ENTERGY

Entergy Operations, Inc.
P.O. Box d
Killona, LA 70066
Tel 504 739 6774

R. F. Burski
Director
Nuclear Safety
Waterford 3

W3F1-92-0140
A4.05
QA

April 23, 1992

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Annual Radiological Environmental Operating Report

Gentlemen:

Attached is the subject 1991 annual report on radiological environmental monitoring which covers the period of January 1 through December 31, 1991. This report is submitted per Section 6.9.1.7 in the Waterford 3 Technical Specifications (NUREG-1117).

If there are any questions, please contact C.J. Thomas at (504) 739-6531.

Very truly yours,

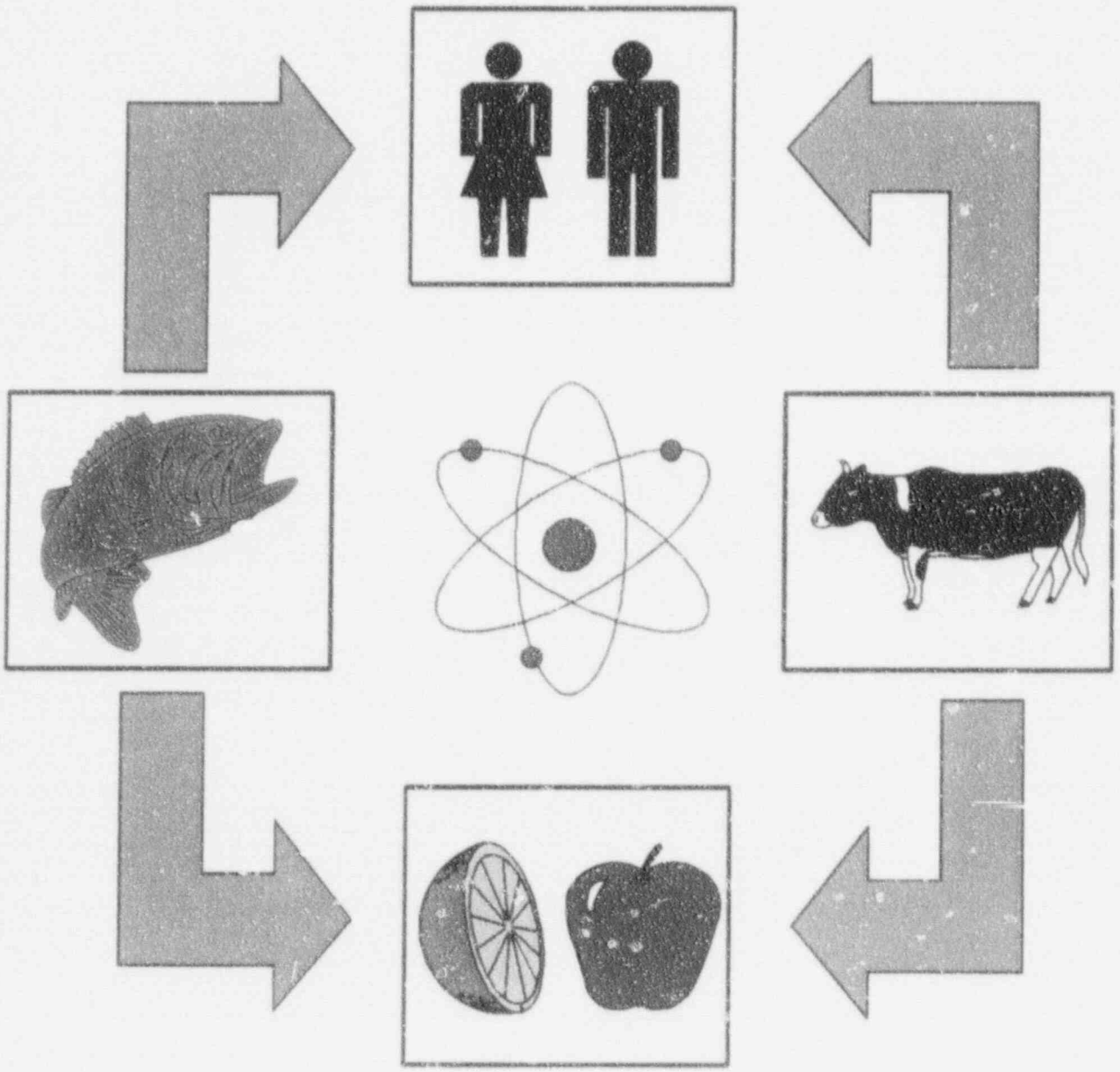
R.F. Burski

RFB/CJT/ssf
Attachment

(w/Attachment)
cc: R.D. Martin, NRC Region IV
NRC Resident Inspectors Office

(w/o Attachment)
cc: D.L. Wigginton, NRC-NRR
R.B. McGehee
N.S. Reynolds

WATERFORD 3 S.E.S
1991
RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT



ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

FOR WATERFORD 3 STEAM ELECTRIC STATION

JANUARY 1 THROUGH DECEMBER 31, 1991

Docket Number: 50-382

License Number: NPF-38

ABSTRACT

This report is issued pursuant to Waterford 3 Technical Specification 6.9.1.7. Its purpose is to discuss the Waterford 3 Radiological Environmental Monitoring Program (REMP), present the results of the program for the year of 1991, and evaluate the radiological impact on the environment resulting from plant operation.

The Waterford 3 REMP collected data on environmental radioactivity levels around the Waterford 3 nuclear power plant. These levels were determined by analyzing samples of air, water, shoreline soil, fish, vegetation, and milk from various locations around the facility. Based on the evaluation of the environmental data collected, the operation of Waterford 3 exhibited no discernable impact on the levels of radioactivity in the environment during 1991.

TABLE OF CONTENTS

LIST OF TABLES

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF FIGURES

1.0 INTRODUCTION

This report describes the Radiological Environmental Monitoring Program (REMP) for the Waterford 3 Steam Electric Station and discusses the results obtained during the calendar year 1991. The results discussed in this report were used to evaluate the radiological environmental impact resulting from the operation of Waterford 3. The submission of this report to the Nuclear Regulatory Commission (NRC) fulfills the requirements pursuant to Waterford 3 Technical Specification 6.9.1.7.

1.1 Program and Report Objectives

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

a. to identify any radioactive materials or radiation in the environment associated with plant operation,

b. to compare the results obtained during the reporting period with past operational and pre-operational data and identify any trends associated with accumulation of radioactivity in the environment, and

c. to verify compliance with federal regulatory requirements.

1.2 Plant and Site Description

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

The plant is located on the west bank of the Mississippi River at River Mile 129.6 between Baton Rouge and New Orleans, Louisiana. The site is in the northwestern section of St. Charles Parish approximately 3 miles southeast of the St. John the Baptist Parish boundary between the towns of Killona and Taft. The Mississippi River is the closest prominent natural feature; other features include Lac des Allemends, about 5.5 miles southwest of the site, and Lake Ponchartrain, about 7 miles northeast of the site.

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

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

2.0 PROGRAM DESCRIPTION

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

2.1 History and Development

The Waterford 3 REMP evolved from the Pre-operational Environmental Radiological Surveillance (PERS) program (1976-1982) and was initiated in April of 1983. Equipment, procedures, techniques, and sampling locations used during the pre-operational survey were incorporated into the operational program. Further, the environmental data collected during the first two years of the REMP (1983 and 1984), prior to initial criticality, were used to supplement the baseline established during the PERS Program.

2.2 Responsibilities

Waterford 3 personnel are responsible for implementing and insuring that the REMP complies with federal regulatory, Technical Specification, and Offsite Dose Calculation Manual (ODCM) requirements. Responsibilities of Waterford 3 personnel include collecting (with the exception of fish samples), preparing, and shipping of environmental samples; conducting environmental dosimetry measurements; reviewing analytical results reports; and preparing and submitting the annual Radiological Environmental Monitoring and other relevant reports to the Nuclear Regulatory Commission.

The primary contractor, the Environmental Services Department of Arkansas Power & Light (AP&L) located in Little Rock, Arkansas, is responsible for performing radiological analyses; conducting initial data review; preparing results reports; and overseeing laboratory quality assurance and control. Additionally, a separate contractor, the Fisheries Co-operative Extension Service of Louisiana State University, is responsible for the collection of fish samples.

2.3 Sample Collection and Handling Procedures

Sample types, location, collection frequency, and the analyses performed are summarized in Tables 2.1 and 2.2. The information contained in these tables is based on requirements specified in Table 5.8-1 of the Waterford 3 ODCM. Location maps of the sampling stations are illustrated in Figures 2.1 through 2.3. Any deviations (i.e., unavailable samples and missed lower limits of detection) or changes made to the REMP during 1991 are discussed in Section 3.6.

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

2.3.1 Direct Radiation Exposure Pathway Samples

Integrated external gamma exposure, determined using Panasonic Multi-element thermoluminescent dosimeters (TLDs), was measured at thirty-one locations as follows:

a. an inner ring of stations, one in each of the sixteen meteorological sectors, in the general area of the site boundary;

b. an outer ring of stations, one in ten of the sixteen meteorological sectors, in the six to eight kilometer range from the site; and

c. the balance placed in areas of special interest (e.g., population centers, schools, etc.) with one area serving as a control.

The TLDs were exchanged and analyzed quarterly by Waterford 3 personnel.

