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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Annual Radiological Environmental Operating Report

Gentlemen:

Attached is the Annual Radiological Environmental Operating Report for the period January 1, 2000 through December 31, 2000. This report is submitted pursuant to the requirements of the Waterford 3 Technical Specification Section 6.9.1.7.

If there are any questions, please contact T.M. Manzella at (504) 739-6882. This submittal does not contain commitments.

Very truly yours,

A handwritten signature in cursive script that reads "A.J. Harris".

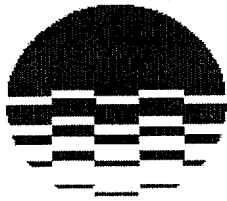
A.J. Harris
Director
Nuclear Safety Assurance

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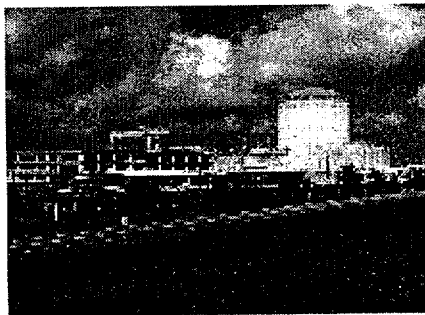
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Entergy

**Annual
Radiological Environmental
Operating Report**

January 1, 2000 - December 31, 2000



**Waterford 3 Steam Electric Station
Entergy Operations, Inc.**

Docket Number 50-382

License Number NPF-38

Originator:

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04-24-01

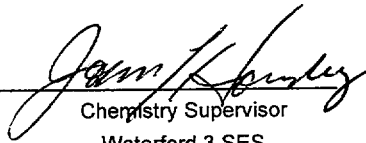
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ABSTRACT

This report is issued pursuant to Waterford 3 Technical Specification 6.9.1.7. Its purpose is to discuss the Waterford 3 Radiological Environmental Monitoring Program (REMP), present the results of the program for the year 2000, and evaluate the radiological impact on the environment resulting from plant operation.

The Waterford 3 Radiological Environmental Monitoring Program collected data of environmental radioactivity levels around the Waterford 3 nuclear power plant. These levels were determined by analyzing samples of air, water, shoreline soil, fish, vegetation, and milk from various locations around the facility. Based on the evaluation of the environmental data collected, the operation of Waterford 3 exhibited no discernable impact on the levels of radioactivity in the environment during 2000.

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1.0 INTRODUCTION

This report describes the Radiological Environmental Monitoring Program (REMP) for the Waterford 3 Steam Electric Station and discusses the results obtained during the calendar year 2000. The results discussed in this report were used to evaluate the radiological environmental impact from the operation of Waterford 3. The submission of this report to the Nuclear Regulatory Commission (NRC) fulfills the requirements pursuant to Waterford 3 Technical Specification 6.9.1.7.

1.1 Program and Report Objectives

The objective of the monitoring program is to evaluate the radiological environmental impact of the plant. In order to conduct this evaluation, the data analyses and interpretations contained in this report fulfill the following specific objectives:

- identifies any radioactive materials or radiation in the environment associated with plant operation,
- compares the results obtained during the reporting period with past and pre-operational data and identifies any trends associated with accumulation of radioactivity in the environment; and,
- verifies compliance with federal regulatory requirements

1.2 Plant and Site Description

Waterford 3 employs a pressurized water reactor for the production of approximately 1153 gross (1104 net) megawatts of electricity. The station uses a flow of water obtained from and discharged to the Mississippi River for condenser cooling. On March 4, 1985, the unit achieved initial criticality.

The plant is located on the west bank of the Mississippi River at river mile 129.6 between Baton Rouge and New Orleans, Louisiana. The site is in the northwestern section of St. Charles Parish, approximately three miles southeast of the St. John the Baptist Parish boundary, between Killona and Taft. The Mississippi River is the closest prominent natural feature. Other features include Lac des Allemands, about 5.5 miles southwest of the site, and Lake Pontchartrain, about 7 miles northeast of the site.

Most of the man-made features are located on the narrow strip of land between the Mississippi River and the wetlands. Specifically, several industrial facilities include Waterford 1 and 2 Steam Electric Station (0.4 miles northwest), Little Gypsy Steam Electric Station (0.8 miles northeast), IMC Agrico, a fertilizer manufacturer (0.6 miles east southeast), Oxychem Chemical Company (0.8 miles east southeast), and Dow Chemical Company, a chemical manufacturer (1.2 miles east southeast).

Major urban centers in the region include New Orleans (approximately 25 miles east) and Baton Rouge (approximately 50 miles west-northwest). Communities near the site in St. Charles Parish include Killona (0.9 miles west northwest), Montz (1.0 miles north), Norco (2.5 miles east), Hahnville (3.7 miles east southeast), and Destrehan (6.3 miles east southeast). LaPlace (4.7 miles north) is located in St. John the Baptist Parish.

2.0 PROGRAM DESCRIPTION

A general summary of the REMP is given in Table 2.1. Brief descriptions and locations of the sampling stations are presented in Table 2.2. In addition, station locations are illustrated in Figures 2.1 through 2.3. A more detailed description of the REMP is provided below.

2.1 History and Development

The Waterford 3 REMP evolved from the Pre-Operational Environmental Radiological Surveillance (PERS) program (1978-1982) and was initiated in April of 1983. Equipment, procedures, techniques, and sampling locations used during the pre-operational survey were incorporated into the operational program. Further, the environmental data collected during the first two years of the REMP (1983 and 1984), prior to initial criticality, were used to supplement the baseline established during the PERS Program.

2.2 Responsibilities

Waterford 3 personnel are responsible for implementing and ensuring that the REMP complies with federal regulatory, Technical Specification, TRM and Offsite Dose Calculation Manual (ODCM) requirements. Responsibilities of Waterford 3 personnel include collecting (with the exception of fish samples), preparing, and shipping of environmental samples; conducting environmental dosimetry measurements; reviewing reports of analytical results; preparing and submitting the Annual Radiological Environmental Operating Report (AREOR) and other relevant reports to the NRC.

The Environmental Services Laboratory at the River Bend Nuclear Station located in St. Francisville, Louisiana, is responsible for performing radiological analyses, conducting initial data review, preparing reports of analytical results, and overseeing laboratory quality assurance and control.

The Fisheries Co-Operative Extension Service of Louisiana State University is responsible for the collection of fish samples.

The TLD Process Laboratory at Waterford 3 is responsible for analyzing Panasonic multi-element thermoluminescent dosimeters (TLDs).

2.3 Sample Collection and Handling Procedures

Sample type, location, collection frequency, and the analyses performed are summarized in Tables 2.1 and 2.2. The information contained in these tables is based on requirements specified on Attachments 7.13 and 7.14 of the Waterford 3 ODCM. Location maps of the sampling are illustrated in Figures 2.1 through 2.3. Any station deviations during 2000 are discussed in Section 3.6.

The environmental samples are classified into four general categories according to exposure pathways: direct radiation exposure, airborne exposure, waterborne exposure, and ingestion exposure. Sample collection and handling procedures are described in the following sections. The descriptions are intended to provide a procedural overview rather than a step-by-step description.

2.3.1 Direct Radiation Exposure Pathway Samples

Integrated external gamma exposure, determined by using Panasonic multi-element TLDs, was measured at thirty-one locations as follows:

- an inner ring of stations; one in each of the sixteen meteorological sectors in the general area of the site boundary;
- an outer ring of stations; one in ten of the sixteen meteorological sectors in the six to eight kilometer range from the site; and,
- the balance placed in areas of special interest (e.g., population centers, schools, etc.) with one area serving as a control

The TLDs were exchanged quarterly and analyzed by the TLD Process Laboratory at Waterford 3.

2.3.2 Airborne Exposure Pathway Samples

Samples of airborne particulate and radioiodine were collected at four indicator locations (APG-1, APQ-1, APP-1, and APC-1) and one control location (APE-30). Low-volume air pumps and flow totalizers in weatherproof shelters provided continuous air sampling.

Using the sampling devices described above, airborne particulate samples were obtained on a filter and collected biweekly by Waterford 3 personnel for shipment to the laboratory for gross beta analysis. The filters were composited quarterly by the laboratory for isotopic analysis by gamma spectroscopy.

Airborne iodine sampling was done in conjunction with air particulate sampling using a charcoal cartridge. The cartridges were collected bi-weekly by Waterford 3 personnel for shipment to the laboratory for Iodine-131 analysis by gamma spectroscopy.

2.3.3 Waterborne Exposure Pathway Samples

Drinking and Surface Water

Because the plant discharges into the Mississippi River, the major source of drinking water in the vicinity of Waterford 3, water samples taken from the Mississippi River were designated as both drinking and surface water samples.

Composite drinking/surface water samples were obtained every four (4) weeks using automatic composite samplers placed at two indicator locations (DWG-2/SWG-2, DWE-5/SWE-5) and one control location (DWP-7/SWP-7). Hydrochloric acid and sodium iodide was added to each sample prior to Iodine-131 analysis by gamma spectroscopy. Samples were composited quarterly for gross beta, gamma spectroscopy and tritium analyses.

Groundwater

Due to the high water table resulting from shallow aquifers in the vicinity of the site, drainage canal sampling represents groundwater discharge. Groundwater was obtained quarterly by grab sampling from one sampling location (GWK-1). Hydrochloric acid and sodium iodide was added to each sample prior to analysis by gamma spectroscopy. Samples collected for tritium analysis were not acidified.

Shoreline Sediment

Samples were obtained semi-annually from two sampling locations. SHWE-3 is downstream of the plant on the shoreline of the Mississippi River, and SHWK-1 is on the shoreline of the 40-Arpent canal. The samples were shipped without further processing to the laboratory for gamma spectroscopy analyses.

2.3.4 Ingestion Exposure Pathway Samples

Milk

Milk samples were collected monthly from one indicator location (MKQ-5). Although one additional indicator location was identified (MKQ-1), no samples were available from this location during 2000 (see Section 3.6). Milk samples were required monthly at one control location (MKR-50). Samples at this location were unavailable however, due to batch mixing of several sources of milk prior to sample collection thus eliminating sample identification. As a result, another control milk location (MKR-40) was added to the REMP. Samples were collected from MKR-40 starting in April 2000. Louisiana Radiation Protection Division personnel performed sampling of the control locations. Formaldehyde was added as a preservative to all milk samples, and sodium iodide was added prior to analysis for Iodine-131. Both Iodine-131 and gamma spectroscopy analyses were performed by the laboratory.

Fish

Fish samples were collected annually from the Mississippi River at one indicator location (FH-2) and one control location (FH-1). A contractor performed the sampling by netting. Subsequently, the fish were segregated by species and location prior to Waterford 3 receiving the samples. The samples were shipped frozen to the laboratory for gamma spectroscopy analyses.

Broad leaf vegetation

The Technical Requirements Manual (TRM), Table 3.12-1, requires that broad leaf vegetation be sampled from three locations in the event milk samples are unavailable. Since milk samples were collected from only one sampling location, broad leaf vegetation samples were collected monthly at two indicator locations (BLQ-1 and BLB-1) and two control locations (BLK-15 and BLE-20). Although control location BLE-20 was added to the REMP during 1999, sampling will continue at control location BLK-15 until sample availability is determined in section E. The samples were shipped without further processing to the laboratory for Iodine-131 and gamma spectroscopy analyses.

2.4 Analytical Procedures by Environmental Services Laboratory

2.4.1 Sample Handling and Treatment

The laboratory staff receives and stores samples upon arrival. Environmental samples frequently require preparation prior to analysis, depending on media and analysis type.

Water Samples

Generally, field personnel acidify one-gallon water samples with hydrochloric acid and sodium iodide unless otherwise directed by the analytical laboratory. Tritium samples are not acidified and are stored in glass bottles under refrigeration until analyses can be performed.

Air Samples

The laboratory handles air filters to avoid disturbing any particulate deposition on the air particulate filter. They normally receive air filters in plastic petri dish containers that aid in transporting heavy dust loaded filters.

Milk Samples

The laboratory refrigerates milk samples until analyzed. They add a preservative (formaldehyde), if analyses are delayed for more than a few days to inhibit bacterial growth and retard spoilage. Unless frozen or shipped on ice, milk samples analyzed for Iodine-131 require an addition of 100 mls of formaldehyde, of which field personnel normally add 10 mls prior to shipment, to avoid binding of the iodine that may occur with smaller levels of formaldehyde.

Soil and Bottom Sediment Samples

The laboratory dries, grinds, and sieves soil and sediment samples before analyses. The lab then mixes the samples to ensure a homogeneous mixture.

Other Samples

The laboratory preserves perishable samples by refrigeration or freezing. Vegetation and other samples may require drying, pulverizing or ashing before or after analyses for long-term storage.

2.4.2 Sample Analysis

Gross Beta Analysis

Air Samples

The laboratory counts air filters for 100 minutes, or until the required LLDs are achieved. This analysis is performed with a low-background alpha-beta counter at least 24 hours after collection to allow for the decay of short-lived isotopes, such as radon and thoron daughters.

Water Samples

This analysis measures overall beta radionuclides in water samples. It involves evaporating a suitable aliquot of sample (usually 100 mls) in a beaker and then drying the beaker residue in a 47mm stainless steel planchet under heat lamps or on a hot plate. The lab counts the plancheted samples for 200 minutes in a low-background alpha-beta counting system. Activity calculation includes a self-absorption attenuation factor (referred to as a salt density curve) for counter efficiency based on weight of residue on each planchet.

Tritium Analysis

Water Samples

The laboratory typically adds six mls of water to 12 mls of liquid scintillation cocktail in a 20 ml vial and inserts the vial into a liquid scintillation spectrometer for a 60 minute count.

Iodine-131 Analysis

Water Samples

The laboratory mixes four liters or more of the sample with a stable iodine carrier solution and then stirs the sample with an anion exchange resin to remove iodine from the sample. The resin is then transferred to a 250 ml micro-marinelli beaker and counted in a shielded intrinsic Germanium detector until the required LLDs are achieved.

Gamma Isotopic Analysis

Milk and Water Samples

The laboratory fills a 3.7 liter marinelli beaker with a representative aliquot of the sample and counts for a minimum of 60 minutes, or until the required LLDs are achieved, in a shielded intrinsic Germanium detector using gamma spectroscopy analysis software.

Vegetation and Fish Samples

The laboratory loads a maximum quantity of undried vegetation, food or garden crop sample into a tared 1 liter marinelli beaker and weighs it. The sample is then counted for 30 minutes, or until the required LLDs are achieved, in a shielded intrinsic Germanium detector as described above. The laboratory loads as much as possible (up to the total sample) of the dried edible portion of a fish sample into a tarred 0.5 liter marinelli beaker, or a lab-tech petri dish, depending on fish quantity, and weighs. The sample is then counted for a minimum of 30 minutes in a shielded intrinsic Germanium detector as described above.

