE 4

Drinking Water Stations

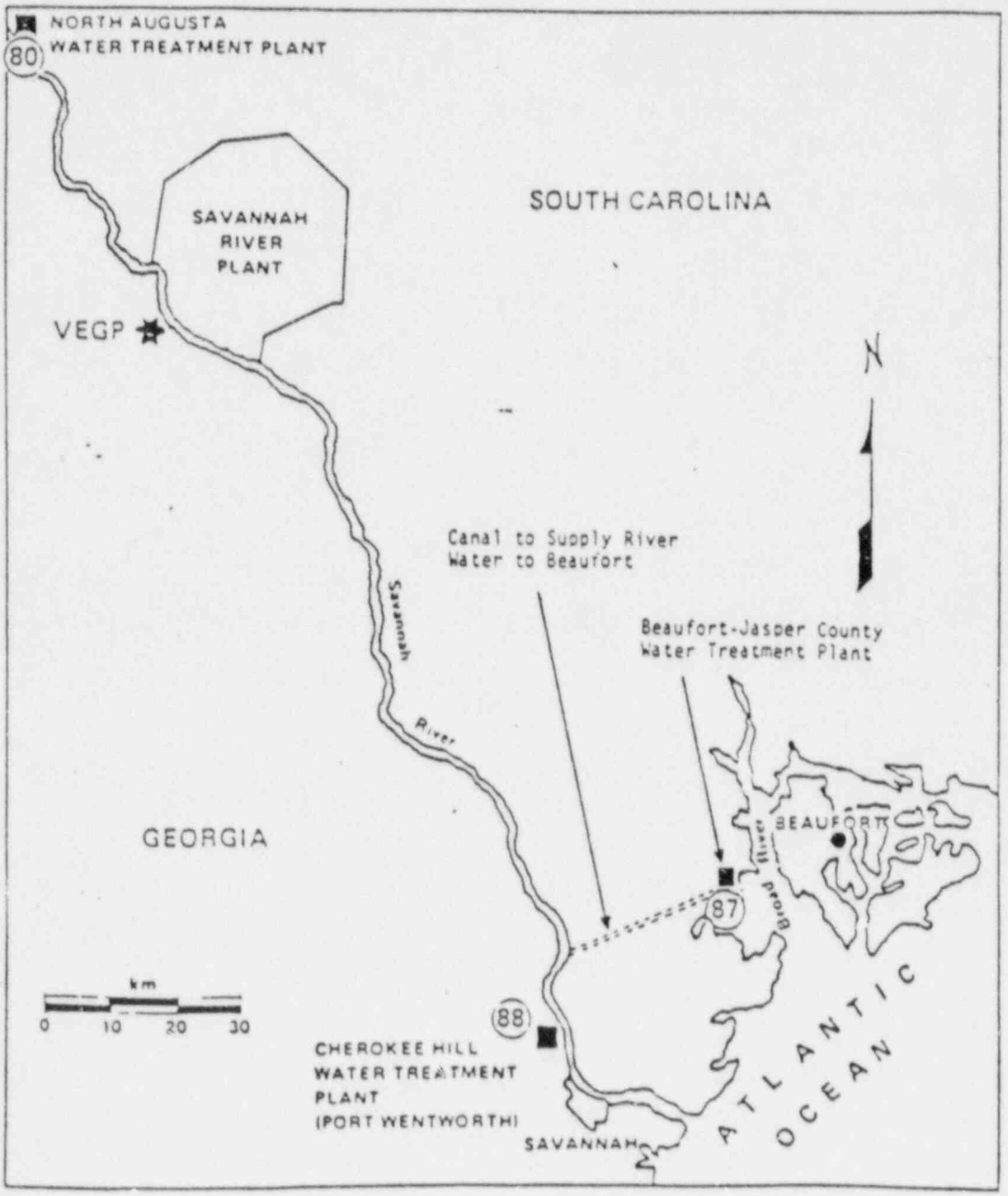

FIGURE 5

TREND CURVE FOR GROSS BETA IN AIR

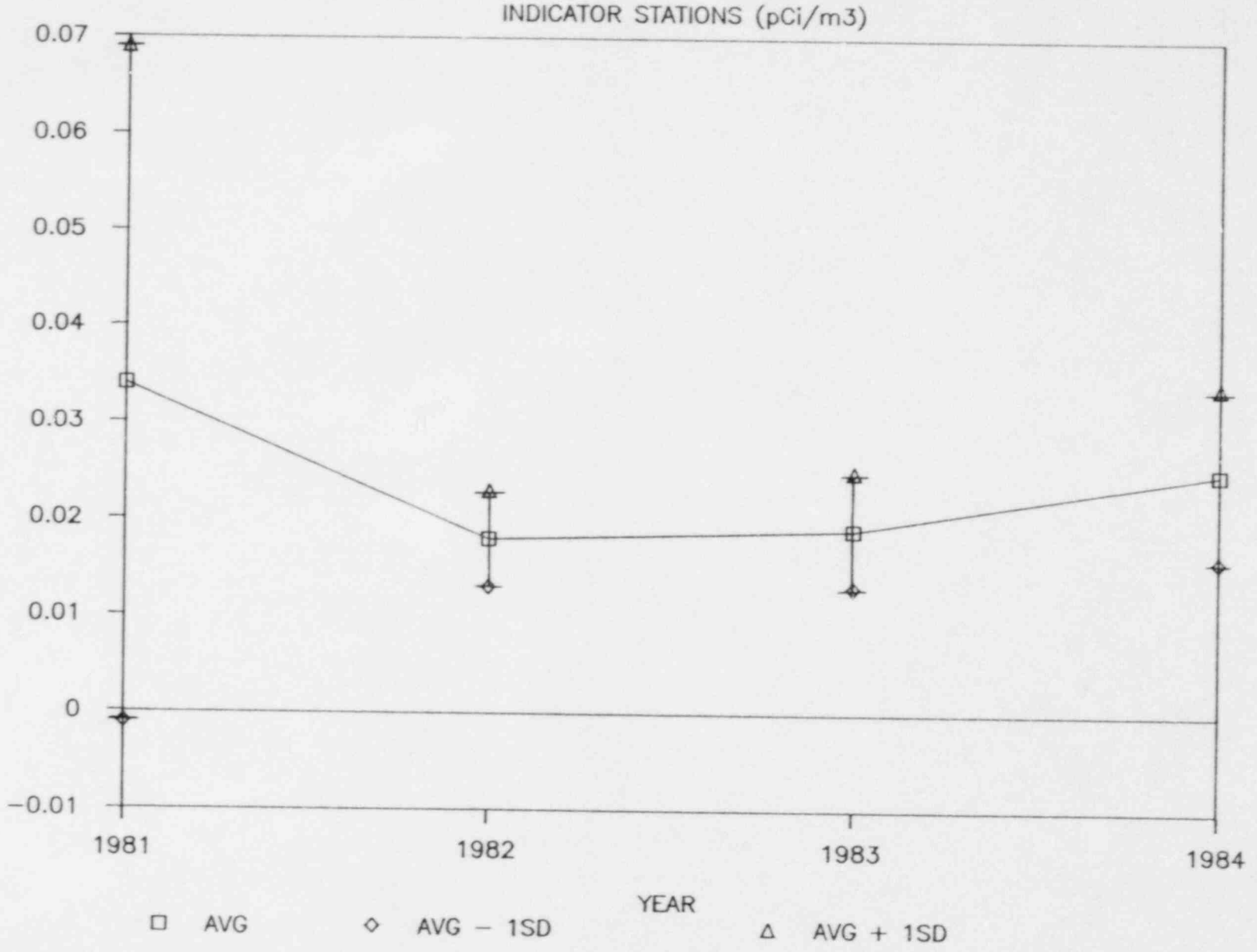

FIGURE 6

TREND CURVE FOR TRITIUM IN AIR

INDICATOR STATIONS (pCi/m3)

