Entergy Nuclear South
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-3093
Tel 504-739-6780
Fax 504-739-6698
ttanker@entergy.com

Tom Tankersley
Licensing Manager
Waterford 3

W3F1-2006-0017

April 27, 2006

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Annual Radiological Environmental Operating Report - 2005
Waterford Steam Electric Station, Unit 3 (Waterford 3)
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

Attached is the Annual Radiological Environmental Operating Report for the period of January 1 through December 31, 2005. This report is submitted pursuant to the requirements of Waterford 3 Technical Specification Section 6.9.1.7.

If there are any questions please contact S.T. Fontenot at (504) 739-6656.

There are no new commitments contained in this submittal.

Sincerely,

T.E. Tankersley
Licensing Manager

TET/STF/stf

Attachment(s)

IE25

cc: Mr. Bruce S. Mallett
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Waterford Steam Electric Station Unit 3
P.O. Box 822
Killona, LA 70066-0751

U. S. Nuclear Regulatory Commission
Attn: Mr. M. Fields
Mail Stop O-07D1
Washington, DC 20555-0001

Wise, Carter, Child & Caraway
ATTN: J. Smith
P.O. Box 651
Jackson, MS 39205

Winston & Strawn
ATTN: N.S. Reynolds
1700 K Street, NW
Washington, DC 20006-3817

Attachment 1 To

W3F1-2006-0017

Annual Radiological Environmental Operating Report - 2005

Entergy

Annual Radiological Environmental Operating Report

January 1, 2005 - December 31, 2005

Waterford 3 Steam Electric Station
Entergy Operations, Inc.

Docket Number 50-382 License Number NPF-38

Originator: Ann V. Dubois, Chemistry Technician — 04-03-06 Date

Reviewed By: Corey M. Zeringue, Chemistry Supervisor — 4-19-06 Date

David M. Rieder, Quality Assurance — 4/19/2006 Date

Approved By: John L. Hofnsby, Chemistry Superintendent — 4/19/2006 Date

TABLE OF CONTENTS

SUMMARY 1

1.0 INTRODUCTION 5

1.1 Radiological Environmental Monitoring Program 5

1.2 Pathways Monitored 5

1.3 Land Use Census 5

2.0 INTERPRETATION AND TRENDS OF RESULTS 20

2.1 Air Particulate and Radioiodine Sample Results 20

2.2 Thermoluminescent Dosimetry Sample Results 20

2.3 Water Sample Results 21

2.4 Sediment Sample Results 22

2.5 Milk Sample Results 22

2.6 Fish Sample Results 22

2.7 Broad Leaf Vegetation Sample Results 23

2.8 Land Use Census Results 23

2.9 Interlaboratory Comparison Results 23

3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY 26

3.1 2005 Program Results Summary 26

LIST OF TABLES

TABLE 1.1	RADIOLOGICAL ENVIRONMENTAL SAMPLING PROGRAM	6
TABLE 2.1	BIENNIAL LAND USE CENSUS RESULTS	24
TABLE 3.1	RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY	27

LIST OF FIGURES

FIGURE 1-1	REMP SAMPLES WITHIN 2 MILES OF WATERFORD 3	17
FIGURE 1-2	REMP SAMPLES WITHIN 10 MILES OF WATERFORD 3	18
FIGURE 1-3	REMP SAMPLES WITHIN 50 MILES OF WATERFORD 3	19
FIGURE 2-1	TLD RADIATION DOSE COMPARISON (BY YEAR)	25

LIST OF ATTACHMENTS

ATTACHMENT 1	2005 RADIOLOGICAL MONITORING REPORT SUMMARY OF MONITORING RESULTS	31
ATTACHMENT 2	STATISTICAL COMPARISONS	48
ATTACHMENT 3	REVISED ODCM TABLES	56

Summary

The Annual Radiological Environmental Operating Report presents data obtained through analyses of environmental samples collected for Waterford 3's (W3) Radiological Environmental Monitoring Program (REMP) for the period January 1 through December 31, 2005. This report fulfills the requirements of W3 Technical Specification 6.9.1.7.

During 2005, gross beta radioactivity was detected in air and drinking/surface water locations. Results obtained at the indicator locations were similar to those obtained at the control location. Therefore, levels continue to remain at background.

Cesium-137, a man-made nuclide, was detected during 2005 at indicator sediment location SHWK-1. This is consistent with results obtained from the preoperational program and previous years of operation. 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 preoperational values, the Cesium-137 level detected in 2005 is more than likely attributable to weapons testing fallout.

Cesium-137 was detected during 2005 at control milk location MKR-38. This is consistent with results obtained from the preoperational program and previous years of operation. The level of Cesium-137 in the sample was below both the reporting level and the LLD level required by the Waterford 3 TRM.

Tritium was detected in two samples during 2005 at indicator surface water location SWK-1. Tritium is discharged to this location during maintenance periods only. The primary pathway is through circulating water discharge. The levels of tritium in these samples are below both the reporting level and the LLD level required by the Waterford 3 TRM.

Radiological Environmental Monitoring Program

W3 established the REMP prior to the station becoming operational (1985) to provide data on background radiation and radioactivity normally present in the area. W3 has continued to monitor the environment by sampling air, water, sediment, milk, fish and broad leaf vegetation, as well as measuring radiation directly.

The REMP includes sampling indicator and control locations within a 38-mile radius of the plant. The REMP utilizes indicator locations near the site to show any increases or buildup of radioactivity that might occur due to station operation, and control locations farther away from the site to indicate the presence of only naturally occurring radioactivity. W3 compares indicator results with control, preoperational, and previous years operational results to assess any impact W3 might have on the surrounding environment.

In 2005, W3 collected environmental samples for radiological analysis. Based on the comparison results of indicator locations with control locations and previous studies, it was concluded that overall W3 operations had no significant impact on plant environs. The review of 2005 data, in many cases, showed undetectable radiation levels in the environment and near background level in significant pathways associated with W3.

Harmful Effects or Irreversible Damage

The REMP did not detect any harmful effects or evidence of irreversible damage in 2005. Therefore, no analysis or planned course of action to alleviate problems was necessary.

Reporting Levels

W3's review indicates that no samples equaled or exceeded reporting levels for radioactivity concentration in environmental samples, as outlined in Technical Requirements Manual (TRM) Table 3.12-2 when averaged over any calendar quarter, due to W3 effluents. Therefore, 2005 results did not trigger any Radiological Monitoring Program Special Reports.

Radioactivity Not Attributable to W3

The W3 REMP detected radioactivity attributable to other sources twice. These include the 25th Chinese nuclear test explosion in 1980, and the radioactivity plume release due to reactor core degradation at the Chernobyl Nuclear Power Plant in 1986.

Comparison to State Program

W3 compared REMP data to the monitoring program of the Environmental Radiological Laboratory – Department of Environmental Quality Laboratory Services Division (ERL-DEQLSD). The ERL-DEQLSD and the W3 REMP entail similar radiological environmental monitoring program requirements. Both programs have obtained similar results over previous years.

Sample Deviations

- **Milk Samples**

  Milk samples for the 3rd and 4th quarter of 2005 were unavailable from indicator location MKE-3 due to cows not producing enough milk. One sample from control location MKR-40 was unavailable during the 1st quarter due to owner selling the cows. With the absence of milk samples at these locations, broad leaf vegetation sampling was performed as required by TRM Table 3.12-1.

- **Air Samples**

  The air sample locations listed below failed to meet the requirement for sample continuity. As described in footnote (1) of TRM Table 3.12-1, deviations are permitted from the required sampling schedule due to malfunction of sampling equipment and other legitimate reasons.

Location	Sample period	Explanation of Deviation
APP-1	04/18/05 - 05/02/05	Sample pump tripped
APE-30	04/18/05 - 05/02/05	Loss power to pump
APF-1	07/07/05 - 07/18/05	Flow rate unsatisfactory
APP-1	08/29/05 - 09/08/05	Loss power during hurricane Katrina
APE-30	08/29/05 - 09/27/05	Loss power during hurricane Katrina

- **TLDs**

  During the third quarter, TLDs from station R-1 were removed from their location and returned to Waterford 3. Another set of TLDs were placed at this location and read at the end of the quarter.

- **Missed Samples**

  TLDs located at stations G-2 and G-4 were missing at the time of the first quarter exchange. TLDs located at station J-15 were missing at the time of the second quarter exchange. TLDs located at stations F-2 and G-4 were missing at the time of the third quarter exchange.

- **Required Lower Limit of Detection (LLD) Values**

  All LLDs during this reporting period were within the acceptable limits required by the W3 TRM.

- **Unavailable Results**

  W3 received analytical results in adequate time for inclusion in this report. In addition, W3's review identified no missing results.

- **Program Modifications**

  The following changes were made to the ODCM during 2005:

  - The description for TLD location G-4 and J-15 was revised.
  - Milk location MKR-40 was deleted from the program.
  - Milk location MKR-38 was added to the program.

Attachments

Attachment 1 contains results of air, TLD, water, sediment, milk, fish and broad leaf vegetation collected in 2005. TLDs were analyzed by Waterford-3 Dosimetry. All remaining samples were analyzed by the River Bend (RBS) Environmental Laboratory. Attachment 1 also contains River Bend's participation in the interlaboratory comparison program during 2005.

Attachment 2 contains statistical comparisons of:

- TLD measurements from stations grouped by distance
- TLD radiation dose to historical data by location
- Gross beta activity measurements on air particulate filters
- Gross beta activity measurements in surface/drinking water samples

Attachment 3 contains revised ODCM tables.

1.0 Introduction

1.1 Radiological Environmental Monitoring Program

W3 established the REMP to ensure that plant operating controls properly function to minimize any associated radiation endangerment to human health or the environment. The REMP is designed for:

- Analyzing important pathways for anticipated types and quantities of radionuclides released into the environment.
- Considering the possibility of a buildup of long-lived radionuclides in the environment and identifying physical and biological accumulations that may contribute to human exposures.
- Considering the potential radiation exposure to plant and animal life in the environment surrounding W3.
- Correlating levels of radiation and radioactivity in the environment with radioactive releases from station operation.

1.2 Pathways Monitored

The airborne, direct radiation, waterborne and ingestion pathways are monitored as required by W3 TRM Table 3.12-1. A description of the W3 REMP utilized to monitor the exposure pathways is described in Table 1.1 and shown in Figures 1-1, 1-2 and 1-3.

Section 2.0 of this report provides a discussion of 2005 sampling results with Section 3.0 providing a summary of results for the monitored exposure pathways.

1.3 Land Use Census

W3 conducts a land use census biennially, as required by Section 3.12.2 of the TRM. The purpose of this census is to identify changes in uses of land within five miles of W3 that would require modifications to the REMP and the Offsite Dose Calculation Manual (ODCM). The most important criteria during this census are to determine the location in each sector of the nearest:

1) Residence
2) Animal milked for human consumption
3) Garden of greater than 50 m^2 (500 ft^2) producing broad leaf vegetation.

W3 conducts the land use census by:

- Field surveys in each meteorological sector out to five miles in order to confirm:
  - Nearest permanent residence
  - Nearest garden and approximate size
  - Nearest beef cow
  - Nearest food product
  - Nearest milking animal
- Identifying locations on maps, measuring distances to W3 and recording results on data sheets.
- Comparing current census results to previous results.