Soil and Sediment Samples

The laboratory dries soil and sediment at a temperature of 110-135°C in a convection oven, sifts the sample through a #20 mesh sieve, then loads the sample into a tared 1.0 liter marinelli beaker and weighs it. The sample is then counted for 30 minutes, or until the required LLDs are achieved, in a shielded intrinsic Germanium detector as described above.

Charcoal Cartridge Samples

The laboratory counts each charcoal cartridge separately by positioning each on the face of the detector in a converted one-half liter marinelli used as a holder. Each sample is counted for a minimum of 30 minutes or until LLDs is achieved.

Air Particulate Samples

The laboratory stacks six to seven air particulate filters, for a quarterly composite for each field station, one on top of another in a covered plastic petri dish. The composite sample is counted for 30 minutes, or until the required LLDs are achieved, in a shielded intrinsic Germanium detector as described above.

2.4.3 Data Reporting

The laboratory calculates the mean of analytical results as follows:

$$\bar{X} = \sum Xi / n$$

where:

\bar{X}	=	Mean
$\sum Xi$	=	Sum of Individual sample results
n	=	Number of sample results

The lab rounds off calculated values by inspection of digits to the right of the third reported significant digit, with values less than five rounded down and values equal to or greater than five rounded up.

The laboratory reports gross beta and tritium analytical results, less than a two sigma counting error, as less-than-LLD value for that sample. The lab reports analytical results, greater than the two sigma counting error, along with associated two sigma counting error, as a plus or minus (+) term.

The laboratory considers calendar quarters and a quarterly composite to be composed of six to seven bi-weekly aliquots or samples, such as air particulate filters, or three to four monthly aliquots or samples, such as drinking water.

2.5 Environmental Dosimetry

Panasonic Model UD-814 TLDs that contain one lithium borate and three calcium sulfate phosphor elements are used for environmental dosimetry. However, only the calcium sulfate phosphor elements are used for analysis. For placement in the field, two annealed dosimeters are placed inside a plastic bag and mounted in an aluminum frame. The dosimeters are inspected monthly and exchanged quarterly for analysis by using a Panasonic Automatic TLD Reader, Model UD-710A.

2.6 Lower Limits of Detection (LLD)

The minimum sensitivities for the analytical procedures are reflected by the LLD values presented in Table 4.12-1 of the TRM. The LLDs are a priori estimates based on assumed sample volumes, counting times, detector efficiencies, etc. Analyses that could not achieve these lower limits of detection are discussed in Section 3.6.

2.7 Laboratory Quality Assurance

2.7.1 Environmental Service Laboratory

During 2000, the Environmental Service Laboratory at the River Bend Station (RBS) participated in a Radiological Interlaboratory Comparison Cross Check Program. This program satisfies the requirements of the Waterford 3 ODCM, Section 5.7.2, for participation in an interlaboratory comparison program. The program performs analyses on various sample media typically found in the REMP. As a result of participation in the program, an objective measure of analytical precision and accuracy was obtained. In the event that results obtained were not within control limits (three standard deviations), an investigation was conducted to determine the cause, and corrective actions were taken. Table 2.4 lists the 2000 results of the laboratory's participation in the cross check program.

Program Exceptions

There were two results out of control limits (3 sigma) for accuracy in the 2000 cross check program. One result was a gamma analysis in a water sample and the other result was gross beta in a water sample.

These two sample results are:

First Quarter

- E2081-125 (Analytics) of 03/23/00 Beta

Third Quarter

- E2374-125 (Analytics) of 09/21/00 Fe-59

The nuclide, Fe-59, was bias high in a gamma analysis, with a normalized deviation of 3.04, with control limits of ± 3.00 . This result is considered conservative. Other Fe-59 analyses during the year were all within acceptable limits.

The second result, gross beta in water, was bias low with a normalized deviation of -3.27 with control limits of ± 3.00 . Gross beta results have shown a downward trend in past analyses. A system efficiency calibration was performed with the water standard on the alpha-beta counter as corrective action.

Impact Statement

There is no impact assessed on previously reported data due to these results. Environmental samples are analyzed and reported with a ninety-five percent confidence level that the analytical result with its associated error encompasses the "true" value. Ninety-six percent of RBS environmental crosscheck results were within control limits for accuracy and precision during 2000.

TABLE 2.1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP) SUMMARY ^a			
SAMPLE TYPE	LOCATION	ANALYSIS	FREQUENCY
DIRECT RADIATION	A-2, B-1, C-1, D-2, E-1, F-2, G-2, H-2, J-2, K-1, L-1, M-1, N-1, P-1, Q-1, R-1, A-5, B-4, D-5, E-5, F-4, G-4, H-6, P-6, Q-5, R-6, F-9, G-9, E-15, J-15, E-30	Gamma Dose	Quarterly
AIR RADIOIODINE AND PARTICULATES	APG-1, APQ-1, APP-1, APC-1, APE-30	Gross Beta I-131	Biweekly
		Gamma Isotopic	Quarterly Composite
DRINKING WATER ^b SURFACE WATER	DWG-2, DWE-5, DWP-7 SWG-2, SWE-5, DWP-7	H-3 Gamma Isotopic Gross Beta	Quarterly Composite
		I-131	Four Week Composite
GROUND WATER	GWK-1	H-3 Gamma Isotopic	Quarterly
SHORELINE SEDIMENT	SHWK-1, SHWE-3	Gamma Isotopic	Semi-Annually
MILK	MKQ-1, MKQ-5, MKR-40	Gamma Isotopic I-131	Monthly
BROAD LEAF	BLQ-1, BLB-1, BLK-15, BLE-20	Gamma Isotopic I-131	Monthly and when milk samples are not collected
FISH	FH-1, FH-2	Gamma Isotopic	In season or annually

a. Based on requirements of Waterford 3 SES Offsite Dose Calculation Manual, Section 5.7.

b. Drinking and surface water samples are identical.

TABLE 2.2

DESCRIPTION OF REMP SAMPLING LOCATIONS			
LOCATION	LOCATION DESCRIPTION	DISTANCE FROM PLANT	METOROLOGICAL DIRECTION
DIRECT RADIATION (TLD)			
A-2	(East bank) Located on a utility pole on River Road (LA 628) at the south corner of the Zephrin L. Perriloux Fire Station (Station 5) in Montz, La.	1.1	N
B-1	(East bank) On fence enclosing the transmission tower 0.3 miles west (up-river) from Little Gypsy. Access from River Road (LA 628). TLDs are located at SW corner of fence enclosure.	0.8	NNE
C-1	(East bank) On fence enclosing the Little Gypsy Cooling Water Intake. Access is from River Road (LA 628) across from Little Gypsy Steam Electric Station entrance. TLDs are on the south side (inside) of the Cooling Water Intake fence enclosure, directly opposite the entrance gate.	0.8	NE
D-2	(East bank) Located approximately 0.3 miles east of Little Gypsy Power Station. Access from River Road (LA 628). TLDs are attached to a stop sign post located at the peak of the levee on the west entrance road through the Bonne Carre Spillway.	1.1	ENE
E-1	(West bank) Located on utility pole along River Road (LA 18) approximately 0.3 miles east of Waterford 3 plant entrance. Access from LA 18. TLDs are on the third utility pole east of the construction entrance road.	0.2	E
F-2	(West bank) Located on fence enclosure surrounding the LP&L sub station on LA 3142. Access from LA 3142 approximately 0.2 miles south of LA 18. TLDs are on the southeast corner of the fence enclosure	1.1	ESE

TABLE 2.2

DESCRIPTION OF REMP SAMPLING LOCATIONS			
LOCATION	LOCATION DESCRIPTION	DISTANCE FROM PLANT	METOROLOGICAL DIRECTION
DIRECT RADIATION (TLD)			
G-2	(West bank) Located on utility pole on east side of LA 3142 (Next to Union Carbide Star Plant Gate 3). Access from LA 3142 approximately 0.2 miles north of railroad overpass.	1.2	SE
H-2	(West bank) Located on fence enclosure to shell road off of LA3142. Access from LA 3142 south of railroad overpass on east side of LA 3142. TLDs are on the south side of the gate for shell road (just south of Texaco pipeline station).	1.2	SSE
J-2	(West bank) Located on northeast corner of fence enclosing Texaco valve station south of LA 3127. Access from LA 3127, approximately 0.6 miles west of LA 3127/3142 intersection.	1.3	S
K-1	(West bank) Located on stop sign at entrance to Entergy Training Center. Access from LA 3127, approximately 1.3 miles west of LA 3127/3142 intersection.	1.0	SSW
L-1	(West bank) Located on fence of Gate 97 entrance off of LA 3127, approximately 1.6 miles west of LA 3127/3142 intersection. (Gate 97 is an access road for Waterford 3.)	1.0	SW
M-1	(West bank) Located on south gate into the Waterford 1 and 2 fuel oil storage tank enclosure. Access is through the Waterford 1 and 2 access road.	0.7	WSW
N-1	(West bank) Located on a pole at the end of Short Street in Killona near the railroad track south of the Killona Elementary School.	0.9	W
P-1	(West bank) Located on Short Street, in Killona. TLD is located on housing of air sample station APP-1.	0.8	WNW

TABLE 2.2

DESCRIPTION OF REMP SAMPLING LOCATIONS			
LOCATION	LOCATION DESCRIPTION	DISTANCE FROM PLANT	METOROLOGICAL DIRECTION
DIRECT RADIATION (TLD)			
Q-1	(West bank) Located on fence enclosing air sample station APQ-1 approximately 0.5 miles west of Waterford 1 and 2 on River Road (LA 18).	0.8	NW
R-1	(West bank) Located on fence enclosure for Waterford 1 and 2 Cooling Water Intake Structure. Access is from River Road (LA 18) opposite Waterford 1 and 2. TLDs are on the southwest corner of fence.	0.5	NNW
A-5	(East bank) Located on utility pole just east of the Shady Nook Trailer Park on Hwy 61 in LaPlace. TLDs are on second utility pole east of trailer park on north side of Hwy 61 (eastern end of LaPlace).	4.5	N
B-4	(East bank) Located on utility pole guidewire west of shell access road to South Central Bell transmission tower on south side of Hwy 61. Transmission tower is just east of weigh station at St. John/St. Charles Parish line. TLDs are on the first utility pole east of access road.	3.8	NNE
D-5	(East bank) Located on fence gate on shell access road to Big 3 Chemical Plant. Shell access road is approximately 0.1 miles west of Hwy 61/48 intersection (at black and yellow gate). TLDs are on fence gate 0.1 miles north on shell access road from Hwy 61.	4.2	ENE
F-4	(West bank) Located on utility pole behind blonde brick house on Aquarius St. in Hahnville. Access from River Road (LA 18) and turn onto Oak St. Follow Oak St. to Hickory St., turn right on Hickory St. and follow to Aquarius St. and turn left. Blonde brick house is on the west side of Aquarius Street.	3.5	ESE
E-5	(East bank) Located on the Norco Substation fence enclosure. Access from River Road (LA-48) onto Wesco St. (adjacent to Norco Shell Chemical Plant), take Wesco St. to the dead end. TLDs are located on sixth fence post south of the north substation gate.	4.2	E

TABLE 2.2

DESCRIPTION OF REMP SAMPLING LOCATIONS			
LOCATION	LOCATION DESCRIPTION	DISTANCE FROM PLANT	METOROLOGICAL DIRECTION
DIRECT RADIATION (TLD)			
G-4	(West bank) Located on railroad sign northwest side of LA 3160/railroad track intersection. Access from either LA 3127 or River Road (LA 18) onto LA 3160.	3.2	SE
H-6	(West bank) Located on a road sign on the northwest side of the second canal bridge east of LA 3160 along LA 3127.	5.7	SSE
P-6	(West bank) Located on a fence surrounding the Union Pacific communications tower at the LA 640/railroad intersection. Tower is located approximately 500 ft. west from LA 640.	5.5	WNW
Q-5	(West bank) Located on fence along River Road (LA 18) across from the Webre's house.	5.0	NW
R-6	(East bank) Located on lay down yard fence on LA 3223 in LaPlace. Access from Hwy 61 onto Elm St. (LA 3223); take Elm St. to the northeast corner of LA 3223/railroad intersection. TLDs are located on the southeast corner of fence enclosure.	5.3	NNW
F-9	(East bank) Located on entrance gate to Destrehan Substation. Access from River Road (LA 48), approximately 1.5 miles east of Luling-Destrehan bridge, onto Jonathan Street (west of Bunge Corp. Grain Elevator), and proceed to substation gate.	8.2	ESE
G-9	(West bank) Located on back fence of Entergy's District Office in Luling. Access via Ellington St. from either River Road (LA 18); or Second or Third St. from Paul Mallaird Rd. (LA 52) to Ellington St.	8.1	SE
E-15	(East bank) Located on Kenner Substation fence enclosure. Access from either River Road (LA 48) or Hwy 61, turn onto Alliance Ave. TLDs are located at the entrance of the fence enclosure.	11.8	E

TABLE 2.2

DESCRIPTION OF REMP SAMPLING LOCATIONS			
LOCATION	LOCATION DESCRIPTION	DISTANCE FROM PLANT	METOROLOGICAL DIRECTION
DIRECT RADIATION (TLD)			
J-15	(West bank) Located on utility pole near the LA 631/Hwy 90 intersection in Des Allemands. TLDs are on the utility pole on east side of LA 631. Access is from LA 631 via shell road.	12.0	S
E-30**	(West bank) Located at Entergy's General Office on Delaronde St. in Algiers. TLDs are on a tree in the courtyard at the south entrance to the building.	27.0	E
AIRBORNE			
APP-1	(West bank) Located in soybean/sugarcane field at northwest corner of Short St. in Killona.	0.8	WNW
APQ-1	(West bank) Located at northwest corner of soybean/sugarcane field on east side of Killona. Access from River Road (LA 18) approximately 0.6 miles east of LA 18/3141 intersection.	0.8	NW
APG-1	(West bank) Located at the north side of the Secondary Meteorological Tower.	0.5	SE
APC-1	(East bank) Located inside the Little Gypsy Cooling Water Intake Structure fence enclosure.	0.8	NE
APE-30**	(West bank) Located on the roof of the Entergy's General Office building on Delaronde St. in Algiers.	27.0	E