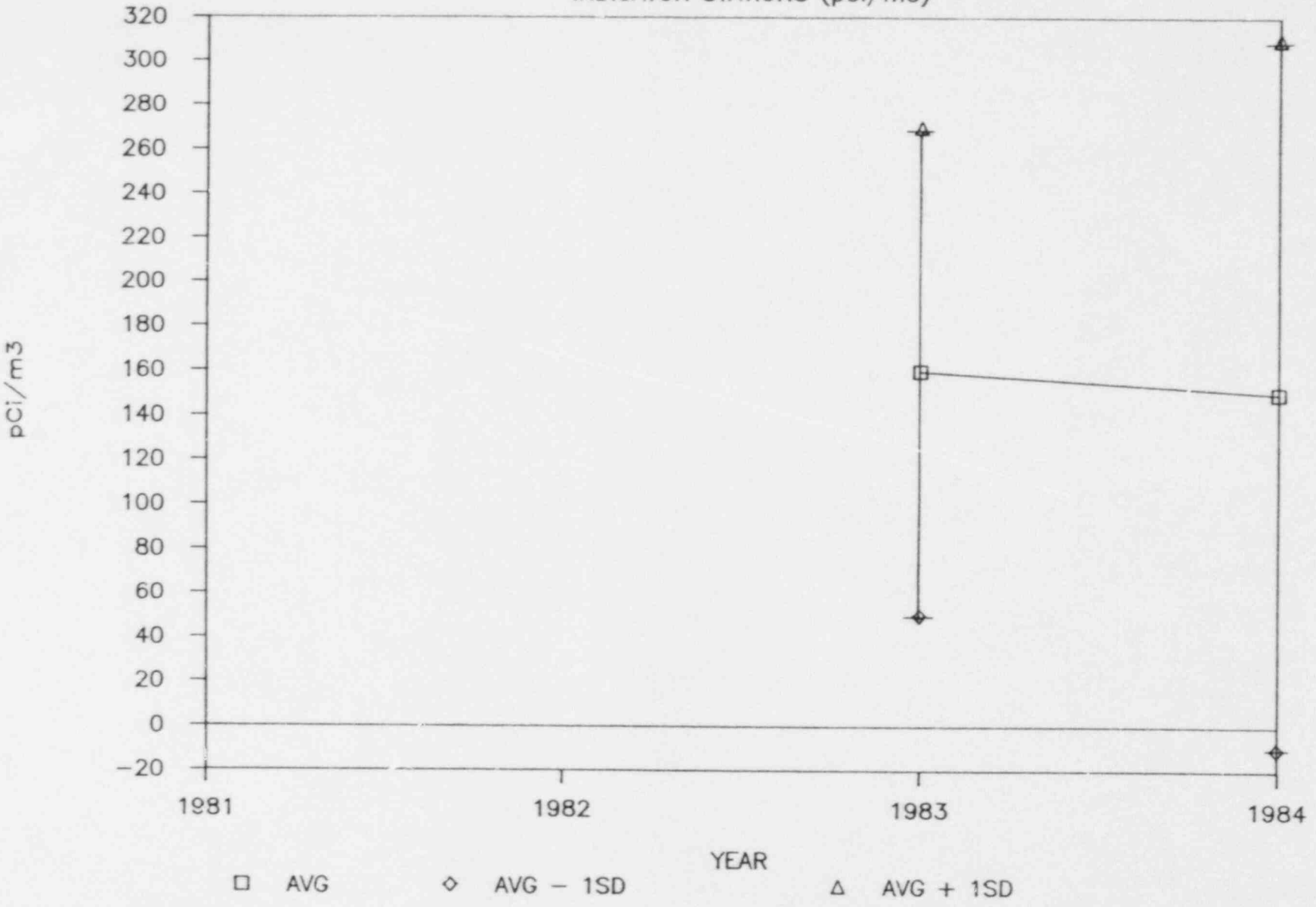

FIGURE 7

TREND CURVE FOR TLDS AT SITE BOUNDARY

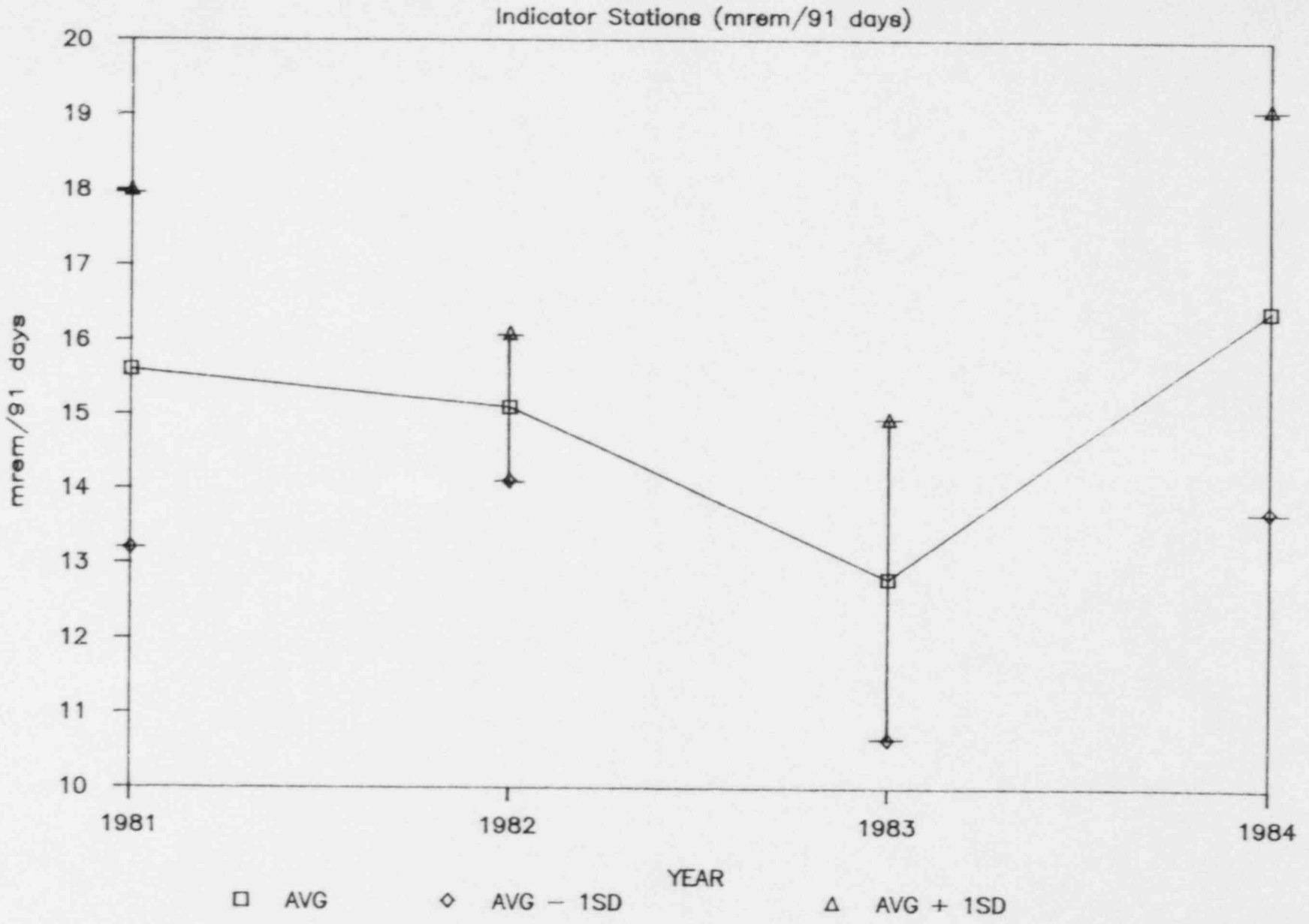

FIGURE 8

TREND CURVE FOR TRITIUM IN GRASS