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Airborne	**Radioiodine and Particulates** Three samples from close to the three SITE BOUNDARY locations, in different sectors, in or near sectors having the highest calculated annual average ground level D/Q.	**APQ-1 (NW, 0.81 Miles)** – (West bank) Located in soybean/sugarcane field off LA 18 approximately 0.6 miles east of LA 18/3141 intersection. **APF-1 (ESE, 0.35 Miles)** – (West bank) Located on north side of Secondary Meteorological Tower. **APC-1 (NE, 0.67 Miles)** – (East bank) Located inside the Little Gypsy Cooling Water Intake Structure fence enclosure.	Continuous sampler operation with sample collection bi-weekly, or more frequently if required by dust loading.	Radioiodine Canister – I-131 analysis bi-weekly. Particulate Sampler – Gross beta radioactivity analysis following filter change. Gamma isotopic analysis of composite (by location) quarterly.
	Radioiodine and Particulates One sample from the vicinity of a community having the highest calculated annual average ground level D/Q.	**APP-1 (WNW, 0.84 Miles)** – (West bank) Located in soybean/sugarcane field at northwest corner of Short St. in Killona.		
	Radioiodine and Particulates One sample from a control location, as for example 15 -30 km distant and in the least prevalent wind direction.	**APE-30 (E, 25.2 Miles)** – (West bank) Located on the roof of the Entergy Office building on Delaronde St. in Algiers. (Control)		

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	**A-2 (N, 1.27 Miles)** – (East bank) Located on a utility pole on LA 628 near the Zephrin L. Perriloux Fire House. **B-1 (NNE, 0.75 Miles)** – (East bank) On fence enclosing the transmission tower 0.3 miles west (up-river) from Little Gypsy on LA 628. **C-1 (NE, 0.67 Miles)** – (East bank) On fence enclosing the Little Gypsy Cooling Water Intake on LA 628 near APC-1. **D-2 (ENE, 1.24 Miles)** – (East bank) Located approximately 0.3 miles east of Little Gypsy Power Station on stop sign post located at the peak of the levee on the west entrance road through the Bonnet Carre Spillway.	Quarterly	Gamma dose quarterly.

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	**E-1 (E, 0.41 Miles)** – (West bank) Located on utility pole along LA 18 approximately 0.3 miles east of Waterford 3 plant entrance. **F-2 (ESE, 1.15 Miles)** – (West bank) Located on southeast corner of fence enclosure surrounding the Entergy sub station 0.2 miles south of LA 18 on LA 3142. **G-2 (SE, 1.26 Miles)** – (West bank) Located on fence east of LA 3142 approximately 0.3 miles north of railroad overpass. **H-2 (SSE, 1.54 Miles)** – (West bank) Located off LA 3142 on southwest edge of fence along shell road 0.4 miles north of LA 3127/3142 intersection.	Quarterly	Gamma dose quarterly.

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	TLDs An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	**J-2 (S, 1.38 Miles)** – (West bank) Located on fence enclosure for valve station south of LA 3127 approximately 0.6 miles west of LA 3127/3142 intersection. **K-1 (SSW, 1.06 Miles)** – (West bank) Located on stop sign at entrance to Entergy Education Center on LA 3127. **L-1 (SW, 1.06 Miles)** – (West bank) Located on gated entrance off of LA 3127 approximately 1.6 miles west of LA 3127/3142 intersection. **M-1 (WSW, 0.76 Miles)** – (West bank) Located on south gate of Waterford 1 and 2 fuel oil storage tank enclosure. **N-1 (W, 0.98 Miles)** – (West bank) Located on pole at corner of Railroad Avenue and School House Road.	Quarterly	Gamma dose quarterly.

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	**P-1 (WNW, 0.84 Miles)** – (West bank) Located on fence enclosing air sample station APP-1. **Q-1 (NW, 0.81 Miles)** – ((West bank) Located on fence enclosing air sample station APQ-1. **R-1 (NNW, 0.51 Miles)** – (West bank) Located at Waterford 1 and 2 Cooling Water Intake Structure on the catwalk.	Quarterly	Gamma dose quarterly.
	TLDs An outer ring of stations, 1 in 10 of the meteorological sectors in the 6- to 8-km range from the site.	**A-5 (N, 4.59 Miles)** – (East bank) Located on utility pole at intersection of Oswald Avenue and US 61.		

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An outer ring of stations, 1 in 10 of the meteorological sectors in the 6- to 8-km range from the site.	**B-4 (NNE, 3.75 Miles)** – (East bank) Located on utility pole guide wire next to transmission tower south of weigh station on US 61 at St. John/St. Charles Parish line. **D-5 (ENE, 4.09 Miles)** – (East bank) Located on gate on shell road approximately 0.1 miles north of US61/LA48 intersection. **F-4 (ESE, 3.53 Miles)** – (West bank) Located on utility pole behind house at 646 Aquarius St. in Hahnville.	Quarterly	Gamma dose quarterly.

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An outer ring of stations, 1 in 10 of the meteorological sectors in the 6- to 8-km range from the site.	**E-5 (E, 4.08 Miles)** – (East bank) Located on the Norco Substation fence enclosure at the end of Wesco Street off of LA 48. **G-4 (SE, 3.30 Miles)** – (West bank) Located on pole on LA 3160 approximately 0.1 miles north of railroad track. **H-8 (SSE, 8.13 Miles)** – (West bank) Located on a road sign on south side of HWY 90 directly in front of Hahnville High School approximately 0.1 miles east of Tiger Drive. **P-6 (WNW, 5.58 Miles)** – (West bank) Located on a fence surrounding the communications tower at the LA 640/railroad track intersection. **Q-5 (NW, 5.01 Miles)** – (West bank) Located on utility pole along LA 18 across from Mississippi River marker 137.	Quarterly	Gamma dose quarterly.

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An outer ring of stations, 1 in 10 of the meteorological sectors in the 6- to 8-km range from the site.	**R-6 (NNW, 5.52 Miles)** – (East bank) Located on fence enclosure approximately 0.2 miles west of US 61 on LA 3223 near railroad crossing.	Quarterly	Gamma dose quarterly.
	TLDs The balance of the stations to be in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control stations.	**F-9 (ESE, 8.18 Miles)** – (East bank) Located on entrance gate to Destrehan Substation just north of railroad tracks on Jonathan Street approximately 1.5 miles east of Luling-Destrehan Bridge, off of LA 48. **G-8 (SE, 7.74 Miles)** – (West bank) Located on southern most corner of the back fence of Entergy Office in Luling. **E-15 (E, 11.7 Miles)** – (East bank) Located on Kenner Substation fence enclosure on Alliance Ave approximately 0.1 miles from LA 48.		

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** The balance of the stations to be in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control stations.	**J-15 (S, 11.7 Miles)** - (West bank) Located on pole near the LA 631/Hwy 90 intersection in Des Allemands. **E-30 (E, 25.2 Miles)** - (West bank) Located at entrance to the Entergy Office on Delaronde St. in Algiers. (Control)	Quarterly	Gamma dose quarterly.
Waterborne	**Surface Water** One sample upstream One sample downstream	**SWP-7 (WNW, 7.37 Miles)** - (West bank) Located at St. John Parish Waterworks off LA 18 in Edgard. (Control) **SWF-2 (ESE, 1.51 Miles)** - (West bank) Located at Dow Chemical Plant drinking water canal. **SWE-5 (E, 4.59 Miles)** - (East bank) Located at St. Charles Parish Waterworks off LA 48 in New Sarpy. **SWK-1 (SSW, 0.49 Miles)** - (West bank) Located at 40 Arpent Canal south of the plant. The canal is northwest of the shell access road/railroad track intersection.	Composite sample over one quarter period.	Gamma isotopic analysis quarterly. Composite for tritium analysis quarterly.

Table 1.1
Radiological Environmental Sampling Program

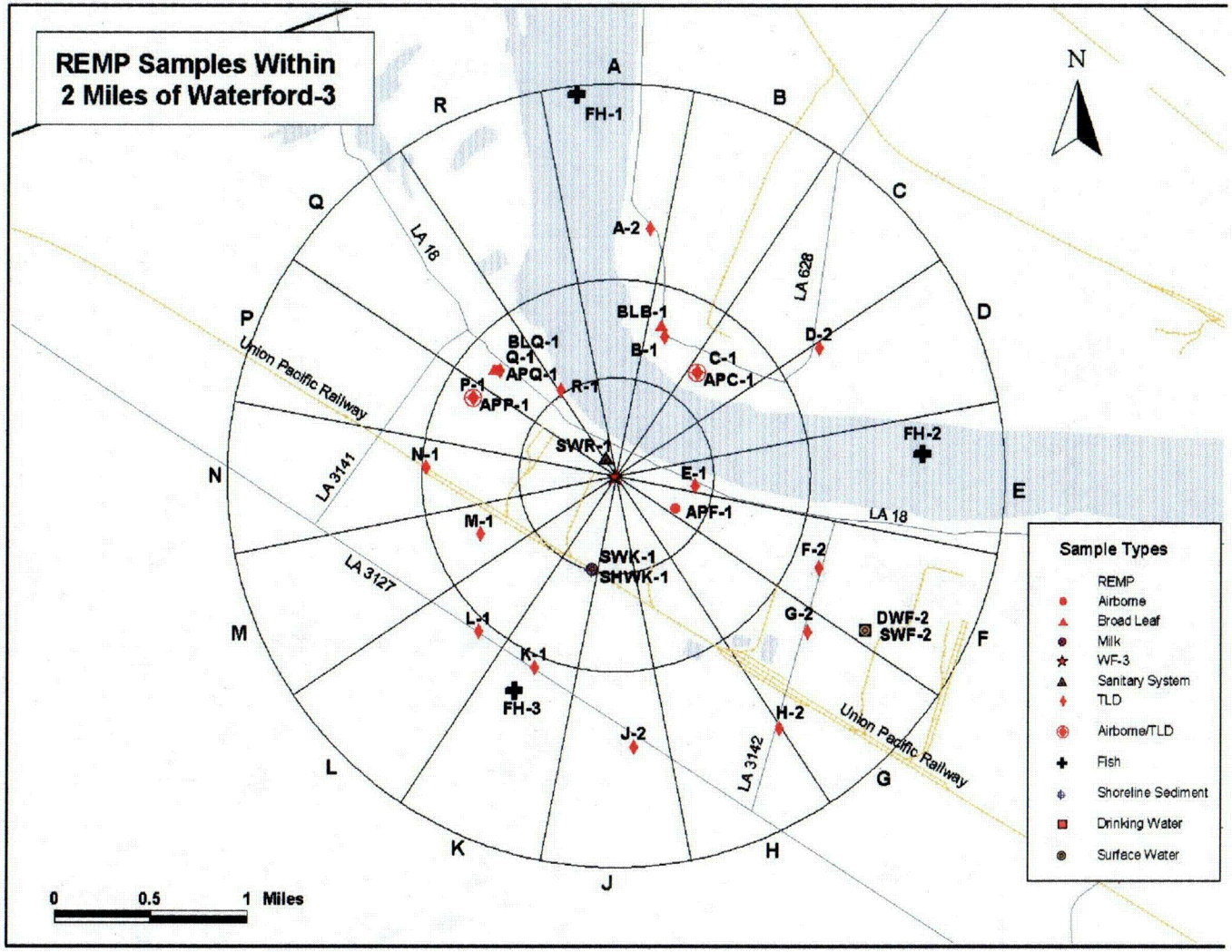
Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Waterborne	**Drinking Water** One sample upstream One sample downstream	**DWP-7 (WNW, 7.37 Miles)** - (West bank) Located at St. John Parish Waterworks off LA 18 in Edgard. (Control) **DWF-2 (ESE, 1.51 Miles)** - (West bank) Located at Dow Chemical Plant drinking water canal. **DWE-5 (E, 4.59 Miles)** - (East bank) Located at St. Charles Parish Waterworks off of LA 48 in New Sarpy.	Composite sample over one month period when I-131 analysis is performed, quarterly composite otherwise.	I-131 analysis on each composite when the dose calculated for the consumption of the water is greater than one mrem per year. Composite for gross beta and gamma isotopic analyses quarterly. Composite for tritium analysis quarterly.
	Sediment from Shoreline One sample upstream One sample downstream	**SHWQ-6 (NW, 5.99 Miles)** – (East bank) Located of LA 628 approximately 0.1 miles east of Reserve ferry landing. (Control) **SHWE-3 (E, 2.99 Miles)** – (West bank) Located at Foot Ferry landing off LA 18 in Taft. **SHWK-1 (SSW, 0.49 Miles)** – (West bank) Located at 40 Arpent Canal south of plant. The canal is northwest of the shell access road/railroad track intersection.	Annually	Gamma isotopic analysis annually.
Ingestion	**Milk** Samples from milking animals in the three locations within 5 km distance having the highest dose potential. If there are none, then, one sample from milking animals in each of the three areas between 5 to 8 km distant where doses are calculated to be greater than 1 mrem per year.	**MKE-3 (E, 2.4 Miles)** - (West bank) Located at the Zeringue's house on LA 18 in Taft.	Quarterly	Gamma isotopic and I-131 analysis quarterly.