TABLE 2.2

DESCRIPTION OF REMP SAMPLING LOCATIONS			
LOCATION	LOCATION DESCRIPTION	DISTANCE FROM PLANT	METOROLOGICAL DIRECTION
WATERBORNE			
DWG-2 SWG-2	(West bank) Located at the Dow Chemical drinking water canal. Access from LA 3142 through Gate 28.	2.0	SE
DWE-5 SWE-5	(East bank) Located at the St. Charles Parish Waterworks off of River Road (LA 48) near New Sarpy.	4.5	E
DWP-7** SWP-7**	(West bank) Located at the St. John Parish Waterworks off of LA 18 in Edgard.	6.5	WNW
SHWE-3	(West bank) Located at the Foot Ferry Landing off of LA 18 in Taft.	3.0	E
SHWK-1	(West bank) Located at the 40 Arpent Canal south of the Plant.	0.5	SSW
GWK-1	(West bank) Located at 40 Arpent Canal south of the plant. The canal is northwest of the shell road/railroad track intersection.	0.5	SSW

TABLE 2.2

DESCRIPTION OF REMP SAMPLING LOCATIONS			
LOCATION	LOCATION DESCRIPTION	DISTANCE FROM PLANT	METOROLOGICAL DIRECTION
INGESTION			
MKQ-1	(West bank) 1.0 miles west of Waterford 3 SES at the corner of River Road and Post Street in Killona.	1.0	NW
MKQ-5	(West bank) Located at the Webre's house, just across LA 18 from river marker, at the eastern end of Edgard.	5.0	NW
MKR-40**	(East bank) Located at 24254 LA Highway 442, Holden. La.	40.0	NNW
BLQ-1	(West bank) Located between LA 18 and soybean field on eastern edge of Killona, near air sample station APQ-1.	0.8	NW
BLB-1	(East bank) Located at wooded area at the southwestern corner of the Little Gypsy plant along River Road.	0.8	NNE
BLK-15**	(West bank) Located 3.5 miles SSW of Des Allemands on Hwy. 90.	15	SSW
BLE-20**	(West bank) Located on property of Nine Mile Point in Westwego, La.	20	E
FH-1 **	Upstream of the plant intake structure.	NA*	NA*
FH-2	Downstream of the plant discharge structure.	NA*	NA*

* NA - NOT APPLICABLE

** Control Location

TABLE 2.3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS LOWER LIMIT OF DETECTION (LLD) ^(a)						
ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GAS (pCi/m ³)	FISH (pCi/kg-wet)	MILK (pCi/l)	FOOD PRODUCTS ^(b) (pCi/kg-wet)	SEDIMENT (pCi/kg-dry)
Gross Beta	4	0.01				
H-3	2000					
Mn-54	15		130			
Fe-59	30		260			
Co-58	15		130			
Co-60	15		130			
Zn-65	30		260			
Zr-95	30					
Nb-95	15					
I-131	1	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-140	60			60		
La-140	15			15		

a. From Table 4.12-1 of Waterford 3 SES TRM

b. Applicable to broad leaf vegetation.

TABLE 2.4
ENVIRONMENTAL CROSS-CHECK PROGRAM
PARTICIPATION RESULTS

Sample Type (units)	Study	Date	Analysis	"Known" Value ^a	RBS Value	RBS N-DEV ^b	RBS N-RANGE ^c
Air Filter (pCi/filter)	E2375-125	9/21/00	BETA	72.0 ± 17.3	78.7	1.15	0.118
Charcoal Cartridge (pCi/cartridge)	E2219-125	6/22/00	I-131	72.0 ± 12.5	75.4	0.82	0.139
	E2483-125	12/07/00	I-131	63.0 ± 10.9	67.6	1.26	0.272
Water (pCi/liter)	E2081-125	3/23/00	BETA	112 ± 29.1	80.2	-3.27 ^d	0.042
	E2079-125	3/10/00	CR-51	238 ± 20.6	246	1.16	1.390
			MN-54	159 ± 13.8	152	-1.45	0.223
			CO-58	44.0 ± 8.66	43.1	-0.31	0.307
			FE-59	92 ± 8.7	91.1	-0.31	0.284
			CO-60	116 ± 10.0	112	-1.29	0.407
			ZN-65	196 ± 33.9	185	-0.97	0.211
			I-131	74.0 ± 12.8	68.0	-1.40	0.231
			CS-134	139 ± 12.0	132	-1.66	0.340
			CS-137	128 ± 11.1	126	-0.45	0.185
			CE-141	427 ± 37.0	425	0.19	0.194
	E2080-125 (Duplicate)	3/10/00	CR-51	238 ± 20.6	250	1.75	2.085
			MN-54	159 ± 13.8	156	-0.58	0.371
			CO-58	44.0 ± 8.66	43.0	-0.36	0.272
			FE-59	92.0 ± 8.66	92.3	0.10	0.815
			CO-60	116 ± 10.0	111	-1.49	0.509
			ZN-65	196 ± 33.9	182	-1.21	0.271
			I-131	74.0 ± 12.8	67.0	-1.63	0.327
			CS-134	139 ± 12.0	134	-1.25	0.680
	E2220-125	6/22/00	H-3	11400 ± 1975	10683	-1.09	0.070
			E2373-125	9/21/00	CR-51	230 ± 23.9	209
	MN-54	89.0 ± 8.66			90.0	0.23	1.122
	CO-58	60.0 ± 8.66			67.0	2.41	0.378
	FE-59	54.0 ± 8.66			57.0	0.88	1.134
	CO-60	246 ± 21.3			229	-2.35	0.480
	ZN-65	134 ± 23.2			128	-0.82	0.573
	I-131	75 ± 13.0			72	-0.59	0.197
CS-134	128 ± 22.2	109			-2.57	0.508	
CS-137	218 ± 18.9	219			0.21	0.054	
CE-141	191 ± 16.54	175			-2.96	0.495	

TABLE 2.4 (continued)
ENVIRONMENTAL CROSS-CHECK PROGRAM
PARTICIPATION RESULTS

Sample Type (units)	Study	Date	Analysis	"Known" Value ^a	RBS Value	RBS N-DEV ^b	RBS N-RANGE ^c
	E2374-125 (Duplicate)	9/21/00	CR-51	230 ± 23.9	211	-2.34	1.284
			MN-54	89.0 ± 8.66	94	1.59	1.689
			CO-58	60.0 ± 8.66	62	0.54	1.040
			FE-59	54.0 ± 8.66	63	3.04 ^d	0.484
			CO-60	246 ± 21.3	228	-2.49	0.240
			ZN-65	134 ± 23.2	131	-0.39	0.529
			I-131	75 ± 13.0	74	-0.15	0.480
			CS-134	128 ± 22.2	114	-1.94	0.461
			CS-137	218 ± 18.9	215	-0.53	0.271
			CE-141	191 ± 16.54	179	-2.12	0.557
Sediment (pCi/gram)	E2484-125	12/07/00	CR-51	0.917 ± 0.079	0.959	1.58	1.278
			MN-54	0.278 ± 0.034	0.307	2.59	0.613
			Co-58	0.139 ± 0.012	0.137	-0.49	1.071
			FE-59	0.149 ± 0.018	0.132	-2.82	1.353
			CO-60	0.336 ± 0.029	0.335	-0.06	0.475
			ZN-65	0.269 ± 0.047	0.293	1.57	0.077
			CS-134	0.155 ± 0.013	0.161	1.29	0.122
			CS-137	0.490 ± 0.042	0.508	1.30	0.338
			CE-141	0.649 ± 0.056	0.670	1.14	0.120

NOTES:

- (a) The "known" values are listed with a range reflecting control (3 sigma) limits.
- (b) The normalized deviation from the "known" value is computed from the deviation and the standard error of the mean; ±2.000 is the warning limit and ±3.000 is the control limit. This is a measure of accuracy of the analytical methods.
- (c) The normalized range is computed from the mean range, the control limit, and the standard error of the range; +2.000 is the warning limit and +3.000 is the control limit. This is a measure of precision of the analytical methods.
- (d) The results reported were out of the control limits.