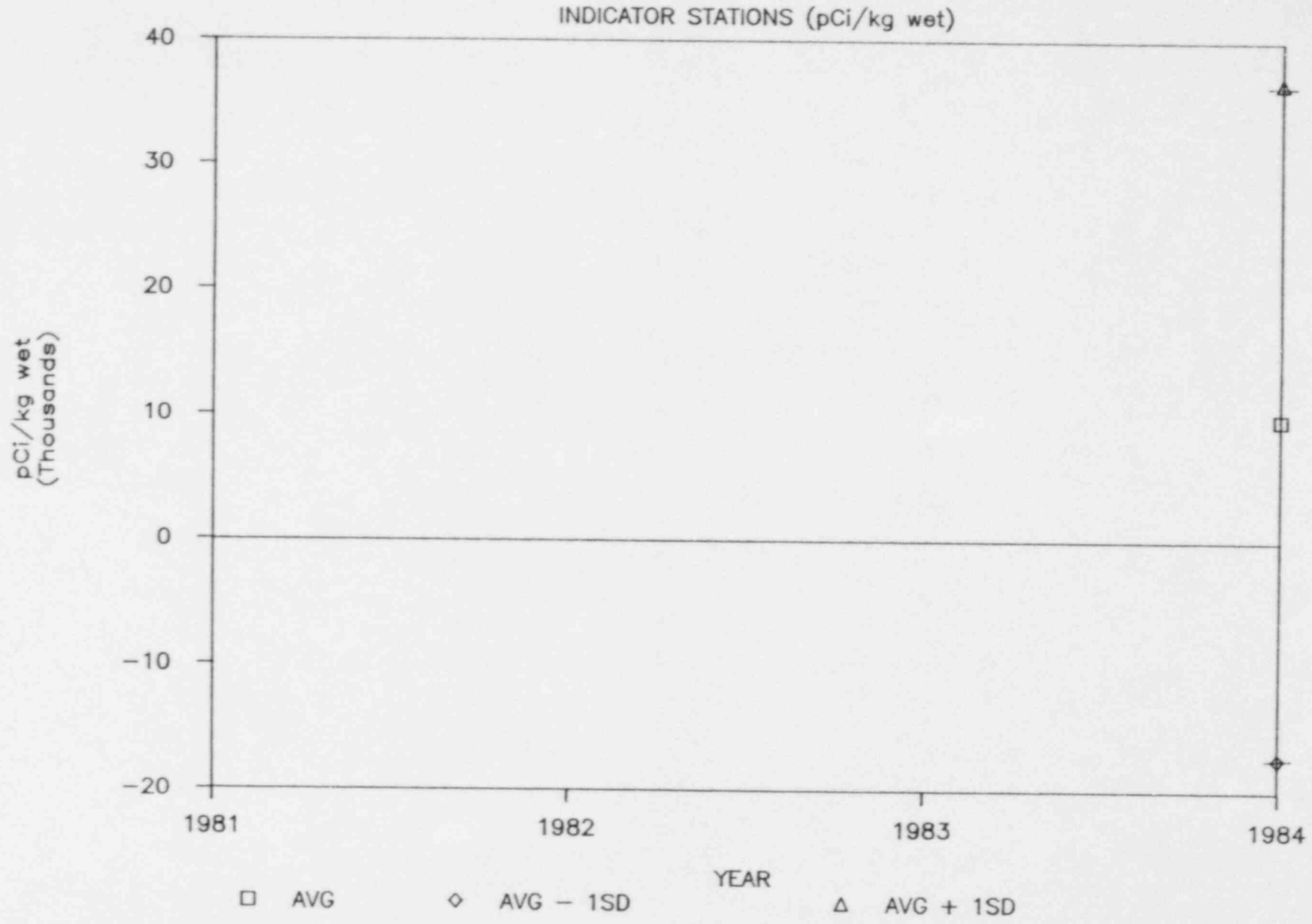

FIGURE 9

TREND CURVE FOR Cs-137 IN GRASS

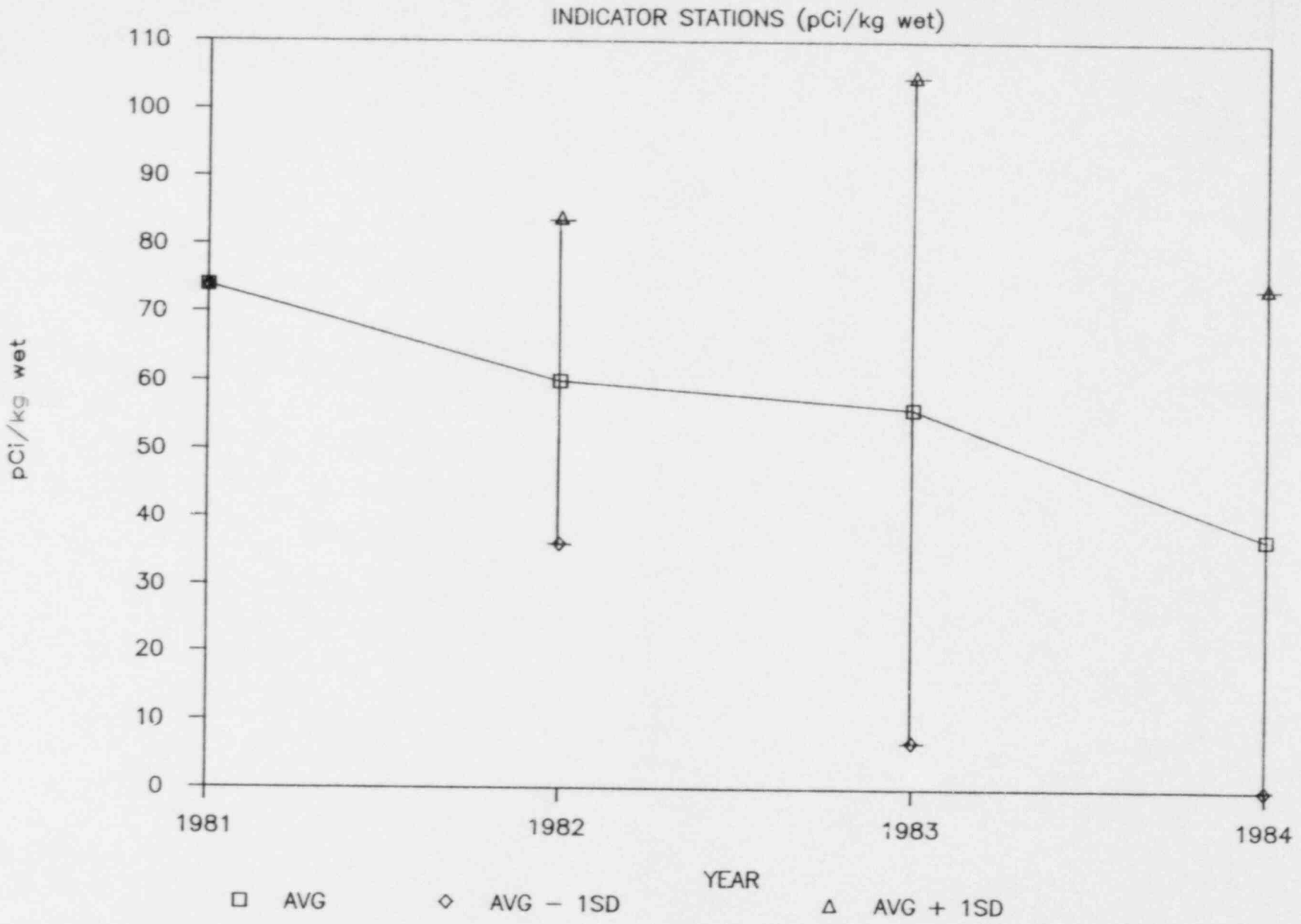

FIGURE 10

TREND CURVE FOR TRITIUM IN RIVER WATER

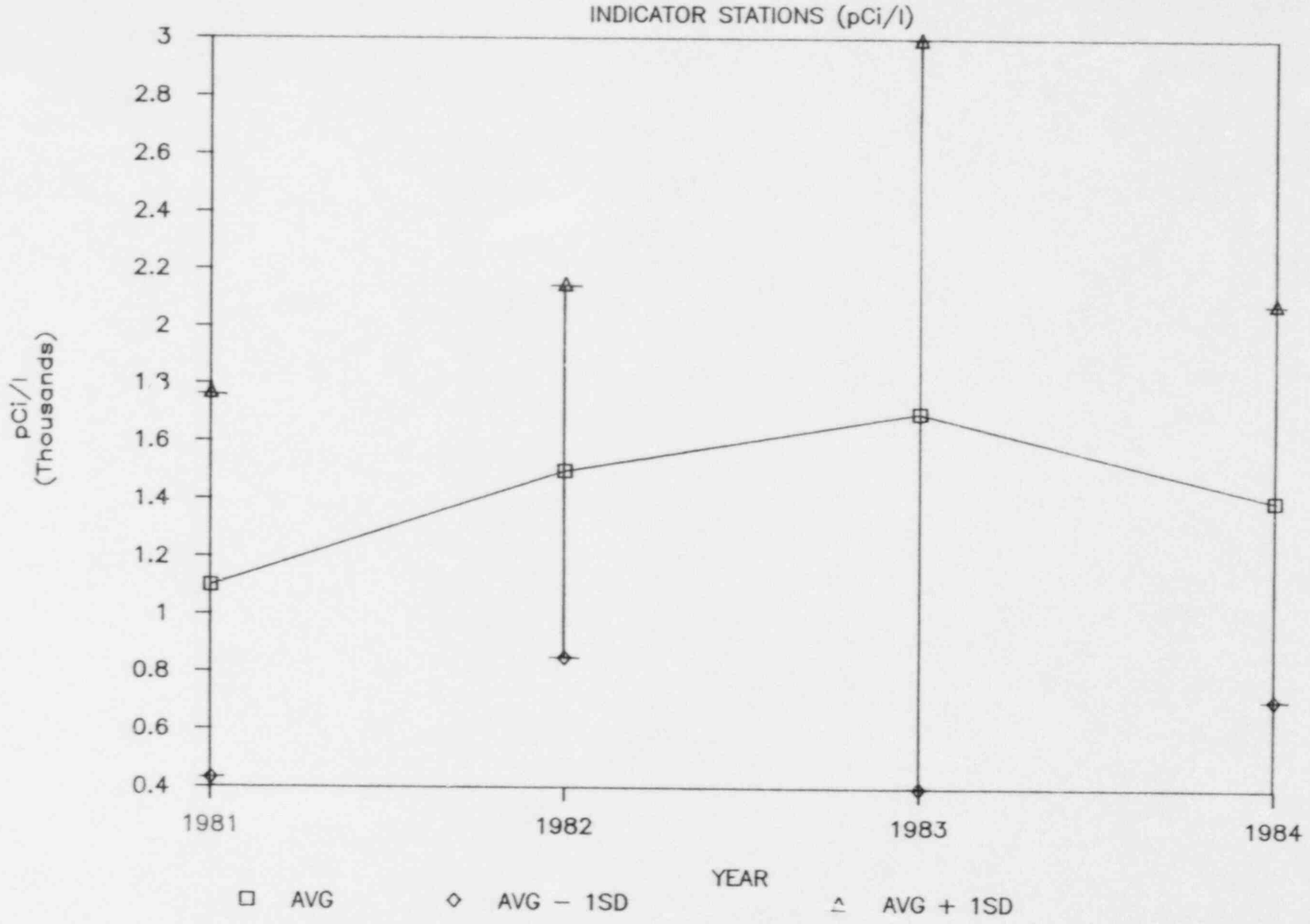