Table 1.1

Radiological Environmental Sampling Program

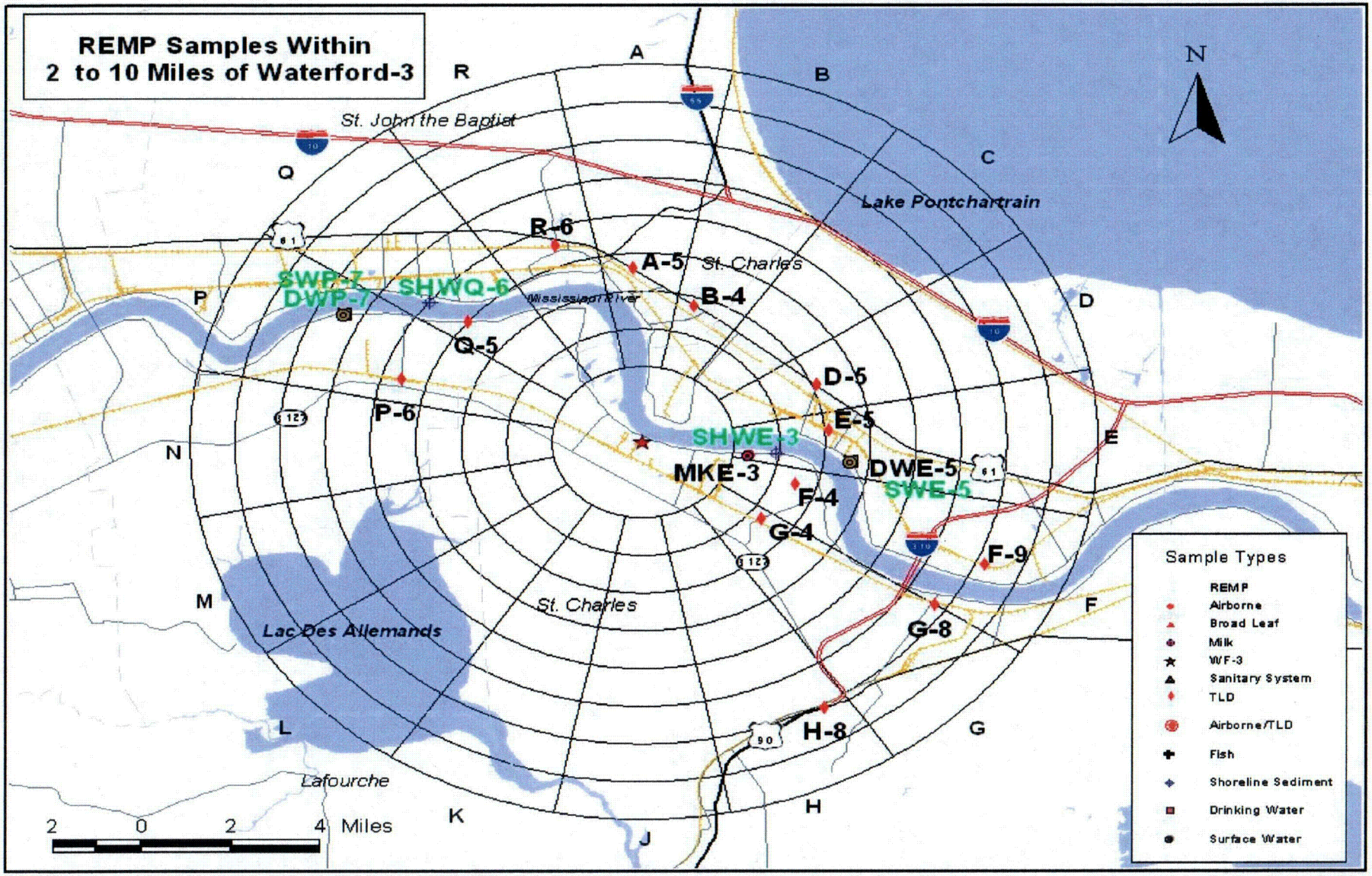
Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Ingestion	**Milk** One sample from milking animals at a control location 15 – 30 km distant and in the least prevalent wind direction.	**MKR-38 (NNW, 38.0 Miles)** – (East bank) Located at 30300 Cleveland Road, Albany. La. (Control)	Quarterly	Gamma isotopic and I-131 analysis quarterly.
	Fish and Invertebrates One sample of each commercially and recreational important species in vicinity of plant discharge area. One sample of same species in area not influenced by plant discharge.	**FH-2 (Distance/Direction Not Applicable)** – Downstream of the plant discharge structure. **FH-3 (Distance/Direction Not Applicable)**– (Westbank) Waterways downstream of plant discharge directed to 40 Arpent Canal. **FH-1 (Distance/Direction Not Applicable)** – Upstream of the plant intake structure. (Control)	Sample in season, or annually if they are not seasonal	Gamma isotopic analysis on edible portion.
	Broadleaf Samples of one to three different kinds of broadleaf vegetation grown nearest each of two different off-site locations of highest predicted annual average groundlevel D/Q if milk sampling is not performed. One sample of each of the similar broadleaf vegetation grown 15 – 30 km distant in the least prevalent wind direction if milk sampling is not performed.	**BLQ-1 (NW, 0.83 Miles)** – (West bank) Located near air sample station APQ-1. **BLB-1 (NNE, 0.81 Miles)** – (East bank) Located near transmission tower west of Little Gypsy on LA 628. **BLE-20 (E, 19.7 Miles)** – (West bank) Located on property of Nine Mile Point in Westwego, LA. (Control)	Quarterly	Gamma isotopic and I-131 analysis.

FIGURE 1-1



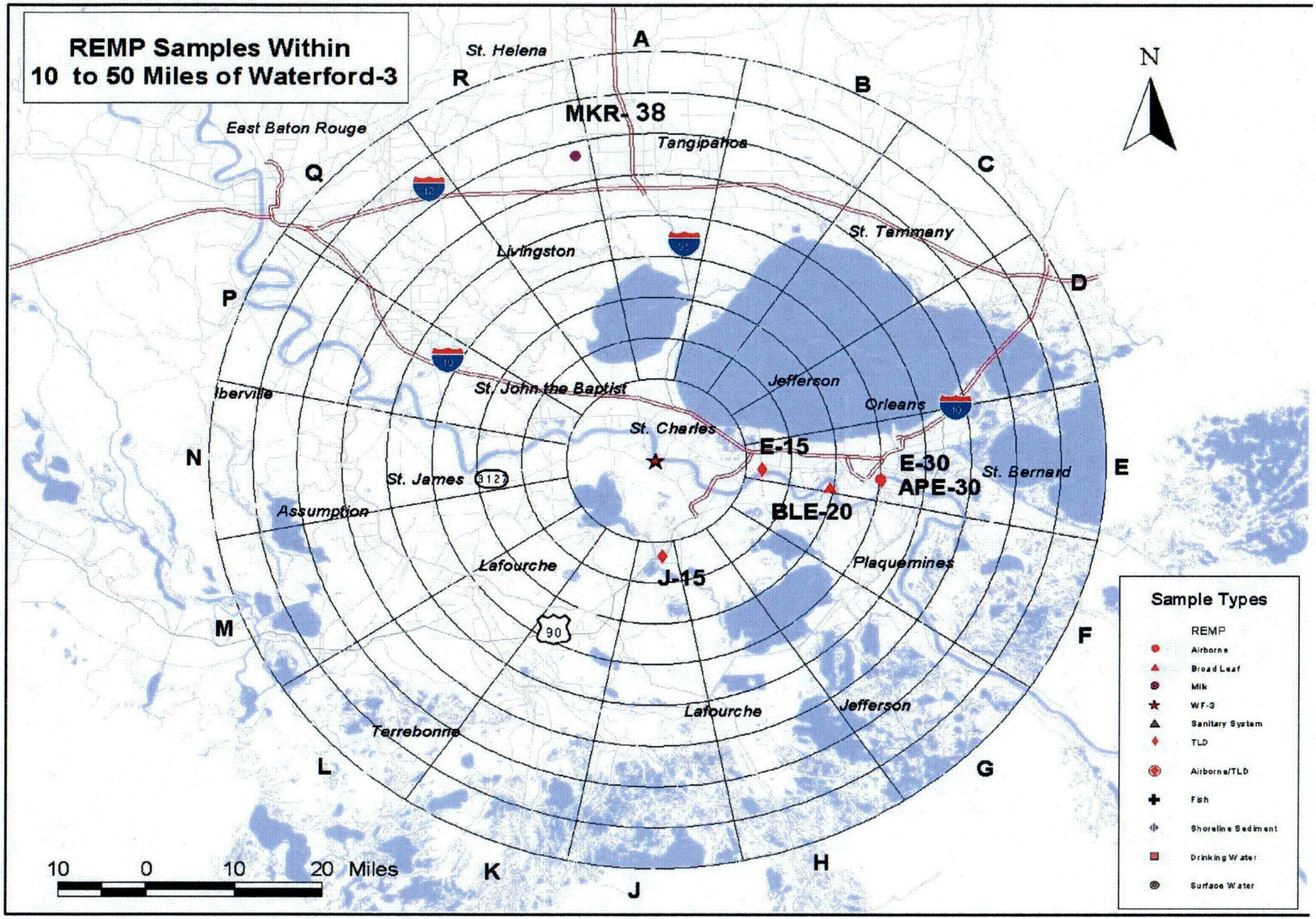
C01

FIGURE 1-2



C02

FIGURE 1-3



C03

2.0 Interpretation and Trends of Results

2.1 Air Particulate and Radioiodine Sample Results

Samples of airborne particulate and radioiodine were collected at four indicator locations and one control location and analyzed for gross beta radionuclides, Iodine-131 and gamma radionuclides (quarterly air particulate filter composites only). W3 did not detect any gamma radionuclides in the quarterly air particulate composites or Iodine-131 in the radioiodine cartridges during the reporting period, as has been the case in previous years. Indicator gross beta air particulate results for 2005 were similar to those background levels obtained in previous years of the operational REMP and well below preoperational levels as seen below. Results are reported as annual average pCi/m^3.

Monitoring Period	Result
Preoperational	0.080
1983 – 2004	0.019
2005	0.019

Table 3.1, which includes gross beta concentrations for 2005, provides a comparison of the indicator and control means further emphasizes that the airborne pathway continues to remain at background levels. In addition, as shown in Attachment 2, 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 is statistically the same as the average activity detected at the control station. Therefore, W3 concluded that plant operations had no significant impact on this pathway during 2005.

