GULF STATES UTILITIES
RIVER BEND STATION

PREOPERATIONAL ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM

ANNUAL REPORT

1984

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ANNUAL REPORT

1984

PREPARED FOR

GULF STATES UTILITIES

BY

EBERLINE ANALYTICAL CORPORATION

ALBUQUERQUE LABORATORY
7021 PAN AMERICAN HWY NE
ALBUQUERUQE, NM 87109

As a contractor to

GULF STATES UTILITIES

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SECTION 1

PREFACE

ABSTRACT

This report summarizes data obtained on samples received during the year 1984 for the preoperational environmental radiological monitoring program for the River Bend Station of Gulf States Utilities.

All samples are collected by Gulf States Utilities personnel and shipped to Eberline Analytical Corporation, 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 recorded on a work order and entered in a log book.

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

A summary of quality control results obtained during the year is presented at the end of the report. Included in this section are data 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 approximate 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 Makeup water will be withdrawn from the Mississippi River through submerged intake screens and suction piplines to a dry pit pumphouse structure.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 summer 1985 with an anticipated commercial operations date of December 1985.

SECTION 2

SAMPLING PROGRAM

2.1 SAMPLE COLLECTION PROCEDURES

AIR PARTICULATE AND RADIOIODINE

Air particulate and radioiodine samples were collected weekly from nine 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 weatherproof 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 labeled envelope. The charcoal cartridge was removed at the same time. Air flow readings and sample volumes were recorded and sent to Eberline for analysis.

The sample collection from location N. Blvd. was started at the beginning of June, 1984.

FISH SAMPLES

Fish samples were collected semi-annually from the Mississippi River upstream and downstream of the plant.

ANIMAL SAMPLES

Animal samples (deer thyroid) were collected annually.

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 formaldehyde solution were added to the milk which was collected in a gallon size plastic container. The container was labeled (location, collection date, sample volume collected, etc.), and shipped to Eberline for analysis.

WATER SAMPLES

Surface water samples were collected as a composite over a 1-month period from three locations. The locations were 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.

DRINKING WATER

Drinking water samples were collected as a composite over a 1-month period from People's Water Service Co. (River Mile 175.5)

Ground water samples were collected quarterly from the dewatering discharge location in East Creek, tributary to Grants Bayou. Starting with the 3rd Quarter of 1984, ground water samples were collected form up-gradient and down-gradient wells.

SEDIMENT SAMPLES

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

VEGETATION SAMPLE

Approximately 1 kg of vegetation samples were collected from the onsite location, and state penitentiary at Angola.

DIRECT GAMMA RADIATION

Thermoluminescent dosimeters (TLD) were placed for field exposure and collected on a monthly and quarterly frequency. Environmental gamma radiation doses was measured using these badges. The badges consisted of five chips sealed in a plastic protective holder having a density of 50 mg/cm^2. The TLD chips were 1/8" x 1/8" x 1/32" LiF known commercially as TLD-100.

Prior to installation, the chips were 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" x 12" x 1".

The TLD area badges were 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 9 locations of special interest.

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

Figure 1 shows the radiological environmental monitoring locations and Figure 2 shows the region within 10 kilometers of River Bend Station

Table 2 describes the TLD locations

TABLE 1

PREOPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

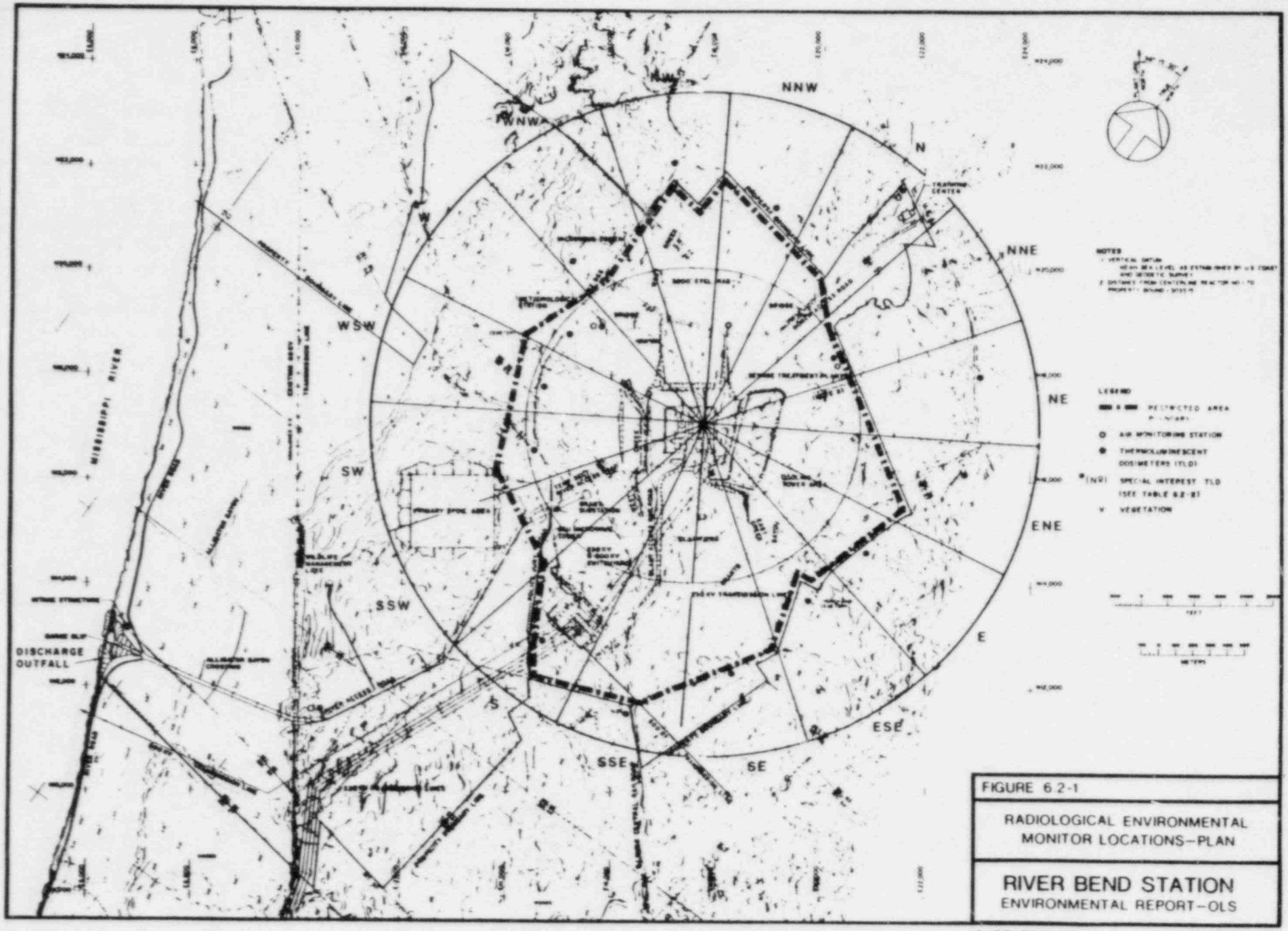
Exposure Pathway and/or Sample	Number of Samples and Locations	Sampling and Collection Frequency	Type, Frequency and Analysis
AIRBORNE			
Radioactive and Particulates	9	Continuous sampler operation with sample collection weekly or as required by dust loading, whichever is more frequent.	Radioiodine cartridges 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 stations (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) 9 areas of special interest	Monthly & Quarterly	Gamma dose measurement monthly & quarterly.
WATERBORNE			
Surface Water	3 (Control & Indicator)	Composite sample over 1-month period	Gross beta and gamma isotopic analyses monthly. Composite for tritium quarterly.
Ground Water	2	Quarterly grab	Gross beta and gamma isotopic analyses and tritium analyses quarterly.
Sediment from Shoreline	2 (Upstream & Downstream)	Semi-annually	Gamnma isotopic analysis semi-annually.
Drinking Water	1	Composite sample over 1-month period	Gross beta and gamma isotopic analyses. Composite for tritium quarterly.

