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W3F1-2004-0118

December 1, 2004

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

Subject: Correction to Annual Radiological Environmental Operating Report – 2003
Originally Submitted via Letter WF3-2004-0026
Waterford Steam Electric Station, Unit 3 (Waterford 3)
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

The attached document is a correction to the Annual Radiological Environmental Operating Report for the period of January 1 through December 31, 2003. The original submittal was submitted under letter W3F1-2004-0026 dated April 22, 2004. All corrections are editorial in nature and do not impact the conclusion of the analysis. Discrepancies which were identified and corrected are as follows:

1. Figure 1-1, page 17: Changed APG-1 to APF-1
Changed DWG-2 to DWF-2
Changed SWG-2 to SWF-2

Although data points throughout the report are correct, the map in figure 1-1 was not updated to reflect the changes from sector G to F.

2. Table 1.1, page 16: Changed distance for MKR-40 from 4070 to 40.70 miles. Decimal point was omitted.
3. Milk sample results, page 22: Reworded sentence by removing the word "indicator". No indicator samples were available for milk during 2003 however, the paragraph did not reflect this.
4. Drinking/surface water results, page 38: Added an * by LLD of 1 with a note to see page 3 of the report for changes in LLD during the year.
5. Fish results, page 44: Changed units from pCi/kg /dry to pCi/kg /wet. All fish samples were analyzed pCi/kg wet.

FE25

6. Calculation of the Mean Standard Deviation, Page 51: changed X to \bar{X} under where: X = mean of sample population.
7. Comparing Two Sample Population Means, Page 52: changed X to \bar{X} and Y to \bar{Y} under where: X = mean of first data set and Y = mean of second data set.

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,

R.J. Murillo

Acting Licensing Manager

RJM/STF/cbh

Attachment(s)

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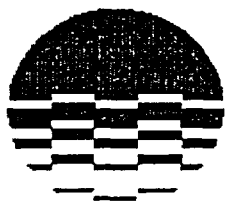
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Attachment 1 To

W3F1-2004-0118

Correction to Annual Radiological Environmental Operating Report - 2003



Entergy

**Annual
Radiological Environmental Operating
Report**

January 1, 2003 - December 31, 2003



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

Docket Number 50-382

License Number NPF-38

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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, 2003. This report fulfills the requirements of W3 Technical Specification 6.9.1.7.

During 2003, gross beta radioactivity was detected in air and drinking water/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.

Tritium was detected in one sample at location SWK-1. Tritium was routinely released as measured in effluent sampling analysis via this pathway until March 2003. Tritium is no longer released via this pathway.

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 broadleaf vegetation, as well as measuring radiation directly.

The REMP includes sampling indicator and control locations within a 40-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 2003, 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 with the exception of surface water tritium where a direct correlation from plant operations exists below the reporting level. The review of 2003 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 2003. 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, 2003 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

Four milk samples were unavailable from indicator location MKQ-5 due to owner selling cows. Four milk samples were unavailable from indicator location MKE-3 due to cows not producing enough milk. With the absence of milk samples at these locations, broadleaf 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
APE-30	12/30/02 – 01/14/03	GFI breaker trip
APF-1	04/21/03 – 05/05/03	Failed cal check and flow rate
APE-30	04/21/03 – 05/05/03	Loss of power
APQ-1	08/11/03 – 08/25/03	Sample pump tripped
APE-30	12/01/03 – 12/15/03	Failed cal check and flow rate

♦ **Water Samples**

The drinking/surface water sample location listed below failed to meet the requirement for sample continuity. However, required LLDs were achieved. 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
SWK-1	02/25/03 – 03/24/03	Low water in canal
SWK-1	05/19/03 – 06/16/03	Leak in hose
SWK-1	10/06/03 – 11/03/03	Replaced power converter

♦ **TLDs**

Station Q-1 was missing one TLD during the first quarter. The remaining TLD was left in place and read at the end of the quarter. Station B-4 TLDs were missing during the fourth quarter TLD inspection. Another set of TLDs were placed at this location and read at the end of the quarter.

♦ **Missed Samples**

TLDs located at station G-4 were missing at the time of the third quarter TLD exchange. TLDs located at station H-8 were missing at the time of the fourth quarter exchange.

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

LLDs for Ba-140 for milk and water samples were not met for quarters 2, 3 and 4 of 2003. Background fluctuation in samples rendered these LLDs unachievable. However, it should be recognized that the LLD, a priori limit, representing the capability of a measurement system, did achieve the required LLDs. All other 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 TRM in accordance with NUREG 1301/Branch Technical Position during 2003:

- ♦ The reporting level for tritium was changed from 20,000 pCi/l to 30,000 pCi/l if no drinking water pathway exists.
- ♦ The reporting level for I-131 in water was changed from 2 pCi/l to 20 pCi/l if no drinking water pathway exists.
- ♦ The LLD for tritium was changed from 2,000 pCi/l to 3,000 pCi/l if no drinking water pathway exists.
- ♦ The LLD for I-131 in water was changed from 1 pCi/l to 15 pCi/l if no drinking water pathway exists.
- ♦ The LLD for Zr-95 was changed from 30 pCi/l to 15 pCi/l.
- ♦ The LLD for Ba-140 was changed from 60 pCi/l in water and milk to 15 pCi/l in water and milk.

Copies of the affected TRM tables are included in this report in Attachment 3.

Attachments

Attachment 1 contains results of air, TLD, water, sediment, milk, fish and broadleaf vegetation collected in 2003. 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 2003.

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 2003 revised TRM 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 2003 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 biannually, 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 m² (500 ft²) producing broadleaf 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	<u>Radiolodine and Particulates</u> 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.
	<u>Radiolodine and Particulates</u> 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.		
	<u>Radiolodine and Particulates</u> 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	<p>TLDs An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.</p>	<p>A-2 (N, 1.27 Miles) – (East bank) Located on a utility pole on LA 628 near the Zephrin L. Perriloux Fire House.</p> <p>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.</p> <p>C-1 (NE, 0.67 Miles) – (East bank) On fence enclosing the Little Gypsy Cooling Water Intake on LA 628 near APC-1.</p> <p>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.</p>	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>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.</p> <p>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.</p> <p>G-2 (SE, 1.26 Miles) – (West bank) Located on fence east of LA 3142 approximately 0.3 miles north of railroad overpass.</p> <p>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.</p>	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	<p><u>TLDs</u> An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.</p>	<p>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.</p> <p>K-1 (SSW, 1.06 Miles) – (West bank) Located on stop sign at entrance to Entergy Education Center on LA 3127.</p> <p>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.</p> <p>M-1 (WSW, 0.76 Miles) – (West bank) Located on south gate of Waterford 1 and 2 fuel oil storage tank enclosure.</p> <p>N-1 (W, 0.98 Miles) – (West bank) Located on pole at corner of Railroad Avenue and School House Road.</p>	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	<u>TLDs</u> 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 east handrail approximately a quarter of the way down the catwalk.	Quarterly	Gamma dose quarterly.
	<u>TLDs</u> 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	<p>TLDs</p> <p>An outer ring of stations, 1 in 10 of the meteorological sectors in the 6- to 8-km range from the site.</p>	<p>B-4 (NNE, 3.75 Miles) – (East bank) Located on utility pole guidewire next to transmission tower south of weigh station on US 61 at St. John/St. Charles Parish line.</p> <p>D-5 (ENE, 4.09 Miles) – (East bank) Located on gate on shell road approximately 0.1 miles north of US61/LA48 intersection.</p> <p>F-4 (ESE, 3.53 Miles) – (West bank) Located on utility pole behind house at 646 Aquarius St. in Hahnville.</p>	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	<p><u>TLDs</u></p> <p>An outer ring of stations, 1 in 10 of the meteorological sectors in the 6- to 8-km range from the site.</p>	<p>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.</p> <p>G-4 (SE, 3.30 Miles) – (West bank) Located on railroad sign on LA 3160 approximately 0.1 miles north of railroad track.</p> <p>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> <p>P-6 (WNW, 5.58 Miles) – (West bank) Located on a fence surrounding the communications tower at the LA 640/railroad track intersection.</p> <p>Q-5 (NW, 5.01 Miles) – (West bank) Located on utility pole along LA 18 across from Mississippi River marker 137.</p>	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	<u>TLDs</u> 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.
	<u>TLDs</u> 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 utility 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