2.3.2 Airborne Exposure Pathway Samples

Samples of airborne particulates and radioiodines were collected at four indicator stations (APP-1, APQ-1, APG-1, APC-1) and one control station (APE-30). Low-volume air pumps and flow totalizers in weather proof shelters provided continuous air sampling.

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

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

2.3.3 Waterborne Exposure Pathway Samples

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

Composite drinking/surface water samples were obtained biweekly from the Mississippi River using automatic composite samplers placed at one upstream (DWP-7/SWP-7) and two downstream (DWG-2/SWG-2, DWE-5/SWE-5) locations. Hydrochloric acid was added to each sample prior to shipment. The contract laboratory analyzed the biweekly samples for iodine-131, composited them monthly for gross beta and gamma spectroscopy, and composited them quarterly for tritium analysis.

Due to the high water table resulting from shallow aquifers in the vicinity of the site, drainage canal sampling represents groundwater discharge. Groundwater was obtained quarterly by grab sampling from one sampling location (GWK-1). Again, hydrochloric acid was added to the sample prior to shipment to the contract laboratory for tritium and gamma spectroscopy analyses.

Shoreline sediment samples were obtained semi-annually from a sampling station at each plant discharge point. Station SHWE-3 is located downstream on the shoreline of the Mississippi River; station SHWK-1 is on the shoreline of the 40-Arpent canal. The samples were shipped without further processing.

2.3.4 Ingestion Exposure Pathway Samples

Milk samples were collected semi-monthly from one indicator location (MKQ-5) and one control location (MKQ-45). Sampling of the control station was performed by Louisiana Radiation Protection Division personnel. Although one additional indicator location was identified (MKE-4), no samples were available from this location during 1991 (see Section 3.6). Formaldehyde was added as a preservative to all samples prior to shipment. Iodine-131 and gamma spectroscopy analyses were performed.

Fish samples were collected bi-annually from the Mississippi River upstream (FH-1) and downstream (FH-2) from the plant. A contractor performed the sampling by netting. Subsequently, the fish were segregated by species and location prior to delivery to Waterford 3. The samples were shipped frozen for analysis by gamma spectroscopy.

The Waterford 3 ODCM, Section 5.8.1, requires broad leaf vegetation to be sampled from 3 locations within 5 miles of the plant in the event milk samples are unavailable. Since milk samples were collected from only one sampling location within five miles of Waterford 3, broad leaf vegetation was sampled monthly at two indicator locations (BLQ-1 and BLB-1) and one control location (BLK-15). The samples were shipped without further processing.

Food product sampling was not required because no areas surrounding the plant were irrigated with water in which plant wastes are discharged. However, food products grown within the site boundary were collected to demonstrate the absence of radionuclide accumulation.

These food product samples (sugarcane and soybeans) were collected at the time of harvest from three locations (FPP-1, FPG-1, and FPQ-1) by normal harvesting techniques and shipped without further processing. Iodine-131 and gamma spectroscopy analyses were performed.

2.4 Analytical Procedures

A brief synopsis of the analytical procedures used by AP&L and Waterford 3 are given in Appendix D to provide an overview of the program.

The minimum sensitivities for the analytical procedures are reflected by the Lower Limits of Detection (LLD) values presented in Table 2.3 from Table 5.8-3 of Waterford 3 ODCM. The LLD's are a priori estimates based on assumed sample volumes, counting times, detector efficiencies, etc. Analyses that could not achieve these lower limits of detection are discussed in Section 3.6.

2.5 Laboratory Quality Assurance

During 1991, AP&L performed between 5% and 10% of all analyses for quality assurance purposes. Spiked and blank samples were prepared in-house. In addition, AP&L participated in the EPA Radiological Interlaboratory Comparison (cross-check) Program.

This quality assurance program satisfies the requirements of the Waterford 3 ODCM, Section 5.8.2, for participation in an interlaboratory comparison program. The program involved analyses on various sample media typically found in the REMP. As a result of participation in the program, an objective measure of analytical precision and accuracy was obtained. In the event that results obtained by AP&L were not within control limits (3 standard deviations), an investigation was conducted to determine the cause, and corrective action was taken to prevent a recurrence. Appendix C lists the 1991 results of AP&L's participation in the cross-check program.

TABLE 2.1

RADIOLOGICAL ENVIRONMENTAL MONITORING
PROGRAM (REMP) SUMMARY[a]

SAMPLE TYPE	LOCATION	ANALYSIS	FREQUENCY
Direct Radiation	A-2, B-1, C-1, D-2, E-1, F-2, G-2, H-2, J-2, K-1, L-1, M-1, N-1, P-1, Q-1, R-1, A-5, B-4, D-5, E-5, F-4, G-4, H-6, P-6, Q-5, R-6, G-9, E-15, J-15, E-30	TLD gamma	Quarterly
Radiolodine and Particulates	APP-1, APQ-1, APG-1, APC-1, APE-30	Gross beta, I-131 gamma isotopic	Weekly Quarterly composite
Drinking Water[b]	DWG-2, DWE-5, DWP-7	H-3 Gross beta, gamma isotopic, I-131	Quarterly composite Monthly composite Bi-weekly composite
Surface Water[b]	SWG-2, SWE-5, SWP-7	H-3 gamma isotopic	Quarterly composite Monthly composite
Ground Water	GWK-1	gamma isotopic, H-3	Quarterly
Shoreline Sediment	SHWE-3, SHWK-1	gamma isotopic	Semi-annually
Milk	MKE-4, MKQ-5, MKQ-1, MKQ-45	gamma isotopic, I-131	Semi-monthly/monthly
Fish	FH-1, FH-2	gamma isotopic	In season or semi-annually
Food Products	FPG-1, FPP-1, FPQ-1	gamma isotopic	At harvest time
Broad Leaf	BLQ-1, BLB-1, BLK-15	gamma isotopic, I-131	Monthly When milk samples not collected

a. Based on requirements in Table 5.8-1 of Waterford 3 SES Offsite Dose Calculational Manual, Section 5.8-1.
b. Drinking and surface water samples are identical.

TABLE 2.2

DESCRIPTION OF REMP SAMPLING STATION LOCATIONS

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
DIRECT RADIATION (TLD)			
A-2	(Eastbank) On fence enclosure surrounding water tower west of Little Gypsy opposite Etienne St. Access from River Road (LA 628). The TLD's are located on the (S) fence opposite the entrance gate to the water tower.	1.1	N
B-1	(Eastbank) On fence enclosing the transmission tower 0.3 miles west (up-river) from Little Gypsy. Access from River Road (LA 628). TLD's are located at SW corner of fence enclosure.	0.8	NNE
C-1	(Eastbank) On fence enclosing the Little Gypsy Cooling Water Intake. Access is from River Road (LA 628) across from Little Gypsy Steam Electric Station entrance. TLD's are on the south side (inside) of the Cooling Water Intake fence enclosure, directly opposite the entrance gate.	0.8	NE

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
D-2	(Eastbank) Located approximately 0.3 miles east of Little Gypsy Power Station. Access from River Road (LA 628) near the west end of the Bonne Carre Spillway. TLD's are on the fence at the west entrance to the Spillway (located on levee).	1.1	ENE
E-1	(Westbank) Located on utility pole along River Road (LA 18) approximately 0.3 miles east of Waterford 3 SES plant entrance. Access from LA 18. TLD's are on the third utility pole east of the construction entrance road.	0.2	E
F-2	(Westbank) Located on fence enclosure surrounding the LP&L substation on LA 3142. Access from LA 3142 approximately 0.2 miles south of LA 18. TLD's are on the southeast corner of the fence enclosure.	1.1	ESE
G-2	(Westbank) Located on utility pole on East side of LA 3142 near Witco entrance gate (Next to Union Carbide Star Plant Gate 3). Access from LA 3142 approximately 0.2 miles north of railroad overpass.	1.2	SE

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
H-2	(Westbank) Located on fence enclosure to shell road off of LA 3142. Access from LA 3142 south of railroad overpass on east side of LA 3142. TLD's are on the south side of the gate for shell road. (Just south of Texaco pipeline station)	1.2	SSE
J-2	(Westbank) Located on northeast corner of fence enclosing Texaco valve station south of LA 3127. Access from LA 3127, approximately 0.5 miles west of LA 3127/3142 intersection.	1.3	S
K-1	(Westbank) Located behind "Private Road" sign at Gate 8 entrance off of LA 3127. Access from LA 3127, approximately 1.3 miles west of LA 3127/3142 intersection. (Gate 8 is the access to the Waterford 3 SES switchyard station)	1.0	SSW
L-1	(Westbank) Located behind "Private Road" sign at LP&L Gate 9 entrance off of LA 3127, approximately 1.6 miles west of LA 3127/3142 intersection. (Gate 9 is an access road for Waterford 3 SES)	1.0	SW

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
M-1	(Westbank) Located on south gate into the Waterford 1 and 2 SES fuel oil storage tank enclosure. Access is either thru LP&L Gate 8, Gate 9 off of LA 3127, the shell access road from LA 18 between Waterford 3 SES, or thru the Waterford 1 and 2 SES access road.	0.7	WSW
N-1	(Westbank) Located behind the "No Trespassing" sign off of Short Street, in Killona, just south of the entrance to Killona Elementary School.	0.9	W
P-1	(Westbank) Located off Short Street, in Killona. TLD is on fence at air sample station APP-1.	0.8	WNW
Q-1	(Westbank) Located on fence enclosing air sample station approximately 0.5 miles west of Waterford 1 and 2 on River Road (LA 18).	0.8	NW
R-1	(Westbank) Located on fence enclosure for Waterford 1 and 2 Cooling Water Intake Structure. Access is from River Road (LA 18) opposite Waterford 1 and 2. TLD's are on the southwest corner of fence.	0.5	NNW