FIGURE 11

TREND CURVE FOR CS-137 IN RIVER WATER

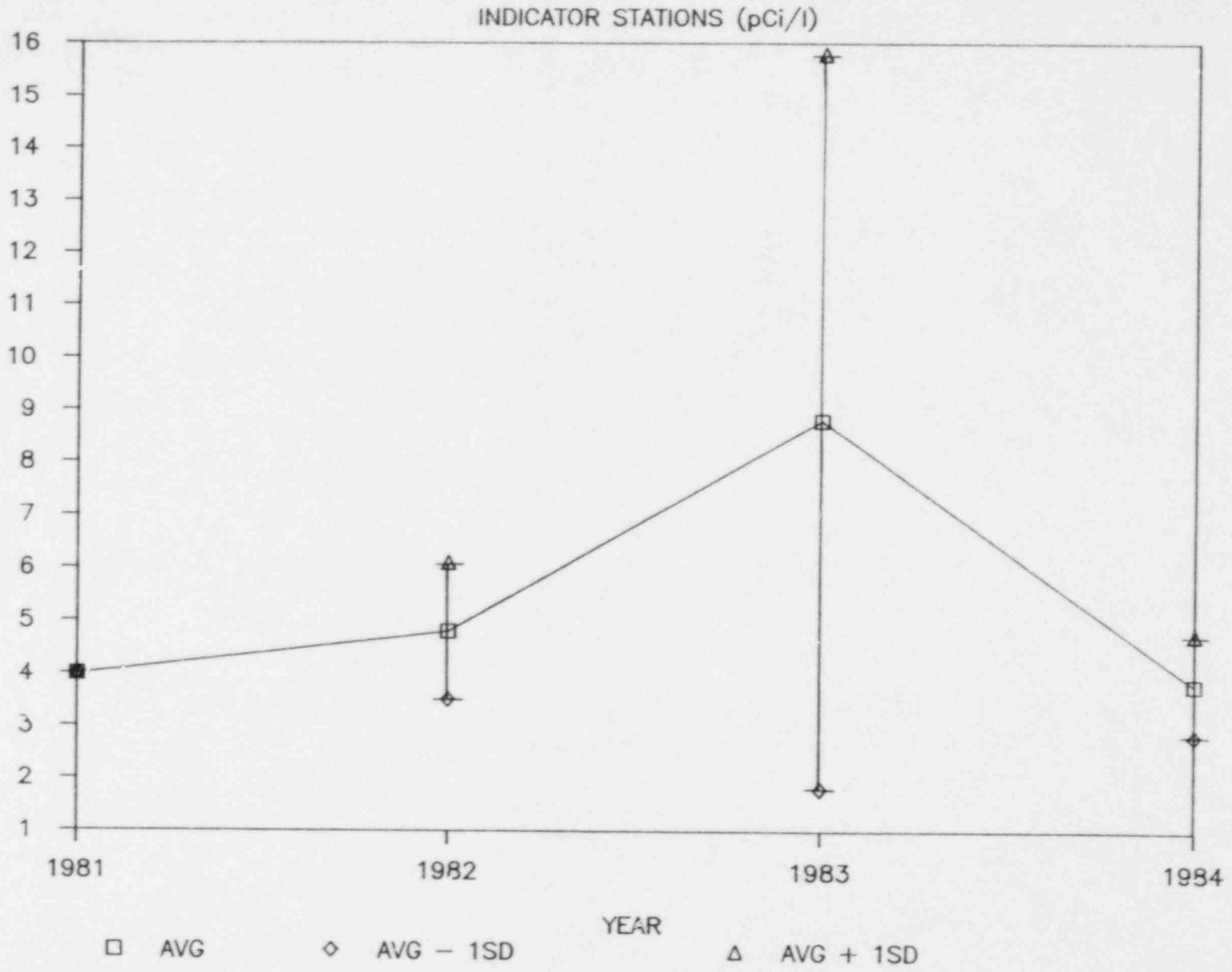

FIGURE 12

TREND CURVE–GROSS BETA–RAW DRNK. WATER

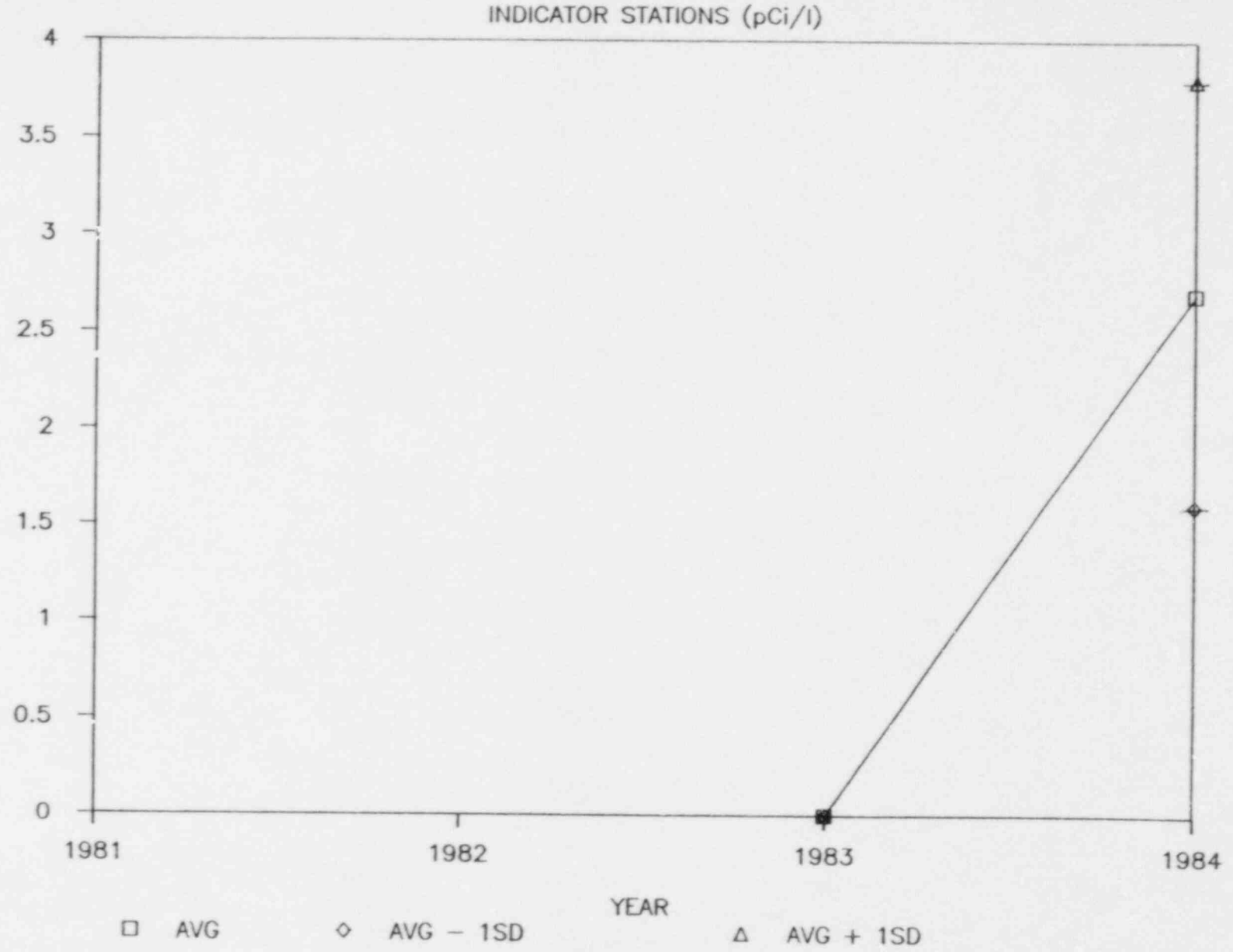