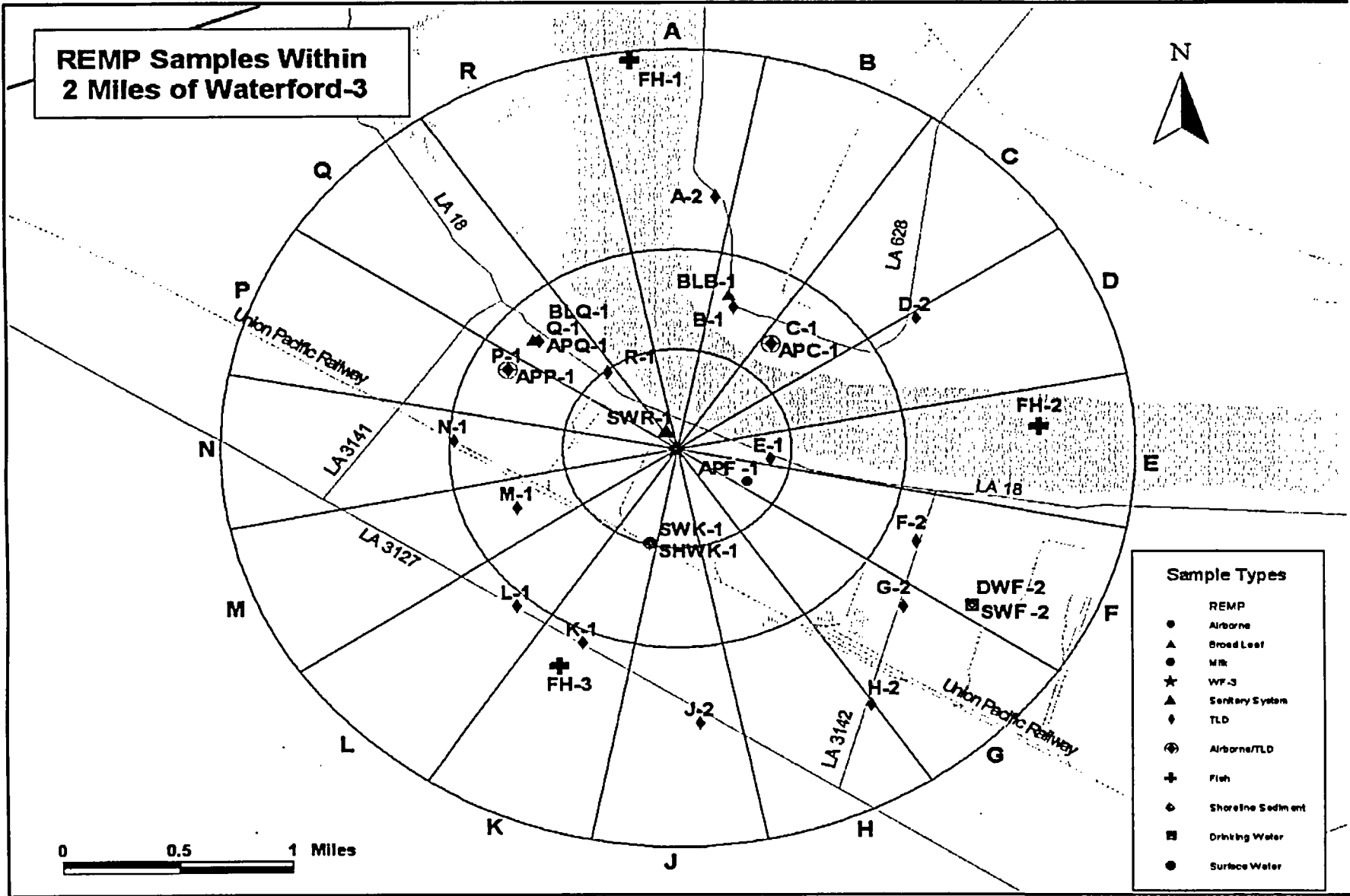
Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Waterborne	<u>Drinking Water</u> One sample upstream	DWP-7 (WNW, 7.37 Miles) - (West bank) Located at St. John Parish Waterworks off LA 18 in Edgard. (Control)	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.
	One sample downstream	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.		
	<u>Sediment from Shoreline</u> One sample upstream	SHWQ-6 (NW, 5.99 Miles) - (East bank) Located off LA 628 approximately 0.1 miles east of Reserve ferry landing. (Control)	Annually	Gamma isotopic analysis annually.
	One sample downstream	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.		
Ingestion	<u>Milk</u> 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. MKQ-5 (NW, 4.99 Miles) - (West bank) Located at the Webre's house on LA 18 across from Mississippi River marker 137.	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-40 (NNW, 40.70 Miles) – (East bank) Located at 24254 LA Highway 442, Holden. 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 intake 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 discharge 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.