FIGURE 2.1

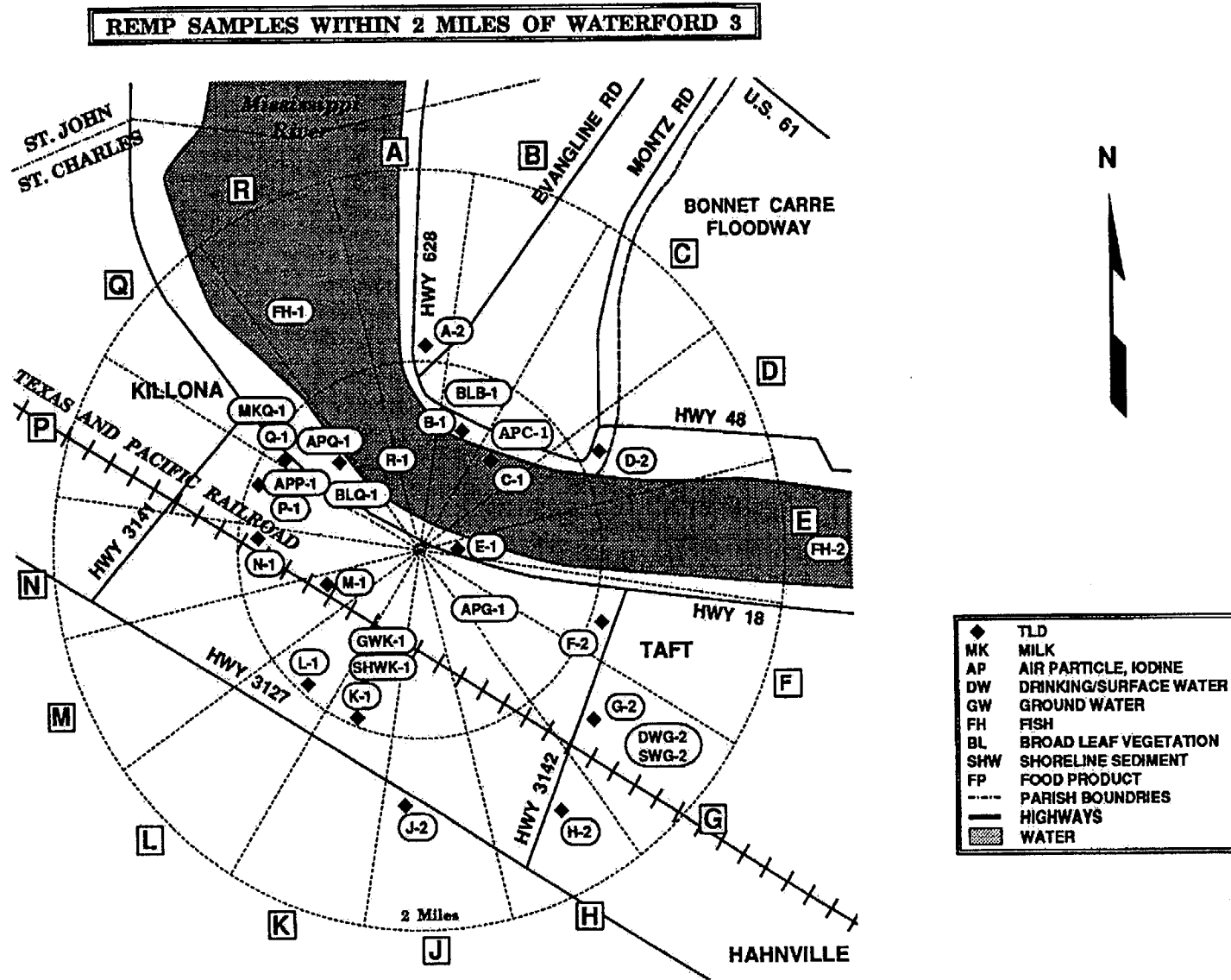


FIGURE 2.2

REMP SAMPLES WITHIN 10 MILES OF WATERFORD 3

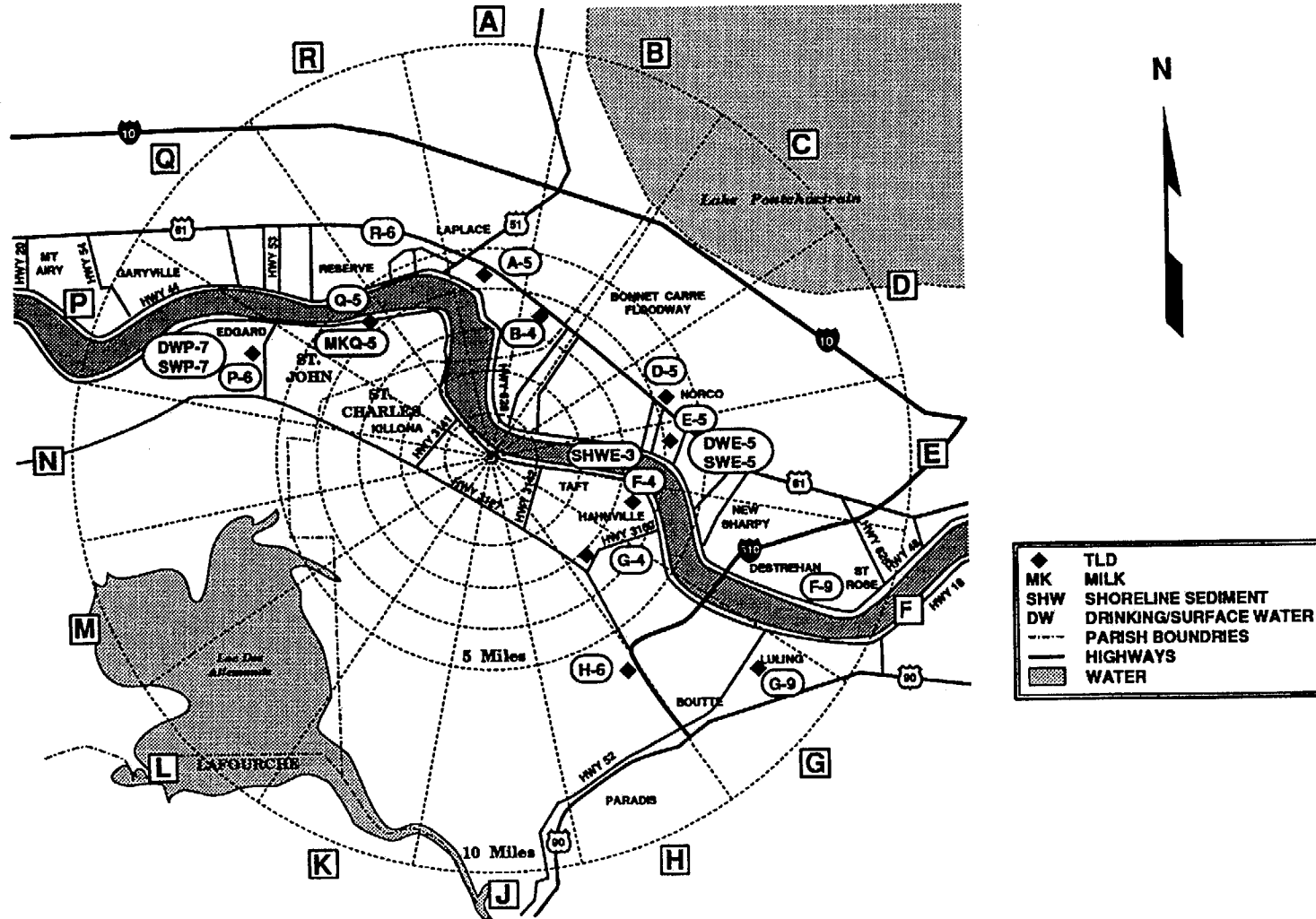
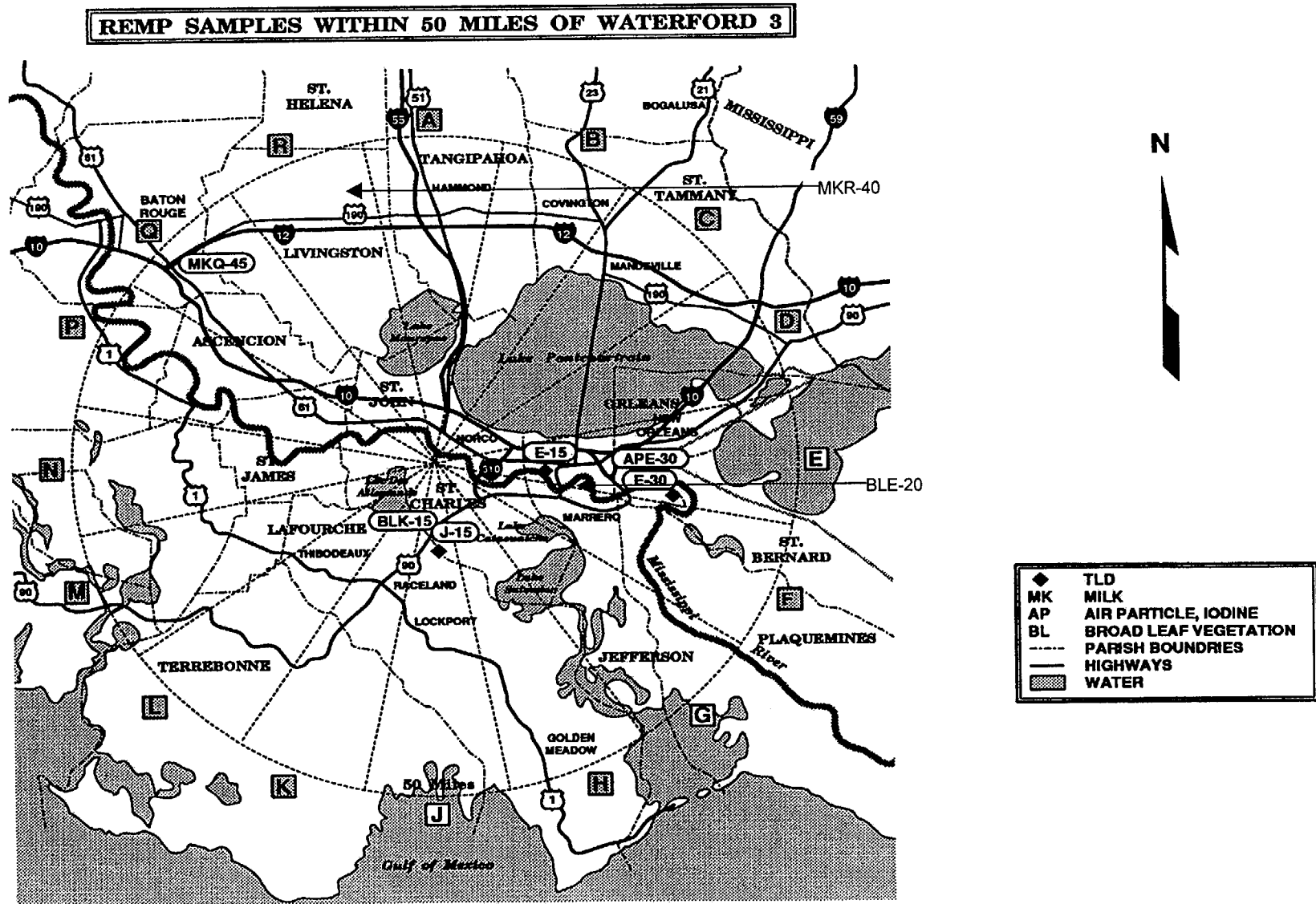


FIGURE 2.3



3.0 DISCUSSION OF RESULTS

Analytical results for the year 2000 are discussed in this section by exposure pathway, sample type, and analyses performed. Analytical results focusing only on man-made radioactivity are summarized in Appendix A and data for the individual analyses are presented in the tables of Appendix B.

3.1 Direct Radiation Exposure Pathway Analyses

The average exposure rates measured by TLDs at all stations were 12, 12, 13, and 12 mrem/standard quarter for the first, second, third, and fourth quarters of 2000, respectively. The average exposure rate of the 119 indicator TLD locations was 13 mrem/standard quarter compared to 10 mrem/standard quarter average exposure rate at the control location. The lowest and highest individual exposure rates were 10 mrem/standard quarter and 15 mrem/standard quarter for all locations. Table 3.1 compares the indicator TLD results by directional sector and distance from the facility. A comparison of directional sectors indicates the highest average exposure rate in 2000 is 14 mrem/standard quarter in Sector N.

The average exposure rates during 2000 are consistent with those from the pre-operational program and the previous five years of operation (Figure 3.1). In particular, the pre-operational survey indicates that exposure rates ranged between 11 and 33 mrem/standard quarter with an average of 20 mrem/standard quarter. The range indicated during the previous five years of operation was 9 to 17 mrem/standard quarter with an average exposure rate of 13 mrem/standard quarter.

3.2 Airborne Exposure Pathway Analyses

3.2.1 Airborne Particulate

Gross beta activity was analyzed and results indicate that activity was detected in all 130 samples with a range of 0.010 pCi/m³ (APC-1: 04/10-04/25) to 0.055 pCi/m³ (APG-1: 01/31-02/14). The average gross beta activity for the indicator locations was 0.021 pCi/m³ compared to 0.022 pCi/m³ at the control location.

Gross beta activity ranged from 0.010 pCi/m³ to 0.055 pCi/m³ with an average of 0.021 pCi/m³ for 130 measurements from all five locations. The average gross beta activity for the indicator locations was 0.021 pCi/m³ compared to 0.022 pCi/m³ at the control location. The airborne gross beta activity results obtained during 2000 are consistent with the results from the pre-operational program and the previous years of operation (Figure 3.2). In the period from 1984 to 1999, the average gross beta activity per year for the indicator locations ranged from 0.006 to 0.046 pCi/m³ with an average of 0.019 pCi/m³ compared to 0.020 pCi/m³ at the control location. Also, the pre-operational survey indicates that in periods not significantly influenced by nuclear weapons testing, the gross beta activity ranged between 0.007 and 0.480 pCi/m³ with an average of 0.080 pCi/m³.

3.2.2 Airborne Iodine

One hundred and thirty (130) air samples were collected from 5 locations and analyzed by gamma spectroscopy for Iodine-131. Results indicate that all measurements were below the calculated LLDs.

3.2.3 Gamma Isotopic

Twenty (20) composite air samples were collected from 5 locations and analyzed for gamma emitters by gamma spectroscopy. Results indicate that all measurements were below the calculated LLDs.

3.3 Waterborne Exposure Pathway Analyses

3.3.1 Drinking/Surface Water

As mentioned previously, drinking water samples also serve as surface water samples for Waterford 3. Therefore, monthly and quarterly gamma spectroscopy and tritium analyses of drinking water also satisfy the surface water sampling requirement.

Thirty-nine (39) composite drinking/surface water samples were collected from 3 locations and analyzed by gamma spectroscopy for Iodine-131. Results indicate that all measurements were below the calculated LLDs.

Gross beta activity was analyzed and results indicate that activity was detected in all twelve composite samples with a range of 2.3 pCi/l (DWP-7) to 12.1 pCi/l (DWG-2). The average gross beta activity for the indicator locations was 6.3 pCi/l compared to 6.4 pCi/l at the control location.

Analyses for gross beta in drinking/surface water samples were not performed during the pre-operational survey. However, in order to fulfill comparison requirements, 2000 data was compared to data from 1983 and the previous years of operation. In particular, the period from 1984 to 1999, the average gross beta activity per year for the indicator locations ranged from 1.1 to 60.0 pCi/l with an average of 5.2 pCi/l compared to 4.7 pCi/l at the control location. Similarly, the 1983 survey indicates that in periods not significantly influenced by nuclear weapons testing the gross beta activity ranged between 2.9 and 14.0 pCi/l with an average of 7.0 pCi/l.

Twelve composite drinking/surface water samples were collected from 3 locations and analyzed by gamma spectroscopy for gamma emitters. Results indicate that all measurements were below the calculated LLDs.

Twelve composite drinking/surface water samples were collected from 3 locations and analyzed for tritium. Results indicate that all measurements were below the calculated LLDs.

The pre-operational survey indicates that tritium concentrations in drinking water samples ranged between 70 and 180 pCi/l with an average of 116 pCi/l. Similarly, the range indicated in the previous years of operation was 170 to 545 pCi/l.

3.3.2 Groundwater

Five groundwater samples were collected from one sampling location, GWK-1, and analyzed for tritium and gamma emitters. Results indicate that all measurements for gamma emitters were below the calculated LLDs. Tritium was detected in all five of the groundwater samples. The detected tritium activities in these samples ranged between 566 and 1435 pCi/l with an average activity of 1022 pCi/l.

Although only a fraction of the reporting level, the tritium concentrations detected in 2000 are higher than those from the pre-operational program. They do, however, compare to the previous years of operation. In particular, the pre-operational survey indicates that tritium concentration in groundwater samples ranged between 50 and 180 pCi/l with an average of 121 pCi/l. Similarly, the range indicated in the previous years of operation was 249 to 4097 pCi/l.

Variations in rainfall will affect the observed results since dilution of plant effluents with rainfall occurs at this monitoring station. Dry periods will cause higher levels of tritium to be observed which was the case during sampling periods in 2000. The tritium results observed are also consistent with effluent release data via this pathway.

The plant is making efforts to reduce the quantity of radioactive effluent released via this pathway. Design Change DC-3521 will reroute effluents from the Dry Cooling Tower Sumps to the Circulating Water System and ultimately to the Mississippi River. This will result in the Turbine Building Industrial Waste Sump being the only routine radioactive effluent release point for this pathway.

Tritium concentrations in samples at this location will continue to be carefully monitored in the future. If the levels approach 10,000 pCi/l (50% of the reporting levels of tritium in water), increased monitoring will be implemented.

3.3.3 Shoreline Sediment

Four shoreline soil samples were collected from two sampling locations and analyzed by gamma spectroscopy for gamma emitters.

Cesium-137, a man-made nuclide, was detected in one sample (SHWK-1) with a concentration of 85 +/- 21 pCi/kg (dry). No other man-made radionuclides were detected in any of the samples.

The Cesium-137 results obtained during 2000 are consistent with those from the pre-operational program and previous years of operation. In particular, the pre-operational survey indicates that Cesium-137 was detected in 9 of 14 soil samples at concentrations ranging between 30 and 890 pCi/kg(dry) with an average concentration of 164 pCi/kg (dry). Similarly, the range indicated during the previous years of operation was 18 to 142 pCi/kg (dry) with an average activity of 51 pCi/kg (dry). Further, studies in Louisiana indicate that Cesium-137 is commonly found in soils and sediments as a result of atmospheric weapons testing. Because the Cesium-137 levels are consistent with pre-operational values, the Cesium-137 level detected in 2000 can be attributed to weapons testing fallout.

3.4 Ingestion Exposure Pathway Analyses

3.4.1 Milk

Nineteen milk samples were collected from two sampling locations and analyzed by gamma spectroscopy for gamma emitters and Iodine-131. Results indicate that all measurements were below the calculated LLDs.

3.4.2 Fish

Nine fish samples were collected from two locations. The edible portions were analyzed by gamma spectroscopy for gamma emitters. Results indicate that all measurements were below the calculated LLDs.

3.4.3 Broad Leaf Vegetation

Thirty-nine broad leaf vegetation samples were collected from four locations and analyzed by gamma spectroscopy for gamma emitters and Iodine-131. Results indicate that all measurements were below the calculated LLDs.

3.5 Statistical Analyses

3.5.1 Calculation of the Mean and Standard Deviation

The mean and standard deviation for different groups of analyses are calculated using the following equations:

$$\bar{X} = \sum_{i=1}^n \frac{X_i}{n}$$

and

$$S = \left(\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{(n-1)} \right)^{0.5}$$

where:

\bar{X} = mean of sample population,
S = standard deviation of sample population,
n = number of samples in sample population, and
 X_i = value of the i'th sample.

3.5.2 Comparing Two Sample Population Means

The means of two sample populations are compared for statistical difference using the standard "t" test. The use of the test requires the assumption that the data within the populations are normally distributed and that the true standard deviations of the mean are equal for both populations. The standard "t" test tests the hypothesis that the true means of both populations are equal. The "t" value can be calculated from the equation below (obtained from the CRC Standard Mathematical Tables, 26th Edition (1981)):

$$t = \frac{\bar{X} - \bar{Y}}{\left(\frac{(n_x - 1)S_x^2 + (n_y - 1)S_y^2}{n_x + n_y - 2} \right)^{0.5} \left(\frac{1}{n_x} + \frac{1}{n_y} \right)^{0.5}}$$

where:

- t = calculated "t" value,
- \bar{X} = mean of first data set,
- \bar{Y} = mean of second data set,
- n_x = number of variables in first data set,
- S_x = standard deviation of first data set,
- n_y = number of variables in second data set, and
- S_y = standard deviation of second data set.

