GULF STATE UTILITIES
RIVER BEND STATION

PREOPERATIONAL ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM

ANNUAL REPORT
1983

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1983

PREPARED FOR

GULF STATE UTILITIES

BY

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As a contractor to

GULF STATE UTILITIES

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SECTION 1

PREFACE

ABSTRACT

This report summarizes data obtained on samples received during the year 1983 for the environmental radiological monitoring program for the River Bend Station of Gulf State Utilities.

All samples are collected by Gulf State Utilities personnel and shipped to Eberline Laboratory, Albuquerque, New Mexico. Upon receipt of the samples, the Eberline Laboratory staff identifies them by sample number, sample type, collection date, sample location, and the specific analysis to be performed on each sample. The information is written up on a work order and entered in a log book.

The data obtained to date were within the expected ranges for environmental media and indicated the presence of radioactivity attributable to natural or fallout orgin.

A summary of Quality Control data obtained during the year is presented at the end of the report. Included in this section are data obtained from Intra-and Interlaboratory comparison programs.

1.0 INTRODUCTION

River Bend Station is in West Feliciana Parish 3 km (2 mi) east of the Mississippi River and approximately 38.4 km (24 mi) north northwest of Baton Rouge, Louisiana.

The reactor for the River Bend Station is warranted for a core thermal power of 2,894 MWt (BWR designed by GE). Reactor output at rated plant operating conditions is 2,887 MWt, which corresponds to a net station electrical output of approximately 936 MWe.

Dissipation of waste heat will be accomplished through a closed cycle system, utilizing multi-cell mechanical draft cooling towers. Makeup water will be withdrawn from the Mississippi River through submerged intake screens and suction pipelines to a dry pit pumphouse structure. Blowdown from the main cooling water system is discharged to the river through a buried pipe located downstream of the intake structure. The design will minimize radioactive releases and insure that radiation dose attributed to the plant operation will be "as low as reasonable achievable".

The scheduled completion date of construction and fuel loading is spring 1985 with an anticipated commercial operations date of spring 1986.

SECTION 2

SAMPLING PROGRAM

2.2 SAMPLE COLLECTION PROCEDURES

AIR PARTICULATE AND RADIOIODINE

Air particulate and radioiodine samples were collected weekly from eight locations. (Fig.1) The samples were gathered with a portable, low-volume air sampling device which is designed to draw a constant flow rate regardless of filter loading. The sampling devices were set to maintain a flow rate of about 1 cfm. The sample pump, metering devices, and timer were in a weather-proof housing. The filter and charcoal cartridge were located in an outlet parallel to and about 1 meter above the ground. Glass fiber filters were used to collect the particulate matter and activated charcoal cartridges (TEDA type) were used to collect radioiodine.

The glass fiber filter was removed from the air sampler and placed in a labelled envelope. The charcoal cartridge was removed at the same time. Air flow readings and sample volumes were recorded and sent to Eberline for analysis.

MILK SAMPLES

Milk samples were collected from McKowen Dairy (indicator station, about 4.2 miles from the plant), semi-monthly during pasture and monthly during other times. Iodine carrier sodium bisulfite and formaldehye solution were added to the milk collected in a gallon size plastic container. The container was labelled (location, collection date, sample volume collected, etc.), and shipped to Eberline for analysis.

WATER SAMPLES

Surface water samples are collected as a composite over a 1-month period from three locations. The locations are St. Francisville Ferry Crossing (control location, 4.2 km upstream from the plant liquid discharge), Crown Zellerbach (indicator station, 3.9 km downstream from the plant liquid discharge), and blowdown discharge area.

Ground water samples are collected quarterly from the dewatering discharge location in East Creek, tributary to Grants Bayou.

SEDIMENT SAMPLES

Approximately 1 kg of shoreline sediment samples are collected semi-annually from the Mississippi River upstream and downstream of the plant.

VEGETABLE SAMPLES

Approximately 1 kg of vegetable samples were collected from onsite location, and state penitentiary at Angola when available.

DIRECT RADIATION USING TLDs

Thermoluminiscent dosimeters (TLDs) were placed for field exposure and collected on a monthly and quarterly frequency. Environmental radiation doses are measured using badges, comprised of five chips sealed in a plastic protective holders having a density of 50 mg/cm^2. The TLD chips are 1/8"x1/8"x1/32" LiF known commercially as TLD-100.

Prior to installation, the chips are annealed by a standard cycle of 60 minutes at 400°c and immediate cooling to ambient temperature by placing the tray containing the annealed chips on an aluminum block 12"x12"x1".

The TLD badges are placed at 16 inner ring locations (in the general area of the restricted area boundary), 16 outer ring locations (6 to 10 km from the site), 3 control locations, and 7 locations of special interest.

Table 1 describes the sample collection programs and the type of analysis performed.

Figure 1 shows the Radiological Environmental Monitor Locations and Figure 2 shows the region within 80 kilometers of River Bend Station.

Table 2 describes the TLD locations.

TABLE 1

PREOPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Samples and Locations	Sampling and Collection Frequency	Type, Frequency and Analysis
AIRBORNE			
Radioactive and Particulates	2	Continuous sampler operation with sample collection weekly or as required by dust loading, whichever is more frequent.	Radioiodine cartridges are analyzed weekly for I-131. Particulate filters are analyzed weekly for gross beta (2). Quarterly composite (by location) for gamma isotopic analysis (3)
DIRECT RADIATION	16 inner ring station (restricted area boundary) 16 outer ring Stations (6 to 10 km from the site) 3 control locations (15 to 30 km SW, E, and N from the site) 7 areas of special interest.	Monthly & Quarterly	Gamma dose measurement monthly & quarterly.
WATERBORNE			
Surface Water	2 (Control & Indicator)	Composite Sample over 1-month period.	Gross beta and Gamma Isotopic analyses monthly. Composite for Tritium quarter
Ground Water	1	Quarterly grab	Gross beta and Gamma Isotopic analyses and Tritium analyses quarterly.
Sediment from Shoreline	1	Semi-annually	Gamma isotopic analysis semi-annually.
Drinking Water	1	Composite sample over 1-month period	Gross beta and Gamma Isotopic analyses. Composite for Tritium quarterly.

INGESTION			
Milk	2 (Control & Indicator)	Semi-monthly when animals are on pasture, monthly at other times.	Gamma Isotopic and I-131 analysis semi-monthly (pasture) and monthly at other times.
Fish and Shellfish	1	Sample in season, or semi-annually if they are not seasonal.	Gamma Isotopic analyses on edible portions.
Produce	1	Monthly when available	Gamma Isotopic & I-131 on edible portions.

(1) The number, medium, frequency and location of sampling may vary. At times, it may not be possible or practical to obtain samples of the medium of choice at the most desired location or time. In these instances, suitable alternative mediums and locations will be chosen for the particular pathway in question.

(2) Particulate sample filters will be analyzed for gross beta 24 hr or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic analysis will be performed on the individual samples.

(3) Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility or from weapons testing fallout.