Exposure Pathway and/or Sample	Number of Samples and Locations	Sampling and Collection Frequency	Type, Frequency and Analysis
INGESTION			
Milk	1 (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	2 (Upstream & Downstream)	Sample in season, or semi-annually if they are not seasonal.	Gamma isotopic analyses on edible portions.
Produce	2	Monthly when available.	Gamma isotopic & I-131 on thyroid portions.
Animal	1	Annually when available	Gamma isotopic & I-131 on thyroid 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 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic 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.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DISCHARGE OUTFALL
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MISSISSIPPI RIVER
TRAINING CENTER
NOTES
LEGEND
AIR MONITORING STATION
THERMOLUMINESCENT DOSIMETERS (TLD)
SPECIAL INTEREST TLD
VEGETATION
FIGURE 6.2-1
RADIOLOGICAL ENVIRONMENTAL MONITOR LOCATIONS–PLAN
RIVER BEND STATION
ENVIRONMENTAL REPORT–OLS
SUPPLEMENT 9
NOVEMBER 1984

Figure 1

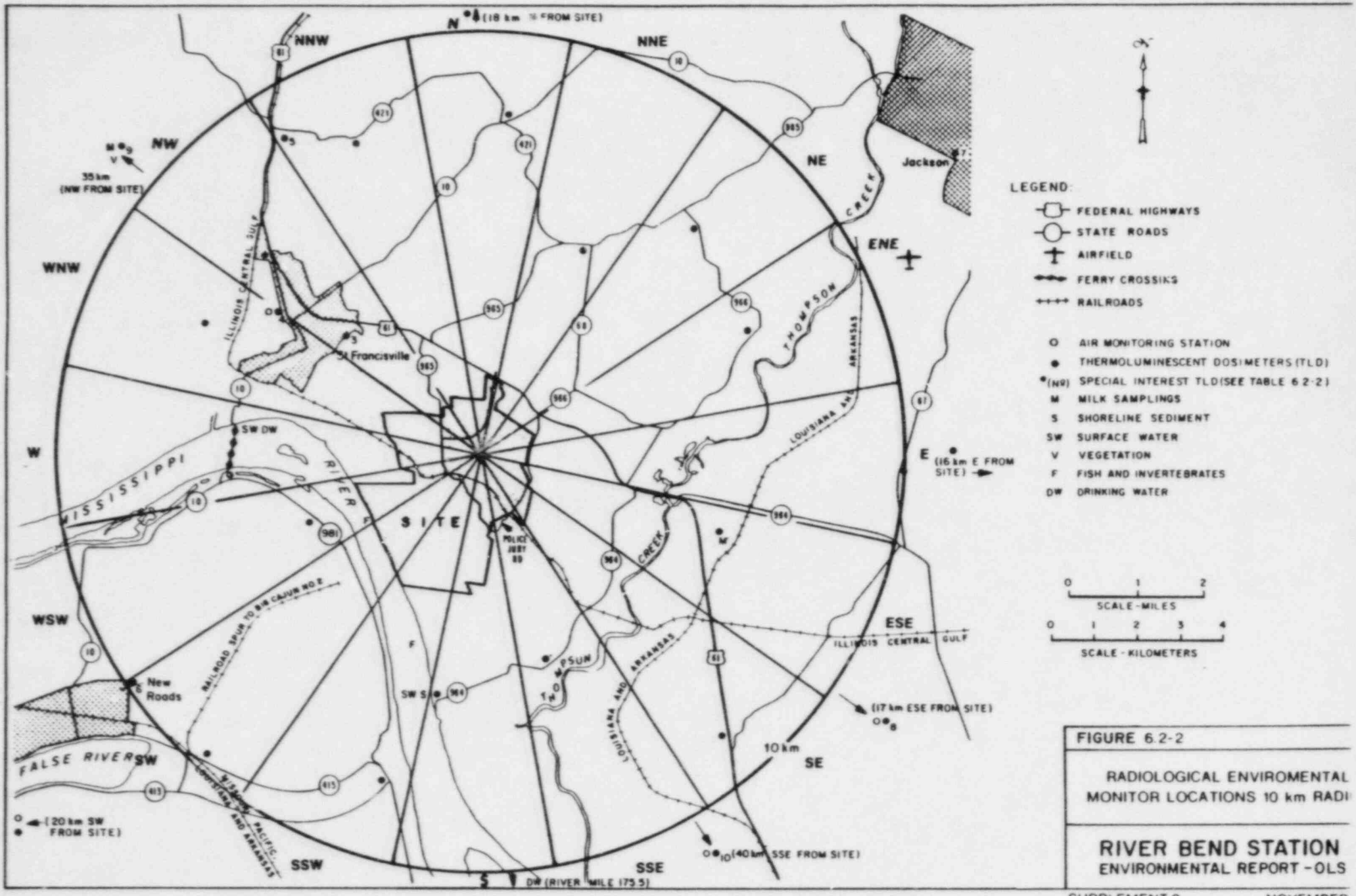

FIGURE 6.2-2

RADIOLOGICAL ENVIROMENTAL MONITOR LOCATIONS 10 km RADI

RIVER BEND STATION
ENVIRONMENTAL REPORT - OLS

SUPPLEMENT 9 NOVEMBER

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 0.3 miles north of WF 7. (300′ South of Tom′s Kitchen).
C-2	On La. Hwy. 966 on a stub pole about 0.4 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 0.6 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 0.4 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).
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).

TLD NO.	LOCATION INDICATOR STATIONS
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. 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.
P-2	Approximately one 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 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 Zachary, LA.
Q-S-3 (9)	On a utility pole at LSP Angola Dairy.
G-S-2 (10)	Air Sampler Station, North Blvd., Baton Rouge, LA.

TLD LOCATIONS

INDICATOR STATIONS

A-1	6,000 Ft.	A-2	26,000 Ft.
B-1	2,500 Ft.	B-2	23,000 Ft.
C-1	5,500 Ft.	C-2	24,500 Ft.
D-1	5,300 Ft.	D-2	24,000 Ft.
E-1	4,500 Ft.	E-2	29,000 Ft.
F-1	4,100 Ft.	F-2	20,500 Ft.
G-1	4,800 Ft.	G-2	27,000 Ft.
H-1	5,600 Ft.	H-2	18,000 Ft.
J-1	5,000 Ft.	J-2	20,000 Ft.
K-1	4,000 Ft.	K-2	27,500 Ft.
L-1	3,000 Ft.	L-2	33,000 Ft.
M-1	3,000 Ft.	M-2	15,500 Ft.
N-1	2,900 Ft.	N-2	20,500 Ft.
P-1	3,000 Ft.	P-2	24,000 Ft.
Q-1	4,500 Ft.	Q-2	22,000 Ft.
R-1	4,000 Ft.	R-2	27,000 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 U.S. Environmental Protection Agency (USEPA).

Analyses of individual sample types, and general methods are discussed below. The analytical detection limits (Lower Limits of Detection LLD) 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 anticoincidence 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/volume of air.

Gamma isotopic analyses are performed with a GeLi detector on quarterly composite of filters from each location. The detection limit is 0.05 pCi/m^3.

3.2 RADIOIODINE

The charcoal cartridges used are of the TEDA-impregnated type. The iodine is extracted from the charcoal, separated and purified chemically, then counted as AgI in a low background gasflow beta counter. The low limit of detection is 0.07 pCi/m^3 based on a 300 m^3 volume of air.

3.3 WATER SAMPLES

Gross beta analysis is performed by transferring a known aliquot of the sample to a beaker and evaporating the water to dryness. Any organic matter is oxidized with concentrated nitric acid and hydrogen peroxide. The residue is dissolved in 0.1 M nitric acid, transferred to a tared stainless steel planchet and evaporated to dryness. The planchet is weighed to determine the sample thickness. The sample is then counted in a low background gas flow proportional counter. The lower limit of detection is 4 pCi/l.

Tritium in water is measured by liquid scintillation counting, after distillation. A known volume of the distilled fraction is transferred to a vial and mixed with a known volume of liquid scintillation cocktail. The sample is then counted in a liquid scintillation counter. The lower limit of detection is 2000 pCi/l.

Gamma isotopic analysis is performed by transferring a unknown volume of water to a marinelli beaker. The sample is then counted in a high resolution Ge(Li) detector coupled to a multi channel analyzer. The resulting spectrum is analyzed by a computer program which scans from about 50 to 2000 keV and lists the energy peaks of any gamma emitting radionuclides present in concentrations exceeding the sensitivity limits set for that partiular measurement. The lower limit of detection is 15 pCi/l based on Cs-137.

3.4 SEDIMENT SAMPLES

A known amount of the dried soil sample is transferred to a calibrated geometry and counted in a Ge(Li) high resolution detector coupled to a multichannel analyzer. The resulting spectrum is analyzed by a computer program which seems about 50 to 2000 keV and lists the energy peaks of any gamma emitting radionuclides present in concentrations exceeding the sensitivity limits set for that particular measurement. The lower limit of detection is 150 pCi/kg (dry) based on Cs-137.

3.5 FISH SAMPLES

The edible portions of the fish sample is weighed, oven dried to determine a dry weight. A known amount of the dry, homogeneous sample is then transferred to a calibrated geometry and counted in a high resolution Ge(Li) detector, coupled with a multichannel analyzer. The resulting spectrum is analyzed by a computer program which scans from about 50 to 2000 keV and lists the energy peaks of any gamma emitting radionuclides present in concentrations exceeding the sensitivity limits set for that particular measurement. The lower limit of detection is 130 pCi/kg (wet) based on Cs-137.