The calculated "t" value is used to test the hypothesis that the true mean of the first population (m_x) is equal to the true mean of the second population (m_y) assuming that the true standard deviation of both populations are equal ($m_x = m_y$). The calculated "t" value is compared to a tabular "t" value such that:

- a. if $t > t_{\mu, n}$ then reject the hypothesis when $m_x > m_y$,
- b. if $t < -t_{\mu, n}$ then reject the hypothesis when $m_x < m_y$,
- c. if $t > t_{\mu/2, n}$ then reject the hypothesis when $m_x = m_y$,

where $t_{\mu/2, n}$ and $t_{\mu, n}$ are the tabular "t" values, with a preselected error (5%), confidence level $(1 - \mu)$ or $(1 - \mu/2)$, and degrees of freedom $n = n_x + n_y - 2$. Tabular values of the "t" were obtained from the CRC Standard Mathematical Tables, 26th Edition (1981).

3.5.3 TLD Measurements

TLD stations were categorized by distance into three groups: 0-2 miles, 2-5 miles, and > 5 miles from the plant. A statistical analysis using the standard "t" test was performed comparing average exposure rates from 0-2 miles and 2-5 miles to the average exposure rate at > 5 miles. In short, results indicate the average exposure rates 0-2 miles and 2-5 miles from the plant are statistically the same as the average exposure rates > 5 miles from the plant. Table 3.2 summarizes the results of this analysis.

3.5.4 Gross Beta Activity on Air Particulate Filters

The standard "t" test was used to compare average gross beta activity from each indicator station to the average gross beta activity at the control station. The results from this test show the average activity detected at all indicator stations are statistically the same as the average activity detected at the control station. Table 3.3 summarizes the results of this analysis.

3.5.5 Gross Beta Activity in Monthly Drinking Water Composites

The standard "t" test was used to compare average gross beta activity from each indicator station to the average gross beta activity from the control station. The results from this test show average activity detected at all indicator stations are statistically the same as the average activity detected at the control station. Table 3.4 summarizes the results of this analysis.

3.6 Deviations from the REMP

3.6.1 Unavailable Samples

Nine milk samples from location MKR-50 were unavailable during the 2000 reporting period. These milk samples were unavailable due to batch mixing of several sources of milk at the dairy prior to sample collection. As a result of this, a new control milk location (MKR-40) was added to the REMP. Samples were collected from MKR-40 starting in April of 2000. Two milk samples were unavailable from indicator location MKQ-5 due to cows not producing enough milk. Milk samples were not available during the 2000 reporting period from location MKQ-1 since the cows are not currently producing milk for human consumption. (See Table 3.5). With the absence of milk samples at these locations, broad leaf vegetation sampling was performed.

TLDs located at H-6 were missing at the time of the quarterly TLD exchange for the second quarter and TLDs located at G-4 were missing during the third quarter monthly inspection.

3.6.2 Lack of Sample Continuity

Four air samples and three drinking water samples failed to meet the requirement for sample continuity (See Table 3.5).

3.6.3 Missed Lower Limits of Detection

All lower limit of detection requirements was met for 2000.

3.7 Land Use Census

In compliance with the Waterford 3 ODCM and TRM, the land use census was conducted September 26 through September 28, 2000. The nearest residence, garden, beef cow, food product and milk animal in each sector within a five mile radius of the plant was located by visual inspection and verbal inquiry.

While milk cow and food product locations remained unchanged for 2000, three locations of goats (sectors N, P and Q) and one location of beef cow (sector F) were removed. Two new resident locations (sector B and G), four new garden locations (sector C, N, P and Q), one new goat location (sector E) and one new beef cow location (sector G) was identified in 2000. Based upon the locations identified in this survey, the locations identified in previous surveys and the locations currently being used to calculate dose commitments from liquid and gaseous effluents released from Waterford 3, no REMP sampling location changes are necessary.

TABLE 3.1

2000 DIRECT RADIATION DATA ORGANIZED BY COMPASS DIRECTION AND DISTANCE FROM WATERFORD 3 SES				
BY COMPASS DIRECTION				
SECTOR	COMPASS DIRECTION	AVERAGE DOSE RATE (mrem/std qtr)	STANDARD DEVIATION (mrem/std qtr)	NUMBER IN GROUP
A	N	13	0.54	8
B	NNE	13	0.71	8
C	NE	10	0.22	4
D	ENE	13	0.44	8
E *	E	11	0.34	12
F	ESE	13	0.26	12
G	SE	14	2.44	12
H	SSE	13	0.46	7
J	S	13	0.10	8
K	SSW	12	0.87	4
L	SW	13	0.65	4
M	WSW	12	0.35	4
N	W	14	0.30	4
P	WNW	12	0.28	8
Q	NW	13	0.22	8
R	NNW	11	0.52	8
CONTROL	E	12	1.48	4
BY DISTANCE FROM PLANT				
DISTANCE FROM PLANT (miles)	AVERAGE DOSE RATE (mrem/std qtr)	STANDARD DEVIATION (mrem/std qtr)	NUMBER IN GROUP	
0 to 2	12	1.50	64	
2 to 5	14	3.02	28	
5 *	12	1.27	27	
CONTROL	10	0.58	4	

* Does not include control station data

TABLE 3.2

STATISTICAL COMPARISON OF 2000 TLD MEASUREMENTS FROM STATIONS GROUPED BY DISTANCE FROM WATERFORD 3 SES			
	Stations Located 0-2 Miles from the Plant	Stations Located 2-5 Miles from the Plant	Stations Located more than 5 Miles from the Plant
Mean (mRem/std.qtr.)	12.28	13.67	12.12
Standard Deviation (mRem/std. qtr.)	1.50	3.02	1.27
Number in Sample	64	28	27
Calculated "t" Value (comparison of stations 0-2 and 2-5 miles from the plant to stations > 5 miles from the plant)	0.48	2.47	NA*
Tabular "t" Value at 95% Confidence ($t_{0.025,n}$)	1.990(a)	2.007(a)	NA*

a. Results indicate the mean for stations located 0-2 miles and 2-5 miles from the plant are statistically identical to the mean for stations located more than 5 miles from the plant.

* Not Applicable

TABLE 3.3

STATISTICAL COMPARISON OF 2000 GROSS BETA ACTIVITY MEASUREMENTS ON AIR PARTICULATE FILTERS FROM WATERFORD 3 SES					
SAMPLE STATION	APG-1	APQ-1	APP-1	APC-1	APE-30
Mean (10⁻³pCi/m³)	21.3	21.0	21.5	19.4	21.9
Standard Deviation (10⁻³pCi/m³)	9.15	6.71	6.76	6.27	6.47
Number in Sample	26	26	26	26	26
Calculated "t" Value (comparison of the indicator stations to the control station)	0.24	0.50	0.23	1.41	NA*
Tabular "t" Value at 95% Confidence(t_{0.025,n})	2.010(a)	2.010(a)	2.010(a)	2.010(a)	NA*

a. Results indicate the mean for the indicator stations is statistically identical to the mean for the control station.

* Not Applicable

TABLE 3.4

STATISTICAL COMPARISON OF 2000 GROSS BETA ACTIVITY MEASUREMENTS IN DRINKING/SURFACE WATER SAMPLES FROM WATERFORD 3 SES			
	DWG-2	DWE-5	DWP-7
Mean (pCi/liter)	7.6	4.9	6.4
Standard Deviation (pCi/liter)	2.7	1.6	2.8
Number in Sample	4	4	4
Calculated "t" Value (comparison of the indicator stations to the control station)	0.61	0.94	NA*
Tabular "t" Value at 95% Confidence($t_{0.025,n}$)	2.447(a)	2.447(a)	NA*

a. Results indicate the mean for the indicator stations is statistically identical to the mean for the control station.

* Not Applicable

TABLE 3.5

SUMMARY OF 2000 REMP DEVIATIONS				
SAMPLE TYPE	ANALYSIS	LOCATION	DATE	EXPLANATION OF DEVIATION
MISSED SAMPLES				
1) Milk	Gamma Isotopic & I-131	MKR-50	01/00 - 09/00	Sample not available due to batch mixing at the dairy Sample not available due to cows not producing enough milk Samples not available due to cows not Producing milk for human consumption
		MKQ-5	09/00 - 10/00	
		MKQ-1	01/00 - 12/00	
2) TLD	Gamma Dose	H-6	04/00 - 07/00	TLDs lost
		G-4	09/00 - 10/00	TLDs lost
LACK OF SAMPLE CONTINUITY				
1) Air	Gross Beta & I-131	APP-1	01-17-00 to 01-31-00	Sample pump tripped
		APE-30	03-13-00 to 03-28-00	Sample pump tripped
		APG-1	07-31-00 to 08-14-00	Cal check unsatisfactory
		APC-1	07-31-00 to 08-14-00	Sample pump tripped
2) Water	I-131	DWE-5	03-28-00 to 04-25-00	Cal check unsatisfactory
		DWE-5	05-23-0 to 06-19-00	Sampler would not prime
		DWG-2	11-06-00 to 12-04-00	Sample pump tripped
MISSED LLDs				
NONE	N/A*	N/A*	N/A*	N/A*

* Not Applicable

**TABLE 3.6
2000 Bi-Annual Land Use Census Results**

Sector	Direction	Distance from Plant in Miles					
		Residence	Garden	Milk Cows	Beef Cows	Goats	Food Products
A	N	1.3	1.7	* 4.6	4.6	^	4.1
B	NNE	1.1	1.3	^	^	^	1.3
C	NE	0.9	0.9	^	^	^	^
D	ENE	0.9	0.9	^	^	^	^
E	E	2.2	2.2	^	2.3	* 2.3	0.3
F	ESE	3.1	2.2	^	2.3	^	0.3
G	SE	^	4.1	^	2.4	^	0.3
H	SSE	^	^	^	^	^	0.3
J	S	^	^	^	^	^	0.5
K	SSW	^	^	^	^	^	0.5
L	SW	^	^	^	^	^	0.5
M	WSW	^	1.4	^	1.2	^	0.5
N	W	1.0	1.1	^	1.0	^	0.6
P	WNW	0.9	0.9	^	0.9	^	0.6
Q	NW	0.9	1	**4.9	0.9	^	0.6
R	NNW	3.0	3.0	^	4.9	^	2.6

^ Indicates that nothing was found in the Sector within a five mile radius of Waterford 3

* Animals were located at this distance from Waterford 3, but the milk is not currently used for human consumption

** Samples are being obtained from animals at this location (MKQ-5) for the REMP

FIGURE 3.1

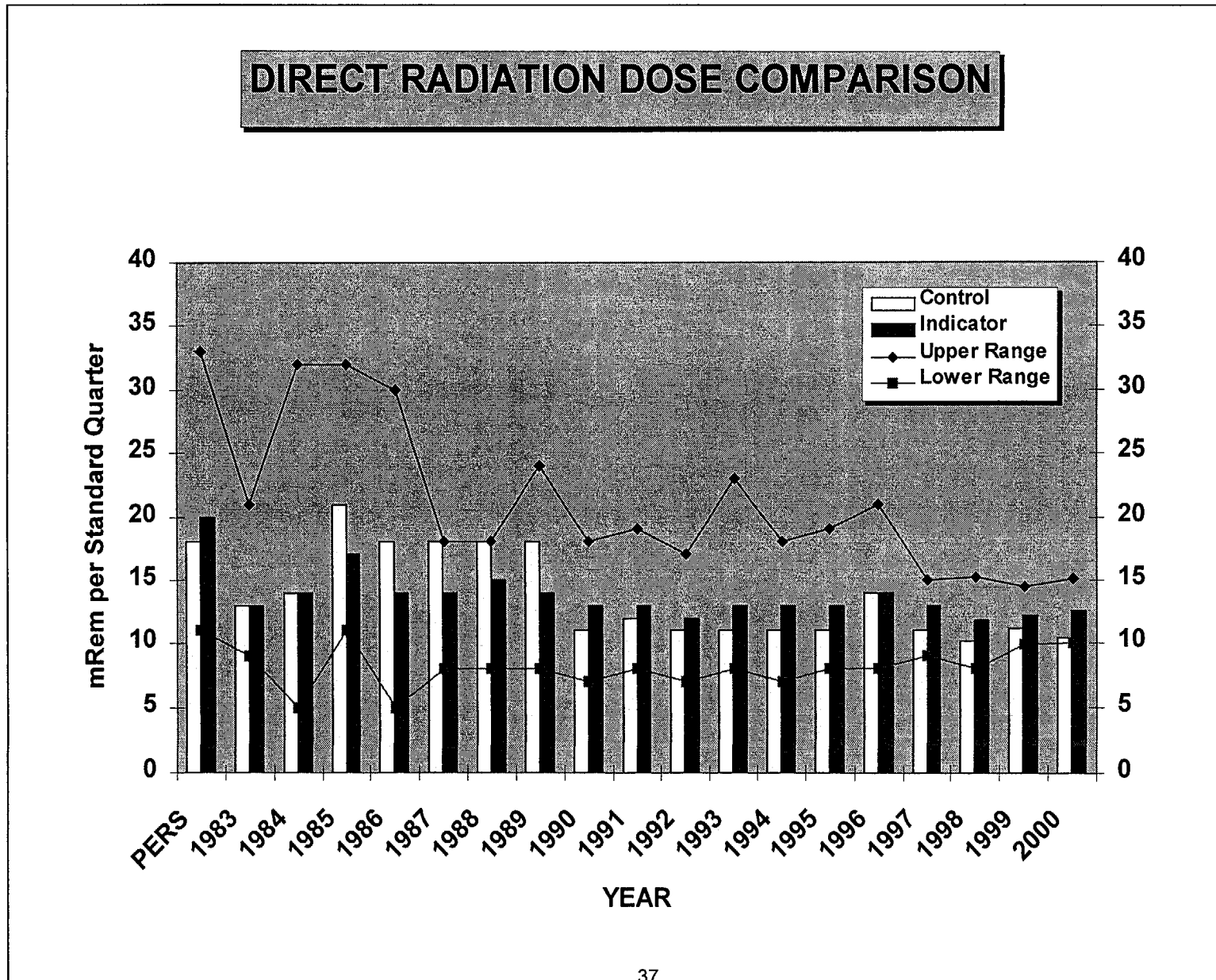
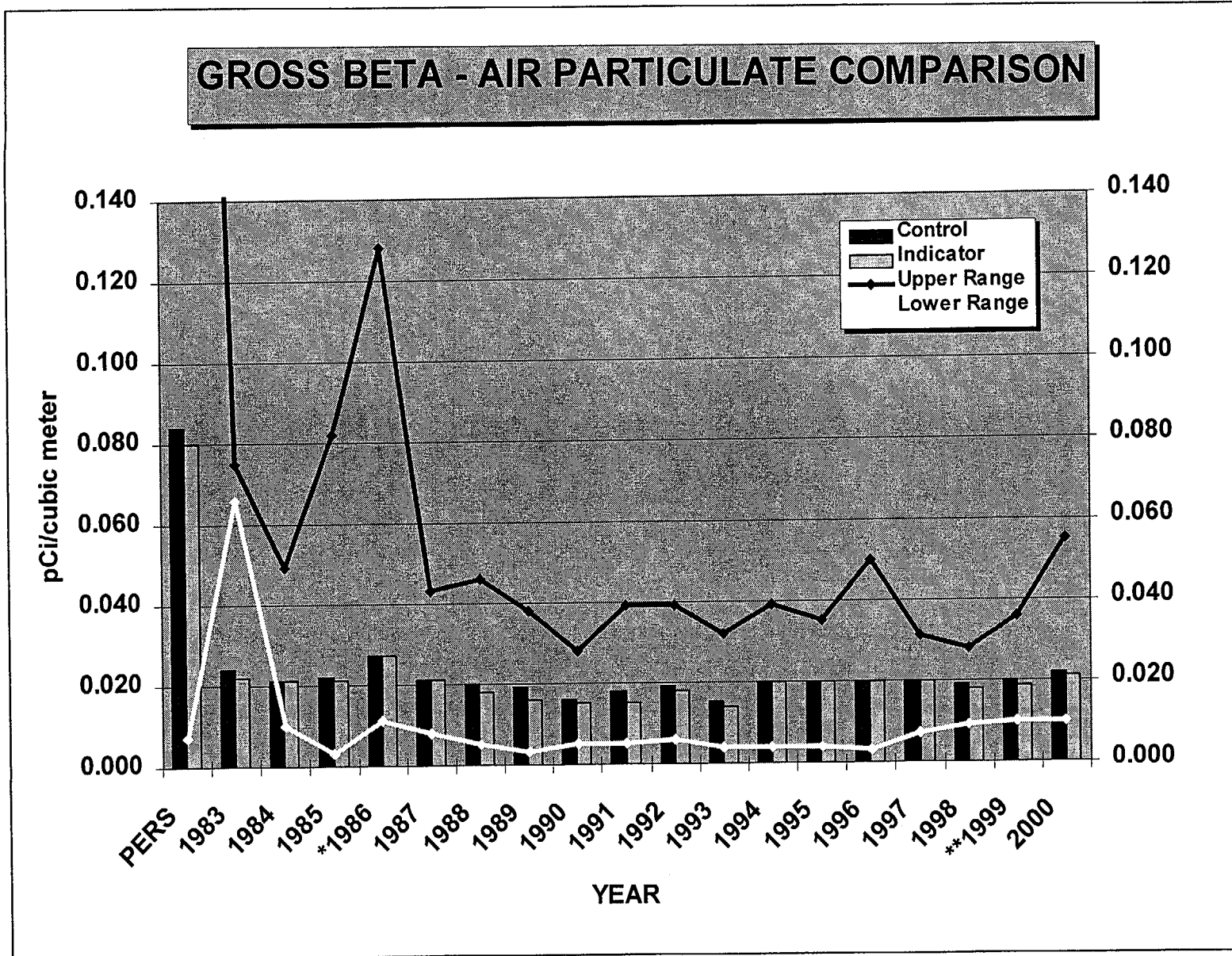