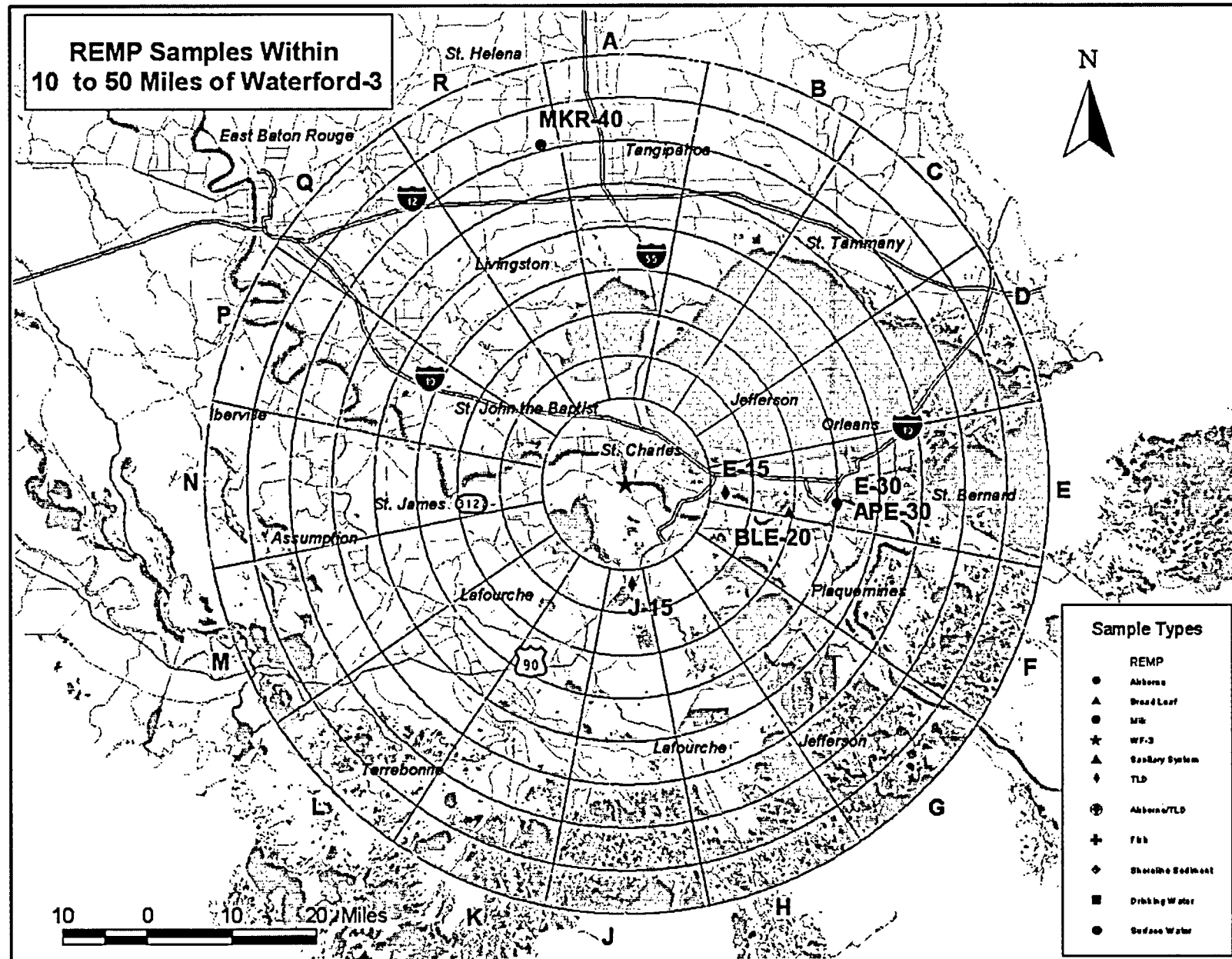
FIGURE 1-1



18



FIGURE 1-3



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 2003 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/m³.

<u>Monitoring Period</u>	<u>Result</u>
Preoperational	0.080
1983 – 2002	0.019
2003	0.020

Table 3.1, which includes gross beta concentrations for 2003, 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 2003.

2.2 Thermoluminescent Dosimetry Sample Results

The average exposure rates during 2003 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 (G-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 2003 as previous years of operation as evidenced on Attachment 2, Table 2.2. In addition, Radiological Gaseous Effluents for 2003 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 2003 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.

<u>Monitoring Period</u>	<u>Result</u>
Preoperational	7.0
1983 – 2002	5.2
2003	3.0

Table 3.1, which includes gross beta concentrations for 2003, 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 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 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 2003.

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 2003 are higher than those from the preoperational program as seen below. Results are reported as annual average pCi/l.

<u>Monitoring Period</u>	<u>Result</u>
Preoperational	121
1983 – 2002	1064
2003	21673

Tritium is expected due to liquid effluent releases from the Turbine Building Industrial Waste Sump (TBIWS) normally being directed to the 40 Arpent canal where samples are collected. Water from this pathway is typically discharged at a rate of approximately 20,000 gallons per day total with tritium concentration ranging from 1.81E-6 uCi/ml to 1.56E-4 uCi/ml. The plant effluent is diluted by adjoining canals and rain, which can vary significantly depending on weather conditions, prior to reaching the sample location. As a result, samples collected after periods of heavy rain can indicate concentrations below detection levels, while those collected during dry periods have the potential to approach concentrations discharged directly from the plant via the TBIWS.

Minor primary to secondary leakage has resulted in a rising trend in TBIWS tritium levels. This was identified in the 4th quarter of 2002. Actions were taken to address the rise to prevent the approach of the reporting limit for SWK-1. Tritium is no longer released via this pathway as of March 2003.

2.4 Sediment Sample Results

Sediment samples were collected from two indicator locations 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 2003.

2.5 Milk Sample Results

Milk samples were collected from 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 2003.

2.6 Fish Sample Results

Fish samples were collected from two indicator 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 2003.

2.7 Broadleaf Vegetation Sample Results

Broadleaf vegetation samples were collected from two indicator 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 2003.

2.8 Land Use Census Results

In compliance with the Waterford 3 ODCM and TRM, the land use census was conducted on September 24, September 30 and October 8, 2002. 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 garden and food product locations remained unchanged for 2002, one location of goats (sector E) and one location of milk cows (sector Q) were removed. One new resident location (sector Q), one new milk cow location (sector E) and one new beef cow location (sector E) was identified in 2002. 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 2002 biannual 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. For the sample result outside the acceptable control limit, W3 and RBS's review indicated no impact on previously reported data. Attachment 1 also provides additional discussion regarding the sample result outside the acceptable control limit.

TABLE 2.1
Biannual Land Use Census Results

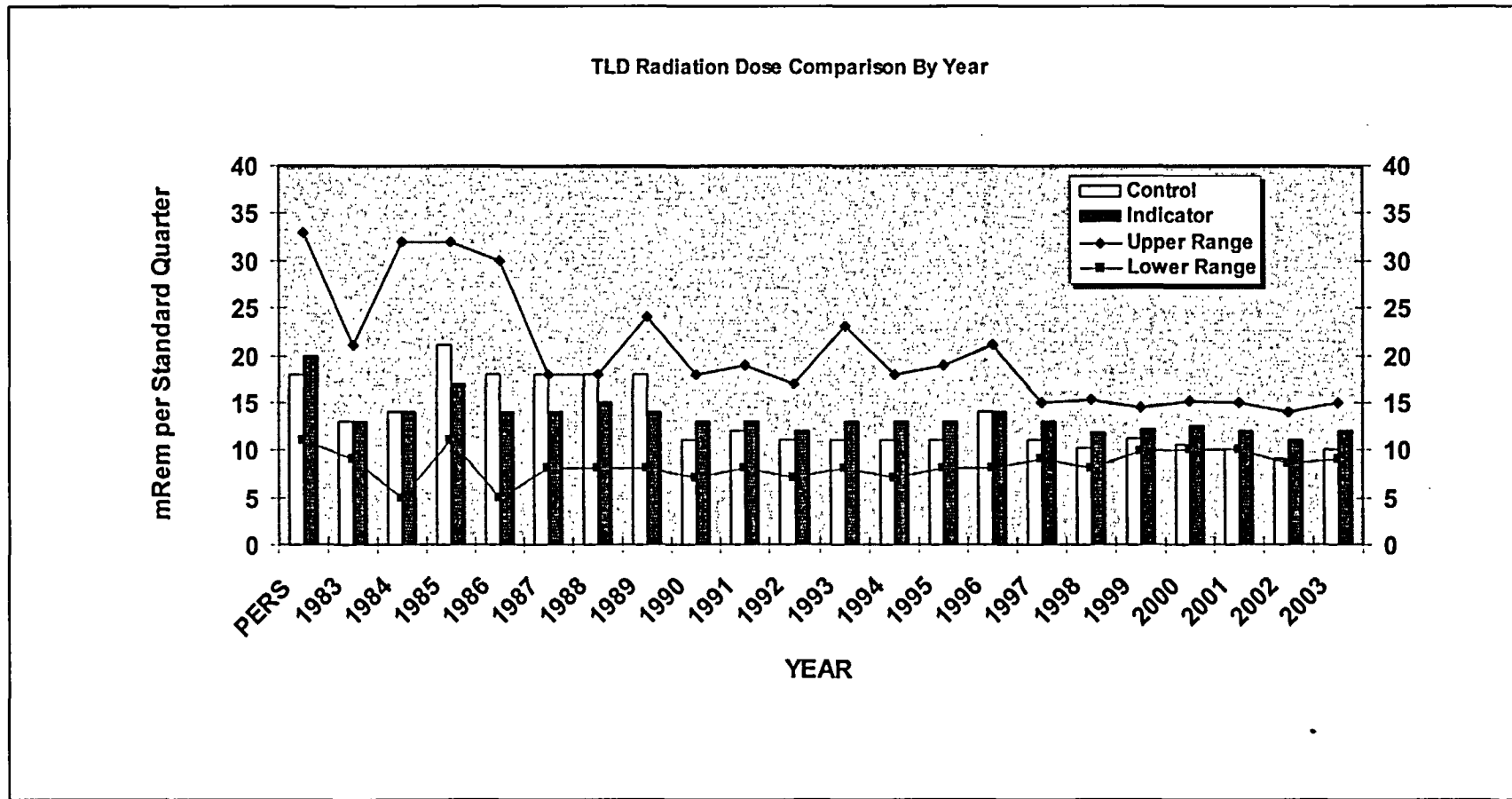
Sector	Direction	Distance from Plant in Miles					
		Residence	Garden	Milk Cows	Beef Cows	Goats	Food Products
A	N	1.3	1.7	* 4.6	4.6	^	4.1
B	NNE	1.1	1.3	^	^	^	1.3
C	NE	0.9	0.9	^	^	^	^
D	ENE	0.9	0.9	^	^	^	^
E	E	2.2	2.2	**2.3	2.3	* 2.3	0.3
F	ESE	3.1	2.2	^	2.3	^	0.3
G	SE	4.0	4.1	^	2.4	^	0.3
H	SSE	^	^	^	^	^	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	0.7	1.0	^	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 (MKE-3) for REMP