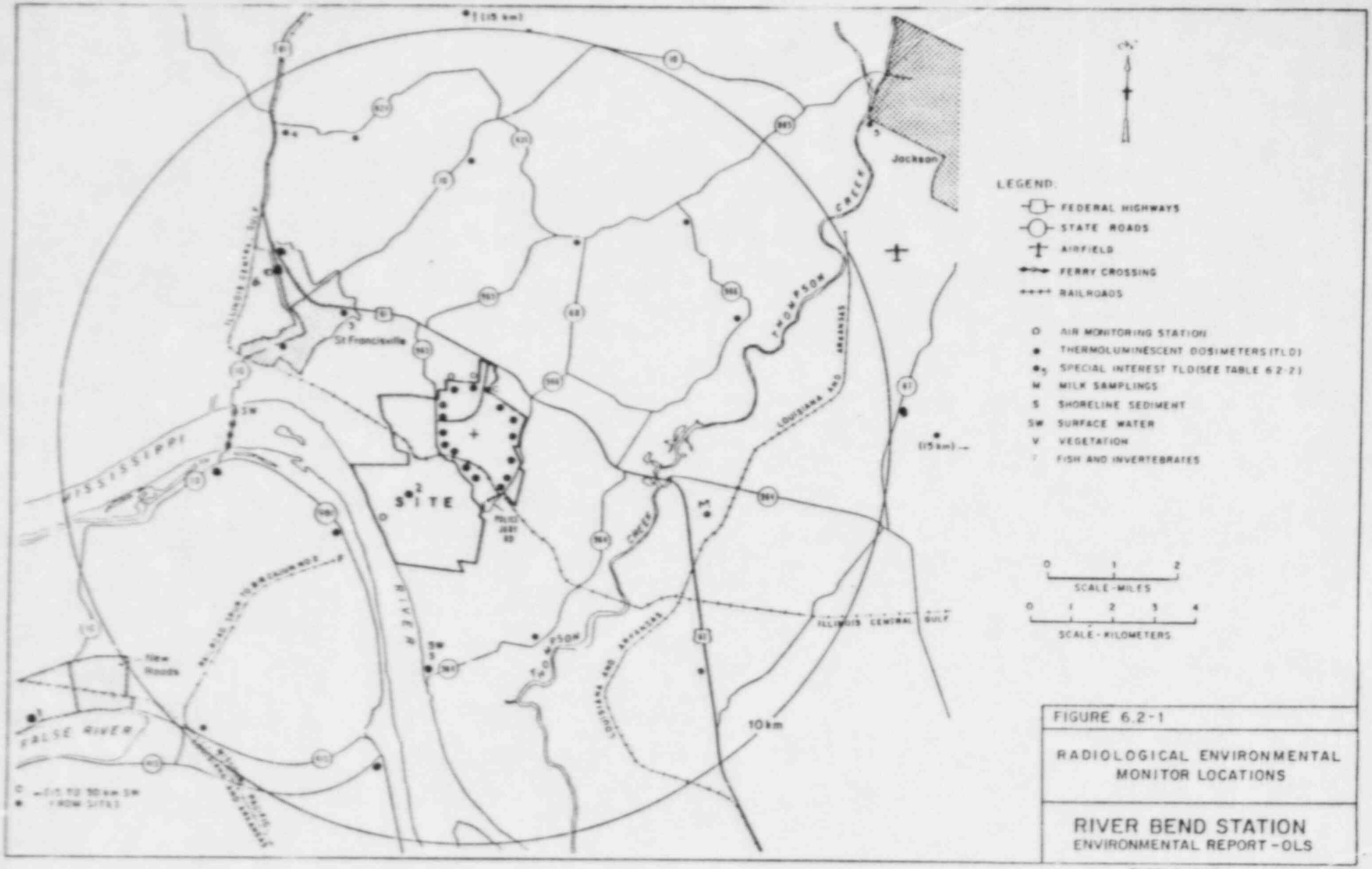

FIGURE 1

4-14-83

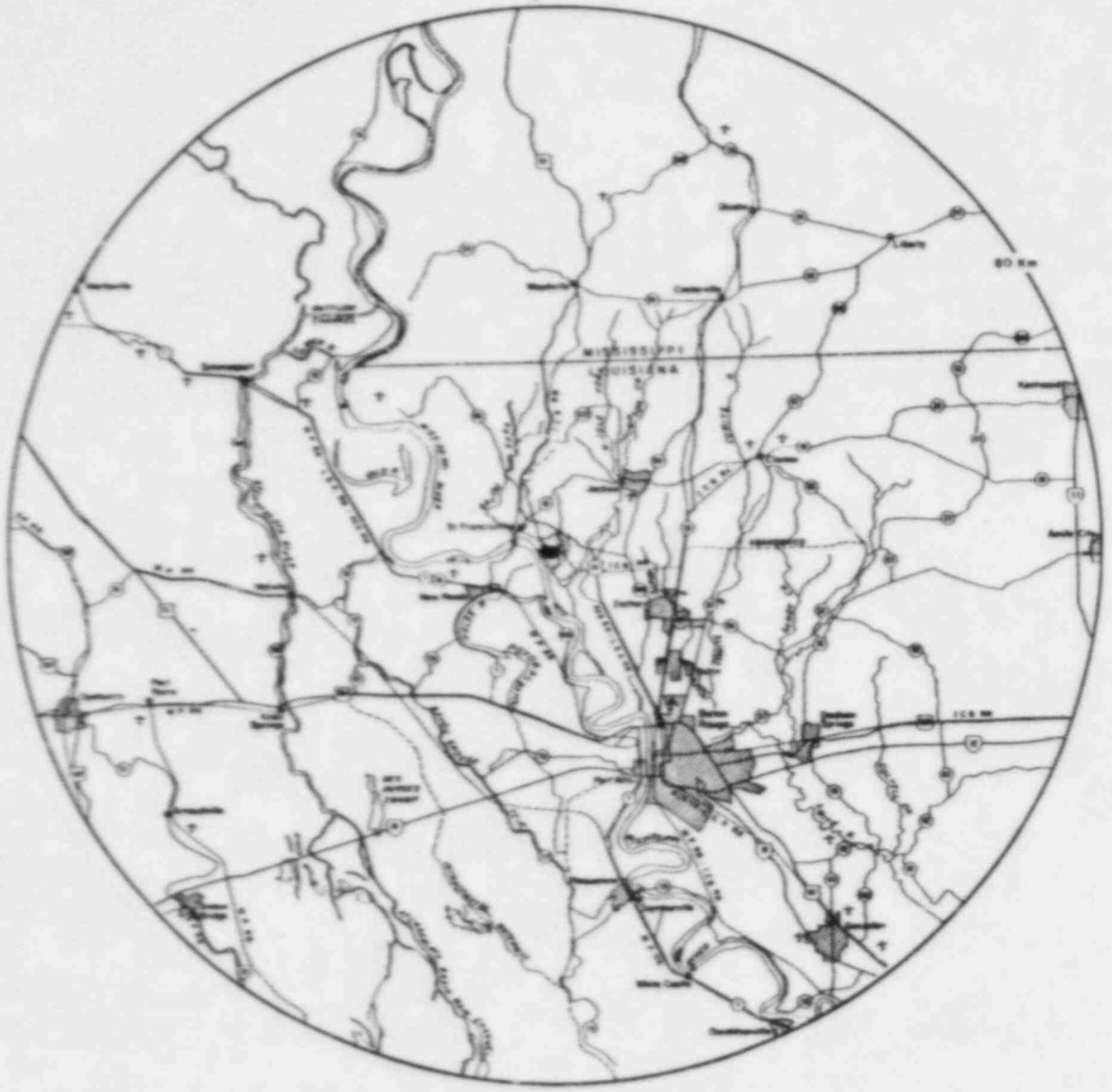

FIGURE 2.1-1

REGION WITHIN 80 KILOMETERS OF RIVER BEND STATION

RIVER BEND STATION
ENVIRONMENTAL REPORT-OLS

FIGURE 2

TABLE 2

TLD IDENTIFICATION NUMBERS

The TLD identification numbers will be a code of three of four characters. The first character of the code is a letter corresponding to the sector in which the TLD is placed. The second character has the following meanings:

1----- inner ring

2----- outer ring

c----- control

s----- special interest (if two or more special interest sites exist in one sector, the "s" will be followed by a 1, 2 or 3 and so on to provide a unique identification number for the TLD)

TLD NO.	LOCATION INDICATOR STATIONS
A-1	Air sampler location at the E.O.F.
A-2	On GSU pole 246 at the intersection of La. Hwy. 10 and West Feliciana Hwy. 2.
B-1	B-1 air sampling station, iron yard area.
B-2	On a stub pole at the intersection of La. Hwy. 965 and West Feliciana Hwy. 17.
C-1	On an existing stub pole across US 61 from intersection of Old Hwy. 61 and US 61 about .3 miles north of WF 7. (300' South of Tom's Kitchen)
C-2	On La. Hwy. 966 on a stub pole about .4 miles south of the intersection of La. Hwy.'s 966 and 965.
D-1	On a stub pole on WF Road 7 about 500 feet south of the intersection of WF 7 and US Hwy. 61.
D-2	On a stub pole adjacent to a gate into a field to the right of Hwy. 966 and about 2.5 miles south of the intersection of La. Hwy.'s 965 and 966.
E-1	On a stub pole about .6 miles from intersection of US Hwy. 61 and WF 7.
E-2	In the Gravel Power Center on La. Hwy. 68 about 1.3 miles North of the intersection of La. Hwy.'s 964 and 68
F-1	On a stub pole approximately 1.05 miles from intersection of US Hwy. 61 and WF 7 about 500 feet after the church on the right side.
F-2	On a stub pole on La. Hwy. 954 and about .4 miles north of the intersection of La. Hwy.'s 954 and 61 (McKowen's Dairy).
G-1	On a stub pole installed about 1.3 miles south of WF 7/US 61 intersection. (Near the 5th utility pole from R.R. tracks).

TABLE 2 (cont'd)

TLD NO.	LOCATION INDICATOR STATIONS
G-2	On US Hwy. 61 on a South Central Bell pole adjacent to the entrance to Marathon Oil Tank Farm about 3.3 miles south of the intersection of US Hwy. 61 and La. Hwy. 964.
H-1	On a stub pole at the railroad crossing on WF 7.
H-2	On the first South Central Bell telephone pole north of the entrance gate to the Crown Zellerback Mill on La. Hwy. 964 (west side of 964).
J-1	On a stub pole at River Bend Gate #23.
J-2	On a large tree, last one from the site side on the C-Z fence.
K-1	On GSU utility pole #L10178 about 50 feet south of intersection of River Bend Access Road and WF 7.
K-2	On a stub pole at the intersection of La. Hwy. 414 and 415.
L-1	On the second utility pole south of the Illinois Central Railroad crossing on La. 965.
L-2	At Patins Dike on the second South Central Bell telephone pole east of the railroad crossing on Hwy. 415.
M-1	On the first GSU utility pole of the Illinois Central Railroad crossing on La. Hwy. 965.
M-2	On a GSU utility pole about 1.8 miles south of the ferry landing on La. Hwy. 981.
N-1	On the eighth GSU utility pole north of the Illinois Central Railroad crossing on La. Hwy. 965 between gates 13 and 14.
N-2	On the GSU utility pole with the electrical meter at the Point Coupee Parish Ferry Landing.
P-1	Energy Center sign on La. 965.