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
A-5	(Eastbank) Located on utility pole just east of the Shady Nook Trailer Park on Hwy 61 in LaPlace. TLD's are on second utility pole east of trailer park on north side of Hwy 61 (eastern end of LaPlace).	4.5	N
B-4	(Eastbank) Located on utility pole just east of shell access road to South Central Bell transmission tower on south side of Hwy 61. Transmission tower is just east of Weigh Station at St. John/St. Charles Parish line. TLD's are on the first utility pole east of access road.	3.8	NNE
D-5	(Eastbank) Located on fence gate on shell access road to Big 3 Chemical Plant. Shell access road is approximately 0.1 miles west of Hwy 61/48 intersection (at black and yellow gate). TLD's are on fence gate 0.1 miles north on shell access road from Hwy 61.	4.2	ENE
E-5	(Eastbank) Located on the Norco Substation fence enclosure. Access from River Road (LA 48) onto Wesco St. (adjacent to Norco Shell Chemical Plant), take Wesco St. to the dead end. TLD's are located on sixth fence post south of the north substation gate.	4.2	E

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
F-4	(Westbank) Located on utility pole behind blonde brick house on Aquarius St. in Hahnville. Access from River Road (LA 18) and turn onto Oak St. Follow Oak St. to Hickory St., turn right on Hickory St. and follow to Aquarius St. and turn left. Blonde brick house is second house on right (west) side of Aquarius St. heading south.	3.5	ESE
G-4	(Westbank) Located on railroad sign northwest side of LA 3160/railroad track intersection. Access from either LA 3127 or River Road (LA 18) onto LA 3160.	3.2	SE
H-6	(Westbank) Located on a road sign on the northwest side of the second canal bridge east of LA 3160 along LA 3127.	5.7	SSE
P-6	(Westbank) Located on utility pole at southwest corner of LA 640/ railroad track intersection. Utility pole is just west of LA 640 and east of radio transmission tower.	5.5	WNW
Q-5	(Westbank) Located on fence post surrounding (green) river marker on levee just east of Edgard. Fence post is located along River Road (LA 18) across from the Webre's house.	5.0	NW

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
R-6	(Eastbank) Located on fence enclosing LP&L Laydown Yard on LA 3223 in LaPlace. Access from Hwy 61 onto Elm St. (LA 3223), take Elm St. to the northeast corner of LA 3223/railroad intersection. TLD's are located on the southeast corner of fence enclosure.	5.3	NNW
F-9	(Eastbank) Located on entrance gate to Destrehan Substation Access from River Road (LA 48), approximately 0.3 miles east of Luling-Destrehan Ferry, onto Destrehan Road (west of Bunge Corp. Grain Elevator), and proceed to substation gate.	8.2	ESE
G-9	(Westbank) Located on back fence of LP&L District Office in Luling. Access via Ellington St. from either River Road (LA 18); or Second or Third St. from Paul Mallard Rd. (LA 52) to Ellington St.	8.1	SE
E-15	(Eastbank) Located on Kenner Substation fence enclosure. Access from either River Road (LA 48) or Hwy 61, turn onto Alliance Ave. TLD's are located on the north side of the fence enclosure, near a light pole.	11.8	E

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
J-15	(Westbank) Located on fence enclosure surrounding LP&L switchyard at LA 631/Hwy 90 intersection in Des Allemands. TLD's are on the northwest corner of fence. Access from LA 631 via shell road.	12.0	S
E-30*	(Westbank) Located on fence at LP&L General Office on Delaronde St. in Algiers. TLD's are on the fence, facing the Mississippi River, in the passageway to the transformer shop.	27.0	E
AIRBORNE			
APP-1	(Westbank) Located in soybean field at northwest corner of Short St. in Killona.	0.8	WNW
APQ-1	(Westbank) Located at northwest corner of soybean field on east side of Killona. Access from River Road (LA 18) approximately 0.6 miles east of LA 18/3141 intersection.	0.8	NW
APG-1	(Westbank) Located at the north side of the Secondary Meteorological Tower.	0.5	SE

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
APC-1	(Eastbank) Located inside the Little Gypsy Cooling Water Intake Structure fence enclosure.	0.8	NE
APE-30*	(Westbank) Located on the roof of the LP&L General Office building on Delaronde St. in Algiers.	27.0	E
WATERBORNE			
DWG-2 SWG-2	(Westbank) Located at the Union Carbide drinking water canal. Access from LA 3142 through Gate 28.	2.0	SE
DWE-5 SWE-5	(Eastbank) Located at the St. Charles Parish Waterworks off of River Road (LA 48) near New Sarpy.	4.5	E
DWP-7* SWP-7*	(Westbank) Located at the St. John Parish Waterworks off of LA 18 in Edgard.	6.5	NNW
SHWE-3	(Westbank) Located at the Foot Ferry Landing off of LA 18 in Taft.	3.0	E
SHWK-1	(Westbank) Located at the 40 Arpent Canal south of the Plant. Access from LA 3127 through Gate 8.	0.5	SSW

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
GWK-1	(Westbank) Located at 40 Arpent Canal south of the plant. Access from LA 3127 through LP&L Gate 8. The canal is northwest of the shell access road/railroad track intersection.	0.5	SSW
INGESTION			
MILK			
MKE-4	(Westbank) Located 0.8 miles west of the Time Saver in Hahnville off of River Road.	4.0	E
MKQ-1	(Westbank) 1.0 miles west of Waterford 3 SES at the corner of River Road and Post Street in Killona.	1.0	NW
MKQ-5	(Westbank) Located at the Webre's house, just across LA 18 from river marker, at the eastern end of Edgard.	4.9	NW
MKQ-45*	(Eastbank) Located off of I-12 in Denham Springs, take LA 3002 south to LA 1034, then right to LA 1032, then left. Farm is 1 mile on the right.	42	NW

TABLE 2.2

(CONTINUED)

LOCATION NUMBER	LOCATION DESCRIPTION	MILES FROM PLANT	SECTOR DIRECTION
FISH			
FH-1*	Upstream of the plant intake structure.	NA**	NA**
FH-2	Downstream of the plant intake structure.	NA**	NA**
BROAD LEAF			
BLQ-1	(Westbank) Located between LA 18 and soybean field on eastern edge of Killona, near air sample station APQ-1.	0.8	NW
BLB-1	(Eastbank) Located at wooded area at the southwestern corner of the LP&L Little Gypsy plant along River Road.	0.8	NNE
BLK-15*	(Westbank) Located 3.5 miles SSW of Des Allemands on Hwy. 90.	15	SSW
FOOD PRODUCTS***			
FPP-1	(Westbank) Located in sugarcane field on eastern edge of Killona, between air sample station APP-1 and APQ-1.	0.8	WNW
FPG-1	(Westbank) Located in a sugarcane field adjacent to the plant near the meteorological towers.	0.4	SE

TABLE 2.2

(CONTINUED)

* DENOTES CONTROL LOCATION

** NA - NOT APPLICABLE

*** Food products are not required since no areas surrounding the plant are irrigated with water into which plant wastes are discharged. Food products grown within the site boundary were collected however, in order to demonstrate the absence of man-made radionuclides.