2.2 Thermoluminescent Dosimetry Sample Results

The average exposure rates during 2005 are consistent with those from the preoperational program and the previous five years of operation as seen in Figure 2-1. In particular, the preoperational survey indicates that exposure rates ranged between 11 and 33 mrem/standard quarter with an average of 20 mrem/standard quarter. The range during the previous five years of operation was 9 to 15 mrem/standard quarter with an average exposure rate of 12 mrem/standard quarter.

A comparison of the indicator results to the control results, as seen in Table 3.1, shows that the average indicator is slightly higher than that of the control. As shown in Attachment 1, Table 2.1, several indicator locations are higher than the control by a few mrem with a maximum difference of five mrem at one location (D-2).

As shown in Attachment 2, Table 2.1, the standard "t" test was used to compare average exposure rates for TLD stations located in groups 0-2 miles and 2-5 miles from the plant to those > 5 miles. The results indicate that the average exposure rates 0-2 miles and 2-5 miles from the plant are statistically the same as those > 5 miles.

The differences between indicator locations and the control, and TLD stations grouped by distance from the plant are expected due to a variety of factors not related to W3 plant operations that can affect background radiation in the vicinity of each TLD station. Direct radiation measurements at each TLD station have remained statistically the same in 2005 as previous years of operation as evidenced on Attachment 2, Table 2.2. In addition, Radiological Gaseous Effluents for 2005 were only a small fraction of the limits as is typical in previous years of operation and are not expected to have any impact on environmental TLD measurements.

2.3 Water Sample Results

Analytical results for 2005 drinking/surface water samples were similar to those reported in previous years.

Drinking/Surface Water

Drinking water samples also serve as surface water samples for W3. Therefore, monthly and quarterly gamma spectroscopy and tritium analyses of drinking water also satisfy the surface water sampling requirement.

Composite drinking/surface water samples were collected from two indicator and one control location and analyzed for Iodine-131, gamma radionuclides and tritium. Results indicate that all measurements were below the calculated LLDs.

Although gross beta was detected in the drinking/surface water samples, results for the indicator locations were below previous operational and preoperational years as seen below. Results are reported as annual average pCi/l.

Monitoring Period	Result
Preoperational	7.0
1983 – 2004	5.0
2005	3.5

Table 3.1, which includes gross beta concentrations for 2005, provides a comparison of the indicator and control means shows that the waterborne pathway continues to remain at background levels. In addition, as shown in Attachment 2, the standard "t" test was used to compare average gross beta activity from indicator stations to the average gross beta activity from the control station. Since there was only one result out of four of gross beta activity for indicator station DWE-5 (three results were less than), a statistical comparison to control station DWP-7 could not be performed. The statistical comparison for indicator station DWF-2 to control station DWP-7 shows that average activity detected at this station is statistically the same as average activity detected at the control station. Therefore, W3 concluded that plant operations had no significant impact on this pathway during 2005.

Surface Water

Surface water samples were collected from one indicator location and analyzed for gamma radionuclides and tritium. W3 did not detect any gamma radionuclides in surface water samples during the reporting period.

Tritium concentrations detected in 2005 are slightly higher than those from the preoperational program and well below previous operational years. Results are reported as annual average pCi/l.

Monitoring Period	Result
Preoperational	121
1983 – 2004	2620
2005	622

Tritium was detected in two out of four samples with a concentration of 291 and 953 pCi/liter. The levels of tritium in these samples are below both the reporting level and the LLD level required by Waterford 3 TRM. Therefore, W3 concluded that plant operations had no significant impact on this pathway during 2005.

2.4 Sediment Sample Results

Sediment samples were collected from two indicator locations and one control location and analyzed for gamma radionuclides. Cesium-137, a man-made nuclide, was detected in sample SHWK-1 with a concentration of 38 pCi/kg. No other man-made radionuclides were detected in any of the samples.

The Cesium-137 results obtained during 2005 are consistent with those from the preoperational program and previous years of operation. In particular, the preoperational survey indicates that Cesium-137 was detected in 9 of 14 soil samples at concentrations ranging between 30 and 890 pCi/kg with an average concentration of 164 pCi/kg. Similarly, the range indicated during the previous years of operation was 18 to 142 pCi/kg with an average activity of 57 pCi/kg.

W3 has detected Cesium-137 in wastewater tanks discharged to the Mississippi River at concentrations typically below 1E-6 uCi/ml in the past few years. After dilution by Circulating Water, this concentration is reduced to well below 1E-10 uCi/ml prior to mixing with the Mississippi River where it is diluted even further. At the minimal concentrations being discharged from W3 as compared to the typical Cesium-137 concentrations commonly found in soils and sediments in Louisiana as a result of atmospheric fallout from nuclear weapons testing as noted in the preoperational study, plant operations is not expected to result in any appreciable quantities of radioactivity in sediment collected from the bank of the Mississippi River. In addition, the radioactivity detected in sediment this year is consistent with preoperational data even after applying a correction for natural decay of Cesium-137.

Therefore, W3 concluded that plant operations had no significant impact on this pathway during 2005.

2.5 Milk Sample Results

Milk samples were collected from one indicator and one control location and analyzed for Iodine-131 and gamma radionuclides. Results from Iodine-131 analyses indicate that all measurements were below the calculated LLDs. Further, Cesium-137 was detected in one control sample MKR-38 on 03-15-05 at a concentration of 5.23 pCi/l. The sample was recounted twice on 03-15-05 with results of 3.65 and 5.25 pCi/l respectively. Another sample was collected and analyzed on 03-22-05. Cesium-137 was detected at a concentration of 6.03 pCi/l. The levels of Cesium-137 in these samples are below both the reporting level and the LLD level required by Waterford 3 TRM. Therefore, W3 concluded that plant operations had no significant impact on this pathway during 2005.

2.6 Fish Sample Results

Fish samples were collected from two indicators and one control location and analyzed for gamma radionuclides. Results indicate that all measurements were below the calculated LLDs. Therefore, W3 concluded that plant operations had no significant impact on this pathway during 2005.

2.7 Broadleaf Vegetation Sample Results

Broadleaf vegetation samples were collected from two indicators and one control location and analyzed for Iodine-131 and gamma radionuclides. Results indicate that all measurements were below the calculated LLDs. Therefore, W3 concluded that plant operations had no significant impact on this pathway during 2005.

2.8 Land Use Census Results

In compliance with the Waterford 3 ODCM and TRM, the land use census was conducted on September 27, 28 and 29, 2004. 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 residence, milk cow and food product locations remained unchanged for 2004, one location of goats (sector E) and two locations of beef cows (sector G) were removed. Two new garden locations (sector C and D), and three new goat locations (sector E, F and Q) were identified in 2004. 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 W3, no REMP sampling location changes are necessary. Results of the 2004 biennial census are shown in Table 2.1.

2.9 Interlaboratory Comparison Results

The River Bend Station Environmental Laboratory analyzed interlaboratory comparison samples for W3 to fulfill the requirements of Section 5.7.2 of the ODCM. Attachment 1 contains these results.

TABLE 2.1
Biennial Land Use Census Results

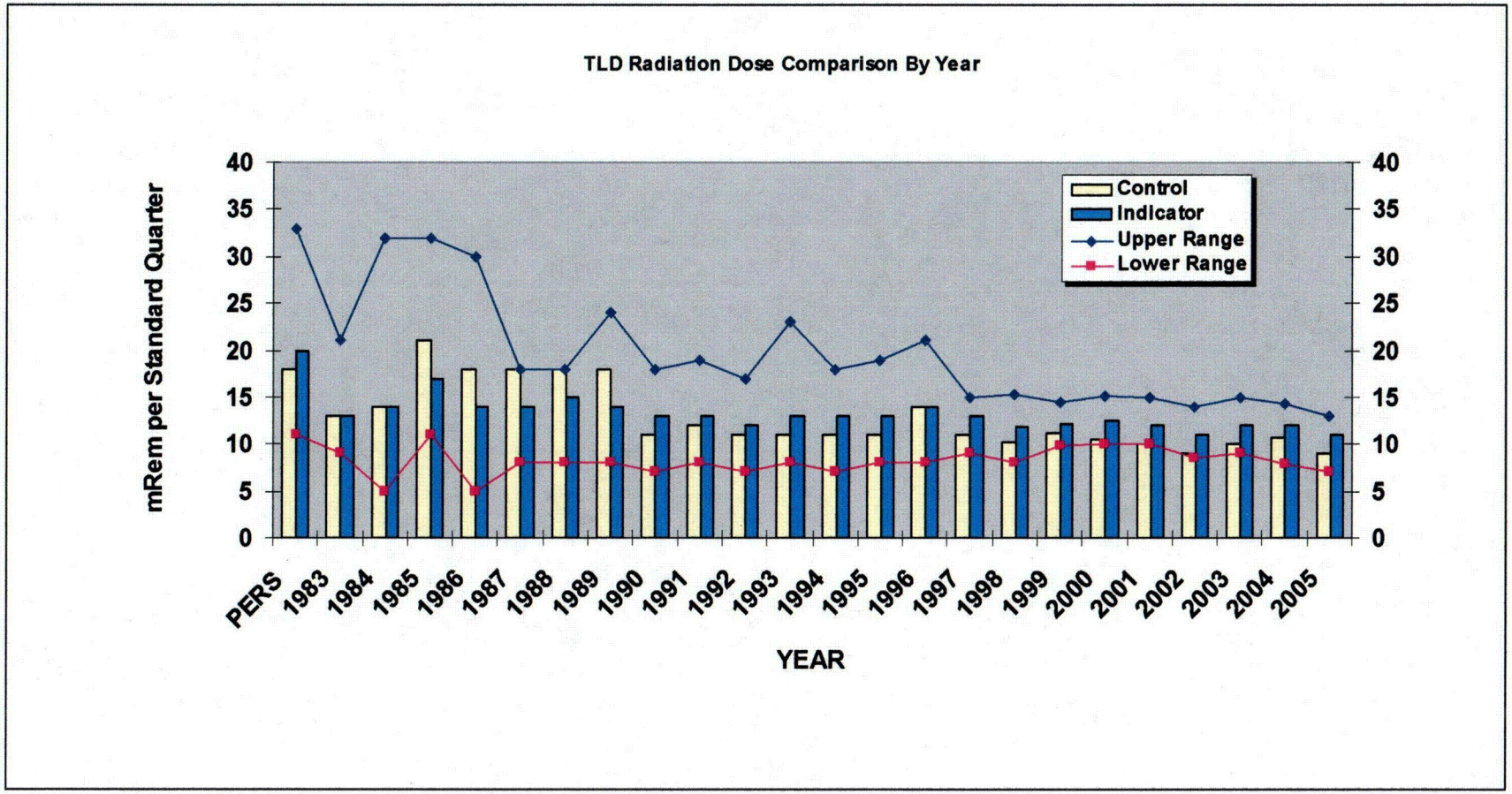
Sector	Direction	Distance from Plant in Miles					
		Residence	Garden	Milk Cows	Beef Cows	Goats	Food Products
A	*N*	1.3	1.7	* 4.6	4.6	^	4.1
B	*NNE*	1.1	1.3	^	^	^	1.3
C	*NE*	0.9	1.0	^	^	^	^
D	*ENE*	0.9	0.9	^	^	^	^
E	*E*	2.2	2.2	**2.3	2.3	* 3.2	0.3
F	*ESE*	3.1	2.2	^	2.3	* 3.5	0.3
G	*SE*	4.0	4.1	^	2.4	^	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	1.0	^	0.9	* 4.9	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 (MKE-3) for REMP

FIGURE 2-1
TLD RADIATION DOSE COMPARISON (BY YEAR)



3.0 Radiological Environmental Monitoring Program Summary

3.1 2005 Program Results Summary

Table 3.1 summarizes the 2005 REMP results. W3 did not use values reported as less than the lower limit of detection (< LLD) when determining ranges and means for indicator and control locations.