TABLE 2 (cont'd)

TLD NO.	LOCATION INDICATOR STATIONS
P-2	Approximately one (1) mile north of the railroad tressel on Tunica Street on a stub pole.
Q-1	On a GSU property sign opposite to the 2nd trailer on Hwy. 965 from the river access road.
Q-2	On GSU pole with street lights at the intersection of North Commerce Street and American Beauty Street in St. Francisville.
R-1	Air sampling station R-1 at gate #3.
R-2	On a stub pole at the intersection of West Feliciana Road 2 and a gravel road about 1 mile east of the intersection of US Hwy. 61 and WF 2.

TLD NO.	CONTROL LOCATIONS
E-C	At the intersection of La. Hwy. 955 and Midway Rd. about 3 miles northeast of the intersection of La. Hwy. 955 and La. Hwy. 964 (on a stub pole).
L-C	In Parlange Power Center in Oscar, Louisiana at the air sampler station.
A-C	On a South Central Bell pole adjacent to a gravel driveway about 650 feet north of the Hamilton Station Water Tower on US Hwy. 61 after Wakefield.

TLD No.	SPECIAL INTEREST LOCATION
P-1 (1)	Energy Center sign on La. 965. Directly behind the River Bend Station meteorological station.
K-S (2)	Air sampling station K-S on the river access road.
Q-S-1 (3)	Behind the Pentecostal Church on Hwy. 61 and Ferdinand St. (Opposite the WF Hospital).
Q-S-2 (4)	In the St. Francis Substation.
R-S (5)	On a stub pole at the intersection of WF2 and U.S. Hwy. 61 near West Feliciana High School.
L-S (6)	On a utility pole right near the False River Academy sign at the edge of New Roads.
C-S (7)	On a utility pole, on the left side, at the gate to the East Louisiana State Hospital, Jackson, La.
G-S-1 (8)	Air sampler station, behind GSU Service Center in Zachary, La.

TABLE 2 (cont'd)

TLD LOCATIONS

INDICATOR STATIONS

A-1	6000	Ft.	A-2	26000	Ft.
B-1	2500	Ft.	B-2	23000	Ft.
C-1	5500	Ft.	C-2	24500	Ft.
D-1	5300	Ft.	D-2	24000	Ft.
E-1	4500	Ft.	E-2	29000	Ft.
F-1	4100	Ft.	F-2	20500	Ft.
G-1	4800	Ft.	G-2	27000	Ft.
H-1	5600	Ft.	H-2	18000	Ft.
J-1	5000	Ft.	J-2	20000	Ft.
K-1	4000	Ft.	K-2	27500	Ft.
L-1	3000	Ft.	L-2	33000	Ft.
M-1	3000	Ft.	M-2	15500	Ft.
N-1	2900	Ft.	N-2	20500	Ft.
P-1	3000	Ft.	P-2	24000	Ft.
Q-1	4500	Ft.	Q-2	22000	Ft.
R-1	4000	Ft.	R-2	27000	Ft.

SPECIAL STATIONS

P-1	3,000	Ft.
R-S	30,000	Ft.
Q-S-1	14,000	Ft.
Q-S-2	19,000	Ft.
L-S	41,000	Ft.
C-S	44,900	Ft.
K-S	9,500	Ft.
G-S-1	71,300	Ft.

CONTROL STATIONS

E-C	49,900	Ft.
L-C	67,500	Ft.
A-C	64,500	Ft.

SECTION 3

ANALYSIS PROGRAM

3.0 ANALYTICAL PROCEDURES AND COUNTING METHODS

Samples received at the laboratory are analyzed for various radioactive components by standard radiochemical methods. These methods are equal to and in most cases, identical with, those of the USDOE (HASL Procedures Manual, HASL-300, Health and Safety Laboratory, U.S. Atomic Energy Commission, 376 Hudson Street, New York 10014) or those of the Federal Environmental Protection Agency (EPA).

Analyses of individual sample types, and general methods are discussed below. The analytical detection limits (Lower Limits of Detection - LLDs) are given in Table 3.

In environmental radiological analyses the dominant known uncertainty is usually the sample count rate. Error terms given in this report are based on this factor since all other analytical uncertainties are relatively small. Uncertainties are calculated by standard methods (see ref.4), and are reported at the 95 percent confidence level (2σ). The lower limit of detection (LLD) is defined as, "that concentration which is 4.66 times the standard deviation error of the average concentration in a blank or background sample". Analytical data for samples for which concentrations are less than or equal to the LLD are preceded by the symbol "$<$".

3.1 AIR PARTICULATES

Gross beta concentrations are measured with low background geiger or proportional gas flow beta counters using anti-coincidence background suppression after the short lived naturally occuring radon and thoron daughters have decayed. Filters are counted long enough to ensure that the required detection limit (LLD) will be met. The routine detection limit is 0.01 pCi/m^3 for gross beta based on about 300 m^3/week of air volume.

Gamma isotopic analyses are performed with a GeLi detector on quarterly composite of filters from each location. The detection limit is 0.01 pCi/m^3.

TABLE 3

LOWER LIMITS OF DETECTION (LLD) *

Sample Type	Analysis	LLD	Units
Air	Beta	0.01	pCi/m^3
	Gamma Isotopic	0.01	pCi/m^3
	I-131	0.07	pCi/m^3
Water	Gross Beta	4	pCi/l
	Gamma Isotopic	15	pCi/l
	Tritium	1000	pCi/l
Milk	Gamma Isotopic	15	pCi/l
	I-131	1	pCi/l
Soil or Sediment	Gamma Isotopic	150	pCi/kg (dry)
Vegetation	Gamma Isotopic	80	pCi/kg (wet)
	I-131	0.06	pCi/g (wet)
Fish	Gamma Isotopic	130	pCi/kg (wet)

* Based on 4.66σ confidence level.

3.2 RADIOIODINE

The Charcoal Cartridges used are of the TEDA-Impregnated type. The iodine is extracted from the charcoal, chemically separated, and counted as AgI using low background gas flow type beta counters. The detection limit is 0.07 pCi/m^3 based on about 300 m^3 of air volume.

3.3 WATER SAMPLES

Gamma isotopic analysis of water is performed by evaporation of a measured aliquot of the sample (1 liter) to 500ml and counted in a standard geometry in a high resolution (GeLi) gamma spectrometer long enough to meet the required analytical sensitivity of the program.

Tritium as tritiated water is measured by liquid scintillation counting after distillation. A known aliquot of the distilled sample is mixed with the appropriate counting phosphors and counted in a liquid scintillation counter. The detection limit is 1000 pCi/l.

3.4 SEDIMENT SAMPLES

The sample is oven dried, and a weighed aliquot of the sample is then transferred into a standard geometry container and counted for a period long enough to meet the detection limit of 150 pCi/kg (dry), based on Cs-134 and Cs-137.

3.5 FISH SAMPLES

Edible portions of fish flesh are weighed, oven dried, weighed again, and a known amount is placed in a controlled geometry and counted in a high resolution (GeLi) gamma spectrometer for a period long enough to meet the detection level of 130 pCi/kg (wet) based on Cs-134 and Cs-137.

3.6 VEGETATION SAMPLES

The sample is oven dried, weighed and a known aliquot is transferred into a standard geometry container and counted for a long enough period to meet the detection level of 80 pCi/kg (wet), based on Cs-134 and Cs-137.

3.7 REFERENCES FOR ANALYTICAL PROCEDURES

1. American Public Health Association, American Water Works Association and Water Pollution Control Federation (1971): Standard Methods for the Examination of Water and Wastewater. Thirteenth edition, pp. 583-632; 12th edition, pp. 325-352. APHA, 1740 Broadway, New York, NY 10019.

2. Department of Health, Education and Welfare, Public Health Service: Radioassay Procedures for Environmental Samples. National Center for Radiological Health (1967), Sec. 1, pp. 36-115.

3. Atomic Energy Commission: Regulatory Guide 4.3 (September 1973)

4. Health and Safety Laboratory, Atomic Energy Commission: HASL Procedures Manual (now known as EML of the Department of Energy). HASL, 376 Hudson Street, New York, NY 10014.

5. National Environmental Research Center, Environmental Protection Agency; Handbook of Radiochemical Analytical Methods. Program Element 1HA 325. Office of Research and Development, Las Vegas, NV 89114.