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



3.0 Radiological Environmental Monitoring Program Summary

3.1 2003 Program Results Summary

Table 3.1 summarizes the 2003 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 2003

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 (102 / 104) [0.004 - 0.030]	APQ-1 (NW, 0.81 mi.)	0.020 (26 / 26) [0.007 - 0.030]	0.020 (23 / 26) [0.004 - 0.030]	0
	GS 20						
	Cs-134 Cs-137	0.05 0.06	<LLD <LLD	N/A N/A	N/A N/A	<LLD <LLD	0 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)	12 (118 / 120) [9.0 - 15.3]	G-2 (SE, 1.26 mi.)	15.3 (4 / 4) [14.7 - 15.9]	N/A	0
Control TLDs (mrem/Std. Qtr)	Gamma 4	(f)	N/A	N/A	N/A	10 (4 / 4) [9.4 - 10.5]	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 2003

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	3.0 (5 / 8) [1.2 – 6.0]	DWF-2 (ESE, 1.51 mi.)	3.6 (3 / 4) [2.1 – 6.1]	2.5 (3 / 4) [2.0 – 3.2]	0
	I-131 52	1	<LLD	N/A	N/A	<LLD	0
	H-3 12	2000	<LLD	N/A	N/A	<LLD	0
	GS 12						
	Mn-54 15	15	<LLD	N/A	N/A	<LLD	0
	Fe-59 30	30	<LLD	N/A	N/A	<LLD	0
	Co-58 15	15	<LLD	N/A	N/A	<LLD	0
	Co-60 15	15	<LLD	N/A	N/A	<LLD	0
	Zn-65 30	30	<LLD	N/A	N/A	<LLD	0
	Zr-95 15	15	<LLD	N/A	N/A	<LLD	0
	Nb-95 15	15	<LLD	N/A	N/A	<LLD	0
	Cs-134 15	15	<LLD	N/A	N/A	<LLD	0
	Cs-137 18	18	<LLD	N/A	N/A	<LLD	0
	Ba-140 15	15	<LLD	N/A	N/A	<LLD	0
	La-140 15	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 2003

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	21673 (1/4)	SWK-1 [SSW, 0.49 mi.]	21673 (1/4)	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	N/A	0
	Cs-137	180	<LLD	N/A	N/A	N/A	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 2003

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 4	1	N/A	N/A	N/A	<LLD	0
	GS 4						
	Cs-134 15		N/A	N/A	N/A	<LLD	0
	Cs-137 18		N/A	N/A	N/A	<LLD	0
	Ba-140 15		N/A	N/A	N/A	<LLD	0
	La-140 15		N/A	N/A	N/A	<LLD	0
Fish (pCi/kg wet)	GS 14						
	Mn-54 130		<LLD	N/A	N/A	<LLD	0
	Fe-59 260		<LLD	N/A	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
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
2003 Radiological Monitoring Report
Summary of Monitoring Results

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Table 1.1

Sample Type: Air Particulate Filter

Analysis: Gross Beta

Units: pCi/m³

Start Date	End Date	APF-1 (Indicator)	APQ-1 (Indicator)	APP-1 (Indicator)	APC-1 (Indicator)	APE-30 (Control)
<u>Required LLD</u> →		<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>
12-30-02	01-14-03	0.0255	0.0243	0.0251	0.0250	0.0300
01-14-03	01-27-03	0.0206	0.0268	0.0283	0.0267	0.0297
01-27-03	02-10-03	0.0284	0.0278	0.0284	0.0257	0.0276
02-10-03	02-25-03	0.0194	0.0208	0.0205	0.0185	0.0224
02-25-03	03-10-03	0.0153	0.0164	0.0164	0.0170	0.0179
03-10-03	03-24-03	0.0168	0.0165	0.0170	0.0160	0.0178
03-24-03	04-07-03	0.0180	0.0193	0.0178	0.0170	0.0178
04-07-03	04-21-03	0.0223	0.0201	0.0209	0.0217	0.0220
04-21-03	05-05-03	0.0094	0.0168	0.0181	0.0161	0.0049
05-05-03	05-19-03	0.0156	0.0151	0.0153	0.0154	0.0158
05-19-03	06-02-03	0.0206	0.0201	0.0206	0.0177	0.0179
06-02-03	06-16-03	0.0106	0.0109	0.0117	0.0099	0.0108
06-16-03	07-01-03	0.0069	0.0071	0.0063	0.0074	0.0037
07-01-03	07-14-03	0.0089	0.0093	0.0092	0.0086	0.0094
07-14-03	07-28-03	0.0147	0.0174	0.0163	0.0159	0.0567
07-28-03	08-11-03	0.0150	0.0147	0.0142	0.0147	0.0160
08-11-03	08-25-03	0.0069	0.0204	0.0101	0.0092	0.0111
08-25-03	09-08-03	0.0140	0.0162	0.0154	0.0142	0.0155
09-08-03	09-22-03	0.0235	0.0264	0.0258	0.0243	0.0256
09-22-03	10-06-03	0.0241	0.0257	0.0248	0.0244	0.0271
10-06-03	10-20-03	0.0248	0.0257	0.0275	0.0247	0.0260
10-20-03	11-03-03	0.0295	0.0296	0.0303	0.0297	0.0304
11-03-03	11-17-03	0.0226	0.0221	0.0210	0.0007	0.0218
11-17-03	12-01-03	0.0155	0.0162	0.0172	0.0160	0.0170
12-01-03	12-15-03	0.0237	0.0243	0.0232	0.0234	0.0293
12-15-03	12-29-03	0.0186	0.0188	0.0202	0.0179	0.0195