TABLE 2.3

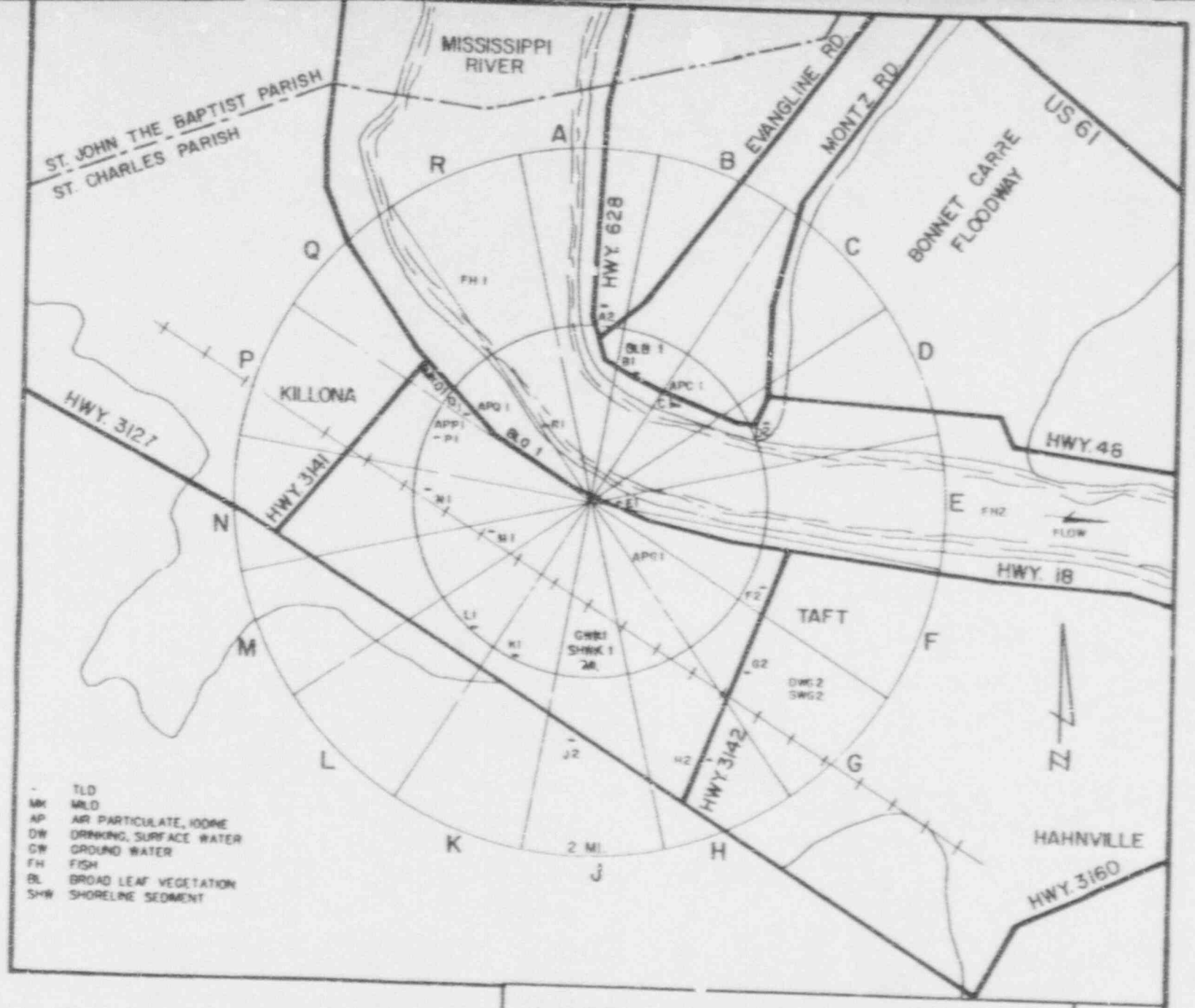
DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANAYLSIS

LOWER LIMIT OF DETECTION (LLD) [a]

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GAS (pCi/m^3)	FISH (pCi/kg-wet)	MILK (pCi/l)	FOOD PRODUCTS[b] (pCi/kg-wet)	SEDIMENT (pCi/kg-dry)
gross beta	4	0.01				
H-3	2000					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140	15			15		

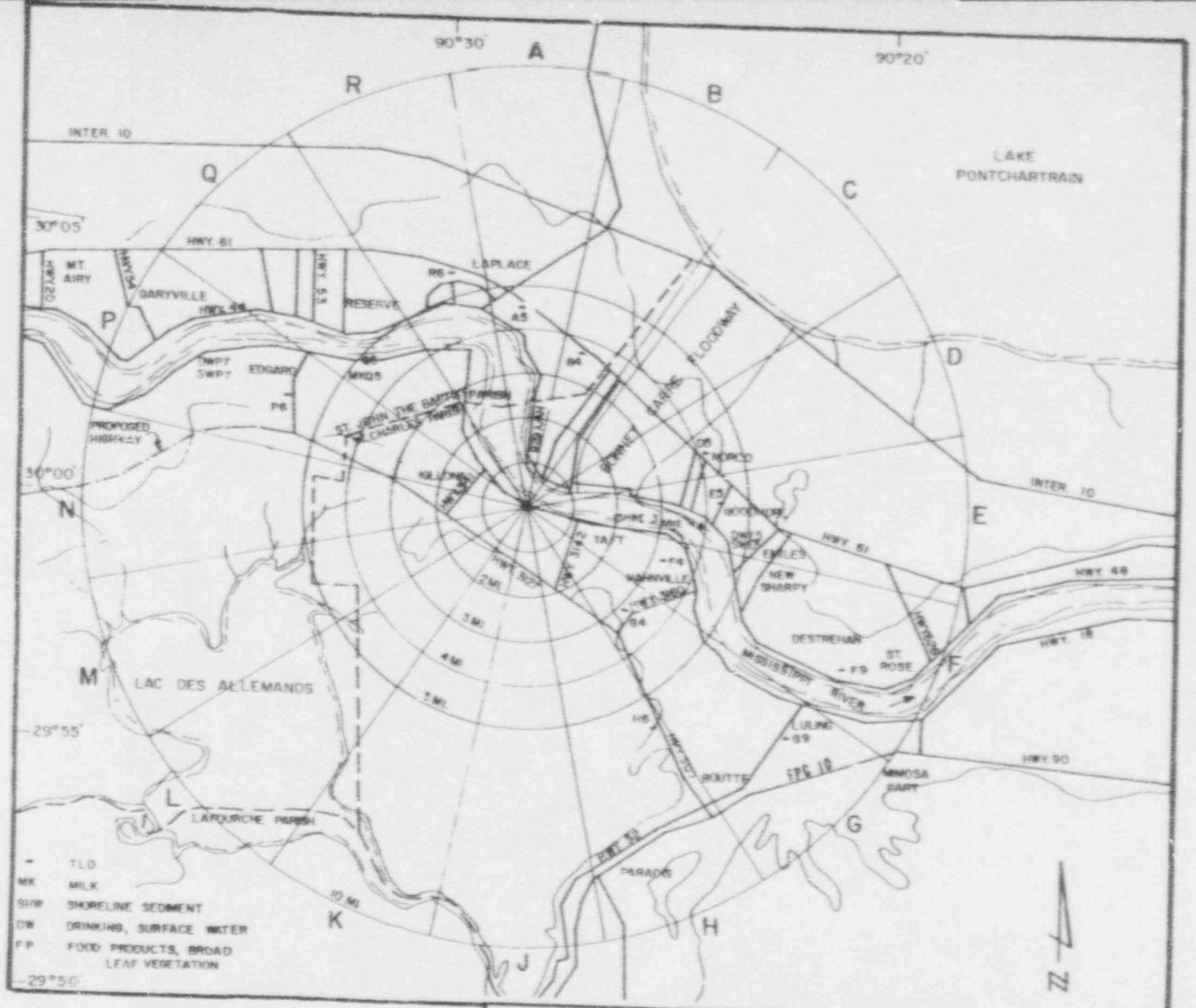
a. From Table 5.8-3 of Waterford 3 SES Offsite Dose Calculation Manual.

b. Applicable to broad leaf vegetation.