FIGURE 13

TREND CURVE–TRITIUM IN RAW DRK. WATER

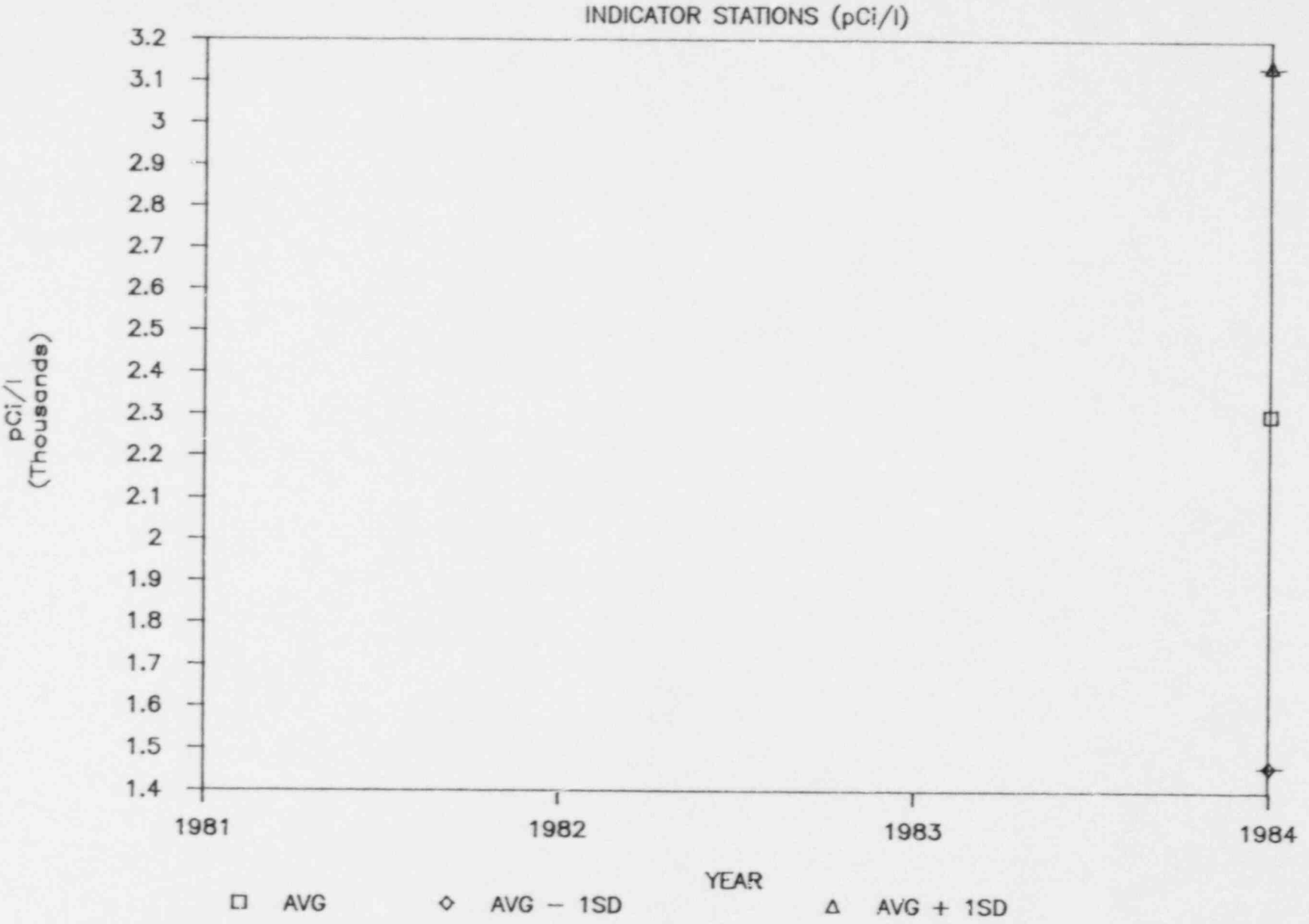

FIGURE 14

TREND CURVE/CS-137 IN RAW DRINK. WATER

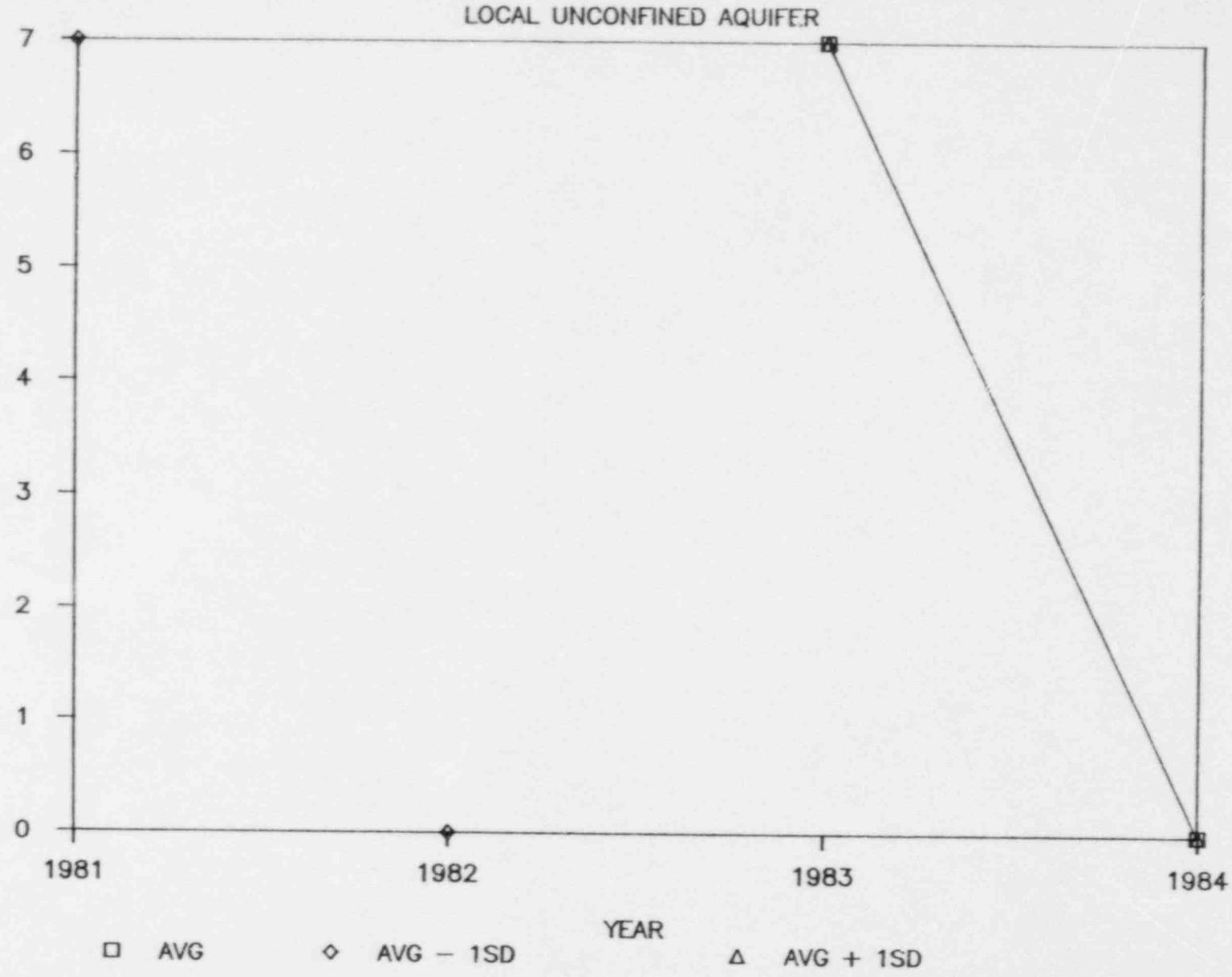

FIGURE 15