Table 1.2

Sample Type: Radiiodine Cartridge

Analysis: Iodine-131

Units: pCi/m³

Start Date	End Date	APF-1 (Indicator)	APQ-1 (Indicator)	APP-1 (Indicator)	APC-1 (Indicator)	APE-30 (Control)
<u>Required LLD</u> →		<u>0.07</u>	<u>0.07</u>	<u>0.07</u>	<u>0.07</u>	<u>0.07</u>
12-30-02	01-14-03	< 0.0184	< 0.0188	< 0.0205	< 0.0143	< 0.0338
01-14-03	01-27-03	< 0.0159	< 0.0159	< 0.0173	< 0.0130	< 0.0145
01-27-03	02-10-03	< 0.0154	< 0.0101	< 0.0120	< 0.0097	< 0.0167
02-10-03	02-25-03	< 0.0118	< 0.0129	< 0.0154	< 0.0131	< 0.0096
02-25-03	03-10-03	< 0.0135	< 0.0177	< 0.0176	< 0.0106	< 0.0150
03-10-03	03-24-03	< 0.0140	< 0.0135	< 0.0133	< 0.0089	< 0.0123
03-24-03	04-07-03	< 0.0159	< 0.0151	< 0.0169	< 0.0125	< 0.0142
04-07-03	04-21-03	< 0.0149	< 0.0147	< 0.0143	< 0.0096	< 0.0127
04-21-03	05-05-03	< 0.0382	< 0.0145	< 0.0147	< 0.0120	< 0.0415
05-05-03	05-19-03	< 0.0116	< 0.0149	< 0.0129	< 0.0114	< 0.0154
05-19-03	06-02-03	< 0.0116	< 0.0146	< 0.0146	< 0.0112	< 0.0157
06-02-03	06-16-03	< 0.0126	< 0.0135	< 0.0129	< 0.0118	< 0.0129
06-16-03	07-01-03	< 0.0162	< 0.0172	< 0.0218	< 0.0183	< 0.0168
07-01-03	07-14-03	< 0.0140	< 0.0113	< 0.0148	< 0.0126	< 0.0140
07-14-03	07-28-03	< 0.0132	< 0.0145	< 0.0145	< 0.0139	< 0.0086
07-28-03	08-11-03	< 0.0148	< 0.0107	< 0.0163	< 0.0100	< 0.0137
08-11-03	08-25-03	< 0.0164	< 0.0272	< 0.0175	< 0.0097	< 0.0155
08-25-03	09-08-03	< 0.0162	< 0.0156	< 0.0159	< 0.0105	< 0.0215
09-08-03	09-22-03	< 0.0175	< 0.0154	< 0.0169	< 0.0153	< 0.0173
09-22-03	10-06-03	< 0.0156	< 0.0136	< 0.0152	< 0.0102	< 0.0122
10-06-03	10-20-03	< 0.0181	< 0.0138	< 0.0168	< 0.0140	< 0.0133
10-20-03	11-03-03	< 0.0116	< 0.0148	< 0.0141	< 0.0087	< 0.0112
11-03-03	11-17-03	< 0.0156	< 0.0162	< 0.0140	< 0.0161	< 0.0190
11-17-03	12-01-03	< 0.0159	< 0.0122	< 0.0146	< 0.0105	< 0.0153
12-01-03	12-15-03	< 0.0147	< 0.0135	< 0.0169	< 0.0124	< 0.0340
12-15-03	12-29-03	< 0.0156	< 0.0155	< 0.0156	< 0.0096	< 0.0125

Table 1.3

Sample Type: Air Particulate Filter

Analysis: Gamma Isotopic

Units: pCi/m³

Location	Quarterly Composite		Cs-134	Cs-137
	<u>Required LLD</u>	→	<u>0.05</u>	<u>0.06</u>
APF-1 (Indicator)	1st		< 0.0017	< 0.0018
APQ-1 (Indicator)	1st		< 0.0019	< 0.0016
APP-1 (Indicator)	1st		< 0.0020	< 0.0017
APC-1 (Indicator)	1st		< 0.0017	< 0.0012
APE-30 (Control)	1st		< 0.0015	< 0.0023
APF-1 (Indicator)	2nd		< 0.0028	< 0.0017
APQ-1 (Indicator)	2nd		< 0.0018	< 0.0015
APP-1 (Indicator)	2nd		< 0.0012	< 0.0014
APC-1 (Indicator)	2nd		< 0.0021	< 0.0009
APE-30 (Control)	2nd		< 0.0029	< 0.0023
APF-1 (Indicator)	3rd		< 0.0021	< 0.0021
APQ-1 (Indicator)	3rd		< 0.0022	< 0.0011
APP-1 (Indicator)	3rd		< 0.0024	< 0.0012
APC-1 (Indicator)	3rd		< 0.0019	< 0.0011
APE-30 (Control)	3rd		< 0.0014	< 0.0012
APF-1 (Indicator)	4th		< 0.0024	< 0.0025
APQ-1 (Indicator)	4th		< 0.0020	< 0.0018
APP-1 (Indicator)	4th		< 0.0043	< 0.0043
APC-1 (Indicator)	4th		< 0.0019	< 0.0016
APE-30 (Control)	4th		< 0.0018	< 0.0020

Table 2.1

Sample Type: Thermoluminescent Dosimeters

Analysis: Gamma Dose

Units: mrem/Std. Qtr.

Indicator Locations					
Station	1st Qtr '03	2nd Qtr '03	3rd Qtr '03	4th Qtr '03	Annual Mean '03
A-2	12	13	13	12	13
A-5	11	12	12	12	12
B-1	12	12	12	13	12
B-4	12	13	13	14	13
C-1	9	9	10	10	10
D-2	12	12	12	13	12
D-5	11	10	12	12	11
E-1	11	14	11	11	12
E-5	11	10	11	11	11
E-15	10	9	11	10	10
F-2	11	12	12	12	12
F-4	13	13	14	15	14
F-9	12	12	12	12	12
G-2*	15	15	16	16	15
G-4**	10	10		11	11
G-8	10	10	10	10	10
H-2	12	12	13	13	12
H-8**	13	12	13		12
J-2	12	12	12	12	12
J-15	12	12	13	13	13
K-1	11	11	12	12	12
L-1	14	13	13	13	13
M-1	12	10	11	11	11
N-1	13	12	12	13	13
P-1	9	9	9	10	9
P-6	14	13	13	13	13
Q-1	12	12	12	11	12
Q-5	11	11	11	11	11
R-1	7	8	10	10	9
R-6	10	10	10	10	10
Control Location					
Station	1st Qtr '03	2nd Qtr '03	3rd Qtr '03	4th Qtr '03	Annual Mean '03
E-30	10	9	10	10	10

* Location with highest annual mean.

** TLDs at location G-4 were missing for 3Q03. TLDs at location H-8 were missing for 4Q03.

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)
<u>Required LLD</u>	→	<u>4</u>	<u>4</u>	<u>4</u>
1st		2.11	<1.68	2.00
2nd		2.74	1.19	2.36
3rd		6.09	3.02	3.15
4th		<3.67	<3.72	<3.58

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	1*	1	1	1
12-30-02	< 6.39	< 0.88	< 0.88	< 0.89
01-27-03	< 5.26	< 0.85	< 0.84	< 0.90
02-25-03	< 5.06	< 0.86	< 0.82	< 0.85
03-24-03	<12.69	< 0.79	< 0.89	< 0.77
04-21-03	< 5.71	< 0.82	< 0.81	< 0.88
05-19-03	< 5.48	< 0.89	< 0.74	< 0.90
06-16-03	< 5.75	< 0.77	< 0.86	< 0.78
07-14-03	< 4.59	< 0.81	< 0.88	< 0.74
08-11-03	< 6.64	< 0.87	< 0.89	< 0.78
09-08-03	<10.40	< 0.88	< 0.89	< 0.69
10-06-03	< 4.63	< 0.81	< 0.90	< 0.88
11-03-03	< 4.99	< 0.78	< 0.84	< 0.81
12-01-03	< 5.95	< 0.81	< 0.90	< 0.90