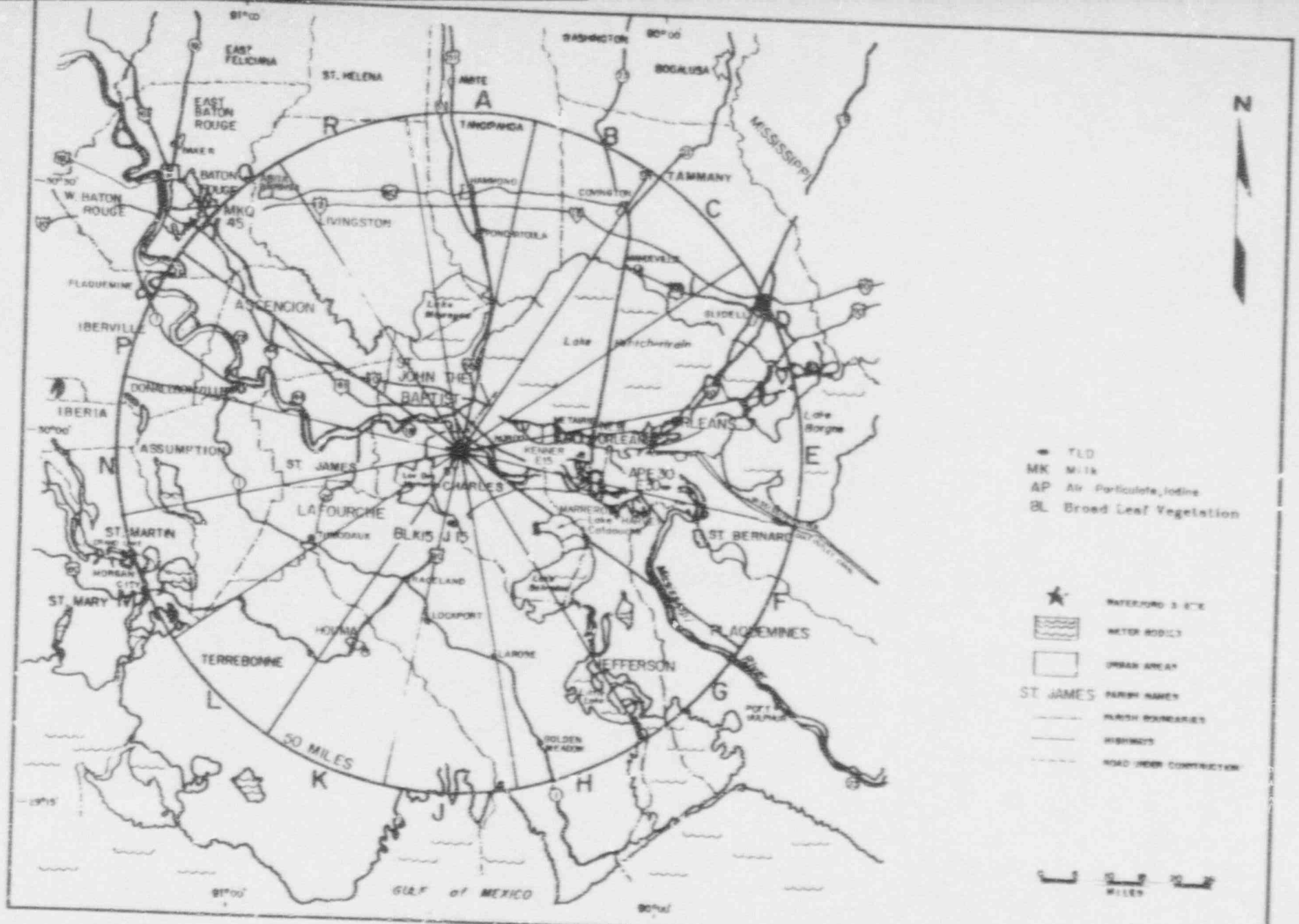
REMP SAMPLE LOCATIONS
WITHIN 2 MILES OF WATERFORD 3

FIGURE 1



REMP SAMPLE LOCATIONS WITHIN 10 MILES OF WATERFORD 3

FIGURE 2



REMP SAMPLE LOCATIONS
WITHIN 50 MILES OF WATERFORD 3

FIGURE 3

3.0 DISCUSSION OF RESULTS

Analytical results for the year 1991 are discussed in this section by exposure pathway, sample type, and analysis performed. Further, analytical results focusing only on man-made radioactivity are summarized in Appendix A; data for the individual analyses are presented in the tables of Appendix B.

3.1 Direct Radiation Exposure Pathway

The average exposure rates measured by thermoluminscent dosimeters (TLDs) at both control and indicator stations were 12, 13, 12, and 13 mrem/standard quarter for the first, second, third, and fourth quarters of 1991 respectively. The average exposure rate of the 117 indicator TLD locations was 13 mrem/standard quarter compared to 12 mrem/standard quarter average exposure rate at the control location. The lowest and highest individual exposure rates were 7 mrem/standard quarter (C-1, 2nd and 3rd quarters) and 19 mrem/standard quarter (G-9, 1st quarter), respectively, for all locations. Table 3.1 compares the indicator TLD results by directional sector and distance from the facility. A comparison of 14 mrem/standard quarter directional sectors indicates the highest average exposure rate to be in Sectors A, G and Q.

The average exposure rates during 1991 are consistent with those from the pre-operational program and the previous five years of operation (Figure 3.1). Specifically, the pre-operational survey indicates that exposure rates ranged between 11 and 33 mrem/standard quarter. Similarly, the range indicated during the previous five years of operation was from 6 to 30 mrem/standard quarter with an average exposure rate of 14 mrem/standard quarter.

3.2 Airborne Exposure Pathway

3.2.1 Airborne Particulates

Gross beta activity ranged from 0.005 pCi/m^3 (APQ-1 and APP-1, 8/26-9/3) to 0.039 pCi/m^3 (G-1) (APG-1, 11/5-11/11) with an average of 0.018 pCi/m^3 for 260 measurements from all five locations. The average gross beta activity for both control (APE-30) and indicator (APG-1, APQ-1, APP-1, APC-1) locations was 0.018 pCi/m^3.

The gross beta activity results obtained during 1991 are consistent with those from the pre-operational program and the previous five years of operation (Figure 3.2). Specifically, the pre-operational survey indicates that in periods not significantly influenced by nuclear weapons testing the gross beta activity ranged between 0.006 and 0.08 pCi/m^3 with an average of .02 pCi/m^3. Similarly, the range indicated during the previous five years of operation was from 0.003 to 0.05 pCi/m^3 with an average activity of 0.02 pCi/m^3.

3.2.2 Airborne Iodine

All of the 264 airborne iodine-131 results were below the calculated lower limit of detection (LLD). The sample LLD variability (0.011 to 0.040 pCi/cubic meter Table B-2) was due primarily to the difference in air sample volumes.

3.2.3 Gamma Isotopic Analysis

Gamma spectroscopy results of the twenty air sample quarterly composites indicate that no man-made radionuclides were detected above their respective lower limits of detection.

3.3 Waterborne Exposure Pathway

3.3.1 Drinking/Surface Water

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

Seventy-eight composite drinking/surface water samples were analyzed by a radiochemical procedure for iodine-131 (Table B-4). Results from these analyses indicate that no activity was detected above the calculated LLD for iodine-131.

Gross beta activity was detected in thirty-five of the forty-two composites with a range of 1.1 (DWP-7, 11/5-12/3) to 9.5 (DWG-2, 7/29-8/26) pCi/l and an average activity of 3.8 pCi/l. The average activity for the control location, DWP-7, was 3.9 pCi/l compared to the averages of 4.2 and 3.3 pCi/l for indicator stations DWG-2 and DWE-5 respectively.

The gross beta activity results obtained during 1991 are consistent with those from the pre-operational program and the previous five years of operation (Figure 3.3). Specifically, the pre-operational survey indicates that in periods not significantly influenced by nuclear weapons testing the gross beta activity ranged between 3 and 14 pCi/l with an average of 7.0 pCi/l. Similarly, the range indicated during the previous five years of operation was from 2 to 60 pCi/l with an average activity of 6.1 pCi/l.

Tritium analysis of drinking/surface water samples indicate that eleven of the twelve measurements were below the respective LLD. Tritium was detected in the first quarter of 1991 at a concentration of 260 pCi/l (DWE-5, an indicator station).

Tritium is man-made and cosmogenically produced and levels detected during 1991 are consistent with the pre-operational program and the previous five years of operation. Specifically, the pre-operational survey indicates that tritium activity ranged between 60 and 220 pCi/l with an average of 136 pCi/l. Similarly, the range indicated during the previous five years of operation was from 170 to 545 pCi/l with an average activity of 265 pCi/l.

3.3.2 Groundwater

Four groundwater samples were collected from one sampling location, GWK-1, and analyzed for tritium and gamma emitters. Gamma emitters were not detected; however, tritium was detected in two of the four samples at concentrations of 200 and 340 pCi/l.

Tritium is man-made and cosmogenically produced and levels detected during 1991 are consistent with the pre-operational program and the previous five years of operation. Specifically, the pre-operational survey indicates that tritium activity ranged between 50 and 180 pCi/l with an average activity of 121 pCi/l. Similarly, the range indicated during the previous five years of operation was from 249 to 650 pCi/l with an average activity of 336 pCi/l. Although the concentrations detected in 1991 are slightly higher than the pre-operational data, they are within the same range as those reported during the previous five years and well below the reporting levels and LLD (2000 pCi/l) required by the Waterford 3 ODCM.

3.3.3 Shoreline Sediment

Four shoreline soil samples were collected from the following sampling locations: two samples from the Mississippi River shoreline downriver of the plant (SHWE-3) and two samples from the shoreline of a drainage canal (SHWK-1).

Naturally occurring radionuclides including potassium-40, radium-226, and actinium-228 were detected in all of the samples. Cesium-137, a man-made nuclide was detected in samples from station SHWK-1 and SHWE at concentrations of 49 and 32 pCi/kg(dry) respectively. No other man-made radionuclides were detected in any of the samples.

The cesium-137 results obtained during 1991 are consistent with those from the pre-operational program and the previous five years of operation. Specifically, the pre-operational survey indicates that cesium-137 was detected in 13 of 18 soil samples at concentrations ranging between 30 and 890 pCi/kg(dry) with an average concentration of 138 pCi/kg(dry). Similarly, the range indicated

during the previous five years of operation was from 21 to 142 pCi/kg (dry) with an average activity of 51 pCi/kg (dry) respectively. Further, studies in Louisiana indicate that cesium-137 is commonly found in soils and sediments as a result of atmospheric weapon testing. Because the cesium-137 levels are consistent with pre-operational values and cesium-137 has been shown to be present in most Louisiana soils, these cesium-137 levels are more than likely attributable to weapon testing fallout.

3.4 Ingestion Exposure Pathway

3.4.1 Milk

Forty-eight milk samples were collected from two sampling locations and analyzed by gamma spectroscopy. Naturally occurring potassium-40 was detected in all samples and cesium-137 was detected in two samples (MKE-45 9/3 and 11/18) at levels of 3 and 4 pCi/l respectively from the control location. The samples were also analyzed by a radiochemical procedure for iodine-131. Results from these analyses indicate that no activity was detected above the calculated LLD for iodine-131.

The cesium-137 results obtained during 1991 are consistent with those from the pre-operational survey and the previous five years of operation. Specifically, the pre-operational survey indicates that cesium-137 activity ranged between 3 and 7 pCi/l with an average activity of 4.8 pCi/l. Cesium-137 was detected in 1986 at 4 pCi/l.

3.4.2 Fish

Twenty fish samples, ten upstream and ten downstream of the plant were collected and the edible portions analyzed by gamma spectroscopy. Only naturally occurring potassium-40 was detected above the lower limits of detection in any samples.

3.4.3 Broad Leaf Vegetation

Thirty-six broad leaf vegetation samples were collected and analyzed by gamma spectroscopy and a radiochemical procedure for iodine-131. Naturally occurring radionuclides were detected in all of the samples; however, no man-made radionuclides were detected above their lower limits of detection.