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Waterford 3 SES Docket No: 50-382
Location of Facility: St. Charles, Louisiana Reporting Period: January - December 2005

Sample Type (Units)	Type & Number Of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Airborne Particulates (pCi/m^3)	GB 130	0.01	0.019 (103 / 104) [0.006 - 0.040]	APQ-1 (NW, 0.81 mi.)	0.020 (26 / 26) [0.009 - 0.035]	0.020 (23 / 26) [0.009 - 0.040]	0
	GS 20						
	Cs-134	0.05	<LLD	N/A	N/A	<LLD	0
	Cs-137	0.06	<LLD	N/A	N/A	<LLD	0
Airborne Iodine (pCi/m^3)	I-131 130	0.07	<LLD	N/A	N/A	<LLD	0
Indicator TLDs (mrem/Std. Qtr)	Gamma 120	(f)	11 (114 / 120) [6.7 – 13.2]	F-4 (ESE, 3.53 mi.)	13 (4 / 4) [11.8 – 15.8]	N/A	0
Control TLDs (mrem/Std. Qtr)	Gamma 4	(f)	N/A	N/A	N/A	9 (4 / 4) [8.3 – 10.8]	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Waterford 3 SES Docket No: 50-382
Location of Facility: St. Charles, Louisiana Reporting Period: January - December 2005

Sample Type (Units)	Type & Number of Analyses [a]	LLD [b]	Indicator Location Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Surface Water & Drinking Water (pCi/l)	Gross Beta 12	4	3.5 (3 / 8) [2.7 – 4.9]	DWE/SWE-5 (E, 4.59 mi.)	4.9 (1 / 4) N/A	2.9 (3 / 4) [2.6 – 3.3]	0
	I-131 40	1	<LLD	N/A	N/A	<LLD	0
	H-3 12	2000	<LLD	N/A	N/A	<LLD	0
	GS 12						
	Mn-54	15	<LLD	N/A	N/A	<LLD	0
	Fe-59	30	<LLD	N/A	N/A	<LLD	0
	Co-58	15	<LLD	N/A	N/A	<LLD	0
	Co-60	15	<LLD	N/A	N/A	<LLD	0
	Zn-65	30	<LLD	N/A	N/A	<LLD	0
	Zr-95	15	<LLD	N/A	N/A	<LLD	0
	Nb-95	15	<LLD	N/A	N/A	<LLD	0
	Cs-134	15	<LLD	N/A	N/A	<LLD	0
	Cs-137	18	<LLD	N/A	N/A	<LLD	0
	Ba-140	15	<LLD	N/A	N/A	<LLD	0
	La-140	15	<LLD	N/A	N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Waterford 3 SES Docket No: 50-382
Location of Facility: St. Charles, Louisiana Reporting Period: January - December 2005

Sample Type (Units)	Type & Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Surface Water (pCi/l)	H-3 4	3000	622 (2 / 4) [291 – 953]	SWK-1 (SSW, 0.49 Miles)	622 (2 / 4) [291 – 953]	N/A	0
	GS 13						
	Mn-54	15	<LLD	N/A	N/A	N/A	0
	Fe-59	30	<LLD	N/A	N/A	N/A	0
	Co-58	15	<LLD	N/A	N/A	N/A	0
	Co-60	15	<LLD	N/A	N/A	N/A	0
	Zn-65	30	<LLD	N/A	N/A	N/A	0
	Zr-95	15	<LLD	N/A	N/A	N/A	0
	Nb-95	15	<LLD	N/A	N/A	N/A	0
	Cs-134	15	<LLD	N/A	N/A	N/A	0
	Cs-137	18	<LLD	N/A	N/A	N/A	0
	Ba-140	15	<LLD	N/A	N/A	N/A	0
	La-140	15	<LLD	N/A	N/A	N/A	0
Shoreline Sediment (pCi/kg dry)	GS 3						
	Cs-134	150	<LLD	N/A	N/A	<LLD	0
	Cs-137	180	38.4 (1 / 2) N/A	SHWK-1 (SSW, 0.49 mi.)	38.4 (1 / 2) N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Waterford 3 SES Docket No: 50-382
Location of Facility: St. Charles, Louisiana Reporting Period: January - December 2005

Sample Type (Units)	Type & Number of Analyses [a]	LLD [b]	Indicator Location Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Milk (pCi/l)	I-131 7	1	<LLD	N/A	N/A	<LLD	0
	GS 7						
	Cs-134	15	<LLD	N/A	N/A	<LLD	0
	Cs-137	18	<LLD	N/A	N/A	5.64 (2 / 5) [5.25 – 6.03]	0
	Ba-140	15	<LLD	N/A	N/A	<LLD	0
	La-140	15	<LLD	N/A	N/A	<LLD	0
Fish (pCi/kg wet)	GS 12						
	Mn-54	130	<LLD	N/A	N/A	<LLD	0
	Fe-59	260	<LLD	N/A		<LLD	0
	Co-58	130	<LLD	N/A	N/A	<LLD	0
	Co-60	130	<LLD	N/A	N/A	<LLD	0
	Zn-65	260	<LLD	N/A	N/A	<LLD	0
	Cs-134	130	<LLD	N/A	N/A	<LLD	0
	Cs-137	150	<LLD	N/A	N/A	<LLD	0
					N/A		
Broadleaf Vegetation (pCi/kg wet)	I-131 12	60	<LLD	N/A	N/A	<LLD	0
	GS 12						
	Cs-134	60	<LLD	N/A	N/A	<LLD	0
	Cs-137	80	<LLD	N/A	N/A	<LLD	0

a GB = Gross beta; I-131 = Iodine-131; H-3 = Tritium; GS = Gamma scan.

b LLD = required lower limit of detection based on Waterford 3 TRM.

c Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthesis (F).

d Locations are specified (1) by name and (2) degrees relative to reactor site.

e Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.

f LLD is not defined in Waterford 3 TRM.

Attachment 1

2005 Radiological Monitoring Report

Summary of Monitoring Results

TABLE OF CONTENTS

TABLE 1.1	AIR PARTICULATE FILTER	33
TABLE 1.2	RADIOIODINE CARTRIDGE	34
TABLE 1.3	AIR PARTICULATE FILTER	35
TABLE 2.1	THERMOLUMINESCENT DOSIMETERS	36
TABLE 3.1	DRINKING/SURFACE WATER	37
TABLE 3.2	DRINKING/SURFACE WATER	38
TABLE 3.3	DRINKING/SURFACE WATER	39
TABLE 3.4	DRINKING/SURFACE WATER	40
TABLE 3.5	SURFACE WATER	41
TABLE 4.1	SEDIMENT	42
TABLE 5.1	MILK	43
TABLE 6.1	FISH	44
TABLE 7.1	BROADLEAF VEGETATION	45
TABLE 8.1	INTERLABORATORY COMPARISON	46

Table 1.1
Sample Type: **Air Particulate Filter**
Analysis: Gross Beta
Units: pCi/m^3

End Date	APF-1 (Indicator)	APQ-1 (Indicator)	APP-1 (Indicator)	APC-1 (Indicator)	APE-30 (Control)
Required LLD →	0.01	0.01	0.01	0.01	0.01
01-10-05	0.010	0.012	0.013	0.012	0.012
01-25-05	0.025	0.024	0.020	0.022	0.022
02-07-05	0.017	0.019	0.018	0.018	0.018
02-21-05	0.022	0.018	0.022	0.022	0.025
03-07-05	0.020	0.025	0.019	0.018	0.022
03-21-05	0.017	0.015	0.014	0.016	0.016
04-04-05	0.016	0.016	0.016	0.018	0.018
04-18-05	0.017	0.017	0.017	0.016	0.017
05-02-05	0.018	0.019	(1)	0.018	0.021
05-18-05	0.024	0.022	0.024	0.022	0.025
05-31-05	0.021	0.020	0.019	0.020	0.011
06-13-05	0.010	0.010	0.010	0.012	0.010
06-27-05	0.019	0.019	0.020	0.019	0.021
07-07-05	0.011	0.012	0.011	0.011	0.011
07-18-05	0.008	0.009	0.008	0.008	0.009
08-01-05	0.008	0.015	0.014	0.014	0.012
08-15-05	0.020	0.019	0.019	0.020	0.020
09-01-05	0.011	0.011	0.009	0.006	(2)
09-14-05	0.014	0.020	0.017	0.028	(2)
09-28-05	0.021	0.024	0.020	0.018	(2)
10-12-05	0.017	0.020	0.023	0.025	0.011
10-25-05	0.034	0.035	0.037	0.035	0.040
11-07-05	0.040	0.033	0.034	0.024	0.020
11-21-05	0.021	0.022	0.023	0.021	0.025
12-05-05	0.026	0.029	0.030	0.030	0.036
12-19-05	0.031	0.031	0.033	0.030	0.036

(1) Low volume due to sample pump trip
(2) Sample location was not accessible from 08-29-05 until 09-15-05 due to hurricane Katrina. Once accessible, there was still no power to the building. Electrical repairs to the building were needed due to extensive damage. Repairs were completed on 09/27/05. The air sampler was placed back in service on 09/27/05 at 1330.

Table 1.2
Sample Type: **Radioiodine Cartridge**
Analysis: Iodine-131
Units: pCi/m^3

End Date	APF-1 (Indicator)	APQ-1 (Indicator)	APP-1 (Indicator)	APC-1 (Indicator)	APE-30 (Control)
Required LLD →	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**
01-10-05	< 0.018	<0.015	<0.014	<0.011	<0.017
01-25-05	< 0.016	<0.016	<0.015	<0.011	<0.011
02-07-05	< 0.024	<0.024	<0.022	<0.017	<0.018
02-21-05	< 0.019	<0.015	<0.014	<0.016	<0.013
03-07-05	< 0.018	<0.020	<0.015	<0.012	<0.017
03-21-05	< 0.018	<0.012	<0.015	<0.012	<0.011
04-04-05	< 0.020	<0.016	<0.018	<0.013	<0.017
04-18-05	< 0.020	<0.017	<0.018	<0.012	<0.016
05-02-05	< 0.019	<0.018	(1)	<0.012	<0.015
05-18-05	< 0.022	<0.017	<0.017	<0.016	<0.017
05-31-05	< 0.017	<0.016	<0.016	<0.011	<0.013
06-13-05	< 0.022	<0.017	<0.013	<0.017	<0.019
06-27-05	< 0.019	<0.013	<0.012	<0.012	<0.013
07-07-05	< 0.026	<0.016	<0.020	<0.018	<0.019
07-18-05	< 0.035	<0.023	<0.014	<0.016	<0.014
08-01-05	< 0.012	<0.011	<0.013	<0.013	<0.014
08-15-05	< 0.016	<0.018	<0.012	<0.012	<0.015
09-01-05	< 0.016	<0.026	<0.021	<0.014	(2)
09-14-05	< 0.019	<0.021	<0.035	<0.018	(2)
09-28-05	< 0.014	<0.019	<0.014	<0.012	(2)
10-12-05	< 0.014	<0.013	<0.008	<0.016	<0.012
10-25-05	< 0.015	<0.014	<0.014	<0.015	<0.014
11-07-05	< 0.012	<0.017	<0.013	<0.013	<0.016
11-21-05	< 0.017	<0.016	<0.014	<0.016	<0.018
12-05-05	< 0.012	<0.017	<0.016	<0.013	<0.014
12-19-05	< 0.012	<0.012	<0.014	<0.015	<0.020

(1) Low volume due to sample pump trip
(2) Sample location was not accessible from 08-29-05 until 09-15-05 due to hurricane Katrina. Once accessible, there was still no power to the building. Electrical repairs to the building were needed due to extensive damage. Repairs were completed on 09/27/05. The air sampler was placed back in service on 09/27/05 at 1330.