3.6 VEGETATION SAMPLES

A known amount of the wet homogeneous sample is transferred to a calibrated geometry and counted in a high resolution Ge(Li) detector, coupled with a multichannel analyzer. The resulting spectrum is analyzed by a computer program which scans from about 50 to 2000 keV and lists the energy peaks of any gamma emitting radionuclides present in concentrations exceeding the sensitivity limits set for that particular measurement. The lower limit of detection is 80 pCi/kg (wet) based on Cs-137 and 60 pCi/kg (wet) for I-131.

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. Thirteen 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: Radiobiosssay 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.

TABLE 3

LOWER LIMITS OF DETECTION (LLD)*

Sample Type	Analysis	LLD	Units
Air	Gross Beta	0.01	pCi/m^3
	Gamma Isotopic (Cs-137)	0.05	pCi/m^3
	I-131	0.07	pCi/m^3
Water	Gross Beta	4	pCi/l
	Gamma Isotopic (Cs-137)	15	pCi/l
	Tritium	2000	pCi/l
Milk	Gamma Isotopic (Cs-137)	15	pCi/l
	I-131	1	pCi/l
Sediment	Gamma Isotopic (Cs-137)	150	pCi/kg(dry)
Vegetation	Gamma Isotopic (Cs-137)	80	pCi/kg(wet)
	I-131	60	pCi/kg(wet)
Fish	Gamma Isotopic (Cs-137)	130	pCi/kg(wet)

* Based on 4.66σ confidence level.

A. DESIGN OF PLAN

The management of Eberline Analytical Corporation (EAC) is committed to a rigorous Quality Assurance Program. While this commitment is necessary for the normal conduct of business, our basic policies dictate professional ethics based upon concern for a safe and clean environment. This philosophy, and the specific procedures to attain the objectives, form the framework of our Quality Assurance Program. Eberline will provide only those services within our qualifications and with confidence that our Q.A. Program, and all related procedures, permits reliable performance of these services.

This quality assurance program complies with applicable requirements of the following specifications:

A.1 NRC 10 CFR Part 50, Appendix B "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants".

A.2 ANSI N45.2, "Quality Assurance Program Requirements for Nuclear Power Plants".

A.3 MIL-Q-9858, "Quality Program Requirements for Government Agencies".

A.4 NRC 10 CFR Part 21, "Reporting of Defects and Noncompliance".

A.5 ANSI/ASME NQA-1-1983, "Quality Assurance Program Requirements for Nuclear Facilities".

A.6 NRC Regulatory Guide 4.15 Rev. 1, "Quality Assurance for Radiological Monitoring Programs - Effluent Streams and the Environment".

A.7 ANSI 13.11, "Criteria for Testing Personnel Dosimetry Performance".

A.8 Other more specific standards covering specific services functions.

B. COLLABORATIVE TESTING

In addition to the internal quality control samples, each laboratory participates in collaborative testing or interlaboratory comparison programs. Natural or synthetic samples carefully prepared to contain known concentrations of the nuclides are sent to participating laboratories by an independent referee group such as the Quality Assurance Branch of the National Environmental Research Center of the U.S. Environmental Protection Agency at Las Vegas, Nevada or the Environmental Measurements Laboratory, U.S. Department of Energy, at New York. After statistically comparing

the resulting data from triplicate analyses of the special standard sample, the degree of analytical validity of the results are reported and updated performance information is returned to each participant. The program thus enables each laboratory to document the precision and accuracy of radioactivity measurements, identify instrumental and procedural problems and compare performance with other laboratories.

TLD area badges representative of the current supply, and routinely processed in the same manner as those shipped to customers, are sent quarterly to Battelle Pacific Northwest Laboratories (BPNL) for additional performance testing. Upon returning from BPNL, the TLD badges are read out using the standard operating procedures. The exposures are reported by BPNL following receipt of the EAC exposure report. Quality Control results are summarized monthly with distribution to the Quality Assurance Manager and to others upon request.

C. QUALITY ASSURANCE PLAN

The Quality Assurance Program follows the requirements of the Company and department procedures manuals. The discussion below outlines Quality Assurance Programs as conducted in the laboratory and as required in the QA Manual.

1. Procedure Approval

Each procedure goes through a vigorous evaluation and review process before it is incorporated into the EAC 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 alternative 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.

2. 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 log books. To the extent possible, certified standards are used for all primary calibrations. All dilutions of solution standards are recorded in a log book. Identity of dilutions can be traced back to the initial certification.

The following standards are used for the application indicated:

Measurement	Calibration Standard
Gross Beta	Solution of Standard Cs-137 certified by NBS or Amersham Searle.
Tritium	Solution standard of H-3 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 Sr-89 and Sr-90 certified by Amersham Searle or NBS.
Gross Alpha	Solution standards of Pu-239 certified by NBS or Amersham Searle.
Radiation Dose	Cs-137 gamma source cross-referenced with NBS using R-meters.

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 5-10.

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 5-11 and 5-12.

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 5-13.

4.3 SEDIMENT SAMPLES

Sediment samples were collected in December, 1984 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 5-14.

4.4 MILK SAMPLES

Milk samples were collected from McKowen Dairy and analyzed for Iodine-131 and gamma emitters. The results indicate that

concentrations of Iodine-131 and gamma emitters were below the detection limit of the program.

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

4.5 ANIMAL SAMPLES

Deer thyroid was 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 5-16.

4.6 VEGETATION SAMPLES

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

The data are listed in Section 5.0, page 5-17.

4.7 FISH SAMPLES

Fish samples were collected from locations upstream and downstream. 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 5-18.

4.8 ENVIRONMENTAL DOSIMETRY (TLDs)

Measurements of environmental gamma radiation dose were made on a quarterly basis using thermoluminescent dosimeters (TLD). The dose rates measured were normally in the range to be expected for background levels.

The data are presented in Section 5.0, pages 5-19 to 5-23.

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 hours.

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 measurement.

Error Terms — Figures following "$\pm$" 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 taht 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 STATES UTILITIES - RIVER BEND STATION
AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES

1984

10^{-2} pCi/m^3

Collection	Location: St. Francisville			Collection	Location: Parlange		
Date	Volume (m^3)	Beta	I-131	Date	Volume (m^3)	Beta	I-131
01/10/84	365	2±1	<7	01/17/84	400	3±1	<7
01/17/84	405	5±1	<7	01/74/84	400	4±1	<7
01/23/84	346	4±1	<7	01/23/84	349	3±1	<7
01/30/84	370	3±1	<7	01/30/84	400	2±1	<7
02/06/84	401	2±1	<7	02/06/84	405	2±1	<7
02/13/84	398	2±1	<7	02/13/84	401	2±1	<7
02/21/84	477	2±1	<7	02/21/84	461	2±1	<7
02/27/84	327	2±1	<7	02/27/84	344	2±1	<7
03/05/84	399	2±1	<7	03/05/84	403	3±1	<7
03/12/84	417	3±1	<7	03/12/84	404	4±1	<7
03/19/84	416	2±1	<7	03/19/84	402	2±1	<7
03/26/84	400	<1	<7	03/26/84	400	2±1	<7
04/02/84	390	2±1	<7	04/02/84	423	2±1	<7
04/09/84	397	2±1	<7	04/09/84	436	2±1	<7
04/16/84	391	3±1	<7	04/16/84	455	3±1	<7
04/23/84	391	3±1	<7	04/23/84	474	3±1	<7
04/30/84	387	3±1	<7	04/30/84	455	3±1	<7
05/07/84	391	4±1	<7	05/07/84	429	3±1	<7
05/15/84	434	3±1	<7	05/15/84	448	3±1	<7
05/21/84	383	2±1	<7	05/21/84	372	3±1	<7
05/29/84	502	1±1	<7	05/29/84	440	3±1	<7
06,04/84	374	2±1	<7	06/04/84	334	4±1	<7
06/11/84	441	6±1	<7	06/11/84	392	4±1	<7
06/18/84	456	2±1	<7	06/18/84	400	2±1	<7
06/25/84	448	2±1	<7	06/25/84	397	3±1	<7
07/02/84	385	3±1	<7	07/02/84	391	3±1	<7
07/09/84	439	1±1	<7	07/09/84	395	2±1	<7
07/16/84	445	2±1	<7	07/16/84	406	2±1	<7
07/23/84	440	4±1	<7	07/23/84	391	4±1	<7
07/30/84	445	2±1	<7	07/30/84	399	2±1	<7
08/06/84	448	2±1	<7	08/06/84	405	2±1	<7
08/13/84	438	4±1	<7	08/13/84	430	2±1	<7
08/20/84	442	5±1	<7	08/20/84	442	4±1	<7
08/27/84	437	4±1	<7	08/27/84	450	4±1	<7
09/04/84	502	2±1	<7	09/04/84	513	2±1	<7
09/10/84	386	3±1	<7	09/10/84	386	4±1	<7
09/17/84	451	3±1	<7	09/17/84	456	4±1	<7
09/24/84	447	2±1	<7	09/24/84	442	2±1	<7
10/01/84	456	3±1	<7	10/01/84	447	5±1	<7
10/09/84	510	4±1	<7	10/09/84	503	5±1	<7
10/15/84	389	2±1	<7	10/15/84	380	2±1	<7
10/22/84	445	2±1	<7	10/22/84	436	2±1	<7
10/29/84	456	1±1	<7	10/29/84	446	2±1	<7