QUALITY ASSURANCE PROGRAM

A. Design of Plan

Quality of product or service has always been a primary key to increase in sales, customer satisfaction, and profit. The management of Eberline Instrument Corporation recognizes the ever increasing demand for higher quality and reliability for services related to protection of workers and the environment. It is our firm belief that in order to judge the worth of a support service, one must know the philosophy behind it. Eberline will provide only those services for which it is qualified and these will be provided in a manner that is reliable, with a quality assurance program that maintains a high degree of client confidence. This quality assurance program has been prepared consistent with the following specifications, per the Technical and Quality Assurance Requirements for Special Purposes.

ANSI-N45.2, American National Standard Institute
NRC Branch Technical Position of November 1979
NRC Regulatory Guide 4.15, Revision 1 of February 1979.

B. Intercomparison Program

Results of Eberline Albuquerque Laboratory's participation in the USEPA's Crosscheck Program are included in the monthly and annual reports provided to the client. Other intercomparisons in which we routinely participate include:

Environmental Protection Agency
Environmental Measurement Lab DOE Quality Assessment Program
Battelle Northwest Laboratories
IAEA Analytical Quality Control Service
US National Bureau of Standards

Each of the laboratory managers is responsible for preparing spikes and blanks to be run routinely. Every tenth sample is a spike, a blank, or a split sample.

Regular QC reports are prepared by a laboratory manager on a monthly

schedule and forwarded to each client. Each report routinely includes:

results from EIC interlaboratory comparison,
results from EPA Crosscheck program, and
results from other intercomparison programs.

Results are reviewed by the laboratory manager. If a problem is indicated by the data, the nature of the problem is investigated and corrective steps taken immediately. A copy of each report is also provided to the Quality Assurance Manager of the Nuclear Services Division.

C. Quality Assurance Plan

The Quality Assurance Program follows the requirments of Company and Division Manuals. The discussion below outlines Quality Assurance Programs as conducted in the laboratory and as required in our QA Manual.

Procedure Approval

Each procedure goes through a vigorous evaluation and review process before it is incorporated into the EIC Procedures Manual. Established procedures of the Environmental Protection Agency (EPA) or the Environmental Measurements Laboratory of the US Department of Energy (EML) are used unless thorough testing has demonstrated that an alternate procedure is equal to or better than the EPA or EML procedure. Uniform procedures are used at both laboratories to the fullest extent possible, except when deviations are necessary to meet the specific requirements of the client. The manager of each laboratory and the quality assurance manager review and approve significant procedural changes before they are implemented.

Equipment Calibration and Maintenance

Equipment used for qualitative or quantitative measurements is carefully calibrated and maintained with records of each calibration or maintenance action kept in appropriate logbooks. To the extent possible, certified standards are used for all primary calibrations. The following standards are used for the application indicated:

Measurement	Calibration Standard
Gross Beta	Solution of Standard ^{137}Cs certified by NBS or Amersham Searle
Tritium	Solution standard of ^{3}H certified by NBS
Gamma Spectrometry	Solution standards of various gamma emitters certified by NBS or Amersham Searle. Standards are used to calibrate each counting geometry used.
Strontium-89 and 90	Solution standards of ^{90}Sr certified by Amersham Searle or NBS
Gross Alpha	Solution standards of ^{239}Pu certified by NBS or Amersham Searle.
Radiation Dose	^{137}Cs gamma source cross-referenced with NBS using R-meters. ^{226}Ra is used for some special application.

When suitable standards are not available for a specific gamma emitter, quantitative gamma isotopic analysis is based on an energy calibration of the gamma spectrometer and the gamma energy and abundance information provided in Table of Isotopes, Sixth Edition by Ledrer, Hollander, and Perlman.

The results of the Quality Control Programs are summarized in Section 6.

SECTION 4

RESULTS AND DISCUSSION

4.1 AIR PARTICULATES AND AIRBORNE I-131

The gross beta particulate data during the year remained at low levels and were generally in the range to be expected from measurements of this type in the medium.

The Iodine-131 concentration in charcoal cartridges was below the detection limits of the program.

Gamma spectral analysis of the quarterly composites of the weekly air filter collections indicate the presence of no gamma emitters in concentrations exceeding the detection limit of the program.

Data for these analyses are listed in section 5.0, pages 5-2 to 5-8.

4.2 WATER SAMPLES

Gross beta analysis of the monthly samples during the year remained at low levels and were generally in the range to be expected from measurements of this type in the medium. Gamma spectral analysis of the monthly samples indicate that the gamma emitters concentrations were below the detection limit of the program.

Quarterly composite of the monthly samples were analyzed for tritium. The tritium concentrations were below the detection limit of the program.

The data for these analyses are listed in section 5.0, pages 5-9 and 5-10.

Ground water samples were collected from one location and were analyzed for gamma emitters and tritium. The results indicate that the concentrations of gamma emitters and tritium were below the detection limit of the program.

The results of these analyses are listed in section 5.0, page 5-11.

4.3 SEDIMENT SAMPLES

Sediment samples were collected in November, 1983, and analyzed for gamma emitters. The results indicate that the concentrations of gamma emitters were below the detection limit of the program.

The results of these analyses are listed in section 5.0, page 5-12.

4.4 MILK SAMPLES

Milk samples were collected from McKowen Dairy and analyzed for Iodine-131 and gamma emitters. The results indicate that the concentrations of Iodine-131 and gamma emitters were below the detection limit of the program.

The data are listed in section 5.0, page 5-13.

4.5 ANIMAL SAMPLES

Deer thyroid, deer meat, and deer bones were collected and analyzed by gamma spectrometry. The results indicate that the concentrations of gamma emitters were below the detection limits of the program for all samples. The data are listed on page 5-14.

4.6 VEGETABLE SAMPLE

Vegetable samples were collected from two locations, and analyzed for gamma emitters. The results indicate that the gamma emitters concentrations were below the detection limit of the program.

The data are listed in section 5.0, page 5-15.

4.7 ENVIRONMENTAL DOSIMETRY (TLDs)

Measurements of environmental dose rates were made on a quarterly basis using thermoluminiscent dosimeters (TLDs). The dose rates measured were normally in the range to be expected as background levels.

The data are presented in section 5.0, pages 5-16 and 5-17.

SECTION 5

DATA TABLES

5.0 COMMENTS ON, AND TERMS USED IN DATA TABLES

Wet Weight	A reporting unit used with organic tissue samples such as vegetation and animal samples in which the amount of sample is taken to be the weight as received from the field with no moisture removed.
Dry Weight	A reporting unit used for soil and sediment in which the amount of sample is taken to be the weight of the sample after removal of moisture by drying in an oven at about 110°C for about 15 hrs.
pCi/m^3	A reporting unit used with air particulate and radioiodine data which refers to the radioactivity content expressed in picocuries of the volume of air expressed in cubic meters passed through the filter and/or the charcoal trap. Note that the volumes are not corrected to standard conditions.
Gamma Emitters or Gamma Isotopic	Samples were analyzed by high resolution (GeLi) gamma spectrometry. The resulting spectrum is analyzed by a computer program which scans from about 50 to 2000 KeV and lists the energy peaks of any nuclides present in concentrations exceeding the sensitivity limits set for that particular experiment.
Error Terms	Figures following "±" are error terms based on counting uncertainties at the 2σ (95 percent confidence) level. Values preceded by the "<" symbol were below the stated concentration at the 4.66σ (99.99 percent confidence) level.
Sensitivity	In general, all analyses meet the sensitivity requirements of the program as given in Table 3. For the few samples that do not (because of inadequate sample quantities, analytical interference, etc.) the sensitivity actually obtained in the analysis is given.
Comment	When all analyses of a particular type during the period resulted in concentrations below the sensitivity limits, a statement is made on the appropriate table rather than presenting a whole page of "<" data. If all but one or two data points are below the sensitivity limits, the previously mentioned convention is followed and the finite data are given as footnotes.