Table 1.3
Sample Type: **Air Particulate Filter**
Analysis: Gamma Isotopic
Units: pCi/m^3

Location	Quarterly Composite	Cs-134	Cs-137
	Required LLD →	**0.05**	**0.06**
APF-1 (Indicator)	1st	< 0.003	< 0.002
APQ-1 (Indicator)	1st	< 0.003	< 0.003
APP-1 (Indicator)	1st	< 0.002	< 0.002
APC-1 (Indicator)	1st	< 0.002	< 0.002
APE-30 (Control)	1st	< 0.002	< 0.001
APF-1 (Indicator)	2nd	< 0.003	< 0.002
APQ-1 (Indicator)	2nd	< 0.002	< 0.002
APP-1 (Indicator)	2nd	< 0.001	< 0.001
APC-1 (Indicator)	2nd	< 0.004	< 0.003
APE-30 (Control)	2nd	< 0.005	< 0.004
APF-1 (Indicator)	3rd	< 0.002	< 0.002
APQ-1 (Indicator)	3rd	< 0.002	< 0.002
APP-1 (Indicator)	3rd	< 0.001	< 0.002
APC-1 (Indicator)	3rd	< 0.002	< 0.001
APE-30 (Control)	3rd	< 0.004	< 0.002
APF-1 (Indicator)	4th	< 0.002	< 0.001
APQ-1 (Indicator)	4th	< 0.002	< 0.002
APP-1 (Indicator)	4th	< 0.002	< 0.002
APC-1 (Indicator)	4th	< 0.002	< 0.001
APE-30 (Control)	4th	< 0.001	< 0.002

Table 2.1
Sample Type: **Thermoluminescent Dosimeters**
Analysis: Gamma Dose
Units: mrem/Std. Qtr.

Indicator Locations

Station	1st Qtr '05	2nd Qtr '05	3rd Qtr '05	4th Qtr '05	Annual Mean '05
A-2	12	13	10	11	12
A-5	12	13	10	11	11
B-1	12	13	11	11	12
B-4	12	14	11	11	12
C-1	9	11	8	9	9
D-2	12	16	12	12	13
D-5	11	13	12	11	12
E-1	10	12	12	9	11
E-5	10	12	9	10	10
E-15	9	13	10	9	10
F-2	11	12	(2)	11	11
(1) F-4	12	16	12	13	13
F-9	11	12	11	11	11
G-2	(2)	13	11	12	12
G-4	(2)	10	(2)	9	10
G-8	9	10	8	9	9
H-2	11	13	11	11	11
H-8	11	13	9	11	11
J-2	12	12	10	11	12
J-15	13	(2)	11	13	12
K-1	11	12	10	11	11
L-1	12	12	12	13	12
M-1	11	11	9	11	11
N-1	11	11	10	12	11
P-1	8	9	8	9	8
P-6	12	13	10	12	12
Q-1	11	12	10	12	11
Q-5	10	11	9	10	10
R-1	6	7	(3) 2	7	6
R-6	10	10	8	10	10

Control Location

Station	1st Qtr '05	2nd Qtr '05	3rd Qtr '05	4th Qtr '05	Annual Mean '05
E-30	8	11	9	9	9

(1) Location with highest annual mean.
(2) No data - TLDs missing at time of exchange
(3) Data was not used in statistical comparison due to short exposure time in the field.

Table 3.1
Sample Type: **Drinking/Surface Water**
Analysis: Gross Beta
Units: pCi/l

Quarterly Composite	DWF/SWF-2 (Indicator)	DWE/SWE-5 (Indicator)	DWP/SWP-7 (Control)
Required LLD →	4	4	4
1st	<3.33	<3.32	2.59
2nd	2.70	<3.19	3.26
3rd	<3.50	<3.54	<3.53
4th	2.85	4.94	2.89

Table 3.2
Sample Type: **Drinking/Surface Water**
Analysis: Iodine-131
Units: pCi/l

Collection Date	SWK-1 (Indicator)	DWF/SWF-2 (Indicator)	DWE/SWE-5 (Indicator)	DWP/SWP-7 (Control)
LLD	15	1	1	1
01-25-05	< 4.02	< 0.83	<0.89	<0.90
(1) 01-25-05				<0.90
02-21-05	< 4.44	< 0.88	<0.74	<0.89
03-21-05	< 4.79	< 0.77	<0.87	<0.88
04-18-05	< 4.55	< 0.88	<0.77	<0.88
05-18-05	< 6.09	< 0.82	<0.85	<0.79
06-08-05	< 4.71	< 0.90	<0.89	<0.87
07-07-05	< 7.81	< 0.85	<0.87	<0.84
08-09-05	< 6.00	< 0.87	<0.89	<0.90
09-07-05	< 4.73	< 0.90	<0.83	<0.70
10-04-05	< 5.20	< 0.90	<0.77	<0.89
10-31-05	< 4.29	< 0.85	<0.89	<0.87
11-28-05	< 5.86	< 0.89	<0.88	<0.89
12-28-05	< 4.44	< 0.85	<0.84	<0.88

(1) Duplicate sample

Table 3.3
Sample Type: **Drinking/Surface Water**
Analysis: Gamma Isotopic
Units: pCi/l

Location	Collection Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Required LLD →		15	15	30	15	30	15	15	15	18	15	15
DWF/SWF-2 (Indicator)	03-21-05	<3.52	<3.34	<6.85	<3.37	<8.00	<4.13	<5.97	<3.31	<3.88	<14.44	<4.54
DWE/SWE-5 (Indicator)	03-21-05	<3.62	<4.45	<8.89	<3.47	<6.24	<3.97	<4.51	<3.63	<4.09	<14.84	<6.49
DWP/SWP-7 (Control)	03-21-05	<3.68	<5.67	<10.01	<4.32	<15.27	<3.89	<8.96	<5.73	<5.76	<13.04	<4.77
DWF/SWF-2 (Indicator)	06-08-05	<4.31	<3.57	<4.92	<2.83	<5.45	<4.99	<6.89	<4.26	<4.57	<14.35	<5.45
DWE/SWE-5 (Indicator)	06-08-05	<2.88	<3.63	<6.41	<3.43	<7.18	<3.08	<4.76	<3.36	<2.68	<14.36	<4.13
DWP/SWP-7 (Control)	06-08-05	<2.97	<3.13	<6.91	<2.81	<7.31	<3.64	<4.64	<3.17	<3.58	<14.54	<5.38
DWF/SWF-2 (Indicator)	09-07-05	<3.32	<2.50	<5.52	<2.59	<6.13	<3.55	<4.89	<2.88	<2.42	<12.39	<5.16
DWE/SWE-5 (Indicator)	09-07-05	<3.11	<3.34	<4.82	<2.80	<6.42	<3.81	<5.55	<3.57	<3.93	<14.67	<4.22
DWP/SWP-7 (Control)	09-07-05	<3.09	<2.46	<6.29	<3.30	<6.49	<3.39	<5.67	<3.43	<2.87	<13.99	<4.90
DWF/SWF-2 (Indicator)	12-28-05	<2.72	<2.93	<5.91	<2.64	<5.15	<3.15	<5.45	<2.93	<2.99	<13.09	<4.48
DWE/SWE-5 (Indicator)	12-28-05	<2.87	<3.04	<5.55	<3.30	<5.19	<3.52	<5.04	<2.87	<3.28	<13.92	<4.76
DWP/SWP-7 (Control)	12-28-05	<2.73	<3.07	<6.46	<2.78	<4.77	<2.89	<5.09	<3.15	<2.56	<14.95	<4.77

Table 3.4
Sample Type: **Drinking/Surface Water**
Analysis: Tritium
Units: pCi/l

Quarter	DWF/SWF-2 (Indicator)	DWE/SWE-5 (Indicator)	SWK-1 (Indicator)	DWP/SWP-7 (Control)
Required LLD →	**2000**	**2000**	**3000**	**2000**
1st	< 594.00	< 567.58	<592.00	< 577.87
2nd	< 567.59	< 556.42	291.00	< 554.60
3rd	< 573.72	< 581.28	<570.64	< 563.55
4th	< 583.00	< 584.00	953.00	< 582.00

Table 3.5
Sample Type: **Surface Water**
Analysis: Gamma Isotopic
Units: pCi/l

Location	Collection Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Required LLD →		15	15	30	15	30	15	15	15	18	15	15
SWK-1 (Indicator)	01-25-05	< 3.96	< 3.32	< 7.98	< 3.35	< 6.12	< 3.77	< 5.71	< 4.01	< 3.80	< 14.11	< 4.59
	02-21-05	< 3.63	< 3.11	< 6.28	< 2.05	< 7.22	< 4.12	< 6.12	< 3.72	< 3.24	< 14.25	< 4.63
	03-21-05	< 3.44	< 4.93	< 9.29	< 4.22	< 8.25	< 3.21	< 8.02	< 4.57	< 5.08	< 13.25	< 4.88
	04-18-05	< 4.06	< 3.08	< 9.16	< 5.31	< 6.42	< 3.72	< 6.81	< 4.63	< 4.69	< 13.98	< 5.67
	05-18-05	< 3.65	< 3.14	< 5.95	< 2.84	< 7.01	< 3.54	< 6.96	< 3.96	< 3.89	< 14.90	< 5.77
	06-08-05	< 2.81	< 2.93	< 6.09	< 3.29	< 7.46	< 4.00	< 6.27	< 3.11	< 3.68	< 14.81	< 5.08
	07-07-05	< 6.76	< 4.05	< 4.94	< 6.20	< 6.02	< 5.69	< 9.88	< 5.40	< 5.10	< 14.81	< 6.93
	08-09-05	< 3.53	< 2.52	< 7.76	< 3.43	< 6.84	< 4.32	< 6.16	< 4.18	< 3.43	< 14.90	< 7.34
	09-07-05	< 4.34	< 3.62	< 5.48	< 3.93	< 6.79	< 3.30	< 6.91	< 4.70	< 3.69	< 13.79	< 4.63
	10-04-05	< 5.35	< 4.19	< 8.61	< 3.77	< 9.29	< 4.52	< 8.07	< 4.47	< 5.40	< 14.99	< 8.12
	10-31-05	< 2.83	< 2.70	< 5.37	< 2.76	< 6.59	< 3.19	< 5.42	< 3.29	< 3.29	< 13.45	< 3.44
	11-28-05	< 3.89	< 3.07	< 6.46	< 3.66	< 7.16	< 4.37	< 6.22	< 3.71	< 3.07	< 15.00	< 3.46
	12-28-05	< 4.41	< 4.07	< 7.63	< 4.26	< 6.70	< 2.92	< 5.21	< 2.98	< 3.62	< 14.52	< 5.93

Table 4.1
Sample Type: **Sediment**
Analysis: Gamma Isotopic
Units: pCi/kg (dry)

Location	Collection Date	Mn-54	Co-58	Co-60	Cs-134	Cs-137
Required LLD	→	**n/a**	**n/a**	**n/a**	**150**	**180**
SHWK-1 (Indicator)	06-06-05	<35.3	<36.1	<37.0	<34.4	38.4
SHWE-3 (Indicator)	06-06-05	<39.3	<29.0	<44.9	<35.6	<40.4
SHWQ-6 (Control)	06-06-05	<34.1	<34.5	<41.7	<40.3	<47.3

Table 5.1
Sample Type: **Milk**
Analysis: Iodine-131 and Gamma Isotopic
Units: pCi/l

Location	Collection Date	I-131	Cs-134	Cs-137	Ba-140	La-140
Required LLD	→	**1**	**15**	**18**	**15**	**15**
MKE-3 (Indicator)	03-14-05	<0.72	<5.00	<5.00	<14.65	<2.79
	06-27-05	<0.87	<4.62	<4.30	<14.66	<4.91
	[1] 09-29-05	n/a	n/a	n/a	n/a	n/a
	[1] 12-20-05	n/a	n/a	n/a	n/a	n/a
MKR-38 (Control)	03-15-05	<0.74	<4.56	5.23	<14.93	<3.90
	[3] 03-15-05		<3.37	3.65	<12.40	<3.49
	[3] 03-15-05		<4.29	5.25	<13.89	<5.15
	[4] 03-22-05	<0.87	<6.75	6.03	<14.38	<6.97
	06-28-05	<0.72	<4.13	<5.75	<14.80	<4.07
	09-29-05	<0.77	<5.03	<6.73	<13.88	<4.37
	12-20-05	<0.87	<4.67	<6.74	<13.63	<5.75
[2]MKR-40 (Control)	03-15-05	n/a	n/a	n/a	n/a	n/a

(1) Sample not available. Cow not producing enough milk.
(2) Removed from program. Owner sold cows.
(3) Sample recounted to confirm results.
(4) Resample to confirm results.