3.4.4 Food Products

Three food products samples were collected and analyzed by a radiochemical procedure for iodine-131. Results indicated iodine-131 concentrations to be below the lower limit of detection.

Further, the samples were analyzed by gamma spectroscopy. Naturally occurring potassium-40 was the only radionuclide detected in all the samples. All man-made gamma emitters were below their respective lower limits of detection.

3.5 Statistical Analyses

3.5.1 Calculation of the Mean and Standard Deviation

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

(F-1) $$\bar{X} = \sum_{i=1}^{n} \frac{X_i}{n}$$

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

where:

$\bar{x}$ = mean of sample population,
s = standard deviation of sample population,
n = number of samples in sample population, and
x_i = value of the i'th sample.

3.5.2 Comparing Two Sample Population Means

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

(F-3) $$t = \frac{(\bar{X}-\bar{Y})}{\left(\frac{(n_x-1)\,s_x^2 + (n_y-1)\,s_y^2}{n_x + n_y - 2} \right)^{0.5} \left(\frac{1}{n_x} + \frac{1}{n_y} \right)^{0.5}}$$

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.

If the data from both sample populations are treated as correlated pairs, the difference between individual measurements can be examined using the statistical "t" test. In this case, if the true means and true standard deviations for the sample populations are equal, the difference between the correlated data points should be normally distributed about a mean of zero. The "t" value can be calculated from the following equation (obtained from the CRC Standard Mathematical Tables, 26th Edition (1981)):

(F-4) $$t = \frac{\bar{d}\,(n)^{0.5}}{s_d}$$

where:

$\bar{d}$ = the average of the difference between the correlated data points from the two sample populations:

$$\bar{d} = \sum_{i=1}^{n} \frac{(x_i - y_i)}{n}$$

x_i = the i'th data point from population x,
y_i = the i'th data point from population y
N = the number of correlated pairs of data points,
n = degrees of freedom, for equation F-4, n=N-1, and
s_d = the standard deviation of the difference between the correlated data points.

The calculated "t" value in both cases is used to test the hypothesis that the true mean of the first population (μ_x) is equal to the true mean of the second population (μ_y) assuming that the true standard deviations of both populations are equal ($\mu_x = \mu_y$). The calculated "t" value is compared to a tabular "t" value such that:

a. if $t > t_{\alpha,n}$ then reject the hypothesis when $\mu_x > \mu_y$,

b. if $t < -t_{\alpha,n}$ then reject the hypothesis when $\mu_x < \mu_y$,

c. if $t > t_{\alpha/2,n}$ then reject the hypothesis when $\mu_x = \mu_y$,

where $t_{\alpha/2,n}$ and $t_{\alpha,n}$ are the tabular "t" values, with a preselected error (5 percent in this case), confidence level $(1 - \alpha)$ or $(1 - \alpha/2)$, and degrees of freedom n ($n=n_x+n_y-2$ for Equation F-3 and $n=N-1$ for F-4, respectively). Tabular values of the "t" were

obtained from the CRC Standard Mathematical Tables, 26th Edition (1981).

3.5.3 TLD Measurements

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

3.5.4 Gross Beta Activity on Air Particulate Filters

Additionally, 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 average activity detected at all indicator locations to be statistically the same as the activity detected at the control location. Table 3.3 summarizes the result of this analysis.

3.5.5 Gross Beta Activity in Monthly Drinking Water Composites

Finally, the standard "t" test was used to compare average gross beta activity from the two indicator stations to the average gross beta activity from the control station. The results from this test show average activity detected at both indicator locations to be statistically the same as the average activity detected at the control location. Table 3.4 summarizes the result of this analysis.

3.6 Deviations from the REMP

3.6.1 Unavailable Samples

Deviations from the REMP associated with missing TLDs resulted from theft of the dosimeters and were beyond the control of Waterford 3. Three TLDs were discovered missing from locations A-2, D-5, and R-6 during dosimeter change-out at the end of the third quarter. Consequently, the missing TLDs were replaced and the deviation noted.

Milk samples were not available during 1991 from the animal owners at station MKQ-1 since the cows are not currently producing milk for human consumption. With the absence of milk samples at these stations, broad leaf vegetation sampling was performed.

Mechanical malfunction of a sample pump resulted in low sample volume for one air sample. Although the sample volume was sufficient to complete analysis, the requirement for continuous sampling was not met for this sample period. A routine sampler maintenance schedule is currently in effect to reduce instances of malfunction.

Additionally, three water samples failed to meet requirements for sample continuity. Tubing problems were responsible for two of the failures, while the third was a result of a power failure at the sample site. As a result, the routine maintenance schedule will be modified to address sampler tubing problems. Sample volumes in all instances were sufficient to complete analysis.

A list of deviations and associated explanations is provided in Table 3.5.

3.6.2 Missed Lower Limits of Detection

All lower limit of detection requirements were met for 1991.

3.7 Annual Land Use Census

In compliance with Waterford 3 ODCM, the annual land use census was conducted on October 1 and 2, 1991. The nearest residence, garden, and milking animal in each sector within a five mile radius of the plant were located by visual inspection and verbal inquiry.

Although residence and garden locations remained unchanged from the 1990 census, three new milk goat locations were identified. Upon inquiry, it was discovered that the animals are not currently producing milk for human consumption. The results of the 1991 census are summarized in Table 3.6.

TABLE 3.1

1991 DIRECT RADIATION DATA
ORGANIZED BY COMPASS DIRECTION
AND DISTANCE FROM WATERFORD 3 SES

BY COMPASS DIRECTION

SECTOR	COMPASS DIRECTION	AVERAGE DOSE RATE (mrem/std qtr)	STANDARD DEVIATION (mrem/std qtr)	NUMBER IN GROUP
A	N	14	1.2	7
B	NNE	13	0.8	8
C	NE	9	0.8	4
D	ENE	11	1.7	7
E(a)	E	12	1.7	12
F	ESE	13	1.2	12
G	SE	14	2.4	12
H	SSE	13	0.8	8
J	S	13	1.0	8
K	SSW	11	0.5	4
L	SW	12	0.8	4
M	WSW	12	0.8	4
N	W	13	0.7	4
P	WNW	12	2.4	8
Q	NW	14	1.0	8
R	NNW	12	1.8	7
CONTROL	E	12	1.7	4

BY DISTANCE FROM PLANT

DISTANCE FROM PLANT (MILES)	AVERAGE DOSE RATE (mrem/std qtr)	STANDARD DEVIATION (mrem/std qtr)	NUMBER IN GROUP
0 - 2	12	2.0	63
2 - 5	13	1.3	27
5(a)	13	1.7	27
CONTROL	12	1.7	4

a. Does not include control station data.

TABLE 3.2

STATISTICAL COMPARISON OF 1991 TLD MEASUREMENTS FROM STATIONS GROUPED BY DISTANCE FROM WATERFORD 3 SES

	Stations Located 0-2 Miles from the Plant	Stations Located 2-5 Miles from the Plant	Stations Located more than 5 miles from the Plant
Mean (mrem/std. qtr.)	11.95(12)	13.22(13)	13.15(13)
Standard Deviation (mrem/std. qtr.)	1.96	1.29	1.74
Number in Sample	63	27	27
Calculated "t" Value to Comparisons with Stations Located more than 5 miles from the Plant	2.79	0.23	NA
Tabular "t" Value at 95% Confidence ($t_{.05,n}$)	1.990(a)	2.008(a)	NA

a. Results indicate that the mean for stations located 0-2 miles from the plant is lower than those greater than 5 miles and for 2-5 miles from the plant means are statistically identical to stations located more than 5 miles from the plant.

NOTE: NA means Not Applicable

TABLE 3.3

STATISTICAL COMPARISONS OF GROSS BETA ACTIVITY
ON AIR PARTICULATE FILTERS FOR 1991

SAMPLE STATION	APC-1	APG-1	APP-1	APQ-1	APE-30
Mean (10^{-3}pCi/m^3)	19.0	18.0	18.1	17.1	18.1
Standard Deviation (10^{-3}pCi/m^3)	7.02	6.71	7.07	5.49	6.70
Number in Sample	52	52	52	52	52
Calculated "t" Value Comparing Control Station (APE-30) to Indicator Station	0.70	0.06	0.04	0.85	NA
Tabular "t" Value at 95% Confidence ($t_{0.025,n}$)	1.986	1.986	1.986	1.986	NA

NOTE: NA means Not Applicable

TABLE 3.4

STATISTICAL COMPARISON OF GROSS BETA ACTIVITY
IN MONTHLY DRINKING WATER COMPOSITES FOR 1991

SAMPLE STATION	DWG-2	DWS-5	DWP-7
Mean (pCi/l)	4.2	3.3	3.9
Standard Deviation (pCi/l)	2.5	2.0	2.3
Number in Sample	9	7	9
Calculated "t" Value Comparing Control Station (DWP-7) to Indicator Station	0.32	0.49	NA
Tabular "t" Value at 95% Confidence ($t_{0.025,n}$)	2.120	2.145	NA