* See page 3 for details

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
<u>Required LLD</u> →		<u>15</u>	<u>15</u>	<u>30</u>	<u>15</u>	<u>30</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>18</u>	<u>15</u>	<u>15</u>
DWF/SWF-2 (Indicator)	03-24-03	< 3.69	< 3.84	< 7.96	< 2.26	< 5.26	< 5.23	< 7.28	< 3.25	< 4.54	< 13.11	< 6.24
DWE/SWE-5 (Indicator)	03-24-03	< 3.82	< 4.29	< 8.63	< 4.39	< 9.32	< 4.55	< 8.77	< 6.45	< 6.02	< 23.68	< 5.72
DWP/SWP-7 (Control)	03-24-03	< 5.24	< 3.75	< 9.45	< 4.23	< 12.58	< 4.99	< 7.86	< 5.77	< 3.66	< 25.53	< 7.52
DWF/SWF-2 (Indicator)	06-16-03	< 4.09	< 4.15	< 6.70	< 4.83	< 9.31	< 4.65	< 8.66	< 4.19	< 6.41	< 18.70*	< 3.41
DWE/SWE-5 (Indicator)	06-16-03	< 3.50	< 4.80	< 8.20	< 5.19	< 7.80	< 5.43	< 6.87	< 5.15	< 4.46	< 20.40*	< 7.39
DWP/SWP-7 (Control)	06-16-03	< 4.13	< 5.29	< 12.8	< 2.44	< 8.07	< 7.08	< 8.03	< 6.69	< 6.07	< 19.80*	< 9.35
DWF/SWF-2 (Indicator)	09-08-03	< 3.08	< 5.36	< 10.80	< 4.18	< 7.23	< 2.91	< 9.51	< 5.18	< 5.76	< 22.90*	< 4.10
DWE/SWE-5 (Indicator)	09-08-03	< 4.65	< 4.57	< 8.13	< 3.53	< 7.52	< 4.61	< 7.46	< 4.67	< 3.91	< 13.00	< 3.66
DWP/SWP-7 (Control)	09-08-03	< 6.26	< 5.78	< 7.35	< 3.96	< 8.94	< 6.22	< 6.83	< 4.47	< 5.60	< 12.80	< 6.07
DWF/SWF-2 (Indicator)	12-01-03	< 5.12	< 4.06	< 10.50	< 4.86	< 9.47	< 6.00	< 8.19	< 5.20	< 4.24	< 27.10*	< 9.69
DWE/SWE-5 (Indicator)	12-01-03	< 3.90	< 3.55	< 8.48	< 3.96	< 6.88	< 5.46	< 7.80	< 3.74	< 4.44	< 20.00*	< 5.87
DWP/SWP-7 (Control)	12-01-03	< 5.73	< 4.83	< 11.20	< 5.73	< 12.80	< 4.87	< 10.40	< 5.57	< 5.39	< 26.30*	< 6.74

* See page 3 for details

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)
<u>Required LLD</u>	→	<u>2000</u>	<u>2000</u>	<u>3000</u>	<u>2000</u>
1st		< 575.92	< 574.93	*21673.00	< 571.19
2 nd		< 583.77	< 569.29	< 578.87	< 580.39
3 rd		< 585.52	< 576.46	< 584.37	< 576.67
4 th		< 588.91	< 576.77	< 576.69	< 578.21

* See page 21 for details.

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
<u>Required LLD</u>	→	<u>15</u>	<u>15</u>	<u>30</u>	<u>15</u>	<u>30</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>18</u>	<u>15</u>	<u>15</u>
SWK-1 (Indicator)	01-27-03	< 4.92	< 4.94	< 9.97	< 3.80	< 9.61	< 5.30	< 6.23	< 4.40	< 5.01	< 15.30	< 4.48
	01-27-03**	< 5.25	< 4.35	< 10.70	< 6.95	< 13.80	< 4.57	< 10.30	< 4.16	< 6.76	< 30.40	< 8.86
	02-25-03	< 3.13	< 3.98	< 9.10	< 3.66	< 3.66	< 4.77	< 7.30	< 4.24	< 4.54	< 13.90	< 5.97
	03-24-03	< 12.60	< 11.66	< 23.92	< 5.12	< 27.88	< 11.07	< 15.77	< 14.13	< 13.85	< 49.84	< 11.77
	04-21-03	< 6.50	< 3.45	< 7.33	< 4.23	< 10.80	< 6.06	< 9.49	< 5.78	< 4.71	< 19.40*	< 7.94
	05-19-03	< 5.41	< 3.75	< 9.80	< 5.58	< 8.06	< 4.72	< 7.14	< 6.03	< 5.79	< 20.10*	< 5.06
	06-16-03	< 4.39	< 3.99	< 10.33	< 4.39	< 12.40	< 2.14	< 8.75	< 4.22	< 5.69	< 14.78	< 6.12
	07-14-03	< 5.59	< 5.04	< 8.74	< 7.30	< 8.56	< 5.66	< 3.17	< 4.39	< 6.12	< 16.10*	< 5.96
	08-11-03	< 5.31	< 6.37	< 11.20	< 4.39	< 10.40	< 6.57	< 10.30	< 6.57	< 6.41	< 21.70*	< 5.90
	09-08-03	< 7.92	< 10.50	< 13.40	< 2.71	< 15.20	< 8.44	< 3.61	< 8.15	< 7.63	< 33.80*	< 11.90
	10-06-03	< 4.00	< 5.06	< 8.92	< 4.22	< 10.60	< 2.95	< 6.82	< 4.89	< 4.64	< 13.40	< 5.64
	11-03-03	< 2.98	< 3.48	< 8.98	< 3.99	< 8.17	< 4.31	< 5.23	< 3.50	< 3.02	< 12.90	< 4.17
	12-01-03	< 5.09	< 4.11	< 8.29	< 5.96	< 13.90	< 5.26	< 7.42	< 5.30	< 6.14	< 12.80	< 4.44

* See page 3 for details

** Duplicate sample

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
<u>Required LLD</u>	→	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>	<u>150</u>	<u>180</u>
SHWK-1 (Indicator)	04-28-03	< 25.3	< 20.4	< 24.7	< 25.5	< 34.1
SHWE-3 (Indicator)	04-28-03	< 28.5	< 27.9	< 30.5	< 23.8	< 25.8
SHWQ-6 (Control)	04-28-03	< 27.8	< 25.9	< 32.8	< 26.4	< 35.2

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
<u>Required LLD</u> →		<u>1</u>	<u>15</u>	<u>18</u>	<u>15</u>	<u>15</u>
**MKE-3 (Indicator)	03-18-03	n/a	n/a	n/a	n/a	n/a
***MKQ-5 (Indicator)	03-18-03	n/a	n/a	n/a	n/a	n/a
MKR-40 (Control)	03-17-03	< 0.89	< 6.23	< 11.8	< 29.3	< 6.85
**MKE-3 (Indicator)	06-17-03	n/a	n/a	n/a	n/a	n/a
***MKQ-5 (Indicator)	06-17-03	n/a	n/a	n/a	n/a	n/a
MKR-40 (Control)	06-16-03	< 0.76	< 6.64	< 9.83	< 28.0*	< 5.83
**MKE-3 (Indicator)	09-16-03	n/a	n/a	n/a	n/a	n/a
***MKQ-5 (Indicator)	09-16-03	n/a	n/a	n/a	n/a	n/a
MKR-40 (Control)	09-15-03	< 0.67	< 6.65	< 9.09	< 24.5*	< 7.34
**MKE-3 (Indicator)	12-16-03	n/a	n/a	n/a	n/a	n/a
***MKQ-5 (Indicator)	12-16-03	n/a	n/a	n/a	n/a	n/a
MKR-40 (Control)	12-15-03	< 0.83	< 6.69	< 8.80	< 22.0*	< 6.63