GULF STATE UTILITIES - RIVER BEND STATION

AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES

1983

10^{-2} pCi/m^3

Collection Date	Location: St. Francisville Volume (m^3)	Beta	I-131	Collection Date	Location: Parlange Volume (m^3)	Beta	I-131
01/03/83	260	3±1	<7	01/03/83	256	2±1	<7
01/10/83	245	4±1	<7	01/10/83	255	2±1	<7
01/17/83	253	1±1	<7	01/17/83	252	1±1	<7
01/24/83	250	2±1	<7	01/24/83	254	2±1	<7
01/31/83	259	4±1	<7	02/01/83	286	3±1	<7
02/07/83	249	2±1	<7	02/07/83	216	2±1	<7
02/14/83	248	2±1	<7	02/14/83	248	2±1	<7
02/22/83	288	3±1	<7	02/22/83	289	1±1	<7
02/28/83	224	2±1	<7	02/28/83	216	2±1	<7
03/08/83	287	2±1	<7	03/07/83	251	1±1	<7
03/15/83	243	1±1	<7	03/15/83	419	1±1	<7
03/21/83	220	3±1	<7	03/21/83	340	4±1	<7
03/31/83	357	1±1	<7	03/31/83	577	2±1	<7
04/04/83	(a)	(a)	(a)	04/04/83	236	2±1	<7
04/11/83	635	1±1	<7	04/11/83	400	2±1	<7
04/15/83	230	3±1	<7	04/15/83	(a)	(a)	(a)
04/18/83	240	4±1	<7	04/18/83	410	4±1	<7
04/25/83	395	4±1	<7	04/25/83	395	4±1	<7
05/02/83	410	4±1	<7	05/02/83	400	4±1	<7
05/09/83	405	3±1	<7	05/09/83	400	4±1	<7
05/16/83	400	3±1	<7	05/16/83	405	3±1	<7
05/23/83	404	3±1	<7	05/23/83	404	2±1	<7
05/31/83	404	4±1	<7	06/01/83	508	4±1	<7
06/06/83	454	2±1	<7	06/06/83	(a)	(a)	(a)
06/13/83	403	3±1	<7	06/13/83	702	3±1	<7
06/20/83	405	2±1	<7	06/20/83	405	1±1	<7
06/27/83	405	1±1	<7	06/27/83	405	1±1	<7

(a) Sample was not available

GULF STATE UTILITIES - RIVER BEND STATION

AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES

1983

10^{-2} pCi/m^3

Collection Date	Location: St. Francisville			Collection Date	Location: Parlange		
	Volume (m^3)	Beta	I-131		Volume (m^3)	Beta	I-131
07/04/83	405	2±1	<7	07/04/83	405	2±1	<7
07/11/83	405	3±1	<7	07/11/83	405	3±1	<7
07/18/83	405	4±1	<7	07/18/83	405	<1	<7
07/25/83	395	3±1	<7	07/25/83	395	3±1	<7
08/02/83	466	3±1	<7	08/02/83	464	2±1	<7
08/08/83	339	1±1	<7	08/08/83	346	1±1	<7
08/16/83	456	2±1	<7	08/16/83	407	2±1	<7
08/22/83	352	2±1	<7	08/22/83	394	2±1	<7
08/29/83	401	3±1	<7	08/29/83	401	3±1	<7
09/06/83	462	5±1	<7	09/06/83	464	5±1	<7
09/12/83	347	3±1	<7	09/12/83	336	3±1	<7
09/19/83	411	4±1	<7	09/19/83	404	3±1	<7
09/26/83	374	9±1	<7	09/26/83	340	6±1	<7
10/03/83	403	7±1	<7	10/03/83	403	6±1	<7
10/10/83	413	5±1	<7	10/10/83	406	4±1	<7
10/17/83	393	3±1	<7	10/17/83	340	3±1	<7
10/24/83	404	3±1	<7	10/24/83	403	2±1	<7
10/29/83	289	3±1	<7	10/29/83	289	3±1	<7
11/07/83	385	5±1	<7	11/07/83	545	3±1	<7
11/14/83	373	4±1	<7	11/14/83	427	3±1	<7
11/21/83	345	4±1	<7	11/21/83	431	3±1	<7
11/28/83	364	3±1	<7	11/28/83	425	1±1	<7
12/05/83	373	4±1	<7	12/05/83	414	3±1	<7
12/12/83	346	7±1	<7	12/12/83	394	5±1	<7
12/19/83	354	6±1	<7	12/19/83	402	5±1	<7
12/27/83	406	7±1	<7	12/27/83	462	6±1	<7
01/03/84	404	3±1	<7	01/03/84	338	4±1	<7

GULF STATE UTILITIES - RIVER BEND STATION

AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATES SAMPLES

1983

10^{-2} pCi/m^3

Collection Date	Location: A-1 *			Location: K-S *			Location: R-1 *		
	Volume (m^3)	Beta	I-131	Volume (m^3)	Beta	I-131	Volume (m^3)	Beta	I-131
05/09/83	400	3±1	<7	400	3±1	<7	400	3±1	<7
05/16/83	410	3±1	<7	410	2±1	<7	400	2±1	<7
05/23/83	399	3±1	<7	400	2±1	<7	404	2±1	<7
05/31/83	463	4±1	<7	462	3±1	<7	462	3±1	<7
06/06/83	504	2±1	<7	403	3±1	<7	504	2±1	<7
06/13/83	403	4±1	<7	403	3±1	<7	403	3±1	<7
06/20/83	405	2±1	<7	405	2±1	<7	405	2±1	<7
06/27/83	405	1±1	<7	405	1±1	<7	405	1±1	<7
07/04/83	405	2±1	<7	405	2±1	<7	405	2±1	<7
07/11/83	405	5±1	<7	405	3±1	<7	405	4±1	<7
07/18/83	400	5±1	<7	360	4±1	<7	355	4±1	<7
07/25/83	395	3±1	<7	395	3±1	<7	390	3±1	<7
08/02/83	464	3±1	<7	469	2±1	<7	465	2±1	<7
08/08/83	334	1±1	<7	332	1±1	<7	334	1±1	<7
08/16/83	460	2±1	<7	459	2±1	<7	460	2±1	<7
08/22/83	351	2±1	<7	(a)	(a)	(a)	351	2±1	<7
08/29/83	401	3±1	<7	752	3±1	<7	408	3±1	<7
09/06/83	464	6±1	<7	464	4±1	<7	458	6±1	<7
09/12/83	347	3±1	<7	355	2±1	<7	346	3±1	<7
09/19/83	412	4±1	<7	403	4±1	<7	409	3±1	<7
09/26/83	461	6±1	<7	348	7±1	<7	405	7±1	<7
10/03/83	408	6±1	<7	403	5±1	<7	407	6±1	<7
10/10/83	403	5±1	<7	403	2±1	<7	407	3±1	<7
10/17/83	394	4±1	<7	394	2±1	<7	396	2±1	<7
10/24/83	411	3±1	<7	398	2±1	<7	402	2±1	<7
10/29/83	286	4±1	<7	295	2±1	<7	293	3±1	<7

GULF STATE UTILITIES - RIVER BEND STATION

AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATES SAMPLES

1983

10^{-2} pCi/m^3

Collection Date	Location: A-1 *			Location: K-S *			Location: R-1 *		
	Volume (m^3)	Beta	I-131	Volume (m^3)	Beta	I-131	Volume (m^3)	Beta	I-131
11/07/83	270	3±1	<7	498	3±1	<7	257	3±1	<7
11/14/83	319	4±1	<7	366	4±1	<7	319	4±1	<7
11/21/83	410	4±1	<7	354	4±1	<7	325	2±1	<7
11/28/83	402	3±1	<7	379	3±1	<7	354	2±1	<7
12/06/83	453	4±1	<7	414	4±1	<7	399	4±1	<7
12/12/83	357	7±1	<7	328	6±1	<7	299	6±1	<7
12/19/83	401	6±1	<7	371	5±1	<7	339	6±1	<7
12/27/83	433	6±1	<7	409	5±1	<7	378	7±1	<7
01/04/84	511	2±1	<7	522	3±1	<7	416	5±1	<7

GULF STATE UTILITIES - RIVER BEND STATION

AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATES SAMPLES

1983

10^{-2} pCi/m^3

Collection Date	Location: B-1*			Met Tower (a)			Zachary (a)		
	Volume (m^3)	Beta	I-131	Volume(m3)	Beta	I-131	Volume(m3)	Beta	I-131
08/22/83	352	3±1	<7						
08/29/83	402	2±1	<7						
09/06/83	458	5±1	<7						
09/12/83	354	2±1	<7						
09/19/83	404	3±1	<7						
09/26/83	295	9±1	<7						
10/03/83	366	6±1	<7						
10/10/83	359	4±1	<7	446	4±1	<7			
10/17/83	394	2±1	<7	353	3±1	<7	636	4±1	<7
10/24/83	403	2±1	<7	403	2±1	<7	381	2±1	<7
10/29/83	293	3±1	<7	293	2±1	<7	438	4±1	<7
11/07/83	297	3±1	<7	345	3±1	<7	376	3±1	<7
11/14/83	430	3±1	<7	478	3±1	<7	426	3±1	<7
11/21/83	444	3±1	<7	365	4±1	<7	419	4±1	<7
11/28/83	435	2±1	<7	419	2±1	<7	436	2±1	<7
12/06/83	479	2±1	<7	459	4±1	<7	471	4±1	<7
12/12/83	343	5±1	<7	364	6±1	<7	367	6±1	<7
12/19/83	426	4±1	<7	395	6±1	<7	463	6±1	<7
12/27/83	487	6±1	<7	454	6±1	<7	465	5±1	<7
01/04/84	458	4±1	<7	419	4±1	<7	421	4±1	<7

* Sample collection started from August 83.
(a) Sample collection started from October 1983.