NOTE: NA means Not Applicable

TABLE 3.5

SUMMARY OF 1991 REMP DEVIATIONS

	SAMPLE TYPE	ANALYSIS	LOCATION	DATE	EXPLANATION OF DEVIATION
1.	Milk	I-131, Gamma	MKQ-1	01/01/91-12/31/92	No samples available; cows did not supply milk for human consumption.
2.	Water	I-131	DWP-7	01/14/91-01/28/91	First week sample not obtained due to power failure.
3.	Water	I-131	DWG-2	01/14/91-01/28/91	Second week sample not obtained due to faulty tubing connection.
4.	Air	I-131, Gross Beta	APQ-1	01/14/91-01/21/91	Pump motor found not operating due to mechanical failure.
5.	Water	I-131	DWG-2	03/25/91-04/08/91	First week sample not obtained due to tubing obstruction.
6.	Direct Radiation	NA	A-2	Third Quarter	TLD Missing
7.	Direct Radiation	NA	D-5	Third Quarter	TLD Missing
8.	Direct Radiation	NA	R-6	Third Quarter	TLD Missing

NOTE: NA means Not Applicable

TABLE 3.6

1991 ANNUAL LAND USE CENSUS RESULTS

SECTOR	DIRECTION	DISTANCE FROM PLANT (MILES)					
		BEEF COW	MILK COW	MILK GOAT	GARDEN	RESIDENCE	FOOD PRODUCTS
A	N	3.5	-	3.9[c]	1.0	0.9	4.1
B	NNE	-	-	-	1.3	1.3	-
C	NE	1.3	-	-	0.9	0.9	-
D	ENE	-	-	1.0[c]	0.9	0.9	-
E	E	2.3	-	-	2.2	2.2	0.3
F	ESE	2.3	-	-	2.2	3.1	0.3
G	SE	2.4	-	-	2.3	4.0	0.3
H	SSE	-	-	-	-	-	0.3
J	S	-	-	-	-	-	0.7
K	SSW	-	-	-	-	-	0.5
L	SW	-	-	-	-	-	0.5
M	WSW	1.0	-	-	1.5	-	0.7
N	W	-	-	-	1.1	1.0	0.7
P	WNW	0.9	-	-	0.9	0.9	0.6
Q	NW	0.9	4.9[a,b]	4.9[c]	0.9	0.9	0.6
R	NNW	2.3	-	-	3.0	3.0	2.6

- None found in sector within five mile radius of the plant.

a Samples are being taken at 4.9 miles (MKE-5) for the Waterford 3 REMP.

b Cows at Location MKQ-1 are currently not producing milk for human consumption. The owner will be contacted on a periodic basis to determine if milk will be used for human consumption and for the availability of samples.

c Goats located in Sectors A, D, and Q are currently not producing milk for human consumption. The owners will be contacted on a periodic basis to determine if milk will be used for human consumption and for the availability of samples.

4.0 CONCLUSIONS

The radiological environmental data collected during 1991 are consistent with the data obtained during the previous five years of plant operation (1986-90), the Pre-operational Environmental Radiological Surveillance (PERS) Program, and the first two years of the REMP prior to Waterford 3 initial criticality (1983-84). The only man-made radionuclides detected in the environmental samples analyzed during 1991 were cesium-137, and tritium.

Cesium-137 was detected in two milk and shoreline soil samples. Studies in Louisiana indicate that cesium-137 is commonly found in soils and sediments as a result of weapons testing. Further, the detected activity in all instances was at levels less than the required lower limit of detection and well below levels requiring notification. In addition, the detected concentrations were consistent with pre-operational levels. Therefore, it is unlikely that the presence of cesium in these samples can be attributed to Waterford 3 operation.

Tritium was detected in one drinking/surface water sample at levels below the required lower limit of detection and well below levels requiring notification. Tritium is man-made and cosmogenically produced and was frequently detected in samples taken prior to Waterford 3 operation. Due to the absence of tritium in drinking/surface water samples located at a closer downstream location and the presence of tritium in pre-operational samples at comparable levels, it is not likely that the tritium detected in the drinking water samples in 1991 was a result of plant operation.

Tritium activity in the groundwater samples was slightly higher than pre-operational levels but consistent with levels detected during the previous five years of operation. Additionally, the high statistical errors associated with the indicated concentrations are higher than would be expected with true activity. Further, the amounts released were well below regulatory limits, and the concentrations detected in the groundwater were well below both the required LLD and the reporting level.

In conclusion, based on the evaluation of the REMP data collected during 1991 the operation of Waterford 3 had no discernable radiological impact on the environment.

FIGURE 3.1

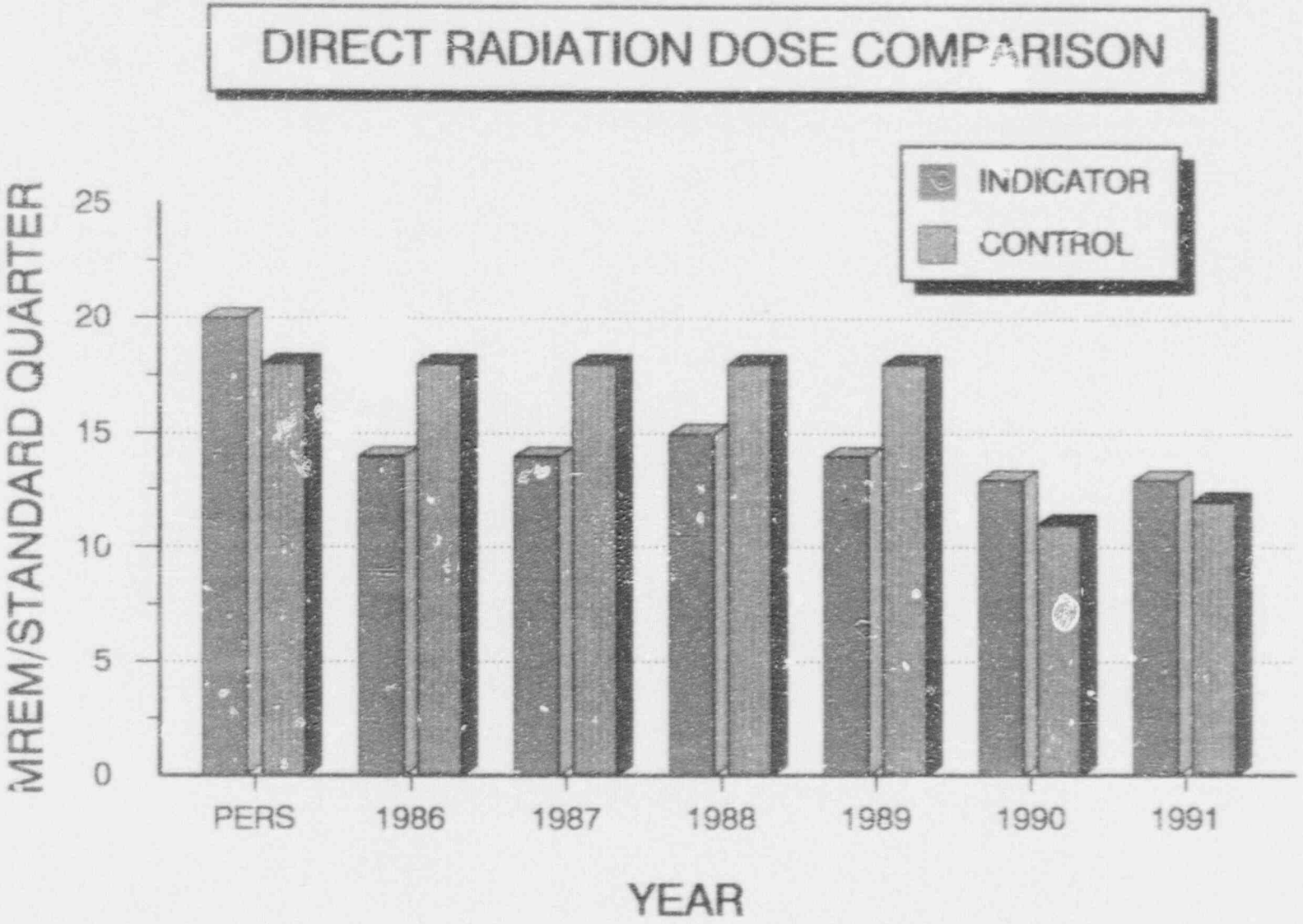

DIRECT RADIATION DOSE COMPARISON
INDICATOR
CONTROL
MREM/STANDARD QUARTER
25
20
15
10
5
0
PERS
1986
1987
1988
1989
1990
1991
YEAR