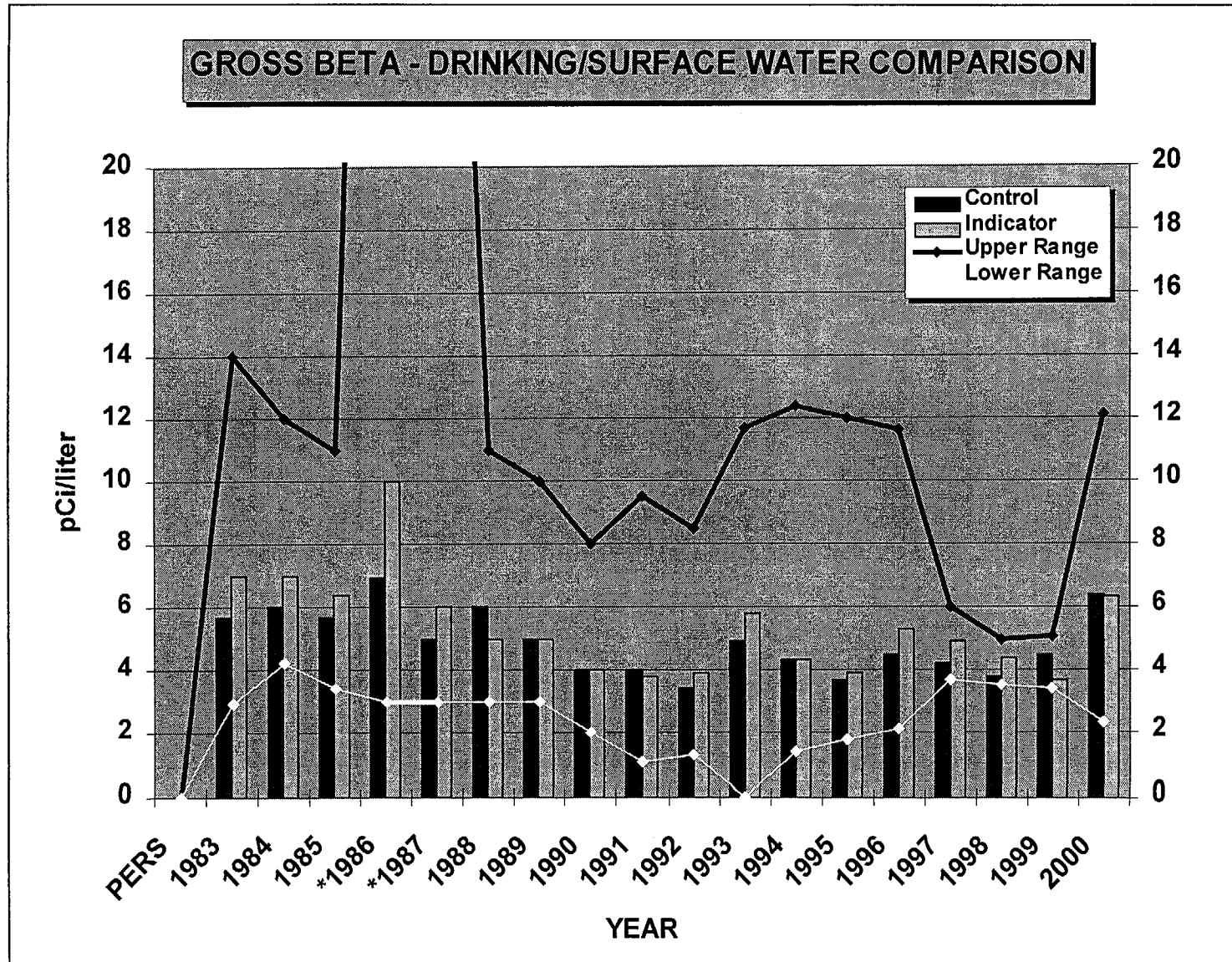
FIGURE 3.2



* Effects from Chernobyl nuclear accident

** Effects from Japanese nuclear accident

FIGURE 3.3



* Effects from Chernobyl nuclear accident

4.0 CONCLUSIONS

Nearly all the radiological environmental data collected during 2000 is consistent with the data obtained during the previous years of plant operation (1985-99), the first two years of the REMP prior to Waterford 3 initial criticality (1983-84), and the Pre-Operational Environmental Radiological Surveillance (PERS) Program (1978-82). The only man-made radionuclide detected in the routine environmental samples analyzed during 2000 was Cesium-137.

Cesium-137 was detected in one shoreline soil sample. Studies in Louisiana indicate that Cesium-137 is commonly found in soils and sediments as a result of fallout from nuclear weapons testing. In addition, the detected concentration was consistent with pre-operational levels and the levels detected in the previous years of operation. Further, the concentration detected was lower than the required LLD and well below levels requiring notification.

Even though tritium was detected in all five groundwater samples, the values observed were less than the required LLD in all five samples. Tritium is routinely released as measured in effluent sampling analysis via this pathway. Those levels observed are consistent with effluent analysis results when REMP samples were collected during dry periods.

In conclusion, based on the evaluation of the REMP data collected during 2000 the operation of Waterford 3 had no adverse radiological impact on the environment.

APPENDIX A

REMP DATA SUMMARY

TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility: Waterford 3 SES Docket No. 50-382

Location of Facility: St. Charles, Louisiana
(Parish, State)

Reporting Period: January 1 to December 31, 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES	LOWER LIMIT OF DETECTION ^a PERFORMED	ALL INDICATOR LOCATIONS MEAN ^b (RANGE) ^b	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION (RANGE) ^b	CONTROL LOCATION MEAN ^b (RANGE) ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
1. Direct Radiation (mrem/Std. qtr.)	TLD 123	(c)	13(119/120) (10-15)	G-2 1.2 miles SE	15(4/4) (14-15)	E-30 10(4/4) (10-11)	0
2. Airborne Particulate (10⁻³pCi/m³)	Gross Beta 130	10	21(104/104) (10-55)	APP-1 0.8 miles WNW	22(26/26) (13-38)	APE-30 22(26/26) (14-37)	0
	Gamma 20	(d)	<LLD (0/20) (-)	N/A	N/A	APE-30 <LLD(0/4) (-)	0
3. Airborne Iodine (10⁻³pCi/m³)	I-131 130	70	<LLD (0/104) (-)	N/A	N/A	APE-30 <LLD (0/26)	0

NOTE: Footnotes at end of table.

TABLE A-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility: Waterford 3 SES Docket No. 50-382

Location of Facility: St. Charles, Louisiana
(Parish, State)

Reporting Period: January 1 to December 31, 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES	LOWER LIMIT OF DETECTION ^a PERFORMED	ALL INDICATOR LOCATIONS MEAN ^b (RANGE) ^b	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION (RANGE) ^b	CONTROL LOCATION MEAN ^b (RANGE) ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS		
4. Drinking/ Surface Water (pCi/l)	Gross Beta	12	4	6.3 (8/8) (3.4 -12.1)	DWG-2 2.0 miles SE	7.6 (4/4) (5.3-12.1)	DWP-7 6.4 (4/4) (2.3-9.8)	0
	I-131	39	1	<LLD (0/26) (-)	N/A	N/A	DWP-7 <LLD(0/13) (-)	0
	Gamma (Cs-137)	12	(d) 18	< LLD (0/8) (-)	N/A	N/A	DWP-7 <LLD(0/4) (-)	0
	Tritium	12	2000	< LLD (0/8) (-)	N/A	N/A	DWP-7 <LLD(0/4) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility: Waterford 3 SES Docket No. 50-382

Location of Facility: St. Charles, Louisiana
(Parish, State)

Reporting Period: January 1 to December 31, 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES	LOWER LIMIT OF DETECTION ^a PERFORMED	ALL INDICATOR LOCATIONS MEAN ^b (RANGE) ^b	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION (RANGE) ^c	CONTROL LOCATION MEAN ^b (RANGE) ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
5. Groundwater (pCi/l)	Gamma 5	(d)	<LLD (0/5) (-)	N/A	N/A	NONE	0
	Tritium 5	2000	1022 (5/5) (566-1435)	GWK-1 0.5 miles SSW	1022(5/5) (566-1435)	NONE	0
6. Shoreline Water Sediment (pCi/kg-dry)	Gamma 4 Cs-137	(d) 180	85(1/4) (85)	SHWK-1 0.5 miles SSW	85(1/4) (85)	NONE	0

NOTE: Footnotes at end of table.

TABLE A-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility: Waterford 3 SES Docket No. 50-382

Location of Facility: St. Charles, Louisiana
(Parish, State)

Reporting Period: January 1 to December 31, 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES	LOWER LIMIT OF DETECTION ^a PERFORMED	ALL INDICATOR LOCATIONS MEAN ^b (RANGE) ^b	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION (RANGE) ^c	CONTROL LOCATION MEAN ^b (RANGE) ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
7. Milk (pCi/l)	I-131 19	1	<LLD (0/10) (-)	N/A	N/A	MKR-40 <LLD (0/9) (-)	0
	Gamma Cs-137 19	18	<LLD (0/10) (-)	N/A	N/A	MKR-40 <LLD (0/9) (-)	0
8. Fish (pCi/kg-wet)	Gamma 9	(d)	<LLD (0/4) (-)	N/A	N/A	FH-1 <LLD (0/5) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility: Waterford 3 SES Docket No. 50-382

Location of Facility: St. Charles, Louisiana
(Parish, State)

Reporting Period: January 1 to December 31, 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES	LOWER LIMIT OF DETECTION ^a PERFORMED	ALL INDICATOR LOCATIONS MEAN ^b (RANGE) ^b	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION (RANGE) ^b	MEAN ^b (RANGE) ^b	CONTROL LOCATION MEAN ^b (RANGE) ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
9. Broad Leaf Vegetation (pCi/kg- wet)	I-131	52	60	<LLD (0/26) (-)	N/A	N/A	BLK-15 BLE-20 <LLD(0/26) (-)	0
	Gamma	52	(d)	<LLD (0/26) (-)	N/A	N/A	BLK-15 BLE-20 <LLD(0/26) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

FOOTNOTES

^aNominal Lower Limit of Detection (LLD) as defined in the Waterford 3 TRM

^bMean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthesis. (Range based on annual averages)

^cLower Limit of Detection (LLD) not defined in Waterford 3 TRM

^dLower Limit of Detection (LLD) for individual radionuclides using gamma spectroscopy are given in Waterford 3 TRM

APPENDIX B

REMP DATA

TABLE B-2
AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGE
GROSS BETA AND IODINE-131 ANALYSIS
INDICATOR SAMPLE
APG-1