1983

Gulf State Utilities - River Bend Station

GAMMA ISOTOPIC ANALYSIS OF AIR FILTER QUARTERLY COMPOSITE SAMPLES

(pCi/m^3)

Collection Date	Location: St. Francisville		Location: Parlange	
	Cs-134, Cs-137	Other γ	Cs-134, Cs-137	Other γ
1st Quarter	<0.01	<0.01	<0.01	<0.01
2nd Quarter	<0.01	<0.01	<0.01	<0.01
3rd Quarter	<0.01	<0.01	<0.01	<0.01
4th Quarter	<0.01	<0.01	<0.01	<0.01

Collection* Date	Location: A-1		Location: K-S		Location: R-1	
	Cs-134,137	Other Gamma	Cs-134.137	Other Gamma	Cs-134,137	Other Gamma
2nd Quarter	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
3rd Quarter	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4th Quarter	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

* Sample collection for A-1, K-S, and R-1 Started from May 1983.

1983

Gulf State Utilities - River Bend Station

GAMMA ISOTOPIC ANALYSIS OF AIR FILTER QUARTERLY COMPOSITE SAMPLES

(pCi/m^3)

Collection Date	Location: B-1 (a)		Location: Met Tower	
	Cs-134, Cs-137	Other γ	Cs-134, Cs-137	Other gamma
1st Quarter	(a)	(a)	(b)	(b)
2nd Quarter	(a)	(a)	(b)	(b)
3rd Quarter	<0.01	<0.01	(b)	(b)
4th Quarter	<0.01	<0.01	<0.01	<0.01

Collection Date	Location: Zachary	
	Cs-134, Cs-137	Other gamma
1st Quarter	(b)	(b)
2nd Quarter	(b)	(b)
3rd Quarter	(b)	(b)
4th Quarter	<0.01	<0.01

(a) Sample collection for location B-1 started from August 1983.

(b) Sample collection started from October 1983

GULF STATE UTILITIES - RIVER BEND STATION

Radioactivity In Surface Water

1983

(Monthly Composite Samples)

pCi/l

Collection Date	Location: St. Francisville Gamma Emitters	Location: Crown Zellerbach Gamma Emitters	Location: Blow Down Discharge Ar Gamma Emitters
01/83	<15	<15	
02/83	<15	<15	
03/83	<15	<15	
04/83	<15	<15	<15
05/83	<15	<15	<15
06/83	<15	<15	<15
07/83	<15	<15	<15
08/83	<15	<15	<15
09/83	<15	<15	<15
10/83	<15	<15	<15
11/83	<15	<15	<15
12/83	<15	<15	<15

(Quarterly Composite Samples)

pCi/l

	Tritium	Tritium	Tritium
1st Quarter	<1000	<1000	-
2nd Quarter	<1000	<1000	-
3rd Quarter	<1000	<1000	<1000
4th Quarter	<1000	<1000	<1000

GULF STATE UTILITIES - RIVER BEND STATION
Radioactivity in Drinking Water

1983

(Monthly Composite Samples)

pCi/l

Location: Donaldsonville

Collection Date	Gross Beta	Gamma Emitters
07/83	6±1	<15
08/83	5±2	<15
09/83	3±1	<15
10/83	6±2	<15
11/83	9±1	<15
12/83	7±2	<15

(Quarterly Composite Samples)

pCi/l

	Tritium
3rd Quarter	<1000
4th Quarter	<1000

GULF STATE UTILITIES - RIVER BEND STATION

Radioactivity in Ground Water Samples

(Monthly Composite Samples)

1983

Location	Collection Date	Tritium pCi/l	Gamma Emitters
Dewatering Discharge	01/83	<1000	<15
"	02/83	<1000	<15
"	03/83	<1000	<15
"	04/83	<1000	<15
"	05/83	<1000	<15
"	06/83 (a)	<1000	<15
"	07/83 (a)	<1000	<15
"	08/83 (b)	<1000	<15
"	09/83 (c)	<1000	<15
"	12/83 (d)	<1000	<15

Quarterly Composite for Tritium (pCi/l)

Dewatering Discharge	3rd Qtr.	<1000
"	4th Qtr.	<1000

(a) Gross Beta <2 pCi/l
(b) Gross Beta 3±2 pCi/l
(c) Gross Beta 4±2 pCi/l
(d) Gross Beta 8±1 pCi/l

GULF STATE UTILITIES - RIVER BEND STATION
Radioactivity in Sediment Samples

1983

Location	Collection Date	pCi/kg (dry) Gamma Emitters
Upstream	11/22/83	<0.15
Downstream	11/22/83	<0.15

GULF STATE UTILITIES - RIVER BEND STATION
Radioactivity In Milk Samples

1983

Location	Collection Date	pCi/l I-131	pCi/l Gamma Emitters
McKowen	01/14/83	<1	<15
McKowen	01/31/83	<1	<15
McKowen	02/11/83	<1.8 (a)	<15
McKowen	02/25/83	<1	<15
McKowen	03/11/83	<1	<15
McKowen	03/25/83	<1	<15
McKowen	04/14/83	<2.8 (a)	<15
McKowen	04/29/83	<1	<15
McKowen	05/13/83	<1	<15
McKowen	05/27/83	<1	<15
McKowen	06/13/83	<1	<15
McKowen	06/24/83	<2 (a)	<15
McKowen	07/07/83	<1	<15
McKowen	07/22/83	<1	<15
McKowen	08/05/83	<1	<15
McKowen	08/19/83	<1	<15
McKowen	09/02/83	<1	<15
McKowen	09/15/83	<1	<15
McKowen	10/04/83	<1	<15
McKowen	10/18/83	<1	<15
McKowen	11/01/83	<1	<15
McKowen	11/15/83	<1	<15
McKowen	12/07/83	<1	<15
McKowen	12/20/83	<1	<15

(a) Lower sensitivity due to delay in sample receipt, resulting in large decay factor for I-131.

GULF STATE UTILITIES - RIVER BEND STATION
Radioactivity In Animal Samples

1983

Location	Collection Date	Sample Type	pCi/g wet I-131	pCi/g wet Cs-134, Cs-137, Co-58 Co-60, and Mn-54	pCi/g wet Fe-59 and Zn-65
On Site	03/15/83	Deer - Thyroid 2 1/2 yrs.	<0.6	--	--
On Site	03/15/83	Deer - Meat	--	<0.13	<0.26
On Site	03/15/83	Deer - Thyroid 2 1/2 yrs.	<0.9	--	--
On Site	03/15/83	Deer - Thyroid 6 months	<1.4	--	--
On Site	03/15/83	Deer - Thyroid 6 months	<1.1	--	--
On Site	03/15/83	Deer - Meat	--	<0.13	<0.26
On Site	03/15/83	Deer - Bones	--	<0.13	<0.26
On site	12/27/83	Deer-Thyroid	<0.15	<0.13	<0.26
On site	12/27/83	Deer-Meat	--	<0.13	<0.26

GULF STATE UTILITIES - RIVER BEND STATION
Radioactivity In Vegetation

1983

Location	Collection Date	Sample Type	Gamma Emitters pCi/kg (wet)
On Site	06/17/83	Squash	<0.08
"	"	Green Beans	<0.08
"	"	Cucumber	<0.08
"	"	Yellow Squash	<0.08
On Site	07/05/83	Corn	<0.08
"	07/18/83	Vegetation	<0.08
"	07/21/83	Okra	<0.08
"	07/25/83	Eggplant	<0.08
On-site	09/06/83	Cucumber	<0.08
"	"	Okra	<0.08
"	"	Squash	<0.08
"	09/26/83	Veg. Leaves	<0.08
Angola	10/21/83	Turnip Greens	<0.08
On-Site	11/10/83	Collard Greens	<0.08 (a)
On-Site	11/10/83	Mustrard Greens	<0.08 (a)
Angola	11/10/83	Green Cabbage	<0.08 (a)
Angola	11/10/83	Egg Plant	<0.08
Angola	12/15/83	Cauliflower	<0.08(a)
"	12/15/83	Cabbage	<0.08(a)
"	12/15/83	Mustard greens	<0.08(a)
On-site	12/15/83	Swiss chard	<0.08(a)
"	12/15/83	Turnip greens	<0.08(a)

(a) I-131 = <0.08 pCi/g wet as of collection date.