TREND CURVE–GROSS BETA–FIN. [illegible]RNK. WATER

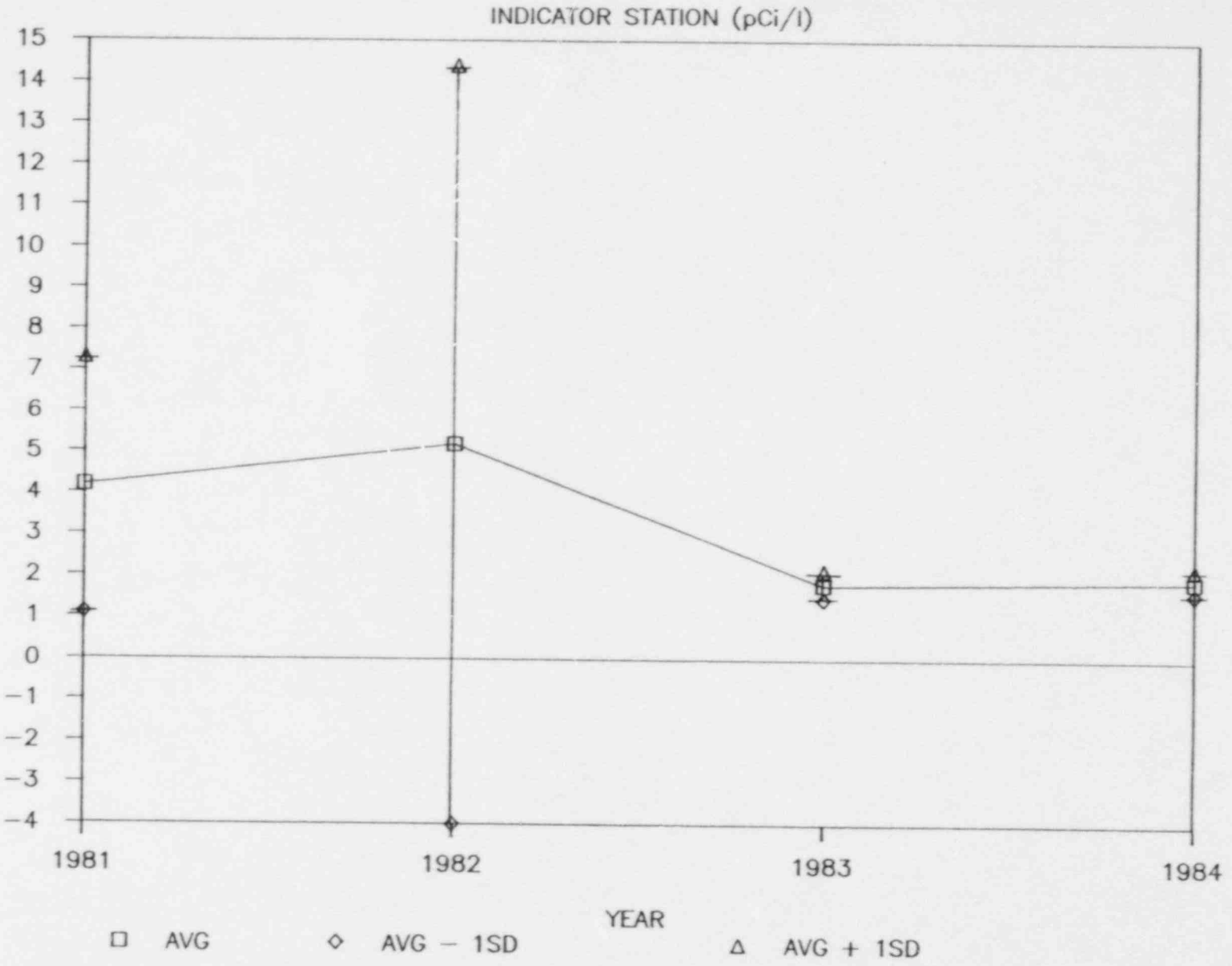

FIGURE 16

TREND CURVE–TRITIUM–FINISHED DRNK WATER

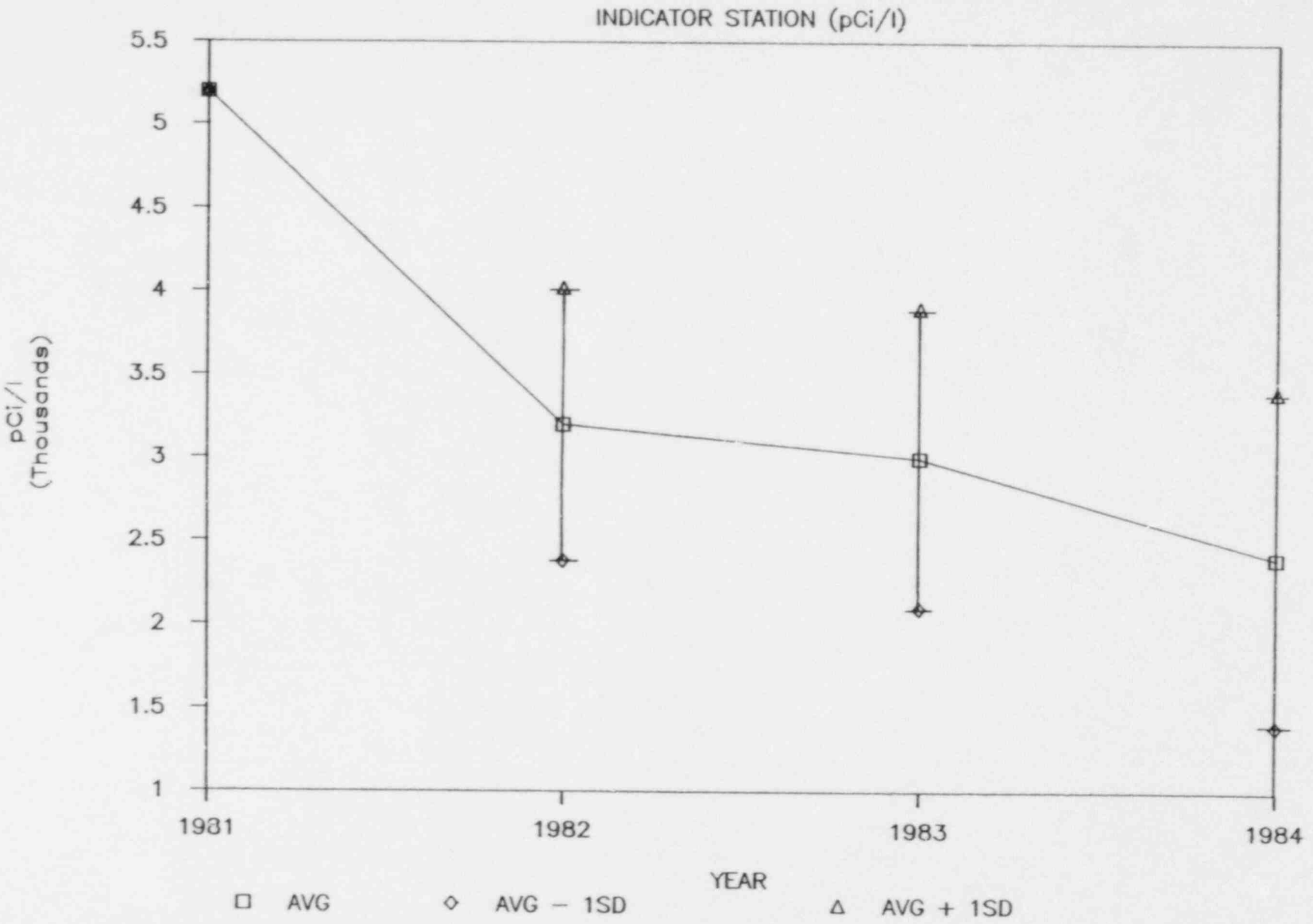

FIGURE 17