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Collection Date	Location: St. Francisville Volume (m^3)	Beta	I-131	Collection Date	Location: Parlange Volume (m^3)	Beta	I-131
11/05/84	456	4±1	<7	11/05/84	452	2±1	<7
11/12/84	461	2±1	<7	11/12/84	450	3±1	<7
11/19/84	461	2±1	<7	11/19/84	445	2±1	<7
11/26/84	452	3±1	<7	11/26/84	437	4±1	<7
12/03/84	454	4±1	<7	12/03/84	445	4±1	<7
12/10/84	446	3±1	<7	12/10/84	440	4±1	<7
12/17/84	450	3±1	<7	12/17/84	445	3±1	<7
12/26/84	579	4±1	<7	12/26/84	567	4±1	<7
01/02/85	446	2±1	<7	01/02/85	436	2±1	<7

GULF STATES UTILITIES - RIVER BEND STATION
AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES

1984

10^{-2} pCi/m^3

Collection	Location:	A-1		Collection	Location:	K-S	
Date	Volume (m^3)	Beta	I-131	Date	Volume (m^3)	Beta	I-131
01/10/84	370	2±1	<7	01/10/84	295	1±1	<7
01/17/84	420	4±1	<7	01/17/84	445	3±1	<7
01/23/84	375	3±1	<7	01/23/84	341	2±1	<7
01/30/84	435	2±1	<7	01/30/84	427	3±1	<7
02/06/84	442	2±1	<7	02/06/84	399	2±1	<7
02/13/84	403	2±1	<7	02/13/84	398	2±1	<7
02/21/84	480	2±1	<7	02/21/84	465	2±1	<7
02/27/84	379	2±1	<7	02/27/84	352	2±1	<7
03/05/84	438	2±1	<7	03/05/84	438	2±1	<7
03/12/84	431	2±1	<7	03/12/84	407	3±1	<7
03/19/84	442	2±1	<7	03/19/84	399	2±1	<7
03/26/84	423	2±1	<7	03/26/84	431(a)	2±1	<7
04/03/84	473	2±1	<7	04/03/84	427	2±1	<7
04/09/84	362	2±1	<7	04/09/84	344	2±1	<7
04/16/84	422	4±1	<7	04/16/84	421	1±1	<7
04/23/84	426	3±1	<7	04/23/84	434	2±1	<7
04/30/84	426	3±1	<7	04/30/84	425	3±1	<7
05/07/84	426	4±1	<7	05/07/84	412	3±1	<7
05/15/84	478	4±1	<7	05/15/84	413	3±1	<7
05/21/84	380	2±1	<7	05/21/84	455	2±1	<7
05/29/84	474	2±1	<7	05/29/84	(b)	(b)	(b)
06/05/84	394	3±1	<7	06/05/84	465	<1	<7
06/11/84	330	8±1	<7	06/11/84	406	6±1	<7
06/18/84	398	2±1	<7	06/18/84	483	2±1	<7
06/25/84	399	3±1	<7	06/25/84	504	3±1	<7
07/02/84	399	3±1	<7	07/02/84	504	2±1	<7
07/09/84	381	1±1	<7	07/09/84	425	<1	<7
07/16/84	395	2±1	<7	07/16/84	496	2±1	<7
07/23/84	383	4±1	<7	07/23/84	502	3±1	<7
07/30/84	378	2±1	<7	07/30/84	486	2±1	<7
08/06/84	390	<1	<7	08/06/84	448	2±1	<7
08/13/84	393	2±1	<7	08/13/84	457	2±1	<7
08/20/84	388	6±1	<7	08/20/84	451	3±1	<7
08/27/84	391	5±1	<7	08/27/84	435	3±1	<7
09/04/84	435	2±1	<7	09/04/84	500	2±1	<7
09/10/84	328	4±1	<7	09/10/84	376	3±1	<7
09/17/84	165	4±1	<7	09/17/84	451	2±1	<7
09/24/84	279	2±1	<7	09/24/84	447	2±1	<7
10/02/84	444	5±1	<7	10/02/84	512	3±1	<7
10/09/84	403	5±1	<7	10/09/84	485	4±1	<7
10/15/84	340	2±1	<7	10/15/84	374	2±1	<7
10/22/84	382	2±1	<7	10/22/84	448	2±1	<7
10/29/84	391	2±1	<7	10/29/84	438	1±1	<7

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Collection Date	Location: A-1 Volume (m^3)	Beta	I-131	Collection Date	Location: K-S Volume (m^3)	Beta	I-131
11/05/84	402	3±1	<7	11/05/84	451	3±1	<7
11/12/84	403	3±1	<7	11/12/84	443	2±1	<7
11/19/84	409	3±1	<7	11/19/84	455	2±1	<7
11/26/84	397	4±1	<7	11/26/84	477	2±1	<7
12/03/84	391	5±1	<7	12/03/84	505	4±1	<7
12/10/84	394	4±1	<7	12/10/84	393	4±1	<7
12/17/84	406	4±1	<7	12/17/84	477	2±1	<7
12/26/84	514	4±1	<7	12/26/84	570	3±1	<7
01/02/85	399	2±1	<7	01/02/85	445	2±1	<7

(a) Sample was collected on 3/27/84
(b) Sample was not available

GULF STATES UTILITIES - RIVER BEND STATION
AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES

1984

10^{-2} pCi/m^3

Collection	Location:	R-1		Collection	Location:	B-1	
Date	Volume (m^3)	Beta	I-131	Date	Volume (m^3)	Beta	I-131
01/10/84	285	2±1	<7	01/10/84	340	3±1	<7
01/17/84	395	5±1	<7	01/17/84	400	5±1	<7
01/23/84	358	3±1	<7	01/23/84	350	4±1	<7
01/30/84	398	3±1	<7	01/30/84	412	3±1	<7
02/06/84	404	2±1	<7	02/06/84	417	2±1	<7
02/13/84	406	2±1	<7	02/13/84	412	2±1	<7
02/21/84	452	2±1	<7	02/21/84	493	3±1	<7
02/27/84	329	3±1	<7	02/27/84	409	3±1	<7
03/05/84	376	3±1	<7	03/05/84	466	3±1	<7
03/12/84	382	3±1	<7	03/12/84	472	4±1	<7
03/19/84	392	2±1	<7	03/19/84	479	2±1	<7
03/26/84	403	2±1	<7	03/26/84	471	2±1	<7
04/03/84	445	2±1	<7	04/03/84	532	2±1	<7
04/09/84	348	2±1	<7	04/09/84	413	2±1	<7
04/16/84	386	3±1	<7	04/16/84	471	3±1	<7
04/23/84	393	4±1	<7	04/23/84	469	3±1	<7
04/30/84	398	3±1	<7	04/30/84	469	3±1	<7
05/07/84	398	4±1	<7	05/07/84	465	4±1	<7
05/15/84	443	4±1	<7	05/15/84	462	3±1	<7
05/21/84	363	3±1	<7	05/21/84	410	2±1	<7
05/29/84	495	1±1	<7	05/29/84	495	2±1	<7
06/05/84	425	3±1	<7	06/05/84	403	3±1	<7
06/11/84	334	7±1	<7	06/11/84	342	7±1	<7
06/18/84	420	2±1	<7	06/18/84	407	2±1	<7
06/25/84	412	3±1	<7	06/25/84	404	3±1	<7
07/02/84	412	3±1	<7	07/02/84	404	3±1	<7
07/09/84	367	1±1	<7	07/09/84	351	1±1	<7
07/16/84	391	2±1	<7	07/16/84	399	2±1	<7
07/23/84	405	4±1	<7	07/23/84	409	4±1	<7
07/30/84	409	2±1	<7	07/30/84	489	2±1	<7
08/06/84	414	2±1	<7	08/06/84	395	2±1	<7
08/13/84	411	2±1	<7	08/13/84	383	2±1	<7
08/20/84	402	5±1	<7	08/20/84	345	6±1	<7
08/27/84	404	4±1	<7	08/27/84	347	5±1	<7
09/04/84	466	2±1	<7	09/04/84	396	2±1	<7
09/10/84	340	4±1	<7	09/10/84	295	4±1	<7
09/17/84	410	4±1	<7	09/17/84	360	5±1	<7
09/24/84	404	3±1	<7	09/24/84	343	3±1	<7
10/02/84	457	5±1	<7	10/02/84	405	5±1	<7
10/09/84	425	4±1	<7	10/09/84	366	5±1	<7
10/15/84	343	3±1	<7	10/15/84	295	2±1	<7
10/22/84	362	2±1	<7	10/22/84	335	2±1	<7
10/29/84	398	2±1	<7	10/29/84	340	2±1	<7