GULF STATE UTILITIES - RIVER BEND STATION
Gamma Radiation Using Thermoluminescent Dosimeters

1983

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Date Annealed:	12/13/83	03/16/83	06/22/83	09/26/83
Date Read:	04/25/83	08/15/83	10/25/83	01/24/84
Location	mR/Quarter ± 2 Sigma Error			
A-1	17.7±2.2	26.8±3.8	14.7±2.4	16.3±2.0
A-2	19.5±2.8	27.3±2.8	19.9±2.5	Missing
B-1	19.8±2.9	24.9±3.5	19.8±2.2	17.6±2.9
B-2	19.6±3.8	20.8±4.4	23.0±2.3	21.2±3.5
C-1	19.1±2.2	24.5±2.5	22.2±2.4	19.0±2.0
C-2	20.5±3.0	23.0±2.3	18.7±1.9	19.4±1.9
D-1	20.7±2.1	25.2±2.9	24.3±2.4	20.4±2.0
D-2	18.9±2.1	23.5±2.4	21.4±2.4	21.1±2.3
E-1	22.9±2.4	25.2±2.5	20.7±3.8	18.6±2.4
E-2	20.7±3.8	22.3±2.5	18.3±1.8	16.4±2.3
F-1	20.1±2.3	32.1±3.2	21.2±2.4	20.3±3.1
F-2	21.3±2.1	28.0±2.8	20.4±4.3	18.4±1.8
G-1	20.8±2.4	27.6±3.3	23.2±2.9	19.2±2.3
G-2	19.5±2.0	Missing	18.3±3.3	19.8±3.4
H-1	18.0±2.1	25.9±3.1	Missing	18.4±4.1
H-2	18.9±1.9	26.4±7.0	19.2±2.5	16.8±2.0
J-1	19.9±2.0	24.5±3.8	17.5±1.9	18.7±2.8
J-2	21.5±4.4	Missing	17.5±3.9	Missing
K-1	21.0±5.4	25.8±7.2	18.3±2.3	18.9±3.1
K-2	22.1±2.4	21.1±2.1	19.2±1.9	18.2±2.8
L-1	20.1±2.0	26.2±3.0	19.9±3.5	19.4±2.1
L-2	19.4±2.1	26.5±2.7	15.0±2.0	13.6±2.4
M-1	19.0±1.9	23.8±3.1	Missing	16.2±2.7
M-2	21.5±2.2	28.7±2.9	21.7±2.2	19.1±2.1
N-1	21.8±2.2	23.2±2.3	20.3±2.7	19.1±1.6
N-2	19.0±3.5	20.0±3.7	19.3±2.6	17.7±2.5
P-1	20.7±2.0	27.0±6.4	20.5±3.3	18.4±1.5
P-2	19.8±2.0	29.4±2.9	19.9±2.1	18.4±2.3
Q-1	19.7±2.6	24.4±4.0	19.4±2.8	18.3±1.8
Q-2	21.5±2.4	21.8±2.5	19.5±3.3	19.0±3.6
R-1	19.5±3.5	25.7±2.8	14.0±2.0	15.5±2.7
R-2	21.6±2.2	25.3±4.5	20.9±3.0	19.9±1.9
E-C	20.5±2.1	21.3±2.1	Missing	17.6±2.2
L-C	17.8±1.8	22.5±2.3	16.6±1.7	16.0±1.9
A-C	21.0±2.1	Missing	19.4±3.2	18.6±2.7
R-S	19.7±2.9	23.8±5.7	18.0±3.3	18.9±1.9
Q-S-1	22.2±3.2	25.7±3.0	17.9±2.3	17.3±2.7
C-S	23.1±2.5	Missing	22.2±2.2	20.3±2.0
L-S	Missing	Missing	Missing	20.0±3.0
K-S	19.2±2.1	16.8±6.1	15.7±2.0	15.6±2.4
Q-S-2	21.2±4.5	17.4±2.2	16.9±2.1	16.2±2.9

GULF STATE UTILITIES - RIVER BEND STATION
Gamma Radiation Using Thermoluminescent Dosimeters
(Monthly Collection*)

1983

	July	August	September	October	November	December
Date Annealed	07/07/83	07/28/83	09/06/83	09/30/83	11/04/83	11/28/83
Date Read	08/17/83	10/04/83	11/02/83	11/22/83	12/21/83	01/24/84
Location	Total mR/Monthly ± 2 Sigma Error					
A-1	7.0±1.2	7.8±1.7	8.3±1.1	8.8±1.7	7.8±1.0	9.5±1.0
A-2	7.8±0.8	7.7±2.0	10.0±1.4	10.8±2.5	8.9±1.2	9.5±0.9
B-1	14.5±2.3	9.5±0.9	8.2±1.2	9.8±2.0	8.5±0.8	9.6±1.5
B-2	7.6±0.8	9.1±1.3	11.5±1.0	7.9±3.1	8.9±0.8	10.9±1.6
C-1	8.1±1.1	9.2±1.2	10.3±0.7	9.9±2.4	7.6±0.8	9.5±1.2
C-2	7.5±2.3	9.4±1.3	9.0±1.8	Missing	8.0±1.5	9.3±1.1
D-1	9.2±1.5	9.5±1.6	9.7±0.9	8.8±1.0	8.1±1.9	11.0±2.3
D-2	7.6±1.2	10.3±4.1	9.5±1.1	8.5±1.9	8.3±1.8	10.0±1.3
E-1	7.0±0.4	9.4±2.4	9.4±0.9	8.7±2.6	7.9±1.6	9.8±1.0
E-2	7.1±1.0	7.1±2.8	8.5±1.6	9.2±1.5	5.9±1.5	9.5±1.4
F-1	8.3±1.2	9.7±3.4	10.5±1.1	8.9±1.5	7.4±1.4	10.5±1.3
F-2	7.5±0.9	9.6±2.2	9.7±1.3	8.2±2.1	7.7±1.3	10.5±1.0
G-1	9.3±1.1	7.4±3.5	10.5±1.2	8.7±1.6	7.6±1.4	11.3±3.1
G-2	7.4±1.3	8.4±1.7	9.1±1.5	9.3±1.3	6.9±0.9	9.4±1.6
H-1	13.0±2.4	7.5±1.7	8.3±1.2	8.3±2.0	6.9±0.8	9.4±1.2
H-2	6.7±1.8	5.4±0.8	9.6±2.4	8.2±0.8	7.5±1.1	10.2±0.9
J-1	7.7±1.3	8.9±1.7	8.6±1.2	8.9±1.6	7.4±1.4	10.0±1.6
J-2	7.0±1.8	7.9±1.1	Missing	9.2±3.1	7.2±0.9	9.6±1.4
K-1	7.5±1.0	7.1±2.1	9.5±2.3	8.9±2.6	7.1±1.1	9.8±0.8
K-2	7.5±1.9	8.8±1.7	10.1±1.5	9.5±2.1	7.1±0.8	10.3±1.2
L-1	7.4±0.7	8.7±1.7	8.7±1.2	9.2±1.1	8.0±0.9	10.1±1.0
L-2	6.5±1.2	7.1±1.3	7.6±0.7	8.2±2.1	6.4±1.0	9.1±1.3
M-1	Missing	Missing	8.5±0.8	8.3±1.2	6.7±1.2	9.3±0.9
M-2	7.5±1.3	10.8±2.7	10.7±0.8	9.3±1.6	7.8±1.4	10.5±1.1
N-1	7.5±1.7	8.9±1.3	8.7±1.5	8.7±1.4	7.8±1.5	10.3±1.2
N-2	7.2±1.0	6.3±0.9	9.3±1.2	8.1±2.3	7.7±1.3	10.6±1.3
P-1	6.8±1.3	9.2±1.5	9.8±1.7	9.5±1.6	7.1±0.4	9.8±0.9
P-2	8.3±1.8	8.1±1.9	9.3±1.6	8.6±1.6	6.8±1.2	10.2±2.1
Q-1	6.7±1.4	8.5±0.9	8.7±1.2	8.5±1.7	6.6±1.3	10.1±1.0
Q-2	6.8±0.7	7.9±2.3	9.2±1.8	9.1±2.6	6.7±1.6	10.4±1.0
R-1	10.3±1.0	6.5±1.5	7.5±1.1	7.6±1.4	5.6±0.9	8.7±1.1
R-2	7.6±1.1	8.9±3.0	9.7±1.1	9.7±1.1	7.3±1.4	10.1±2.1
E-C	7.0±0.7	8.3±2.4	Missing	8.7±1.2	7.8±2.1	10.2±1.5
L-C	6.9±1.1	5.4±1.2	8.3±0.8	8.7±3.1	6.9±0.7	10.0±1.8
A-C	8.4±0.9	8.3±1.1	9.6±0.9	8.7±1.3	7.5±1.2	9.3±1.9
R-S	7.3±1.0	9.1±1.0	9.8±0.9	9.1±1.6	7.1±1.1	10.1±1.0
Q-S-1	7.1±1.1	8.9±4.4	8.2±1.0	8.6±2.1	6.9±0.7	9.2±0.9
C-S	7.8±2.0	7.2±1.2	9.6±1.0	8.7±1.6	6.9±1.7	10.0±1.1
L-S	7.4±1.1	9.3±1.3	8.2±0.8	9.0±1.0	8.0±0.8	10.2±1.0
K-S	6.9±0.9	6.7±1.9	7.5±1.8	8.6±1.8	6.3±0.7	9.0±1.2
Q-S-2	6.6±2.2	7.6±1.4	8.2±1.4	8.3±1.4	6.8±1.0	9.1±0.9