* See page 3 for details

** Sample not available. Cow not producing enough milk.

*** Removing from the program; owner sold cows

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
<u>Required LLD</u> →			<u>130</u>	<u>260</u>	<u>130</u>	<u>130</u>	<u>260</u>	<u>130</u>	<u>150</u>
FH-1 (Control)	10-14-03	Buffalo	< 19.58	< 17.15	< 89.64	< 18.54	< 59.68	< 13.47	< 14.88
FH-1 (Control)	10-14-03	Carp	< 14.67	< 18.35	< 71.38	< 18.91	< 36.61	< 12.82	< 10.55
FH-1 (Control)	10-22-03	Catfish	< 28.99	< 37.80	< 129.79	< 45.03	< 96.64	< 30.37	< 28.81
FH-1 (Control)	10-14-03	Shad	< 11.40	< 17.36	< 58.27	< 15.88	< 29.95	< 11.12	< 10.82
FH-1 (Control)	10-14-03	Mullet	< 15.14	< 17.02	< 8.41	< 15.88	< 46.93	< 12.38	< 12.39
FH-2 (Indicator)	11-06-03	Buffalo	< 12.32	< 15.46	< 31.91	< 8.21	< 33.99	< 11.93	< 10.72
FH-2 (Indicator)	11-06-03	Carp	< 6.56	< 8.40	< 27.54	< 10.14	< 20.56	< 8.12	< 5.44
FH-2 (Indicator)	11-06-03	Shad	< 18.92	< 26.20	< 30.78	< 14.60	< 38.03	< 17.10	< 14.00
FH-2 (Indicator)	11-06-03	Mullet	< 14.52	< 21.26	< 50.99	< 19.05	< 41.27	< 13.66	< 11.90
FH-3 (Indicator)	10-30-03	Buffalo	< 14.12	< 17.54	< 60.35	< 18.78	< 34.69	< 16.12	< 11.02
FH-3 (Indicator)	10-30-03	Carp	< 11.82	< 15.37	< 41.03	< 17.31	< 43.44	< 10.45	< 11.69
FH-3 (Indicator)	10-30-03	Catfish	< 9.84	< 10.84	< 42.74	< 14.90	< 34.15	< 14.05	< 11.22
FH-3 (Indicator)	10-30-03	Mullet	< 14.36	< 18.56	< 59.03	< 19.95	< 33.32	< 11.16	< 15.99
FH-3 (Indicator)	10-30-03	Shad	< 9.41	< 16.05	< 44.97	< 13.08	< 38.42	< 9.60	< 10.75

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
<u>Required LLD</u>	→	<u>60</u>	<u>60</u>	<u>80</u>
BLQ-1 (Indicator)	03-03-03	< 43.1	< 51.6	< 47.5
BLQ-1 (Indicator)	06-02-03	< 49.8	< 40.0	< 56.3
BLQ-1 (Indicator)	09-09-03	< 58.3	< 37.7	< 38.6
BLQ-1 (Indicator)	12-02-03	< 60.0	< 30.9	< 38.2
BLB-1 (Indicator)	03-03-03	< 58.3	< 41.6	< 46.6
BLB-1 (Indicator)	06-02-03	< 56.6	< 39.3	< 40.8
BLB-1 (Indicator)	09-09-03	< 55.7	< 43.7	< 38.4
BLB-1 (Indicator)	12-02-03	< 57.7	< 31.0	< 31.7
BLE-20 (Control)	03-03-03	< 43.6	< 29.3	< 38.2
BLE-20 (Control)	06-02-03	< 52.5	< 44.1	< 37.3
BLE-20 (Control)	09-09-03	< 57.0	< 40.8	< 41.4
BLE-20 (Control)	12-02-03	< 54.6	< 31.3	< 28.7

Table 8.1

Sample Type: **Interlaboratory Comparison**

Analysis: Gross Beta, Iodine-131, Tritium and Gamma Isotopic

Sample Type (units)	Study	Date	Analysis	"Known" Value ^a	RBS Value	RBS N-DEV ^b	RBS N-RANGE ^c
Charcoal Cartridge (pCi/cartridge)	E3757-125	6/12/03	I-131	62.0 ± 10.7	62.3	0.09	0.095
Water (pCi/liter)	E3756-125	6/12/03	BETA	268 ± 69.6	224	-1.90	0.029
	E3755-125	6/12/03	CR-51	213 ± 36.9	210	-0.24	0.638
			MN-54	166 ± 28.8	177	1.17	0.107
			CO-58	83 ± 14.4	86	0.63	0.142
			FE-59	88 ± 15.2	96.3	1.64	0.201
			CO-60	118 ± 20.4	127	1.27	0.250
			ZN-65	162 ± 28.1	178	1.75	0.547
			I-131	81 ± 14	95.3	3.06 ^d	0.438
			CS-134	92 ± 15.9	90.7	-0.25	0.257
			CS-137	206 ± 35.7	218	1.01	0.057
			CE-141	253 ± 43.8	260	0.50	0.117
	E4034-125	12/11/03	H-3	2290 ± 397	2154	-1.03	0.500
Air Filter (pCi/filter)	E4032-125	12/11/03	BETA	28 ± 4.85	30.3	1.40	0.401
	E4035-125	12/11/03	CR-51	272 ± 47.1	260	-0.79	1.060
			MN-54	168 ± 29.1	173	0.52	0.180
			CO-58	107 ± 18.5	109	0.27	0.220
			FE-59	99 ± 17.2	107	1.34	0.180
			CO-60	150 ± 26	149	-0.08	0.320
			ZN-65	191 ± 33.1	200	0.82	0.220
			CS-134	132 ± 22.9	126	-0.74	0.080
			CS-137	126 ± 21.8	124	-0.32	0.141
			CE-141	196 ± 34	196	0.03	0.271
Sediment (pCi/gram)	E4033-125	12/11/03	CR-51	0.208 ± 0.036	0.201	-0.611	0.341
			MN-54	0.128 ± 0.022	0.126	-0.226	0.231
			CO-58	0.082 ± 0.014	0.075	-1.549	0.360
			FE-59	0.076 ± 0.013	0.074	-0.380	0.855
			CO-60	0.115 ± 0.020	0.111	-0.602	0.719
			ZN-65	0.146 ± 0.025	0.149	0.395	0.769
			CS-134	0.100 ± 0.017	0.099	-0.173	0.473
			CS-137	0.202 ± 0.035	0.203	0.057	0.205
			CE-141	0.149 ± 0.026	0.146	-0.387	0.674

Table 8.1
Sample Type: Interlaboratory Comparison
Analysis: Gamma Isotopic

Sample Type (units)	Study	Date	Analysis	"Known" Value ^a	RBS Value	RBS N-DEV ^b	RBS N-RANGE ^c
Milk (pCi/liter)	E3758-125	6/12/03	CR-51	239 ± 41.4	230	-0.68	0.618
			MN-54	186 ± 32.2	192	0.59	0.095
			CO-58	93 ± 16.1	92.3	-0.12	0.191
			FE-59	99 ± 17.2	107	1.34	0.537
			CO-60	132 ± 22.9	141	1.22	0.134
			ZN-65	181 ± 31.4	189	0.80	0.261
			I-131	103 ± 17.8	97.7	-0.90	0.057
			CS-134	103 ± 17.8	101	-0.39	0.229
			CS-137	230 ± 39.8	234	0.33	0.077
			CE-141	283 ± 49	280	-0.20	0.146

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.

Interlaboratory Comparison Program Exceptions

There was one result outside the control limits for accuracy in the 2003 cross check program participation studies. This result was in a gamma isotopic analysis of a water sample.

The result outside the control limits for accuracy was in the analysis of the nuclide I-131 in sample study E3755-125 of 6/12/2003. RBS normalized-deviation for the analysis was +3.06 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. I-131 results were all within control limits in other cross check samples for the year 2003.

ATTACHMENT 2

Statistical Comparisons

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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:

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

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.

♦ 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).

TABLE 2.1

STATISTICAL COMPARISON OF 2003 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.)	11.77	11.79	11.39
Standard Deviation (mRem/std. qtr.)	1.64	1.21	1.24
Number in Sample	64	27	27
Calculated "t" Value (comparison of stations 0-2 and 2-5 miles from the plant to stations >5 miles from the plant)	1.11	1.22	NA*
Tabular "t" Value at 95% Confidence($t_{0.025,n}$)	1.990(a)	2.008(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 2003 TLD RADIATION DOSE TO HISTORICAL DATA BY LOCATION

Units: mrem/Std. Qtr.