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Collection Date	Location: R-1 Volume (m^3)	Beta	I-131	Collection Date	Location: B-1 Volume (m^3)	Beta	I-131
11/05/84	412	3±1	<7	11/05/84	360	3±1	<7
11/12/84	478	2±1	<7	11/12/84	375	3±1	<7
11/19/84	414	3±1	<7	11/19/84	365	3±1	<7
11/26/84	477	3±1	<7	11/26/84	341	4±1	<7
12/03/84	414	4±1	<7	12/03/84	348	5±1	<7
12/10/84	403	4±1	<7	12/10/84	343	5±1	<7
12/17/84	411	4±1	<7	12/17/84	346	4±1	<7
12/26/84	526	4±1	<7	12/26/84	440	5±1	<7
01/02/85	403	2±1	<7	01/02/85	340	2±1	<7

GULF STATES UTILITIES - RIVER BEND STATION
AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES

1984

10^{-2} pCi/m^3

Collection Date	Location: Met Tower Volume (m^3)	Beta	I-131	Collection Date	Location: Zachary Volume (m^3)	Beta	I-131
01/10/84	355	3±1	<7	01/10/84	310	2±1	<7
01/17/84	405	5±1	<7	01/17/84	370	5±1	<7
01/23/84	338	4±1	<7	01/23/84	332	2±1	<7
01/30/84	396	4±1	<7	01/30/84	371	3±1	<7
02/06/84	395	2±1	<7	02/06/84	425	2±1	<7
02/13/84	358	3±1	<7	02/13/84	308	2±1	<7
02/21/84	415	3±1	<7	02/21/84	435	2±1	<7
02/27/84	355	3±1	<7	02/27/84	320	2±1	<7
03/05/84	376	3±1	<7	03/05/84	379	2±1	<7
03/12/84	409	4±1	<7	03/12/84	373	4±1	<7
03/19/84	415	3±1	<7	03/19/84	368	2±1	<7
03/26/84	407	2±1	<7	03/26/84	375	2±1	<7
04/03/84	465	2±1	<7	04/03/84	511	2±1	<7
04/09/84	350	2±1	<7	04/09/84	346	2±1	<7
04/16/84	412	3±1	<7	04/16/84	429	3±1	<7
04/23/84	408	3±1	<7	04/23/84	451	2±1	<7
04/30/84	402	3±1	<7	04/30/84	423	3±1	<7
05/07/84	403	4±1	<7	05/07/84	438	3±1	<7
05/15/84	389	3±1	<7	05/15/84	482	3±1	<7
05/21/84	416	2±1	<7	05/21/84	431	2±1	<7
05/29/84	461	3±1	<7	05/29/84	404	2±1	<7
06/05/84	392	3±1	<7	06/05/84	344	3±1	<7
06/11/84	330	7±1	<7	06/11/84	393	7±1	<7
06/18/84	385	2±1	<7	06/18/84	397	2±1	<7
06/25/84	391	3±1	<7	06/25/84	404	3±1	<7
07/02/84	448	3±1	<7	07/02/84	397	3±1	<7
07/09/84	336	3±1	<7	07/09/84	387	1±1	<7
07/16/84	383	2±1	<7	07/16/84	395	2±1	<7
07/23/84	384	4±1	<7	07/23/84	391	3±1	<7
07/30/84	391	2±1	<7	07/30/84	401	2±1	<7
08/06/84	386	2±1	<7	08/06/84	390	2±1	<7
08/13/84	389	2±1	<7	08/13/84	390	2±1	<7
08/20/84	419	4±1	<7	08/20/84	372	4±1	<7
08/27/84	454	3±1	<7	08/27/84	372	2±1	<7
09/04/84	518	2±1	<7	09/04/84	437	2±1	<7
09/10/84	387	3±1	<7	09/10/84	346	4±1	<7
09/17/84	465	3±1	<7	09/17/84	388	4±1	<7
09/24/84	462	2±1	<7	09/24/84	444	2±1	<7
10/02/84	507	4±1	<7	10/02/84	396	5±1	<7
10/09/84	464	4±1	<7	10/09/84	501	5±1	<7
10/15/84	383	2±1	<7	10/15/84	328	2±1	<7
10/22/84	445	1±1	<7	10/22/84	388	2±1	<7
10/29/84	439	2±1	<7	10/29/84	392	2±1	<7

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Collection Date	Location: Met Tower Volume (m^3)	Beta	I-131	Collection Date	Location: Zachary Volume (m^3)	Beta	I-131
11/05/84	455	2±1	<7	11/05/84	390	3±1	<7
11/12/84	443	2±1	<7	11/12/84	402	3±1	<7
11/19/84	450	2±1	<7	11/19/84	400	3±1	<7
11/26/84	432	3±1	<7	11/26/84	393	3±1	<7
12/03/84	391	3±1	<7	12/03/84	497	3±1	<7
12/10/84	376	4±1	<7	12/10/84	386	5±1	<7
12/17/84	442	4±1	<7	12/17/84	397	4±1	<7
12/26/84	557	4±1	<7	12/26/84	514	4±1	<7
01/02/85	435	2±1	<7	01/02/85	399	2±1	<7

GULF STATES UTILITIES - RIVER BEND STATION
AIRBORNE I-131 AND GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES

1984

10^{-2} pCi/m^3

Collection Date	Location: N. Blvd. (a) Volume (m^3)	Beta	I-131
06/04/84	335	3±1	<7
06/11/84	383	8±1	<7
06/18/84	399	2±1	<7
06/25/84	385	3±1	<7
07/02/84	404	3±1	<7
07/16/84	383	2±1	<7
07/23/84	375	2±1	<7
07/30/84	399	4±1	<7
08/06/84	415	2±1	<7
08/13/84	394	2±1	<7
08/20/84	425	4±1	<7
08/27/84	455	3±1	<7
09/04/84	502	2±1	<7
09/10/84	392	3±1	<7
09/17/84	440	4±1	<7
09/24/84	472	2±1	<7
10/01/84	449	5±1	<7
10/09/84	507	1±1	<7
10/15/84	371	2±1	<7
10/22/84	427	2±1	<7
10/29/84	440	2±1	<7
11/05/84	436	2±1	<7
11/12/84	449	3±1	<7
11/19/84	440	3±1	<7
11/26/84	407	4±1	<7
12/03/84	445	4±1	<7
12/10/84	430	4±1	<7
12/17/84	429	5±1	<7
12/26/84	553	4±1	<7
01/02/85	431	2±1	<7

(a) sample collection was started from June 1984.

GULF STATES UTILITIES - RIVER BEND STATION
GAMMA ISOTOPIC ANALYSIS OF AIR FILTER QUARTERLY COMPOSITE SAMPLES

1984

pCi/m^3

Collection Date	Location: St. Francisville Cs-137	Location: St. Francisville Gamma Emitters	Location: Parlange Cs-137	Location: Parlange Gamma Emitters
1st Quarter,	<0.05	<0.05	<0.05	<0.05
2nd Quarter,	<0.05	<0.05	<0.05	<0.05
3rd Quarter,	<0.05	<0.05	<0.05	<0.05
4th Quarter,	<0.05	<0.05	<0.05	<0.05

pCi/m^3

Collection Date	Location: A-1 Cs-137	Location: A-1 Gamma Emitters	Location: K-S Cs-137	Location: K-S Gamma Emitters
1st Quarter,	<0.05	<0.05	<0.05	<0.05
2nd Quarter,	<0.05	<0.05	<0.05	<0.05
3rd Quarter,	<0.05	<0.05	<0.05	<0.05
4th Quarter,	<0.05	<0.05	<0.05	<0.05

pCi/m^3

Collection Date	Location: R-1 Cs-137	Location: R-1 Gamma Emitters	Location: B-1 Cs-137	Location: B-1 Gamma Emitters
1st Quarter,	<0.05	<0.05	<0.05	<0.05
2nd Quarter,	<0.05	<0.05	<0.05	<0.05
3rd Quarter,	<0.05	<0.05	<0.05	<0.05
4th Quarter,	<0.05	<0.05	<0.05	<0.05

pCi/m^3

Collection Date	Location: Met Tower Cs-137	Location: Met Tower Gamma Emitters	Location: Zachary Cs-137	Location: Zachary Gamma Emitters
1st Quarter,	<0.05	<0.05	<0.05	<0.05
2nd Quarter,	<0.05	<0.05	<0.05	<0.05
3rd Quarter,	<0.05	<0.05	<0.05	<0.05
4th Quarter,	<0.05	<0.05	<0.05	<0.05