TREND CURVE:CS-137 IN FIN. DRNK. WATER

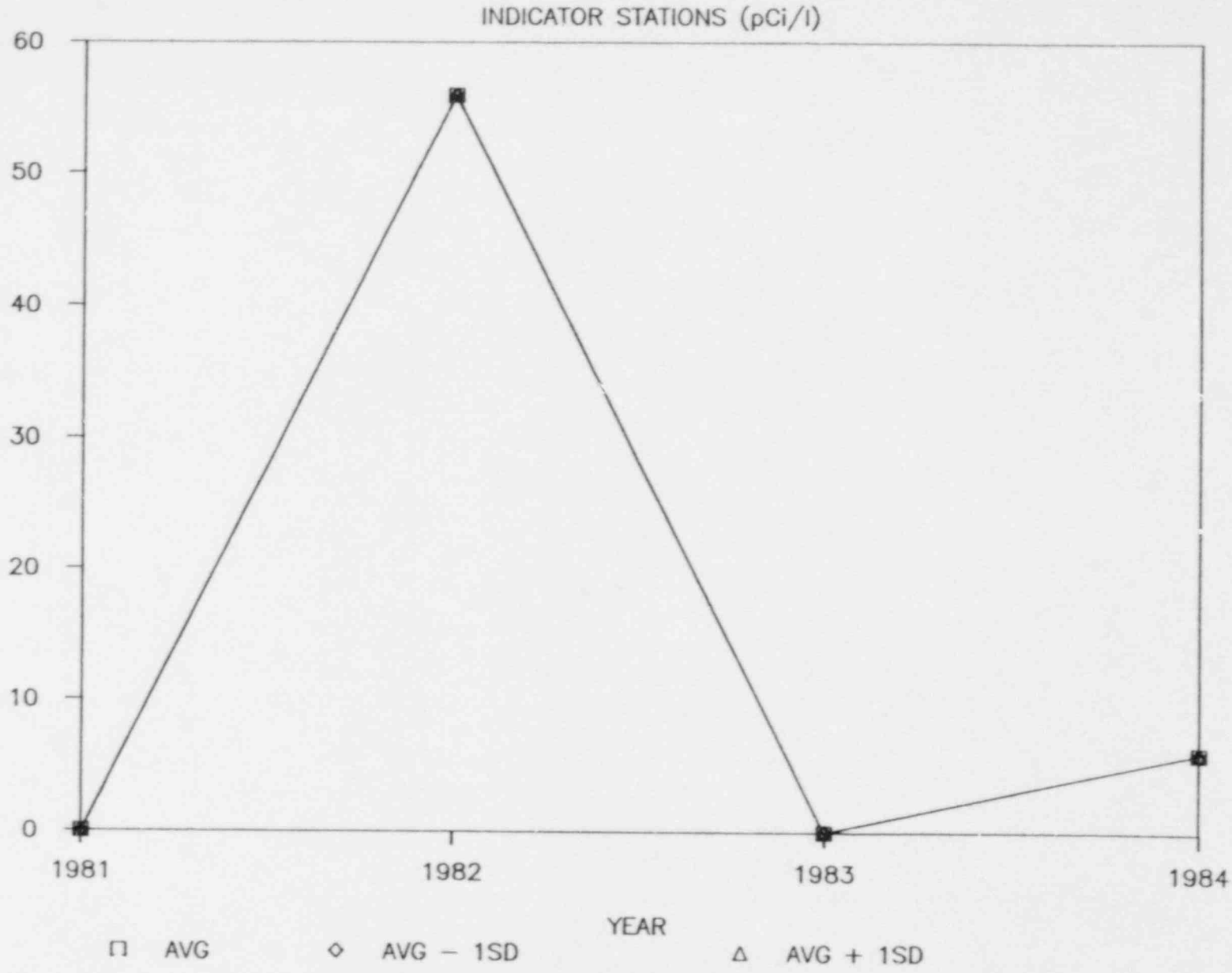

FIGURE 18

TREND CURVE FOR CS-137 IN SEDIMENT

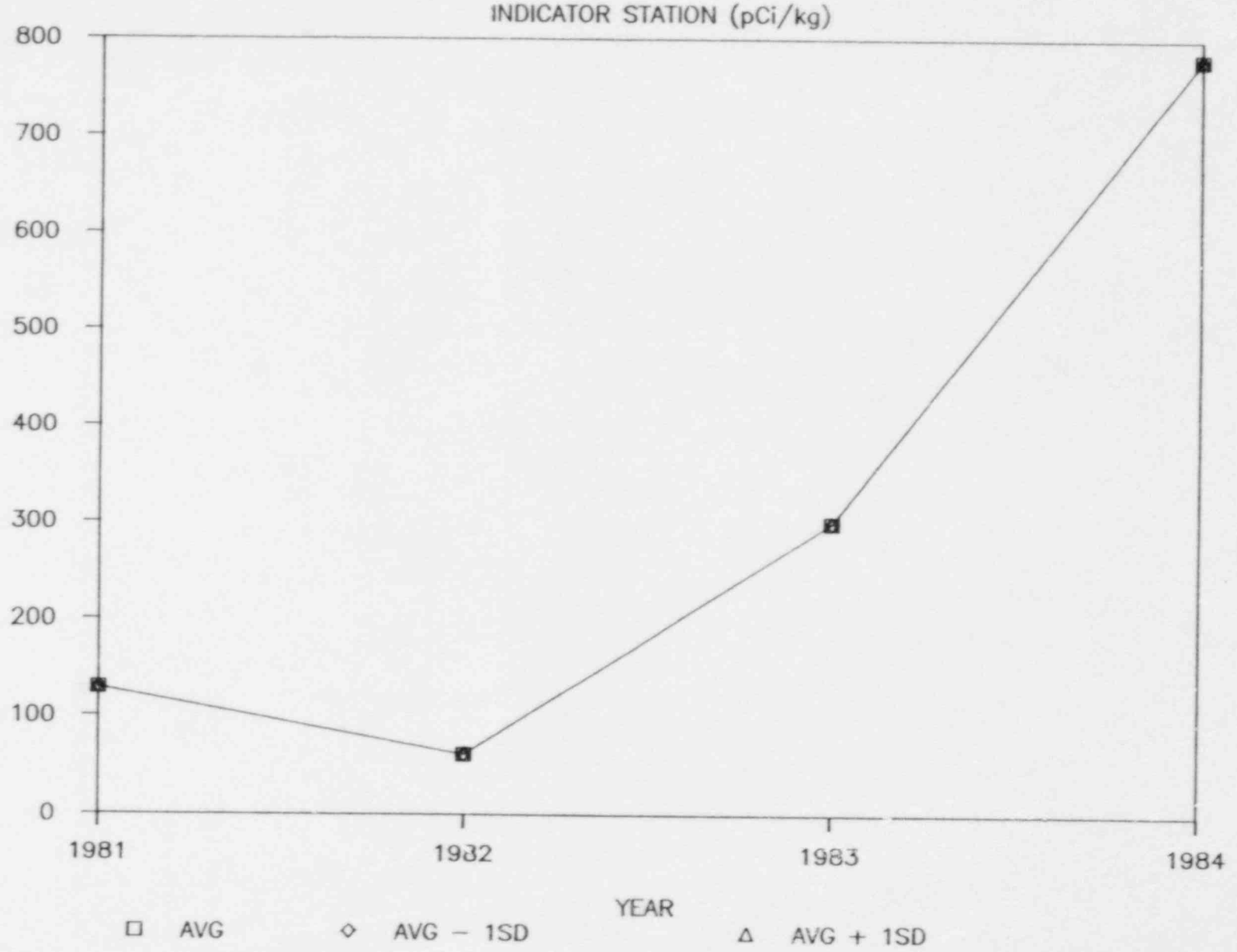

FIGURE 19