* Program started from July 1983

GULF STATE UTILITIES - RIVER BEND STATION

List of Additional Samples
1983

Location	Collection Date	Sample Type	Analysis	Result (Units)
St. Francisville	04/83	Surface water	Tritium	<1000 pCi/l
Crown Zellerbach	04/83	"	"	<1000 pCi/l
St. Francisville	09/83	"	Gross Beta	7±3 pCi/l
Crown Zellerbach	09/83	"	Gross Beta	4±3 pCi/l
St. Francisville	10/83	"	Gross Beta	8±3 pCi/l
Crown Zellerbach	10/83	"	Gross Beta	9±4 pCi/l
Blowdown Discharge Area	"	"	Gross Beta	9±4 pCi/l
St. Francisville	11/83	"	Gross Beta	10±2 pCi/l
Crown Zellerbach	"	"	Gross Beta	12±2 pCi/l
Blowdown Discharge Area	"	"	Gross Beta	9±2 pCi/l
St. Francisville	12/83	"	Gross Beta	7±2 pCi/l
Crown Zellerbach	"	"	Gross Beta	5±2 pCi/l
Blowdown Discharge Area	"	"	Gross Beta	6±2 pCi/l

GULF STATES UTILITIES - RIVER BEND STATION

List of Missed Samples

1983

Sample Type	Location	Expected Collection Date	Reason
TLD	L-S	1st Qtr.	Vandalism
	G-2	2nd Qtr.	"
	J-2	"	"
	A-C	"	"
	C-S	"	"
	L-S	"	"
	H-1	3rd Qtr.	"
	E-C	"	"
	L-S	"	"
	J-2	4th Qtr.	"
	M-1	July	"
	M-1	August	"
	J-2	September	"
	E-C	September	"
	C-2	October	"
Air Filter/ Charcoal Cartridge	St. Francis	04/04/83	Not Available
	Parlange	04/15/83	"
	Parlange	06/06/83	"
	K-S	08/22/83	Lost in shipment

SECTION 6

QUALITY ASSURANCE DATA

The results of the TLD intercomparison program with Battelle Northwest Laboratories are given on page 6-2.

The results of the intercomparison program with USEPA are presented on pages 6-3 and 6-4.

The results of the internal quality control program of Eberline are presented on pages 6-5 and 6-6.

The above data tables are self explanatory. Corrective actions are taken as soon as possible whenever known and measured values are not in agreement within the statistical limits.

TLD INTERCOMPARISON QC DATA

(Eberline-Battelle Pacific Northwest Labs)

1983

Total MR±2 Sigma					
1st Quarter		2nd Quarter		3rd and 4th Quarter	
Actual	Measured	Actual	Measured	Actual	Measured
27	24±6	90	80±14	15	13±4
36	32±3	90	85±11	15	14±3
40	37±4	84	90±13	28	30±4
45	41±7	68	70±13	28	34±7
58	53±5	50	47±5	40	37±4
69	62±6	50	50±7	40	40±7
69	64±6	68	59±7	57	52±5
69	64±9	84	81±8	57	58±6
97	85±15	99	97±16	88	75±10
97	85±15	99	102±10	88	77±8

1983 USEPA - EBERLINE INTERCOMPARISON PROGRAM

Sample Type	Analysis	Value (EPA)	Value (EIC)	Units
Air Filter	Alpha	26±11.2	19±2	pCi/Filter
Air Filter	Beta	68±8.7	72±7	pCi/Filter
Air Filter	Sr-90	20±2.6	26±8	pCi/Filter
Air Filter	Cs-137	27±8.7	42±6	pCi/Filter
Air Filter	Alpha	13±8.7	9±1	pCi/Filter
Air Filter	Beta	36±8.7	41±4	pCi/Filter
Air Filter	Sr-90	10±2.6	12±5	pCi/Filter
Air Filter	Cs-137	15±8.7	10±2	pCi/Filter
Food	Sr-89	35±8.7	31±19	pCi/kg
Food	Sr-90	28±8.7	42±9	pCi/kg
Food	I-131	37±10.4	<27	pCi/kg
Food	Cs-137	31±8.7	52±23	pCi/kg
Milk	Sr-89	37±8.7	19±9	pCi/l
Milk	Sr-90	18±2.6	11±4	pCi/l
Milk	I-131	55±10.4	66±7	pCi/l
Milk	Cs-137	26±8.7	28±3	pCi/l
Milk	K	1512±131	1850±190	pCi/l
Milk	Sr-89	15±8.7	14±6	pCi/l
Milk	Sr-90	14±2.6	16±3	pCi/l
Milk	I-131	40±10.4	54±4	pCi/l
Milk	Cs-137	33±3.7	36±20	pCi/l
Milk	K	1550±135	1550±210	mg/l
Water	Alpha	29±13	17±2	pCi/l
Water	Beta	31±8.7	44±6	pCi/l
Water	Alpha	11±8.7	17±3	pCi/l
Water	Beta	57±8.7	46±5	pCi/l
Water	Alpha	7±5.0	7±2	pCi/l
Water	Beta	22±5.0	24±2	pCi/l
Water	Alpha	14±8.7	13±2	pCi/l
Water	Beta	16±8.7	33±2	pCi/l
Water	U	31±10.4	27±5	pCi/l
Water	Sr-89	29.2±8.7	12±8	pCi/l
Water	Sr-90	17.2±2.6	22±4	pCi/l
Water	Sr-89	15±8.7	7±5	pCi/l
Water	Sr-90	10±2.6	5±2	pCi/l
Water	H-3	2560±612	3090±510	pCi/l
Water	H-3	1529±337	1600±600	pCi/l
Water	H-3	1210±570	1370±600	pCi/l
Water	Pu-239	8.6±1.5	9.0±0.5	pCi/l
Water	I-131	27±10.4	19±4	pCi/l
Water	I-131	14±6	16±2	pCi/l
Water	Cr-51	45±9	102±70	pCi/l

Sample Type	Analysis	Value (EPA)	Value (EIC)	Units
Water	Co-60	22±9	23±3	pCi/l
Water	Zn-65	21±9	20±3	pCi/l
Water	Ru-106	48±9	49±13	pCi/l
Water	Cs-134	20±9	21±3	pCi/l
Water	Cs-137	19±9	20±3	PCi/l
Water	Cr-51	51±8.7	42±37	pCi/l
Water	Co-60	19±8.7	21±3	pCi/l
Water	Zn-65	40±8.7	28±5	pCi/l
Water	Ru-106	52±8.7	46±17	pCi/l
Water	Cs-134	15±8.7	13±3	pCi/l
Water	Cs-137	22±8.7	22±3	pCi/l
Water	Ra-226	12.7±3.3	6.6±2.0	pCi/l
Water	Ra-228	0	<6.0	pCi/l
Water	Ra-226	4.8±0.7	4.4±1.3	pCi/l
Water	Ra-228	0	<2	pCi/l
Water	Ra-226	3.1±0.81	2.5±0.8	pCi/l
Water	Ra-228	2.0±0.52	<5.3	pCi/l
Water	Alpha	46±19.9	87±39	pCi/l
Water	Beta	143±12.4	138±54	pCi/l
Water	Sr-89	24±8.7	25±4	pCi/l
Water	Sr-90	13±2.6	20±4	pCi/l
Water	Ra-226	8.5±2.25	6.8±2.0	pCi/l
Water	Ra-228	4.7±1.21	<46	pCi/l
Water	Co-60	30±8.7	29±2	pCi/l
Water	Cs-134	33±8.7	29±4	pCi/l
Water	Cs-137	27±8.7	25±4	pCi/l
Water	U	25±10.4	19±1	pCi/l

NOTE: Includes all data received for 1983 samples up to 02/10/84.

1983 Quality Control Analyses Summary

The table below summarizes results of samples run for process quality control purposes during the subject year. These listings are in addition to such measurements as detector backgrounds, check source values, radiometric-gravimetric comparisons, system calibrations etc. Detailed listing of each measurement are maintained at the laboratory and are available for inspection if required.

Blank Samples

Nuclide Analyzed	Number of Determinations	Number of Analyses Exceeding the LLD for that Analysis
Gross Alpha	49	0
Gross Beta	101	0
H-3	90	0
U-234	17	0
Th-230	19	0
Ra-226	37	0
Pb-210	29	0
I-131	*	
Sr-89,90	81	0
Pu-239	32	0
Am-241	3	0

* Blank I-131 analyses are performed with each batch of samples processed all blank data were below the detection limit.

Spiked Samples

Nuclide Analyzed	Number of Det'ns	Within 2 sigma of known	Within 3 sigma of known	Differing from known by > 3 sigma
Gross Alpha	49	49	-	-
Gross Beta	101	101	-	-
H-3	90	90	-	-
U-234	17	17	-	-
Th-230	19	19	-	-
Ra-226	37	37	-	-
Pb-210	29	29	-	-
Sr-90	81	81	-	-
Pu-239	32	32	-	-
Am-241	3	3	-	-

Split Samples

Nuclide Analysed	Number of Det'ns	No. Agreeing Within 2 sigma	No. Agreeing Within 3 sigma	No. Differing by > 3 sigma
Gross Alpha	47	47	-	-
Gross Beta	142	142	-	-
H-3	151	151	-	-
U-234	12	12	-	-
Th-230	10	10	-	-
Ra-226	21	20	1	-
Pb-210	19	19	-	-
Sr-89	47	47	-	-
Sr-90	54	54	-	-
Pu-239	12	12	-	-
Am-241	3	2	1	-
Gamma	13	13	-	-