GULF STATES UTILITIES - RIVER BEND STATION
GAMMA ISOTOPIC ANALYSIS OF AIR FILTER QUARTERLY COMPOSITE SAMPLES

1984

pCi/m^3

Collection Date	Location: N. Blvd (a) Cs-137	Gamma Emitters
1st Quarter,	<0.05	<0.05
2nd Quarter,	<0.05	<0.05
3rd Quarter,	<0.05	<0.05
4th Quarter,	<0.05	<0.05

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIVITY IN SURFACE WATER

1984

(Monthly Composite Samples)

Collection Date	pCi/l Location: St. Francisville Gamma Emitters	Gross Beta	Location: Crown Zellerbach Gamma Emitters	Gross Beta
01/84	<15	10±2	<15	12±2
02/84	<15	6±2	<15	<4
03/84	<15	<4	<15	<4
04/84	<15	5±2	<15	<4
05/84	<15	<4	<15	7±2
06/84	<15	7±2	<15	7±2
07/84	<15	8±2	<15	8±2
08/84	<15	10±2	<15	9±2
09/84	<15	5±1	<15	7±1
10/84	<15	13±2	<15	8±1
11/84	<15	5±2	<15	10±3
12/84	<15	8±1	<15	8±1

pCi/l Location: GSU Discharge Gamma Emitters	Gross Beta
<15	7±1
<15	<4
<15	<4
<15	5±2
<15	8±2
<15	8±2
<15	8±2
<15	6±2
<15	9±2
<15	11±2
<15	11±3
<15	12±1

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIVITY IN SURFACE WATER

1984

(Quarterly Composite Samples)

pCi/l

Collection Date	Location: St. Francisville Tritium	Location: Crown Zellerbaugh Tritium
1st Quarter,	<2000	<2000
2nd Quarter,	<2000	<2000
3rd Quarter,	<2000	<2000
4th Quarter,	<2000	<2000

pCi/l

Collection Date	Location: GSU Discharge Tritium
1st Quarter,	<2000
2nd Quarter,	<2000
3rd Quarter,	<2000
4th Quarter,	<2000

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIVITY IN DRINKING WATER

1984

(Monthly Composite Samples)

pCi/l

Collection Date	Location: Donaldsville Gross Beta	Gamma Emitters
01/84	5±3	<15
02/84	8±2	<15
03/84	6±2	<15
04/84	5±2	<15
05/84	5±2	<15
06/84	7±2	<15
07/84	9±2	<15
08/84	7±2	<15
09/84	5±1	<15
10/84	5±1	<15
11/84	6±1	<15
12/84	6±1	<15

pCi/l

Collection Date	Location: Donaldsville Tritium
1st Quarter,	<2000
2nd Quarter,	<2000
3rd Quarter,	<2000
4th Quarter,	<2000

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIVITY IN GROUND WATER SAMPLES

1984

(Monthly Composite Samples)

Location	Collection Date	pCi/l		
		Tritium	Gamma Emitters	Beta
East Creek Discharge	1st Quarter	<2000	<15	<4
East Creek Discharge	2nd Quarter	<2000	<15	<4
East Creek Discharge	3rd Quarter	<2000	<15	<4
East Creek Discharge	4th Quarter	<2000	<15	<4

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIVITY IN SEDIMENT SAMPLES

1984

Location	Collection Date	pCi/kg (dry) Cs-137	pCi/kg (dry) Gamma Emitters
Upstream	12/14/84	<150	<150
Downstream	12/14/84	<150	<150

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIVITY IN MILK SAMPLES

1984

Collection Date	Location: McKowen Dairy I-131	Gamma Emitters
01/09/84	<1	<15
01/24/84	<1	<15
02/07/84	<1	<15
02/21/84	<1	<15
03/12/84	<1	<15
03/29/84	<1	<15
04/09/84	<1	<15
04/24/84	<1	<15
05/07/84	<1	<15
05/21/84	<1	<15
06/12/84	<1	<15
06/26/84	<1	<15
07/09/84	<1	<15
07/23/84	<1	<15
08/07/84	<1	<15
08/22/84	<1	<15
09/11/84	<1	<15
09/24/84	<1	<15
10/09/84	<1	<15
10/23/84	<1	<15
11/07/84	<1	<15
11/20/84	<1	<15
12/11/84	<1	<15
12/27/84	<1	<15

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIVITY IN ANIMAL SAMPLES

1984

Location	Collection Date	Sample Type	pCi/g (wet) I-131	pCi/g (wet) Gamma Emitters
#1	07/17/84	Deer Thyroid	<3.8	<0.13
#2	07/17/84	Deer Thyroid	<0.3	<0.13
#4	07/17/84	Deer Thyroid	<8.1	<0.13
#7	07/17/84	Deer Thyroid	<0.6	<0.13
#9	07/17/84	Deer Thyroid	<2.8	<0.13

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIVITY IN VEGETATION

1984

Location	Collection Date	Sample Type	pCi/kg (wet) Cs-137	pCi/kg (wet) Gamma Emitters (a)
Angola	01/05/84	Green Onions	<80	<60
Angola	01/05/84	Carrots	<80	<60
Onsite	02/28/84	Collard Greens	<80	<60
Onsite	03/20/84	Cabbage	<80	<60
Onsite	05/08/84	Spinach	100±10	<60
Onsite	05/08/84	Mustard Greens	120±20	<60
Onsite	05/30/84	Collard Greens	110±20	<60
Onsite	05/30/84	Mustard Greens	<80	<60
Angola	06/05/84	Butter Squash	<80	<60
Angola	06/05/84	Zucchini	<80	<60
Angola	07/03/84	Carrots	<80	<60
Angola	07/03/84	Peas	<80	<60
Angola	07/10/84	Collard Greens	<80	<60
Angola	07/10/84	Swiss Chard	<80	<60
Angola	08/02/84	Okra	<80	<60
Onsite	08/03/84	Okra	<80	<60
Onsite	08/07/84	Swiss Chard	<80	<60
Onsite	09/05/84	Mustard Greens	<80	<60
Onsite	09/05/84	Collard Greens	<80	<60
Onsite	09/18/84	Mustard Greens	<80	<60
Onsite	09/18/84	Collard Greens	<80	<60
Angola	11/01/84	Cabbage	<80	<60
Angola	11/30/84	Cabbage	<80	<60
Onsite	12/11/84	Collard Greens	<80	<60

(a) I-131 = <60 pCi/kg (wet)

GULF STATES UTILITIES - RIVER BEND STATION

RADIOACTIITY IN FISH SAMPLES

1984

Location	Collection Date	Sample Type	pCi/kg (wet) Gamma Emitters
Downstream	02/09/84	Freshwater drum	<130
Downstream	02/09/84	Catfish	<130
Upstream	03/21/84	Freshwater drum	<130
Downstream	12/18/84	Catfish	<130
Downstream	12/18/84	Drumfish	<130
Upstream	12/18/84	Catfish	<130
Upstream	12/18/84	Drumfish	<130

GULF STATES UTILITIES - RIVER BEND STATION

ENVIRONMENTAL TLD MONITORING DATA

FIRST QUARTER 1984

Location	3 Month Total (mr)	Quarterly (mr)	Remarks
A-1	13.6±2.7	11.1±2.7	
A-2	17.2±2.4	12.8±4.3	
A-C	17.6±2.6	14.7±1.8	
B-1	--	--	MISSING
B-2	18.1±2.6	14.0±3.1	
C-1	15.0±2.0	14.1±2.4	
C-2	13.8±2.0	14.6±2.9	
C-S	15.2±2.6	10.9±2.9	
D-1	16.5±2.6	14.6±2.9	
D-2	14.7±2.7	12.8±2.2	
E-1	15.6±2.8	10.1±3.2	
E-2	12.2±3.1	10.5±3.3	
E-C	17.0±3.0	12.4±3.2	
F-1	13.2±2.7	13.1±2.5	
F-2	16.2±3.6	12.7±3.4	
G-1	15.4±2.3	12.2±2.7	
G-2	11.4±3.1	13.6±2.6	
G-S-1	--	12.8±2.5	MISSING
G-S-2	--	15.1±3.7	MISSING
H-1	11.4±2.9	11.6±3.7	
H-2	14.2±2.7	11.7±3.7	
J-1	13.8±2.8	14.2±3.6	
J-2	13.9±2.9	12.5±3.3	
K-1	14.5±2.3	13.4±1.9	
K-2	14.7±3.1	14.7±2.9	
K-S	13.7±2.6	9.2±2.9	
L-1	16.3±2.7	12.8±2.7	
L-2	13.0±2.8	10.8±2.8	
L-C	14.7±2.2	12.3±2.2	
L-S	16.6±3.6	13.0±1.5	
M-1	12.8±3.3	11.9±3.3	
M-2	16.6±3.0	15.2±2.9	
N-1	16.8±3.1	13.8±3.8	
N-2	16.3±2.3	12.4±2.6	
P-1	14.8±2.5	13.0±3.7	
P-2	15.6±2.3	13.6±3.7	
Q-1	14.3±3.5	13.0±2.3	
Q-2	16.3±2.7	12.8±3.7	
Q-S-1	14.7±2.7	10.4±2.5	
Q-S-2	15.1±3.2	12.4±2.8	
Q-S-3	--	10.7±3.8	MISSING
R-1	13.0±2.9	8.9±2.1	
R-2	17.8±2.9	12.3±2.2	
R-S	16.1±3.8	13.7±2.5	