TREND CURVE FOR CS-137 IN FISH

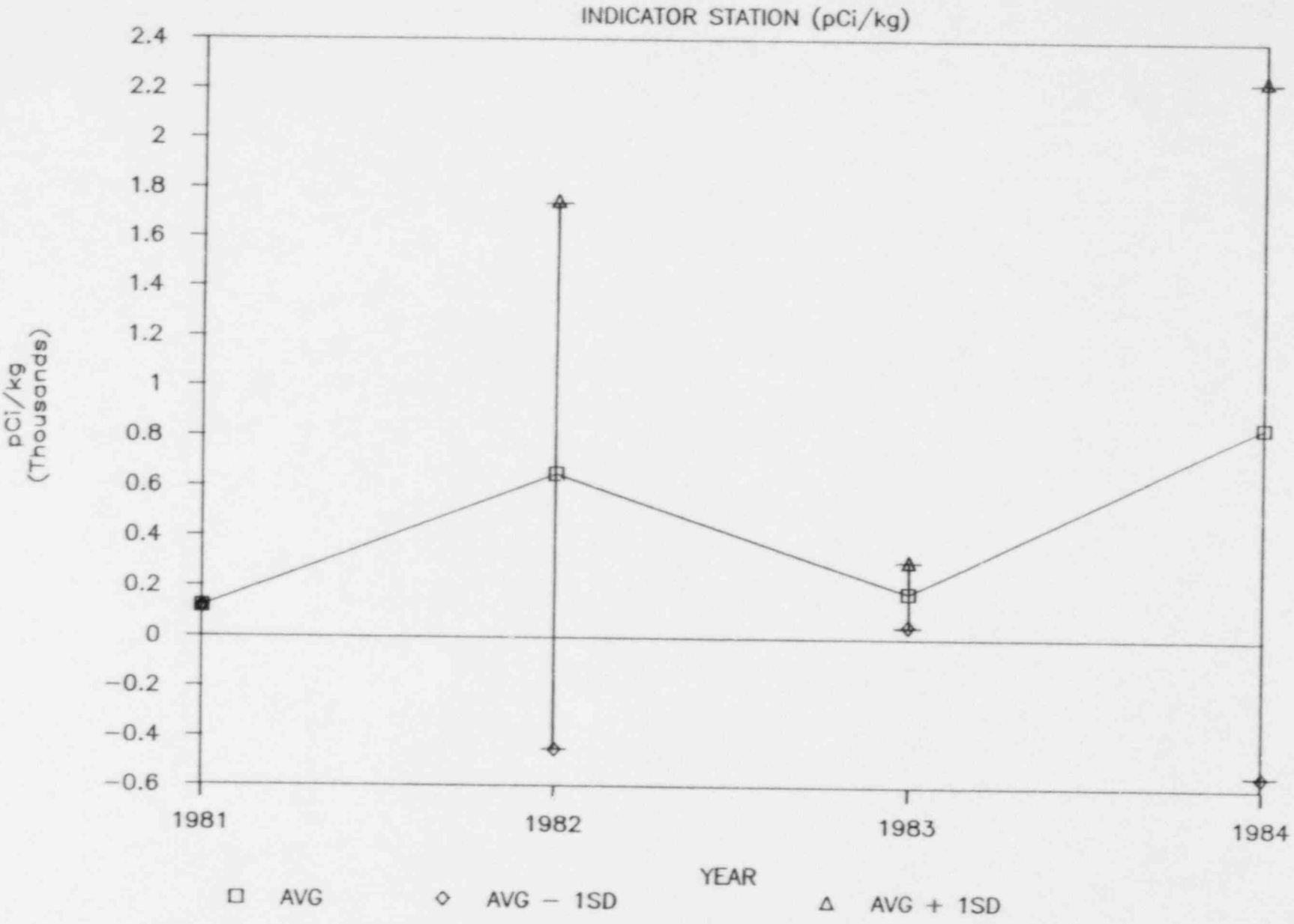

FIGURE 20

TREND CURVE FOR TRITIUM IN GROUNDWATER

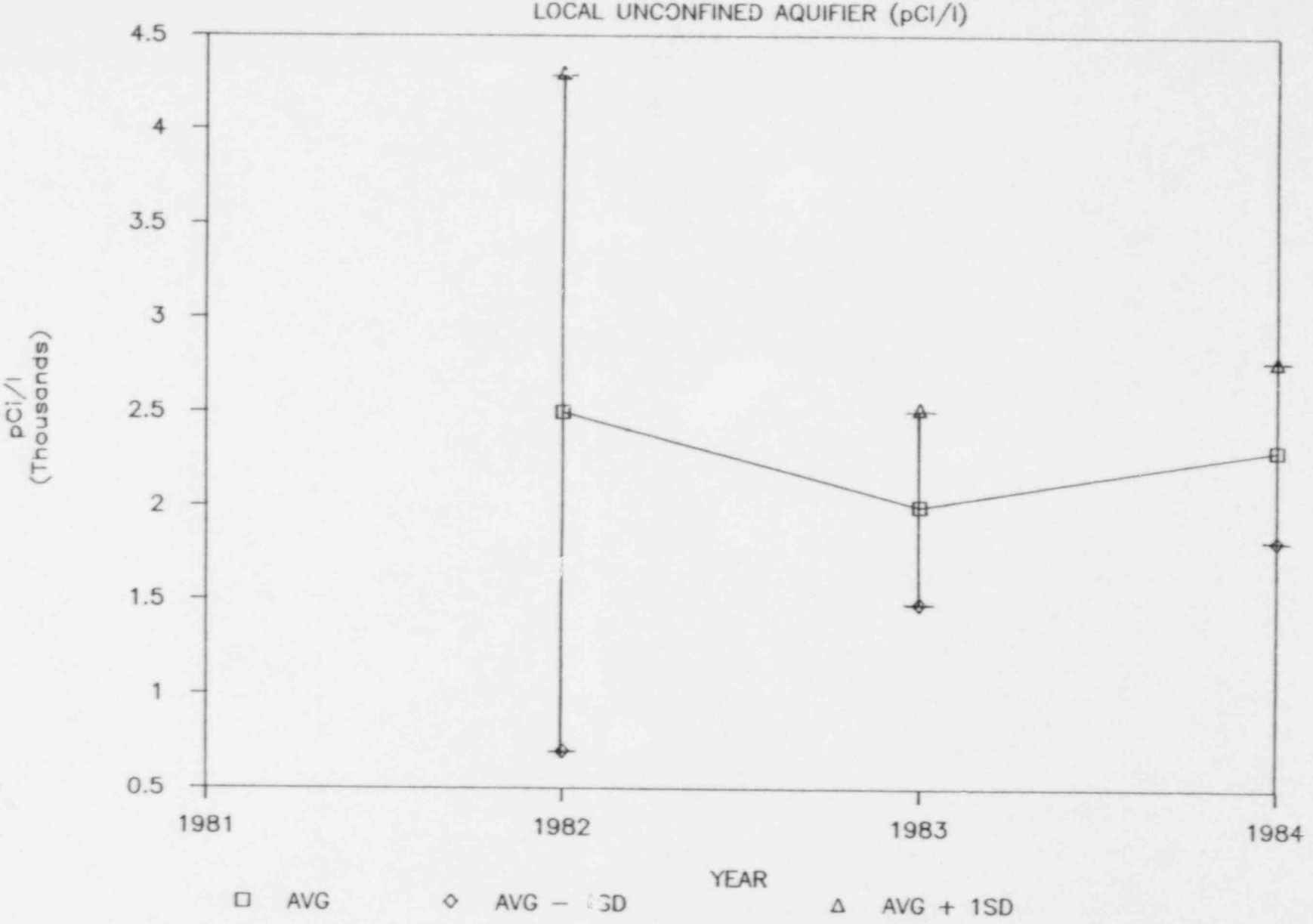

FIGURE 21

TREND CURVE/CS-137 IN GROUNDWATER