COLLECTION: BI-WEEKLY

UNITS: pCi/m³

Begin Date	End Date	Gross Beta LLD= 0.01	I -131 LLD= 0.07
12-20-99	01-04-00	0.0322 +/- 0.00200	<0.0178
01-04-00	01-17-00	0.0185 +/- 0.00180	<0.0172
01-17-00	01-31-00	0.0213 +/- 0.00160	<0.0113
01-31-00	02-14-00	0.0551 +/- 0.00237	<0.0133
02-14-00	02-28-00	0.0153 +/- 0.00144	<0.0142
02-28-00	03-13-00	0.0189 +/- 0.00152	<0.0143
03-13-00	03-28-00	0.0136 +/- 0.00130	<0.0135
03-28-00	04-10-00	0.0148 +/- 0.00147	<0.0129
04-10-00	04-25-00	0.0165 +/- 0.00139	<0.0119
04-25-00	05-08-00	0.0201 +/- 0.00163	<0.0132
05-08-00	05-23-00	0.0173 +/- 0.00141	<0.0147
05-23-00	06-05-00	0.0166 +/- 0.00151	<0.0138
06-05-00	06-19-00	0.0141 +/- 0.00138	<0.0112
06-19-00	07-03-00	0.0140 +/- 0.00137	<0.0144
07-03-00	07-17-00	0.0253 +/- 0.00176	<0.0131
07-17-00	07-31-00	0.0245 +/- 0.00171	<0.0182
07-31-00	08-14-00	0.0124 +/- 0.00201	<0.0254
08-14-00	08-28-00	0.0218 +/- 0.00179	<0.0257
08-28-00	09-11-00	0.0198 +/- 0.00151	<0.0114
09-11-00	09-25-00	0.0124 +/- 0.00124	<0.0111
09-25-00	10-09-00	0.0136 +/- 0.00131	<0.0105
10-09-00	10-23-00	0.0287 +/- 0.00175	<0.0121
10-23-00	11-06-00	0.0360 +/- 0.00194	<0.0143
11-06-00	11-20-00	0.0177 +/- 0.00143	<0.0162
11-20-00	12-04-00	0.0232 +/- 0.00160	<0.0117
12-04-00	12-18-00	0.0297 +/- 0.00176	<0.0130

TABLE B-2 (continued)
AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGE
GROSS BETA AND IODINE-131 ANALYSIS
INDICATOR SAMPLE
APQ-1

COLLECTION: BI-WEEKLY

UNITS: pCi/m³

Begin Date	End Date	Gross Beta LLD= 0.01	I-131 LLD= 0.07
12-20-99	01-04-00	0.0233 +/- 0.00150	<0.0147
01-04-00	01-17-00	0.0192 +/- 0.00160	<0.0128
01-17-00	01-31-00	0.0196 +/- 0.00150	<0.0130
01-31-00	02-14-00	0.0348 +/- 0.00189	<0.0110
02-14-00	02-28-00	0.0155 +/- 0.00141	<0.0133
02-28-00	03-13-00	0.0173 +/- 0.00144	<0.0139
03-13-00	03-28-00	0.0139 +/- 0.00127	<0.0146
03-28-00	04-10-00	0.0161 +/- 0.00147	<0.0134
04-10-00	04-25-00	0.0168 +/- 0.00136	<0.0189
04-25-00	05-08-00	0.0227 +/- 0.00166	<0.0137
05-08-00	05-23-00	0.0166 +/- 0.00135	<0.0110
05-23-00	06-05-00	0.0167 +/- 0.00146	<0.0223
06-05-00	06-19-00	0.0137 +/- 0.00132	<0.0102
06-19-00	07-03-00	0.0124 +/- 0.00128	<0.0145
07-03-00	07-17-00	0.0251 +/- 0.00169	<0.0117
07-17-00	07-31-00	0.0259 +/- 0.00167	<0.0128
07-31-00	08-14-00	0.0146 +/- 0.00169	<0.0275
08-14-00	08-28-00	0.0212 +/- 0.00164	<0.0224
08-28-00	09-11-00	0.0194 +/- 0.00157	<0.0158
09-11-00	09-25-00	0.0139 +/- 0.00140	<0.0128
09-25-00	10-09-00	0.0175 +/- 0.00155	<0.0123
10-09-00	10-23-00	0.0316 +/- 0.00196	<0.0151
10-23-00	11-06-00	0.0372 +/- 0.00211	<0.0134
11-06-00	11-20-00	0.0187 +/- 0.00158	<0.0164
11-20-00	12-04-00	0.0277 +/- 0.00185	<0.0160
12-04-00	12-18-00	0.0308 +/- 0.00195	<0.0120

TABLE B-2 (continued)
AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGE
GROSS BETA AND IODINE-131 ANALYSIS
INDICATOR SAMPLE
APP-1

COLLECTION: BI-WEEKLY

UNITS: pCi/m³

Begin Date	End Date	Gross Beta LLD= 0.01	I-131 LLD= 0.07
12-20-99	01-04-00	0.0276 +/- 0.00170	<0.0101
01-04-00	01-17-00	0.0223 +/- 0.00170	<0.0126
01-17-00	01-31-00	0.0126 +/- 0.00920	<0.0643
01-31-00	02-14-00	0.0376 +/- 0.00196	<0.0137
02-14-00	02-28-00	0.0184 +/- 0.00150	<0.0138
02-28-00	03-13-00	0.0194 +/- 0.00151	<0.0141
03-13-00	03-28-00	0.0156 +/- 0.00133	<0.0130
03-28-00	04-10-00	0.0178 +/- 0.00153	<0.0139
04-10-00	04-25-00	0.0179 +/- 0.00140	<0.0139
04-25-00	05-08-00	0.0237 +/- 0.00170	<0.0154
05-08-00	05-23-00	0.0197 +/- 0.00144	<0.0127
05-23-00	06-05-00	0.0181 +/- 0.00151	<0.0201
06-05-00	06-19-00	0.0137 +/- 0.00132	<0.0112
06-19-00	07-03-00	0.0161 +/- 0.00140	<0.0156
07-03-00	07-17-00	0.0261 +/- 0.00172	<0.0122
07-17-00	07-31-00	0.0271 +/- 0.00172	<0.0126
07-31-00	08-14-00	0.0152 +/- 0.00138	<0.0187
08-14-00	08-28-00	0.0197 +/- 0.00151	<0.0215
08-28-00	09-11-00	0.0192 +/- 0.00143	<0.0113
09-11-00	09-25-00	0.0133 +/- 0.00129	<0.0160
09-25-00	10-09-00	0.0160 +/- 0.00135	<0.0125
10-09-00	10-23-00	0.0306 +/- 0.00176	<0.0141
10-23-00	11-06-00	0.0365 +/- 0.00191	<0.0144
11-06-00	11-20-00	0.0174 +/- 0.00139	<0.0180
11-20-00	12-04-00	0.0248 +/- 0.00160	<0.0134
12-04-00	12-18-00	0.0292 +/- 0.00173	<0.0097

TABLE B-2 (continued)
AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGE
GROSS BETA AND IODINE-131 ANALYSIS
INDICATOR SAMPLE
APC-1

COLLECTION: BI-WEEKLY

UNITS: pCi/m³

Begin Date	End Date	Gross Beta LLD= 0.01	I -131 LLD= 0.07
12-20-99	01-04-00	0.0270 +/- 0.00160	<0.0129
01-04-00	01-17-00	0.0168 +/- 0.00150	<0.0145
01-17-00	01-31-00	0.0181 +/- 0.00150	<0.0121
01-31-00	02-14-00	0.0313 +/- 0.00184	<0.0131
02-14-00	02-28-00	0.0177 +/- 0.00148	<0.0098
02-28-00	03-13-00	0.0166 +/- 0.00142	<0.0116
03-13-00	03-28-00	0.0138 +/- 0.00126	<0.0117
03-28-00	04-10-00	0.0174 +/- 0.00151	<0.0142
04-10-00	04-25-00	0.0102 +/- 0.00114	<0.0114
04-25-00	05-08-00	0.0218 +/- 0.00163	<0.0139
05-08-00	05-23-00	0.0181 +/- 0.00139	<0.0097
05-23-00	06-05-00	0.0153 +/- 0.00142	<0.0163
06-05-00	06-19-00	0.0130 +/- 0.00129	<0.0127
06-19-00	07-03-00	0.0128 +/- 0.00131	<0.0159
07-03-00	07-17-00	0.0247 +/- 0.00165	<0.0154
07-17-00	07-31-00	0.0220 +/- 0.00158	<0.0116
07-31-00	08-14-00	0.0134 +/- 0.00154	<0.0244
08-14-00	08-28-00	0.0188 +/- 0.00143	<0.0165
08-28-00	09-11-00	0.0193 +/- 0.00146	<0.0151
09-11-00	09-25-00	0.0120 +/- 0.00117	<0.0126
09-25-00	10-09-00	0.0139 +/- 0.00129	<0.0115
10-09-00	10-23-00	0.0283 +/- 0.00170	<0.0135
10-23-00	11-06-00	0.0320 +/- 0.00179	<0.0103
11-06-00	11-20-00	0.0143 +/- 0.00128	<0.0144
11-20-00	12-04-00	0.0258 +/- 0.00162	<0.0109
12-04-00	12-18-00	0.0293 +/- 0.00173	<0.0097

TABLE B-2 (continued)
AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGE
GROSS BETA AND IODINE-131 ANALYSIS
INDICATOR SAMPLE
APE-30

COLLECTION: BI-WEEKLY

UNITS: pCi/m³

Begin Date	End Date	Gross Beta LLD= 0.01		I -131 LLD= 0.07
12-20-99	01-04-00	0.0303	+/- 0.00180	<0.0146
01-04-00	01-17-00	0.0217	+/- 0.00170	<0.0167
01-17-00	01-31-00	0.0206	+/- 0.00160	<0.0181
01-31-00	02-14-00	0.0372	+/- 0.00205	<0.0145
02-14-00	02-28-00	0.0158	+/- 0.00149	<0.0114
02-28-00	03-13-00	0.0178	+/- 0.00154	<0.0137
03-13-00	03-28-00	0.0163	+/- 0.00142	<0.0117
03-28-00	04-10-00	0.0177	+/- 0.00167	<0.0146
04-10-00	04-25-00	0.0175	+/- 0.00143	<0.0175
04-25-00	05-08-00	0.0228	+/- 0.00173	<0.0162
05-08-00	05-23-00	0.0188	+/- 0.00146	<0.0129
05-23-00	06-05-00	0.0192	+/- 0.00160	<0.0123
06-05-00	06-19-00	0.0142	+/- 0.00138	<0.0127
06-19-00	07-03-00	0.0163	+/- 0.00148	<0.0118
07-03-00	07-17-00	0.0272	+/- 0.00178	<0.0140
07-17-00	07-31-00	0.0293	+/- 0.00184	<0.0111
07-31-00	08-14-00	0.0141	+/- 0.00135	<0.0159
08-14-00	08-28-00	0.0245	+/- 0.00172	<0.0148
08-28-00	09-11-00	0.0192	+/- 0.00153	<0.0121
09-11-00	09-25-00	0.0143	+/- 0.00131	<0.0102
09-25-00	10-09-00	0.0146	+/- 0.00136	<0.0134
10-09-00	10-23-00	0.0311	+/- 0.00185	<0.0151
10-23-00	11-06-00	0.0331	+/- 0.00188	<0.0153
11-06-00	11-20-00	0.0190	+/- 0.00150	<0.0182
11-20-00	12-04-00	0.0257	+/- 0.00168	<0.0120
12-04-00	12-18-00	0.0288	+/- 0.00178	<0.0114

**TABLE B-3
AIR PARTICULATE FILTERS
GAMMA ISOTOPIC ANALYSIS**

COLLECTION: Quarterly

UNITS: pCi/m³

Sample Location	End Date	Cs-134 LLD 0.05	Cs-137 LLD 0.06
APG-1	03-28-00	<0.00244	<0.00212
	07-03-00	<0.00186	<0.00176
	09-25-00	<0.00181	<0.00167
	01-02-01	<0.00171	<0.00160
APQ-1	03-28-00	<0.00197	<0.00217
	07-03-00	<0.00215	<0.00152
	09-25-00	<0.00163	<0.00251
	01-02-01	<0.00104	<0.00256
APP-1	03-28-00	<0.00178	<0.00090
	07-03-00	<0.00223	<0.00227
	09-25-00	<0.00241	<0.00196
	01-02-01	<0.00225	<0.00198
APC-1	03-28-00	<0.00208	<0.00115
	07-03-00	<0.00199	<0.00190
	09-25-00	<0.00167	<0.00268
	01-02-01	<0.00204	<0.00175
APE-30	03-28-00	<0.00230	<0.00207
	07-03-00	<0.00230	<0.00209
	09-25-00	<0.00212	<0.00172
	01-02-01	<0.00163	<0.00178

**TABLE B-4
DRINKING/SURFACE WATER IODINE-131 ANALYSIS
INDICATOR SAMPLE
DWG/SWG-2**

COLLECTION: EVERY FOUR WEEKS

UNITS: pCi/liter

End Date	I-131* LLD = 1
01-04-00	< 0.79
01-31-00	< 0.90
02-28-00	<0.84
03-28-00	<0.89
04-25-00	<0.89
05-23-00	<0.89
06-19-00	<0.75
07-17-00	<0.87
08-14-00	<0.80
09-11-00	<0.86
10-09-00	<0.89
11-06-00	<0.88
12-04-00	<0.90

* Low Level Analysis

TABLE B-4 (continued)
DRINKING/SURFACE WATER IODINE-131 ANALYSIS
INDICATOR SAMPLE
DWE/SWE-5

COLLECTION: EVERY FOUR WEEKS

UNITS: pCi/liter

End Date	I-131* LLD = 1
01-04-00	< 0.87
01-31-00	< 0.86
02-28-00	<0.72
03-28-00	<0.83
04-25-00	<0.89
05-23-00	<0.88
06-19-00	<0.88
07-17-00	<0.89
08-14-00	<0.85
09-11-00	<0.90
10-09-00	<0.77
11-06-00	<0.90
12-04-00	<0.86

* Low Level Analysis

TABLE B-4 (continued)
DRINKING/SURFACE WATER IODINE-131 ANALYSIS
INDICATOR SAMPLE
DWP/SWP-7

COLLECTION: EVERY FOUR WEEKS

UNITS: pCi/liter

End Date	I-131* LLD = 1
01-04-00	< 0.83
01-31-00	< 0.89
02-28-00	<0.88
03-28-00	<0.88
04-25-00	<0.84
05-23-00	<0.90
06-19-00	<0.80
07-17-00	<0.86
08-14-00	<0.88
09-11-00	<0.84
10-09-00	<0.89
11-06-00	<0.87
12-04-00	<0.87

* Low Level Analysis

**TABLE B-5
DRINKING/SURFACE WATER GROSS BETA ANALYSIS
INDICATOR SAMPLE
DWG/SWG-2**

COLLECTION: QUARTERLY

UNITS: pCi/liter

End Date	BETA LLD = 4
03-28-00	6.55 +/- 2.43
06-19-00	6.38 +/- 2.47
09-11-00	5.33 +/- 2.32
12-04-00	12.13 +/- 3.93

TABLE B-5 (continued)
DRINKING/SURFACE WATER GROSS BETA ANALYSIS
INDICATOR SAMPLE
DWE/SWE-5

COLLECTION: QUARTERLY

UNITS: pCi/liter

End Date	BETA LLD = 4
03-28-00	3.43 +/- 2.19
06-19-00	4.72 +/- 2.33
09-11-00	4.00 +/- 2.25
12-04-00	7.52 +/- 3.49