Station	1990 - 2002 Avg**	1990 - 2002 Std. Dev.**	1990 - 2002 Range**		2003 Avg**	2003 Std Dev**	2003 Range**	
A-2	14	1.4	11	18	13	0.6	12	13
A-5	13	1.5	10	17	12	0.5	11	12
B-1	13	1.6	11	19	12	0.5	12	13
B-4	13	1.2	12	17	13	0.8	12	14
C-1	9	1.4	7	13	10	0.6	9	10
D-2	12	2.2	8	19	12	0.5	12	13
D-5	12	1.7	9	18	11	1.0	10	12
E-1	11	1.3	10	16	12	1.5	11	14
E-5	12	1.7	9	17	11	0.5	10	11
E-15	11	1.9	8	16	10	0.8	9	11
E-30*	11	1.8	8	17	10	0.5	9	10
F-2	12	1.3	10	17	12	0.5	11	12
F-4	14	1.6	11	19	14	1.0	13	15
F-9	13	1.7	7	17	12	0.0	12	12
G-2	15	1.3	12	19	16	0.6	15	16
G-4	11	1.5	9	16	10	0.6	10	11
G-9	12	2.1	9	19	10	0.0	10	10
H-2	13	1.2	11	18	13	0.6	12	13
H-6	12	1.3	10	17	13	0.6	12	13
J-2	13	1.3	11	17	12	0.0	12	12
J-15	13	1.6	11	17	13	0.6	12	13
K-1	11	1.4	9	16	12	0.6	11	12
L-1	13	1.4	10	16	13	0.5	13	14
M-1	12	1.6	10	18	11	0.8	10	12
N-1	13	1.7	8	18	13	0.6	12	13
P-1	10	1.4	8	15	9	0.5	9	10
P-6	14	1.6	11	19	13	0.5	13	14
Q-1	12	1.3	10	16	12	0.5	11	12
Q-5	14	2.0	9	18	11	0.0	11	11
R-1	11	1.6	6	15	9	1.5	7	10
R-6	13	2.7	9	18	10	0.0	10	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 2003 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)	18.6	19.7	19.4	18.4	20.1
Standard Deviation (10^{-3} pCi/m ³)	6.17	5.68	6.18	5.98	7.22
Number in Sample	25	26	26	25	23
Calculated "t" Value (comparison of the indicator stations to the control station)	0.76	0.21	0.38	0.87	NA*
Tabular "t" Value at 95% Confidence($t_{0.025,n}$)	2.015(a)	2.014(a)	2.014(a)	2.015(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 2003 GROSS BETA ACTIVITY MEASUREMENTS IN DRINKING/SURFACE WATER SAMPLES			
	DWF-2	DWE-5	DWP-7
Mean (pCi/liter)	3.6	2.1	2.5
Standard Deviation (pCi/liter)	1.7	0.9	0.5
Number in Sample	3	2	3
Calculated "t" Value (comparison of the indicator stations to the control station)	1.09	0.55	NA*
Tabular "t" Value at 95% Confidence($t_{0.025,n}$)	2.776(a)	3.182(a)	NA*

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

* Not Applicable

ATTACHMENT 3

2003 REVISED TRM TABLES

□ (DRN 02-216, Am. 51)
TABLE 3.12-2 (See note below)
I (DRN 02-216, Am. 51)

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS
IN ENVIRONMENTAL SAMPLES

Reporting Levels

<u>ANALYSIS</u>	<u>WATER</u> <u>(pCi/l)</u>	<u>AIRBORNE</u> <u>PARTICULATE</u> <u>OR GASES</u> <u>(pCi/M³)</u>	<u>FISH</u> <u>(pCi/kg,</u> <u>wet)</u>	<u>MILK</u> <u>(pCi/l)</u>	<u>FOOD</u> <u>PRODUCTS</u> <u>(pCi/kg,</u> <u>wet)</u>
□ (DRN 03-255, Am. 73)					
H-3	20,000*				
I (DRN 03-255, Am. 73)					
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-95	400				
Nb-95	400				
□ (DRN 03-255, Am. 73)					
I-131	2**	0.9		3	100
I (DRN 03-255, Am. 73)					
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-140	200			300	
La-140	200			300	

□ (DRN 02-216, Am. 51)

NOTE: TRM Table 3.12-2 is part of the Offsite Dose Calculation Manual (ODCM), reference UNT-005-014. Revision of this TRM Table requires the approval of the General Manager Plant Operations (GMPO) in accordance with Technical Specification 6.14.

I (DRN 02-216, Am. 51)

□ (DRN 03-255, Am. 73)

* For drinking water samples. This is 40CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

** If no drinking water pathway exists, a value of 20 pCi/l may be used.

I (DRN 03-255, Am. 73)

□ (DRN 02-216, Am. 51)
TABLE 4.12-1 (See note below)
| (DRN 02-216, Am. 51)

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

□ (DRN 03-255, Am. 73)

LOWER LIMITS OF DETECTION (LLD)^{a,b,c}

| (DRN 03-255, Am. 73)

<u>ANALYSIS</u>	<u>WATER</u> <u>(pCi/l)</u>	<u>AIRBORNE</u> <u>PARTICULAT</u> <u>E</u> <u>OR GASES</u> <u>(pCi/M³)</u>	<u>FISH</u> <u>(pCi/kg,</u> <u>wet)</u>	<u>MILK</u> <u>(pCi/l)</u>	<u>FOOD</u> <u>PRODUCTS</u> <u>(pCi/kg,</u> <u>wet)</u>	<u>SEDIMENT</u> <u>(pCi/kg,</u> <u>dry)</u>
Gross Beta □ (DRN 03-255, Am. 73)	4	0.01				
H-3 (DRN 03-255, Am. 73)	2,000 ^f					
Mn-54	15		130			
Fe-59	30		260			
Co-58	15		130			
Co-60	15		130			
Zn-65 □ (DRN 03-255, Am. 73)	30		260			
Zr-95 (DRN 03-255, Am. 73)	15					
Nb-95	15					
I-131	1 ^d	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137 □ (DRN 03-255, Am. 73)	18	0.06	150	18	80	180
Ba-140 (DRN 03-255, Am. 73)	15			15		
La-140	15			15		

□ (DRN 02-216, Am. 51)

NOTE: TRM Table 4.12-1 is part of the Offsite Dose Calculation Manual (ODCM), reference UNT-005-014. Revision of this TRM Table requires the approval of the General Manager Plant Operations (GMPO) in accordance with Technical Specification 6.14.

| (DRN 02-216, Am. 51)

□ (DRN 02-216, Am. 51)
TABLE 4.12-1 (See note below)
| (DRN 02-216, Am. 51)
TABLE NOTATIONS

- a. This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 6.9.1.7.
- b. Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13.
- c. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 6.9.1.7.

□ (DRN 03-255, Am. 73)

- d. LLD for drinking water samples. If no drinking water pathway exists, a value of 15 pCi/l may be used.

| (DRN 03-255, Am. 73)

- e. The LLD is defined in the ODCM.

□ (DRN 03-255, Am. 73)

- f. If no drinking water pathway exists, a value of 3000 pCi/l may be used.

| (DRN 03-255, Am. 73)

□ (DRN 02-216, Am. 51)

NOTE: TRM Table 4.12-1 is part of the Offsite Dose Calculation Manual (ODCM), reference UNT-005-014. Revision of this TRM Table requires the approval of the General Manager Plant Operations (GMPO) in accordance with Technical Specification 6.14.

| (DRN 02-216, Am. 51)