GULF STATES UTILITIES - RIVER BEND STATION

ENVIRONMENTAL TLD MONITORING DATA

SECOND QUARTER 1984

Location	3 Month Total (mr)*	Quarterly (mr)	Remarks
A-1	8.5±2.9	12.9±3.3	
A-2	10.8±2.6	15.1±3.0	
A-C	14.8±2.6	17.7±2.5	
B-1	13.3±3.7	13.5±2.4	
B-2	12.7±3.0	19.0±3.1	
C-1	14.5±3.0	15.9±3.3	
C-2	12.2±3.4	14.4±3.1	
C-S	13.2±4.0	11.5±3.5	
D-1	15.0±3.5	15.1±2.5	
D-2	12.0±2.9	15.3±3.5	
E-1	12.7±3.6	14.8±2.5	
E-2	10.9±3.2	12.3±2.4	
E-C	15.6±3.0	14.7±2.5	
F-1	12.5±2.7	13.2±2.4	
F-2	13.9±3.0	13.7±2.4	
G-1	15.1±4.6	18.3±4.6	
G-2	13.0±2.8	14.1±4.3	
G-S-1	16.0±2.8	15.9±3.3	
G-S-2	14.8±4.1	16.0±3.7	
H-1	10.7±3.2	11.1±2.6	
H-2	11.1±4.1	11.3±2.4	
J-1	9.8±2.2	10.1±2.5	
J-2	11.8±3.5	6.8±1.9	
K-1	10.4±3.7	14.4±3.8	
K-2	12.1±2.8	14.5±3.3	
K-S	12.7±3.5	10.0±3.3	
L-1	11.8±2.5	15.0±2.5	
L-2	8.5±2.3	10.1±2.4	
L-C	10.8±3.5	10.0±3.3	
L-S	16.5±3.3	14.7±2.5	
M-1	9.6±2.7	12.4±2.5	
M-2	14.9±2.9	15.2±2.1	
N-1	18.7±3.6	14.8±3.2	
N-2	13.5±3.5	13.8±2.9	
P-1	13.2±3.7	13.1±4.7	
P-2	16.4±3.5	14.5±2.5	
Q-1	14.7±2.9	11.8±2.4	
Q-2	14.9±4.1	13.9±2.4	
Q-S-1	14.1±3.4	10.8±3.0	
Q-S-2	13.9±3.7	13.5±3.3	
Q-S-3	14.5±2.6	14.4±2.5	
R-1	9.4±3.1	8.8±2.1	
R-2	14.0±3.3	13.7±3.6	
R-S	--	13.3±3.0	MISSING

* Control value of 4.8 mr (average value) was subtracted from the monthly data.

GULF STATES UTILITIES - RIVER BEND STATION

ENVIRONMENTAL TLD MONITORING DATA

THIRD QUARTER 1984

Location	3 Month Total (mr)	Quarterly (mr)	Remarks
A-1	13.9±3.2	11.2±4.0	
A-2	20.4±3.7	12.9±3.0	
A-C	19.3±4.4	13.6±3.0	
B-1	19.8±4.9	13.4±3.3	
B-2	21.8±3.2	14.6±3.2	
C-1	22.7±5.1	12.4±2.9	
C-2	20.1±4.2	14.5±3.0	
C-S	16.9±4.0	12.0±2.9	
D-1	20.2±3.8	14.1±3.4	
D-2	22.6±4.0	13.3±3.0	
E-1	21.1±3.9	15.2±3.1	
E-2	14.4±4.1	12.9±3.6	
E-C	16.1±3.9	15.0±3.1	
F-1	21.3±4.3	13.6±3.0	
F-2	20.7±4.6	15.6±3.3	
G-1	20.1±4.1	17.4±3.3	
G-2	18.1±3.7	11.3±3.7	
G-S-1	20.4±3.9	6.5±4.9	
G-S-2	19.3±3.4	14.4±3.6	
H-1	17.5±4.8	11.9±2.5	
H-2	15.8±4.3	11.4±2.8	
H-1	16.4±3.5	12.3±3.5	
H-2	15.8±4.3	11.4±2.8	
J-1	16.4±3.5	12.3±3.5	
J-2	15.9±4.1	10.8±3.7	
K-1	15.6±3.4	11.3±3.3	
K-2	1[illegible].0±3.7	13.3±2.5	
K-S	16.7±4.3	12.7±3.3	
L-1	20.6±3.6	12.4±4.1	
L-2	14.8±4.4	9.9±3.2	
L-C	14.6±3.9	10.7±3.6	
L-S	20.1±3.2	16.7±3.7	
M-1	15.7±3.9	11.1±2.8	
M-2	20.6±3.3	16.0±3.7	
N-1	15.0±4.1	10.8±2.7	
N-2	--	--	MISSING
P-1	16.6±4.1	14.1±3.3	
P-2	19.4±3.9	13.8±3.0	
Q-1	18.5±3.4	15.3±3.1	
Q-2	18.5±3.4	15.3±2.1	
Q-S-1	14.3±3.6	11.2±2.8	
Q-S-2	16.3±4.5	11.0±3.0	
Q-S-3	18.9±4.1	8.4±2.8	
R-1	12.0±3.8	7.2±3.3	
R-2	21.1±3.8	13.6±3.0	
R-S	18.8±3.4	11.2±4.3	

GULF STATES UTILITIES - RIVER BEND STATION

ENVIRONMENTAL TLD MONITORING DATA

FOURTH QUARTER 1984

Location	3 Month Total (mr)	Quarterly (mr)	Remarks
A-1	13.9±5.6	16.2±2.4	
A-2	14.7±5.7	18.8±2.6	
A-C	13.6±5.9	15.8±2.4	
B-1	14.2±5.6	15.2±1.8	
B-2	14.2±3.7	15.5±3.1	
C-1	16.6±5.2	16.3±1.6	
C-2	11.6±4.6	13.6±1.5	
C-S	12.2±4.2	15.5±1.3	
D-1	12.2±5.1	13.3±2.7	
D-2	15.0±5.0	15.9±2.2	
E-1	13.7±3.6	15.6±1.8	
E-2	11.0±5.1	14.9±1.9	
E-C	12.5±5.8	16.6±3.2	
F-1	11.4±4.1	15.6±1.8	
F-2	15.0±5.2	14.1±2.4	
G-1	16.9±6.3	14.3±2.7	
G-2	13.9±4.7	15.3±1.6	
G-S-1	11.7±4.2	17.4±2.8	
G-S-2	12.9±4.5	17.1±1.9	
H-1	13.9±3.8	13.5±3.0	
H-2	10.3±5.4	14.6±1.9	
J-1	12.4±4.6	15.0±1.5	
J-2	11.4±4.2	13.2±2.4	
K-1	12.0±4.8	14.6±1.4	
K-2	13.6±4.7	15.2±3.0	
K-S	10.3±4.3	16.5±2.0	
L-1	13.1±4.6	15.2±2.3	
L-2	9.4±5.2	16.2±2.4	
L-C	9.7±3.7	16.3±1.6	
L-S	18.1±3.6	15.9±1.5	
M-1	11.4±4.4	14.8±2.0	
M-2	14.9±4.7	15.3±1.6	
N-1	12.9±4.3	15.1±2.6	
N-2	8.3±4.1	--	MISSING
P-1	10.5±3.7	17.6±2.1	
P-2	13.8±4.8	15.6±1.7	
Q-1	14.9±4.6	16.4±2.0	
Q-2	12.4±4.1	16.0±1.6	
Q-S-1	12.8±3.6	16.0±1.6	
Q-S-2	11.9±5.8	16.1±2.7	
Q-S-3	11.5±4.2	16.2±2.4	
R-1	9.8±5.8	15.3±2.3	
R-2	13.8±5.7	15.8±2.1	
R-S	14.9±4.4	15.0±1.5	

GULF STATES UTILITIES - RIVER BEND STATION

LIST OF ADDITIONAL SAMPLES

1984

Location	Collection Date	Sample Type	Analysis	Result (Units)