TABLE B-5 (continued)
DRINKING/SURFACE WATER GROSS BETA ANALYSIS
INDICATOR SAMPLE
DWP/SWP-7

COLLECTION: QUARTERLY

UNITS: pCi/liter

End Date	BETA LLD = 4
03-28-00	7.82 +/- 2.47
06-19-00	2.27 +/- 2.17
09-11-00	5.83 +/- 2.30
12-04-00	9.76 +/- 3.66

**TABLE B-6
DRINKING/SURFACE WATER GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
DWG/SWG-2**

COLLECTION: QUARTERLY

UNITS: pCi/Liter

End Date	Mn-54 LLD=15	Co-58 LLD=15	Fe-59 LLD=30	Co-60 LLD=15	Zn-65 LLD=30	Nb-95 LLD=15	Zr-95 LLD=30	Cs-134 LLD=15	Cs-137 LLD=18	Ba-140 LLD=60	La-140 LLD=15
03-28-00	<5.53	<5.16	<9.55	<2.35	<8.28	<2.98	<8.17	<4.27	<5.64	<18.2	<6.65
06-19-00	<4.69	<4.30	<9.86	<5.82	<11.1	<4.80	<8.28	<4.89	<5.77	<17.1	<5.99
09-11-00	<3.96	<3.59	<8.07	<5.02	<6.21	<4.44	<9.27	<4.25	<5.07	<20.2	<5.51
12-04-00	<4.53	<5.08	<9.89	<5.30	<12.5	<5.60	<8.51	<5.57	<5.70	<18.2	<8.95

TABLE B-6 (continued)
DRINKING/SURFACE WATER GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
DWE/SWE-5

COLLECTION: QUARTERLY

UNITS: pCi/Liter

End Date	Mn-54 LLD=15	Co-58 LLD=15	Fe-59 LLD=30	Co-60 LLD=15	Zn-65 LLD=30	Nb-95 LLD=15	Zr-95 LLD=30	Cs-134 LLD=15	Cs-137 LLD=18	Ba-140 LLD=60	La-140 LLD=15
03-28-00	<4.05	<3.01	<8.38	<2.43	<8.02	<4.72	<6.87	<4.72	<4.41	<14.0	<4.86
06-19-00	<6.01	<3.78	<11.3	<6.15	<11.1	<5.75	<8.87	<3.95	<5.16	<18.8	<6.66
09-11-00	<4.33	<3.99	<7.22	<4.67	<9.37	<5.07	<6.02	<5.13	<3.77	<11.4	<5.06
12-04-00	<3.90	<4.67	<11.5	<5.33	<9.81	<3.97	<7.88	<4.74	<5.30	<16.9	<5.15

TABLE B-6 (continued)
DRINKING/SURFACE WATER GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
DWP/SWP-7

COLLECTION: QUARTERLY

UNITS: pCi/Liter

End Date	Mn-54 LLD=15	Co-58 LLD=15	Fe-59 LLD=30	Co-60 LLD=15	Zn-65 LLD=30	Nb-95 LLD=15	Zr-95 LLD=30	Cs-134 LLD=15	Cs-137 LLD=18	Ba-140 LLD=60	La-140 LLD=15
03-28-00	<3.10	<3.59	<8.39	<5.04	<13.6	<6.45	<8.53	<4.24	<6.01	<18.3	<8.58
06-19-00	<4.82	<5.37	<10.0	<5.59	<11.0	<6.20	<10.1	<5.38	<4.49	<20.8	<7.10
09-11-00	<5.60	<5.05	<7.93	<3.19	<10.5	<3.47	<6.40	<4.73	<5.43	<17.7	<8.16
12-04-00	<4.00	<3.75	<8.50	<4.41	<7.94	<3.63	<6.81	<4.09	<4.34	<12.1	<4.17

**TABLE B-7
DRINKING/SURFACE WATER TRITIUM ANALYSIS**

COLLECTION: QUARTERLY

UNITS: pCi/liter

Sample Location	End Date	H-3 LLD=2000
DWG-2	03-28-00	<539.07
	06-19-00	<536.11
	09-11-00	<552.00
	12-04-00	<553.00
DWE-5	03-28-00	<541.35
	06-19-00	<533.74
	09-11-00	<558.00
	12-04-00	<559.00
DWP-7	03-28-00	<538.39
	06-19-00	<537.37
	09-11-00	<560.00
	12-04-00	<571.00

**TABLE B-8
GROUND WATER
TRITIUM AND GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
GWK-1**

COLLECTION: QUARTERLY

UNITS: pCi/Liter

Collection Date	H-3 LLD=2,000	Mn-54 LLD=15	Co-58 LLD=15	Fe-59 LLD=30	Co-60 LLD=15	Zn-65 LLD=30	Nb-95 LLD=15	Zr-95 LLD=30	Cs-134 LLD=15	Cs-137 LLD=18	Ba-140 LLD=60	La-140 LLD=15
01-17-00		< 2.90	< 5.13	< 8.87	< 2.39	< 7.16	< 4.93	< 5.24	< 6.53	< 5.75	< 18.40	< 5.74
01-17-00	1197											
*01-17-00		< 4.11	< 2.32	< 5.94	< 5.04	< 6.06	< 4.77	< 8.26	< 4.26	< 4.54	< 9.51	< 5.39
*01-17-00	1176											
04-18-00		< 6.81	< 5.59	< 12.40	< 3.25	< 10.30	< 6.10	< 7.82	< 5.74	< 6.27	< 19.90	< 5.18
04-18-00	1435											
07-17-00		< 4.61	< 5.33	< 8.63	< 6.38	< 10.30	< 4.86	< 8.35	< 5.39	< 3.40	< 21.30	< 5.51
07-17-00	738											
10-16-00		< 3.76	< 3.20	< 6.60	< 4.37	< 9.15	< 6.31	< 5.26	< 3.51	< 4.73	< 16.17	< 4.94
10-16-00	566											

* Duplicate Sample

**TABLE B-9
SHORELINE SOIL
GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLES
SHWK-1 & SHWE-3**

COLLECTION: SEMI-ANNUAL

UNITS: pCi/kg (dry)

Sample Location	Collection Date	Mn-54	Co-58	Co-60	Cs-134 LLD= 150	Cs-137 LLD = 180
SHWK-1	04-18-00	< 48.4	< 50.3	< 54.4	< 46.8	85.4 +/- 20.5
	10-16-00	< 27.7	< 23.5	< 34.1	< 26.7	< 33.4
SHWE-3	04-18-00	< 50.2	< 43.1	< 57.1	< 47.9	< 50.7
	10-16-00	< 44.4	< 37.0	< 42.3	< 37.1	< 43.3

TABLE B-10
MILK
IODINE-131 AND GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
MKQ-5

COLLECTION: MONTHLY WHEN ANIMALS ARE ON PASTORE UNITS: pCi/liter

Collection Date	I-131* LLD= 1	Cs-134 LLD= 15	Cs-137 LLD= 18	Ba-140 LLD= 60	La-140 LLD= 15
01-18-00	<0.76	<7.88	<8.94	<27.1	<9.65
02-15-00	<0.84	<6.78	<6.59	<26.3	<9.54
03-21-00	<0.81	<6.56	<7.04	<24.9	<6.21
04-18-00	<0.83	<7.63	<7.67	<24.6	<9.56
05-16-00	<0.74	<7.38	<6.50	<23.4	<6.33
06-20-00	<0.72	<5.16	<5.08	<16.8	<5.61
07-18-00	<0.87	<7.12	<7.81	<25.5	<8.53
08-15-00	<0.80	<6.69	<8.00	<28.7	<8.18
09-18-00					
09-19-00					
10-17-00					
11-21-00	<0.84	<5.07	<7.49	<19.0	<7.13
12-19-00	<0.87	<7.44	<7.48	<25.1	<9.10

* Low Level Analysis

TABLE B-10 (continued)
MILK
IODINE-131 AND GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
MKR-40

COLLECTION: MONTHLY WHEN ANIMALS ARE ON PASTORE UNITS: pCi/liter

Collection Date	I-131* LLD= 1	Cs-134 LLD= 15	Cs-137 LLD= 18	Ba-140 LLD= 60	La-140 LLD= 15
04-18-00	<0.77	<5.91	<8.52	<18.6	<8.00
05-15-00	<0.75	<5.86	<6.70	<19.5	<6.49
06-20-00	<0.88	<7.31	<6.80	<24.9	<8.54
07-17-00	<0.85	<5.94	<8.48	<26.6	<7.94
08-14-00	<0.88	<5.57	<7.33	<20.6	<4.10
09-18-00	<0.76	<5.18	<9.55	<23.1	<10.2
10-16-00	<0.81	<6.05	<9.26	<19.6	<6.41
11-20-00	<0.72	<5.63	<7.14	<24.3	<8.57
12-18-00	<0.87	<6.75	<8.73	<23.8	<6.69

* Low Level Analysis

**TABLE B-11
FISH
GAMMA ISOTOPIC ANALYSIS
CONTROL SAMPLE
FH-1**

COLLECTION: ANNUAL

UNITS: pCi/kg (wet)

Species	Collection Date	Mn-54 LLD=130	Co-58 LLD=130	Fe-59 LLD=260	Co-60 LLD=130	Zn-65 LLD=260	Cs-134 LLD=130	Cs-137 LLD=150
Buffalo	10/23/00	<15.9	<9.5	<38.9	<15.9	<22.3	<15.4	<11.2
Carp	10/23/00	<13.2	<13.5	<32.2	<12.0	<22.4	<13.3	<13.1
Catfish	10/23/00	<10.7	<10.3	<27.6	<10.6	<25.6	<11.0	<10.0
Shad	10/23/00	<18.8	<24.5	<45.8	<14.7	<55.4	<16.4	<20.8
Mullet	10/23/00	<10.7	<13.1	<27.0	<12.5	<38.3	<13.7	<14.6

TABLE B-11 (continued)
FISH
GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
FH-2

COLLECTION: ANNUAL

UNITS: pCi/kg (wet)

Species	Collection Date	Mn-54 LLD=130	Co-58 LLD=130	Fe-59 LLD=260	Co-60 LLD=130	Zn-65 LLD=260	Cs-134 LLD=130	Cs-137 LLD=150
Buffalo	10/24/00	<15.5	<13.4	<40.4	<9.6	<43.2	<15.3	<14.8
Catfish	10/24/00	<11.4	<13.2	<39.0	<14.4	<33.4	<12.6	<12.2
Shad	10/24/00	<16.4	<20.9	<40.2	<25.2	<34.6	<17.2	<7.2
Mullet	10/24/00	<14.0	<13.1	<33.3	<16.0	<37.8	<11.4	<12.0

**TABLE B-12
BROAD LEAF VEGETATION
IODINE-131 AND GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
BLQ-1**

COLLECTION: MONTHLY

UNITS: pCi/kg (wet)

Collection Date	I-131 LLD= 60	Cs-134 LLD= 60	Cs-137 LLD= 80
01-10-00	<57.7	<46.7	<40.6
02-07-00	<57.8	<35.1	<29.6
03-06-00	<24.5	<18.1	<20.7
04-03-00	<58.4	<46.4	<45.9
05-02-00	<57.4	<55.7	<61.6
05-30-00	<45.1	<52.7	<63.1
06-26-00	<59.6	<49.8	<54.7
07-24-00	<37.6	<54.1	<51.0
08-21-00	<49.8	<41.5	<42.6
09-18-00	<32.8	<25.1	<33.9
10-16-00	<52.1	<36.0	<37.2
11-13-00	<37.3	<17.9	<31.1
12-11-00	<48.2	<35.1	<51.5

TABLE B-12 (continued)
BROAD LEAF VEGETATION
IODINE-131 AND GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
BLB-1

COLLECTION: MONTHLY

UNITS: pCi/kg (wet)

Collection Date	I-131 LLD= 60	Cs-134 LLD= 60	Cs-137 LLD= 80
01-10-00	<57.1	<36.4	<33.8
02-07-00	<48.7	<46.1	<44.2
03-06-00	<22.4	<15.1	<18.4
04-03-00	<43.7	<41.7	<43.9
05-02-00	<57.6	<53.3	<57.8
05-30-00	<42.4	<45.4	<47.1
06-26-00	<59.7	<51.2	<42.0
07-24-00	<24.8	<22.0	<34.3
08-21-00	<46.6	<48.6	<21.6
09-18-00	<29.7	<34.2	<36.4
10-16-00	<41.3	<58.8	<42.9
11-13-00	<59.7	<34.8	<28.8
12-11-00	<44.4	<45.3	<61.5

TABLE B-12 (continued)
BROAD LEAF VEGETATION
IODINE-131 AND GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
BLK-15

COLLECTION: MONTHLY

UNITS: pCi/kg (wet)

Collection Date	I-131 LLD= 60	Cs-134 LLD= 60	Cs-137 LLD= 80
01-10-00	<59.2	<41.0	<36.8
02-07-00	<33.1	<36.8	<34.5
03-06-00	<26.0	<19.0	<24.9
04-03-00	<59.4	<51.0	<37.7
05-02-00	<52.2	<51.3	<40.9
05-30-00	<54.6	<43.8	<45.4
06-26-00	<37.2	<33.4	<39.3
07-24-00	<34.2	<34.5	<40.5
08-21-00	<38.6	<27.9	<35.8
09-18-00	<27.2	<18.2	<26.5
10-16-00	<59.4	<43.9	<39.4
11-13-00	<53.4	<30.5	<27.9
12-11-00	<57.1	<59.8	<45.8

TABLE B-12 (continued)
BROAD LEAF VEGETATION
IODINE-131 AND GAMMA ISOTOPIC ANALYSIS
INDICATOR SAMPLE
BLE-20

COLLECTION: MONTHLY

UNITS: pCi/kg (wet)

Collection Date	I-131 LLD= 60	Cs-134 LLD= 60	Cs-137 LLD= 80
01-10-00	<58.0	<35.7	<37.1
02-07-00	<53.9	<43.9	<35.9
03-06-00	<31.3	<27.3	<21.0
04-03-00	<33.9	<27.3	<38.5
05-02-00	<59.2	<40.4	<53.8
05-30-00	<40.3	<37.3	<29.4
06-26-00	<58.5	<57.8	<67.6
07-24-00	<28.6	<23.8	<22.7
08-21-00	<59.0	<44.3	<35.8
09-18-00	<44.9	<37.5	<34.8
10-16-00	<42.9	<51.0	<46.2
11-13-00	<58.6	<37.5	<28.7
12-11-00	<53.6	<53.1	<50.2