Table 6.1
Sample Type: **Fish**
Analysis: Gamma Isotopic
Units: pCi/kg (wet)

Location	Collection Date	Species	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
Required LLD →			**130**	**260**	**130**	**130**	**260**	**130**	**150**
FH-1 (Control)	10-27-05	Buffalo	<13.87	<35.00	<15.07	<22.82	<47.77	<12.24	<15.61
FH-1 (Control)	10-27-05	Carp	< 9.48	<33.00	<12.56	<13.25	<27.67	<14.55	< 9.86
FH-1 (Control)	10-27-05	Catfish	<11.58	<44.94	<15.09	<15.77	<41.51	< 9.84	<11.40
FH-1 (Control)	10-27-05	Mullet	<16.46	<48.40	<13.46	<16.10	<34.26	<12.57	<16.05
FH-2 (Indicator)	10-24-05	Buffalo	<16.86	<60.43	<23.74	<22.65	<52.01	<14.14	<10.62
FH-2 (Indicator)	10-24-05	Carp	<13.84	<34.82	<14.64	<13.06	<40.20	<12.12	<15.24
FH-2 (Indicator)	10-24-05	Catfish	<11.31	<38.50	<10.54	<12.17	<28.36	<11.64	<11.59
FH-2 (Indicator)	10-24-05	Mullet	<16.96	<49.31	<15.69	<17.36	<45.90	<12.05	<11.18
FH-3 (Indicator)	10-28-05	Buffalo	<13.83	<46.57	<14.05	<15.05	<52.31	<17.27	<18.57
FH-3 (Indicator)	10-28-05	Carp	<14.56	<40.83	<16.28	<14.58	<35.78	<11.88	<11.18
FH-3 (Indicator)	10-28-05	Catfish	< 9.30	<37.86	<15.67	<12.89	<33.51	< 9.75	<10.94
FH-3 (Indicator)	10-28-05	Mullet	<17.49	<60.85	<15.36	<20.04	<47.99	<13.69	<13.87

Table 7.1
Sample Type: **Broad Leaf Vegetation**
Analysis: Iodine-131 and Gamma Isotopic
Units: pCi/kg (wet)

Location	Collection Date	I-131	Cs-134	Cs-137
Required LLD	→	**60**	**60**	**80**
BLQ-1 (Indicator)	02-28-05	<48.24	<53.29	<50.59
BLQ-1 (Indicator)	06-06-05	<59.43	<47.37	<47.91
BLQ-1 (Indicator)	09-14-05	<54.83	<48.49	<44.33
BLQ-1 (Indicator)	12-12-05	<26.51	<20.29	<23.54
BLB-1 (Indicator)	02-28-05	<59.50	<45.33	<43.24
BLB-1 (Indicator)	06-06-05	<56.07	<59.55	<55.44
BLB-1 (Indicator)	09-14-05	<50.56	<33.13	<38.41
BLB-1 (Indicator)	12-12-05	<17.43	<23.72	<30.66
BLE-20 (Control)	02-28-05	<42.36	<37.82	<41.74
BLE-20 (Control)	06-06-05	<49.09	<56.84	<40.51
BLE-20 (Control)	09-14-05	<57.18	<45.00	<44.09
BLE-20 (Control)	12-12-05	<18.69	<23.68	<23.17

Table 8.1
Sample Type: **Interlaboratory Comparison**
Analysis: Gross Beta, Iodine-131, Tritium and Gamma Isotopic

Sample Type (units)	Analytics #	Date	Analysis	Known value[a]	RBS Value	RBS N-DEV[b]	RBS N-RANGE[c]
Charcoal Cartridge (pCi/filter)	E4570-125	6/9/2005	I-131	91.7	96.3	0.88	0.386
Water (pCi/liter)	E4569-125	6/9/2005	BETA	214	232	1.48	0.055
	E4568-125	6/9/2005	CR-51	330	347	0.89	0.251
			MN-54	136	140	0.55	0.217
			CO-58	69.7	81.3	2.89	0.678
			FE-59	158	165.7	0.84	0.262
			CO-60	169	191	2.25	0.384
			ZN-65	93.8	100	1.08	0.378
			I-131	104	95.7	-1.39	0.170
			CS-134	206	213	0.56	0.086
			CS-137	101	107	1.09	0.117
			CE-141	214	232	1.48	0.055
	E4719-125	9/15/2005	H-3	4190	4337	0.61	0.152
Air Filter (pCi/filter)	E4717-125	9/15/2005	BETA	95.8	94.2	-0.29	0.253
	E4720-125	9/15/2005	CR-51	237	209	-2.05	0.548
			MN-54	64.5	65.3	0.21	0.449
			CO-58	44.4	43.1	-0.51	0.931
			FE-59	42.7	44.7	0.81	0.332
			CO-60	117	112	-0.79	0.454
			ZN-65	86.6	89.6	0.60	0.498
			CS-134	85.7	80.2	-1.12	0.193
			CS-137	137	135	-0.29	0.302
			CE-141	164	153	-1.16	0.576
Sediment (pCi/gram)	E4718-125	9/15/2005	CR-51	0.455	0.467	0.47	0.091
			MN-54	0.124	0.155	4.28[d]	0.191
			CO-58	0.085	0.093	1.63	0.347
			FE-59	0.082	0.090	1.76	1.008
			CO-60	0.225	0.246	1.59	0.158
			ZN-65	0.166	0.187	2.19	0.676
			CS-134	0.164	0.183	1.97	0.396
			CS-137	0.364	0.418	2.55	0.097
			CE-141	0.314	0.355	2.24	0.150

Table 8.1
Sample Type: **Interlaboratory Comparison**
Analysis: Gross Beta, Iodine-131, Tritium and Gamma Isotopic

Sample Type (units)	Analytics #	Date	Analysis	Known Value[a]	RBS Value	RBS N-DEV[b]	RBS N-RANGE[c]
Milk (pCi/liter)	E4571-125	6/9/2005	CR-51	303	254	-2.82	1.111
			MN-54	125	126.0	0.18	0.614
			FE-59	63.9	74.7	2.92	0.647
			CO-60	145	132.0	-1.51	0.407
			ZN-65	155.0	158.0	0.37	0.495
			I-131	86.9	83.3	-0.71	0.068
			CS-134	95.0	89.0	-1.09	0.373
			CS-137	189	184	-0.49	0.281
			CE-141	92.4	95.7	0.61	0.447

NOTES:

(a) The known value as determined by Analytics.
(b) The normalized deviation from the "known" value is computed from the deviation and the standard error of the mean; ±2.00 is warning limit and ±3.00 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.

Exceptions:

There was one result outside the control limits for accuracy in the 2005 Interlaboratory Comparison program participation studies. This result was in a gamma isotopic analysis of a sed ment/soil sample.

The result outside the control limits for accuracy was in the analysis of the nuclide Mn-54 in Analytics sample number E4718-125 of 9/15/2005. RBS normalized-deviation for the analysis was +4.28 with control limits of ±3.00. This high bias result is considered conservative and is considered as having no impact on past results of the program. Mn-54 results were all within control limits in other program samples for the year 2005; with normalized-deviation of 0.55 in a water sample analysis; 0.21 in an air filter sample analysis; and 0.18 in a milk sample analysis.

Review of trending information of Mn-54 results in sediment/soil samples indicates a steady high bias, with only one result for Mn-54 out of the control limits in 1998. Reanalysis of the 2005 soi sample produced results very similar to the original averaged result.

ATTACHMENT 2

Statistical Comparisons

TABLE OF CONTENTS

TABLE 2.1	STATISTICAL COMPARISON OF 2005 TLD MEASUREMENTS FROM STATIONS GROUPED BY DISTANCE	52
TABLE 2.2	STATISTICAL COMPARISON OF 2005 TLD RADIATION DOSE TO HISTORICAL DATA BY LOCATION	53
TABLE 2.3	STATISTICAL COMPARISON OF 2005 GROSS BETA ACTIVITY MEASUREMENTS ON AIR PARTICULATE FILTERS	54
TABLE 2.4	STATISTICAL COMPARISON OF 2005 GROSS BETA ACTIVITY MEASUREMENTS IN DRINKING/SURFACE WATER SAMPLES	55

Statistical Analyses

- **Calculation of the Mean and Standard Deviation**

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

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

and

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

where:

$\overline{X}$ = 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.

- **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)):

$$t = \frac{\overline{X} - \overline{Y}}{\left(\frac{(n_x - 1)s_x^2 + (n_y - 1)s_y^2}{n_x + n_y - 2}\right)^{0.5}\left(\frac{1}{n_x} + \frac{1}{n_y}\right)^{0.5}}$$

where:

t = calculated "t" value,
$\overline{X}$ = mean of first data set,
$\overline{Y}$ = mean of second data set,
η_x = number of variables in first data set,
S_x = standard deviation of first data set,
η_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 - μ) or (1- μ/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).

TABLE 2.1

STATISTICAL COMPARISON OF 2005 TLD MEASUREMENTS FROM STATIONS GROUPED BY DISTANCE

	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.)	11	11	11
Standard Deviation (mRem/std. qtr.)	1.67	1.53	1.49
Number in Sample	61	26	27
Calculated "t" Value (comparison of stations 0-2 and 2-5 miles from the plant to stations >5 miles from the plant)	0.31	1.38	NA*
Tabular "t" Value at 95% Confidence($t_{0.025,n}$)	1.991(a)	2.009(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 2.2

STATISTICAL COMPARISON OF 2005 TLD RADIATION DOSE TO HISTORICAL DATA BY LOCATION

Units: mrem/Std. Qtr.