GULF STATES UTILITIES - RIVER BEND STATION

LIST OF MISSED SAMPLES

1984

Sample Type	Location	Expected Collection Date	Reason
TLD	B-1	January	Missing
TLD	G-S-1	February	Missed by Eberline
TLD	G-S-2	February	Missed by Eberline
TLD	Q-S-3	February	Missed by Eberline
TLD	B-1	1st Quarter	Missing
TLD	R-S	June	Missing
TLD	N-2	August	Missing
TLD	N-2	3rd Quarter	Missing
TLD	N-2	October	Missing
TLD	N-2	4th Quarter	Missing
Sediment	Downstream	Spring	High water level in the river
Catfish	Upstream	Spring	Non available at time of collection
Shrimp		Summer & Fall	Non available at time of collection

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 AREA MONITOR INTERCOMPARISON PROGRAM

EBERLINE ANALYTICAL AND BATTELLE NORTHWEST LABORATORIES

1984

Total mrem ± 2 Sigma

1st Quarter		2nd Quarter	
Actual	Measured	Actual	Measured
10	13±7	13	11±2
20	22±9	21	19±3
29	24±5	30	29±4
40	35±5	38	35±4
51	44±4	47	43±6
60	54±10	55	60±10
72	57±5	72	67±9
83	82±12	81	74±7
90	83±11	89	96±10
100	87±10	98	100±10

Total mrem ± 2 Sigma

3rd Quarter		4th Quarter	
Actual	Measured	Actual	Measured
22	28±4	30	29±4
30	26±4	30	28±4
36	36±7	51	49±12
40	51±12	51	46±7
44	52±7	73	68±16
50	56±8	73	64±14
65	78±8	91	90±9
73	78±9	91	88±13
82	85±13	100	95±22
99	111±11	100	96±14

1984 USEPA - EAC INTERCOMPARISON PROGRAM

Sample Type	Analysis	Value (EPA)	Value (EAC)	Units
Air Filter	Alpha	19±8.7	16±2	pCi/filter
Air Filter	Beta	50±8.7	58±4	pCi/filter
Air Filter	Sr-90	15±2.6	18±3	pCi/filter
Air Filter	Cs-137	20±8.7	26±2	pCi/filter
Air Filter	Alpha	15±8.7	12±1	pCi/filter
Air Filter	Beta	51±8.7	63±3	pCi/filter
Air Filter	Sr-90	21±2.6	16±3	pCi/filter
Air Filter	Cs-137	10±8.7	13±6	pCi/filter
Air Filter	Alpha	17±8.7	15±1	pCi/filter
Air Filter	Beta	51±8.7	53±3	pCi/filter
Air Filter	Sr-90	18±2.4	27±4	pCi/filter
Air Filter	Cs-137	15±8.7	7±1	pCi/filter
Food	Sr-89	34±8.7	28±6	pCi/kg
Food	Sr-90	20±8.7	19±4	pCi/kg
Food	I-131	20±10.4	<33	pCi/kg
Food	Cs-137	20±8.7	22±6	pCi/kg
Food	K-40	2720±235	2660±270	mg/kg
Food	Sr-89	25±8.7	14±6	pCi/kg
Food	Sr-90	20±2.6	10±1	pCi/kg
Food	I-131	39±10.4	<30	pCi/kg
Food	Cs-137	25±8.7	30±11	pCi/kg
Food	K	2605±226	2093±30	mg/kg
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±8.7	36±20	pCi/l
Milk	K	1550±135	1550±210	mg/l
Milk	I-131	6±1.6	6.3±1.9	pCi/l
Milk	Sr-89	25±8.7	20±4	pCi/l
Milk	Sr-90	17±2.6	5±1	pCi/l
Milk	I-131	43±10.4	49±1	pCi/l
Milk	Cs-137	35±8.7	42±13	pCi/l
Milk	K	1496±130	1610±200	mg/l
Milk	Sr-89	22±8.7	20±6	pCi/l
Milk	Sr-90	16±2.6	14±3	pCi/l
Milk	I-131	42±10.4	32±4	pCi/l
Milk	Cs-137	3.±8.7	36±12	pCi/l
Milk	K	1517±131	1010±320	mg/l
Water	Alpha	22±5.5	26±2	pCi/l
Water	Beta	63±5	64±6	pCi/l
Water	Alpha	5±8.7	9±2	pCi/l
Water	Beta	20±8.7	22±2	pCi/l
Water	Alpha	3±8.7	5±1	pCi/l
Water	Beta	6±8.7	8±1	pCi/l
Water	Alpha	5.0±8.7	5±1	pCi/l
Water	Beta	16.0±8.7	17±2	pCi/l

Sample Type	Analysis	Value (EPA)	Value (EAC)	Units
Water	Alpha	7.0±8.7	7±2	pCi/l
Water	Beta	20.0±8.7	23±2	pCi/l
Water	I-131	20±10.4	24±2	pCi/l
Water	I-131	6±1.5	7.3±1.2	pCi/l
Water	I-131	34.0±10.4	31±1	pCi/l
Water	H-3	2389±608	2970±620	pCi/l
Water	H-3	2383±607	3120±560	pCi/l
Water	H-3	3508±630	3931±580	pCi/l
Water	H-3	3051±622	3800±600	pCi/l
Water	H-3	2817±617	2680±510	pCi/l
Water	H-3	2810±356	2940±540	pCi/l
Water	Ra-226	7.4±1.92	9.7±1.8	pCi/l
Water	Ra-228	3.9±1.01	5.7±0.8	pCi/l
Water	Ra-226	5.1±0.8	5.4±0.5	pCi/l
Water	Ra-228	2.8±0.4	7.9±1.8	pCi/l
Water	Ra-226	4.1±1.06	4.5±0.8	pCi/l
Water	Ra-228	2.0±0.52	1.8±0.5	pCi/l
Water	Ra-226	4.9±1.27	7.1±2.1	pCi/l
Water	Ra-228	2.3±0.6	1.9±0.8	pCi/l
Water	Uranium	11±6	11±1	pCi/l
Water	Uranium	15±10	14±1	pCi/l
Water	Uranium	20.0±10.4	19.7±1.7	pCi/l
Water	Sr-89	17±5	7±3	pCi/l
Water	Sr-90	8±1.5	9±1	pCi/l
Water	Sr-89	36±8.7	15±8	pCi/l
Water	Sr-90	24±2.6	11±2	pCi/l
Water	Sr-89	25±8.7	9±5	pCi/l
Water	Sr-90	5±2.6	3±1	pCi/l
Water	Sr-89	34±8.7	20±5	pCi/l
Water	Sr-90	19±2.6	11±2	pCi/l
Water	Pu-239	18.8±3.3	16.2±0.8	pCi/l
Water	Pu-239	12.5±2.1	11.7±0.4	pCi/l
Water	Co-60	11±5	12±2	pCi/l
Water	Cs-134	15±5	16±2	pCi/l
Water	Cs-137	15±5	18±1	pCi/l
Water	Cr-51	40±8.7	56±11	pCi/l
Water	Co-60	10±8.7	12±2	pCi/l
Water	Zn-65	50±8.7	68±7	pCi/l
Water	Ru-106	61±8.7	57±16	pCi/l
Water	Cs-134	31±8.7	35±3	pCi/l
Water	Cs-137	16±8.7	19±3	pCi/l
Water	Cr-51	66±8.7	56±11	pCi/l
Water	Co-60	31±8.7	30±3	pCi/l
Water	Zn-65	63±8.7	62±6	pCi/l
Water	Ru-106	29±8.7	22±11	pCi/l
Water	Cs-137	47±8.7	41±3	pCi/l
Water	Cr-51	40±8.7	<420	pCi/l
Water	Co-60	20±8.7	21±3	pCi/l
Water	Zn-65	147±8.7	144±9	pCi/l
Water	Ru-106	47±8.7	47±14	pCi/l
Water	Cs-134	31±8.7	25±3	pCi/l
Water	Cs-137	24±8.7	25±3	pCi/l

1984 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 Analysis Exceeding the LLD for that Analysis
Gross Alpha	68	0
Gross Beta	65	0
H-3	61	0
U-134	35	0
Th-230	21	0
Ra-226	41	0
Pb-210	16	0
I-131	*	
Sr-89, 90	35	0
Pu-239	21	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	68	68	--	--
Gross Beta	65	65	--	--
H-3	61	61	--	--
U-234	35	35	--	--
Th-230	21	21	--	--
Ra-226	41	41	--	--
Pb-210	16	16	--	--
Sr-90	35	35	--	--
Pu-239	21	21	--	--
Am-241	3	3	--	--

Split Samples

Nuclide Analyzed	Number of Det'ns	No. Agreeing Within 2 sigma	No. Agreeing Within 3 sigma	No. Differing by >3 sigma
Gross Alpha	53	53	--	--
Gross Beta	69	69	--	--
H-3	62	62	--	--
U-234	24	24	--	--
Th-230	11	11	--	--
Ra-226	29	29	--	--
Pb-210	13	13	--	--
Sr-89	16	16	--	--
Sr-90	25	25	--	--
Pu-239	8	8	--	--
Am-241	1	1	--	--
Gamma	8	8	--	--

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