Station	1990 - 2004 Avg**	1990 – 2004 Std Dev**	1990 - 2004 Range**		2005 Avg**	2005 Std Dev**	2005 Range**	
A-2	14	1.4	11	18	12	1.3	10	13
A-5	13	1.4	10	17	12	1.3	10	13
B-1	13	1.5	11	19	12	1.0	11	13
B-4	13	1.1	12	17	12	1.4	11	14
C-1	9	1.4	7	13	9	1.3	8	11
D-2	12	2.1	8	19	13	2.0	12	16
D-5	12	1.6	9	18	12	1.0	11	13
E-1	11	1.3	10	16	11	1.5	9	12
E-5	12	1.7	9	17	10	1.3	9	12
E-15	11	1.9	8	16	10	1.9	9	13
E-30*	11	1.7	8	17	9	1.3	8	11
F-2	12	1.2	10	17	11	0.6	11	12
F-4	14	1.5	11	19	13	1.9	12	16
F-9	13	1.6	7	17	11	0.5	11	12
G-2	15	1.3	12	19	12	1.0	11	13
G-4	11	1.4	9	16	10	0.7	9	10
G-8	12	2.1	9	19	9	0.8	8	10
H-2	13	1.3	11	18	12	1.0	11	13
H-8	12	1.2	10	17	11	1.6	9	13
J-2	13	1.5	11	17	11	1.0	10	12
J-15	13	1.3	11	17	12	1.2	11	13
K-1	12	1.4	9	16	11	0.8	10	12
L-1	13	1.3	10	16	12	0.5	12	13
M-1	12	1.5	10	18	11	1.0	9	11
N-1	13	1.6	8	18	11	0.8	10	12
P-1	10	1.3	8	15	9	0.6	8	9
P-6	14	1.5	11	19	12	1.3	10	13
Q-1	12	1.3	10	16	11	1.0	10	12
Q-5	14	2.2	9	18	10	0.8	9	11
R-1	11	1.8	6	15	7	0.6	6	7
R-6	13	2.7	9	18	10	1.0	8	10

* Control Location

** Significant outliers were removed from data sets.

PERS data indicates an average of 20 mrem for all indicator locations with a range of 11 to 33 and an average control of 18 mrem.

TABLE 2.3

STATISTICAL COMPARISON OF 2005 GROSS BETA ACTIVITY
MEASUREMENTS ON AIR PARTICULATE FILTERS

SAMPLE STATION	APF-1	APQ-1	APP-1	APC-1	APE-30
Mean (10^{-3}pCi/m^3)	19.2	19.8	19.6	19.3	19.9
Standard Deviation (10^{-3}pCi/m^3)	7.66	6.72	7.47	6.71	8.40
Number in Sample	26	26	25	26	23
Calculated "t" Value (comparison of the indicator stations to the control station)	0.33	0.03	0.14	0.26	NA*
Tabular "t" Value at 95% Confidence($t_{0.025,n}$)	2.014(a)	2.014(a)	2.015(a)	2.014(a)	NA*

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

* Not Applicable

TABLE 2.4

STATISTICAL COMPARISON OF 2005 GROSS BETA ACTIVITY MEASUREMENTS IN DRINKING/SURFACE WATER SAMPLES

	DWF/SWF-2	DWE/SWE-5	DWP/SWP-7
Mean (pCi/liter)	2.8	4.9	2.9
Standard Deviation (pCi/liter)	0.07	0.00	0.27
Number in Sample	2	1	3
Calculated "t" Value (comparison of the indicator stations to the control station)	0.89	(b)	NA*
Tabular "t" Value at 95% Confidence($t_{0.025,n}$)	3.182(a)	(b)	NA*

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

(b) Since there is only one sample of gross beta activity out of four (three samples were less than detectable), a statistical comparison between indicator location DWE-5 to control location DWP-7 could not be performed.

* Not Applicable

ATTACHMENT 3

2005 Revised ODCM Tables

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SAMPLE	LOCATION	ANALYSIS	FREQUENCY*	VOLUME
TLD	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-8, P-6, Q-5 R-6, F-9, G-8, E-15, J-15 E-30	TLD[1]	Quarterly	N/A
Radioiodine and Particulates	APP-1, APQ-1, APF-1, APC-1, APE-30	Gross beta[2], I-131	Bi-Weekly	285m³/wk
		γ isotopic[2]	Quarterly composite	3700m³/qtr
Ground Water	NONE	NONE	NONE	NONE
Drinking Water/ Surface Water[3]	DWF-2[4]/SWF-2[4] DWP-7/SWP-7 DWE-5[4]/SWE-5[4] SWK-1	H-3	Quarterly composite[5]	Homogeneous 8 liters
		Gross beta, γ isotopic	Quarterly composite[5]	
		I-131[7]	Monthly composite[10]	
Shoreline Sediment	SHWE-3, SHWK-1, SHWQ-6	γ isotopic	Annually	2 Kilograms
Milk	MKE-3, MKR-38	γ isotopic, I-131	Quarterly	8 liters
Fish	FH-1, FH-2, FH-3	γ isotopic	In season or Annually[9]	500 grams
Broad Leaf	BLQ-1, BLB-1, BLE-20	γ isotopic, I-131	Quarterly	500 grams
Sanitary System[11]	SWR-1	γ isotopic	Monthly Composite[10]	Homogeneous 1 Liter

*Sample collection at specific locations may be increased at any time in order to increase the effectiveness of the REMP program.

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SAMPLE LOCATION TABLE (Continued)

LOCATION NUMBER	LOCATION DESCRIPTION	BEARING/ MILES TO PLANT	Position Latitude Longitude
	DIRECT RADIATION (TLD) (continued)		
D-5	(Eastbank) Located on gate on shell road approximately 0.1 miles north of US 61/LA 48 intersection.	249° 4.09	N 30.01628 W 90.40730
E-5	(Eastbank) Located on the Norco Substation fence enclosure at the end of Wesco St. off of LA 48.	266° 4.08	N 29.99840 W 90.40314
F-4	(Westbank) Located on utility pole behind house at 646 Aquarius St. in Hahnville.	289° 3.53	N 29.97818 W 90.41582
G-4	(Westbank) Located on pole on LA 3160 approximately 0.1 miles north of railroad track.	309° 3.30	N 29.96507 W 90.42867

12

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SAMPLE LOCATION TABLE (Continued)

LOCATION NUMBER	LOCATION DESCRIPTION	BEARING/ MILES TO PLANT	Position Latitude Longitude
	DIRECT RADIATION (TLD) (continued)		
G-8	(Westbank) Located on southern most corner of the back fence of Entergy Office in Luling.	305° 7.74	N 29.93055 W 90.36592
E-15	(Eastbank) Located on Kenner Substation fence enclosure on Alliance Ave. approximately 0.1 miles from LA 48.	275° 11.7	N 29.97695 W 90.27658
J-15	(Westbank) Located on pole near the LA 631/Hwy 90 intersection in Des Allemands.	357° 11.7	N 29.82575 W 90.46457
E-30*	(Westbank) Located at entrance to the Entergy Office on Delaronde St. in Algiers.	276° 25.2	N 29.95233 W 90.05441

* DENOTES CONTROL LOCATIONS

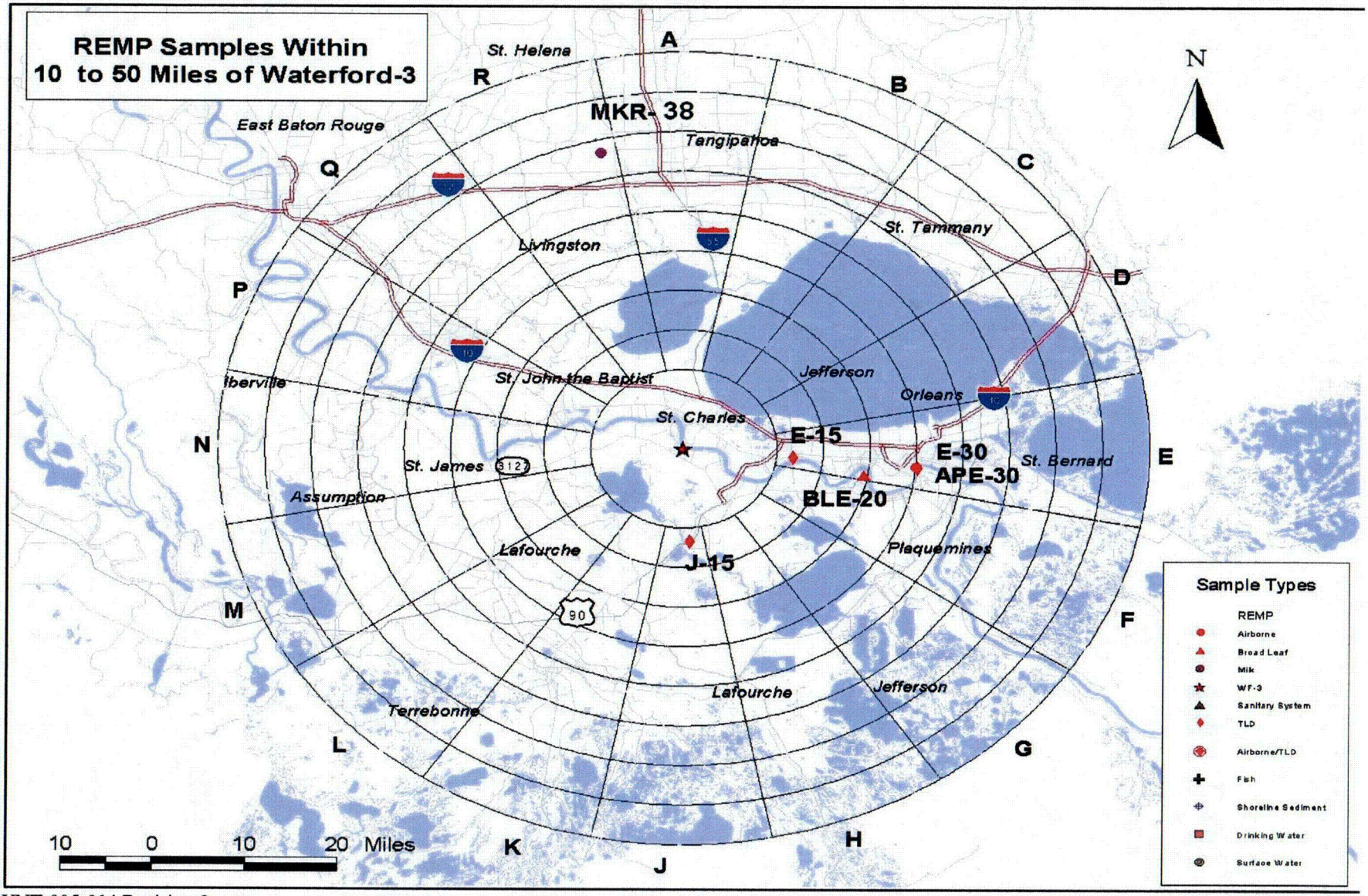
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SAMPLE LOCATION TABLE (Continued)

LOCATION NUMBER	LOCATION DESCRIPTION	BEARING/ MILES TO PLANT	Position Latitude Longitude
	INGESTION		
	MILK		
MKE-3	(Westbank) Located at the Zeringue's house on LA 18 in Taft.	279° 2.35	N 29.98926 W 90.43243
MKR-38*	(Eastbank) Located at 30300 Cleveland Road, Albany, LA.	169° 38.0	N 30.32361 W 90.34793
	FISH		
FH-1*	Upstream of the plant intake structure.	N/A	N/A
FH-2	Downstream of the plant discharge structure.	N/A	N/A
FH-3	(Westbank) Waterways downstream of plant discharge directed to 40 Arpent Canal.	N/A	N/A

* DENOTES CONTROL LOCATIONS

N/A - Not Applicable for this sampling location.


REMP Samples Within
10 to 50 Miles of Waterford-3
St. Helena
East Baton Rouge
Tangipahoa
St. Tammany
Livingston
St. John the Baptist
Jefferson
Orleans
St. Charles
St. James
Assumption
Lafourche
Plaquemines
Terrebonne
Iberville
MKR-38
E-15
E-30
APE-30
BLE-20
J-15
A
B
C
D
E
F
G
H
J
K
L
M
N
P
Q
R
N
10 0 10 20 Miles
Sample Types
REMP
Airborne
Broad Leaf
Milk
WF-3
Sanitary System
TLD
Airborne/TLD
Fish
Shoreline Sediment
Drinking Water
Surface Water

C05