FIGURE 3.2

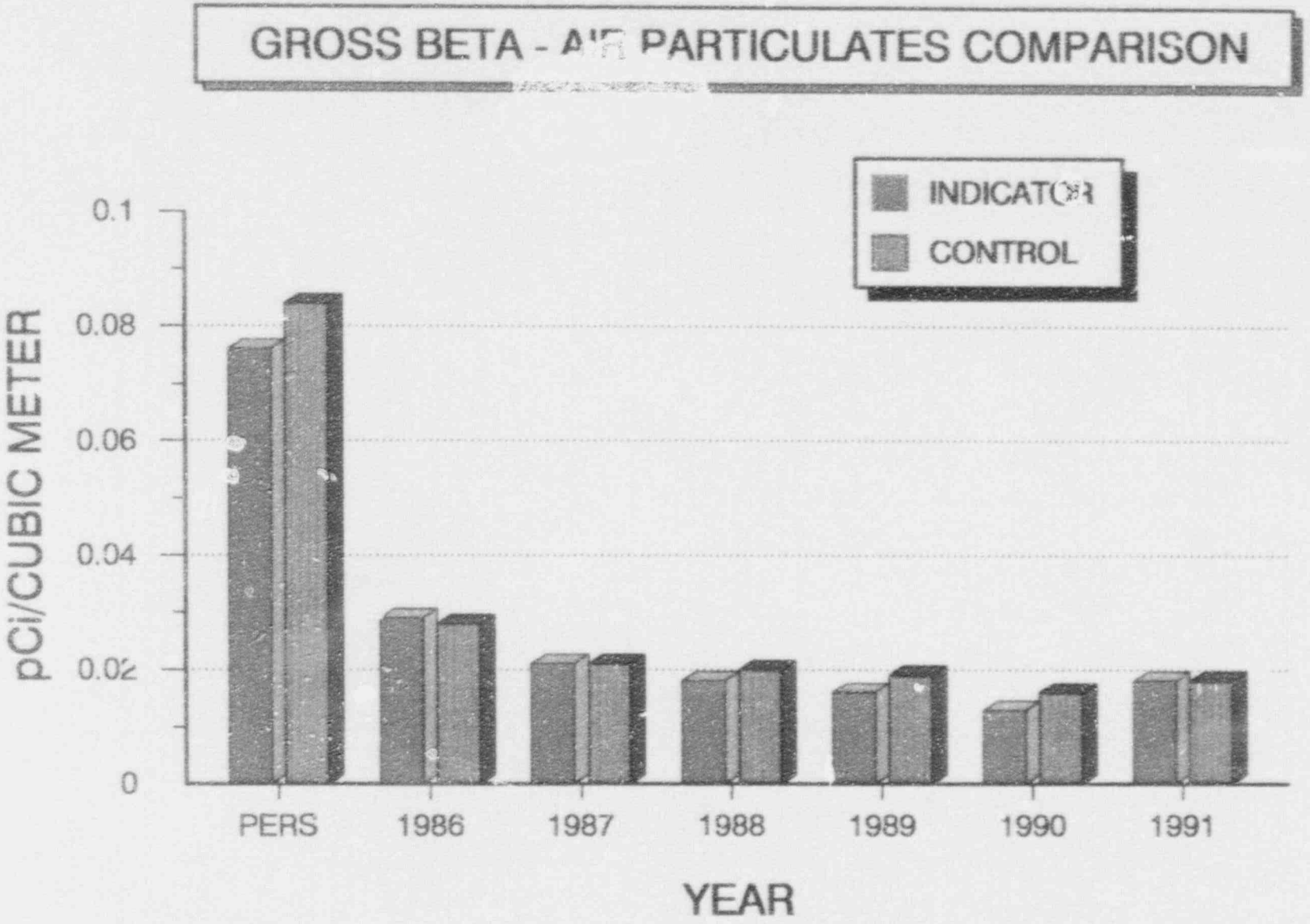
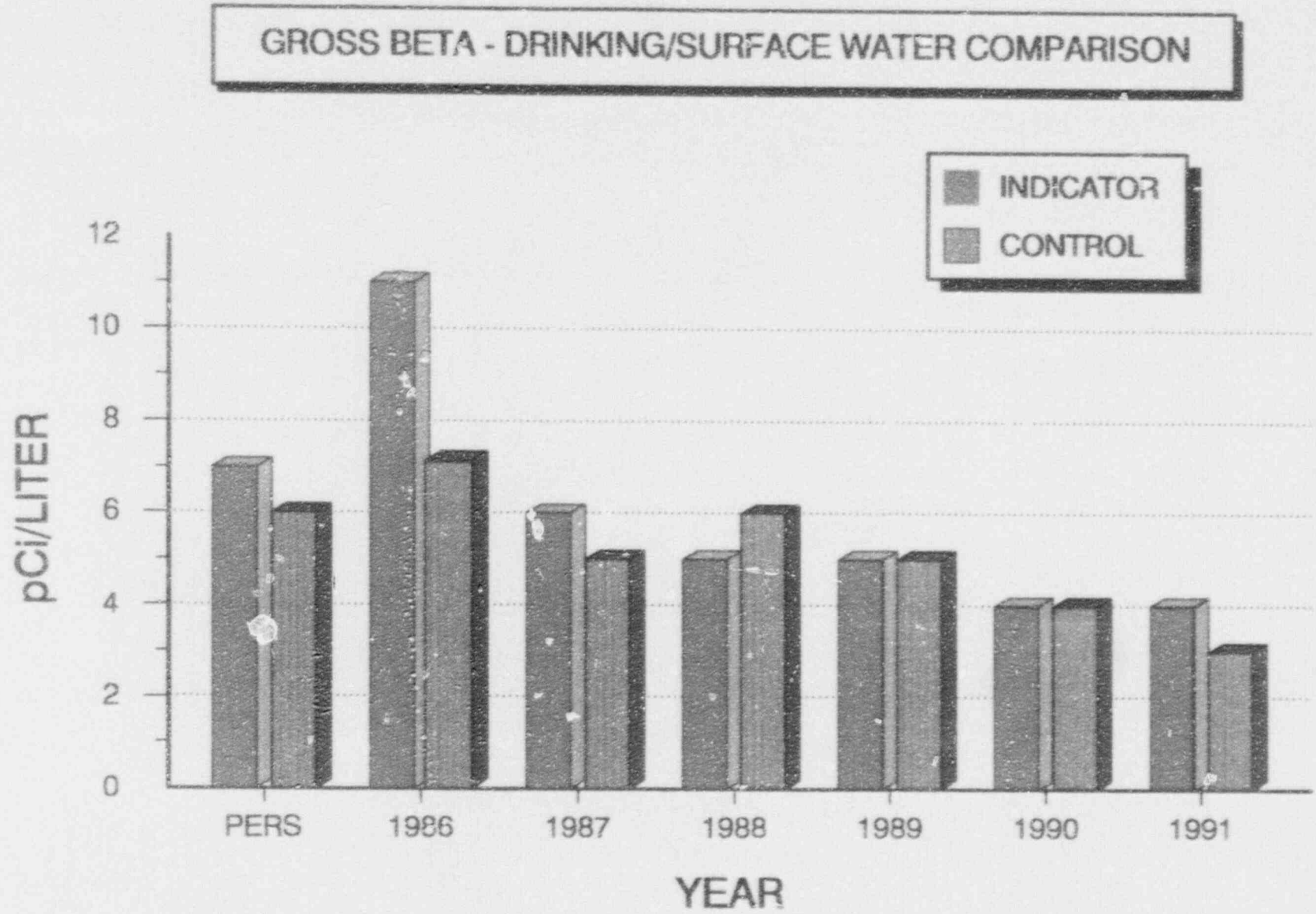

GROSS BETA - AIR PARTICULATES COMPARISON
INDICATOR
CONTROL
pCi/CUBIC METER
0.1
0.08
0.06
0.04
0.02
0
PERS
1986
1987
1988
1989
1990
1991
YEAR

FIGURE 3.3


GROSS BETA - DRINKING/SURFACE WATER COMPARISON
INDICATOR
CONTROL
12
10
8
6
4
2
0
pCi/LITER
PERS
1986
1987
1988
1989
1990
1991
YEAR

APPENDIX A
REMP DATA SUMMARY

TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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

Location of Facility St. Charles, Louisiana (Parish, State) Reporting Period January 1 to December 31, 1991

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED		LOWER LIMIT OF DETECTION* (LLD)	ALL INDICATOR LOCATIONS MEAN* (RANGE)*	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN* (RANGE)*	CONTROL LOCATION MEAN* (RANGE)*	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
1. Direct Radiation (mrem/Std. Qtr.)	TLD	121	(c)	13(117/117) (8-19)	G-9 8.1 miles SE	14(4/4) (13-19)	E-30 12(4/4) (11-13)	0
2. Airborne Particulates (10^{-3}pCi/m^3)	Gross Beta	260	10	15(208/208) (6-39)	APG-1 0.5 miles SE	19(52/52) (6-39)	APE-30 18(52/52) (8-37)	0
	Gamma	20	(d)	<LLD (0/16) (-)	NA	NA	APE-30 <LLD (0/4) (-)	0
3. Airborne Iodine (10^{-3}pCi/m^3)	I-131	260	70	<LLD (0/208) (-)	NA	NA	APE-30 <LLD (0/53) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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

Location of Facility St. Charles, Louisiana (Parish, State) Reporting Period January 1 to December 31, 1991

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN[b] (RANGE)[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN[b] (RANGE)[b]	CONTROL LOCATION MEAN[b] (RANGE)[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
4. Drinking Water (pCi/l)	Gross Beta 42	4	3.8(21/28) (1.1-9.5)	DWG-2 2.0 miles ESE	4.2(12/14) (2.3-9.5)	DWP-7 3.9(9/14) (1.1-7.6)	0
	I-131 78	1	<LLD (0/52) (-)	NA	NA	DWP-7 <LLD (0/26) (-)	0
	Gamma 39	(d)	<LLD (0/26) (-)	NA	NA	DWP-7 <LLD (0/13) (-)	0
	Tritium 12	2000	260(1/8) (-)	DWE-5 4.5 miles E	NA	DWP-7 <LLD (0/4) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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

Location of Facility St. Charles, Louisiana (Parish, State) Reporting Period January 1 to December 31, 1991

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED		LOWER LIMIT OF DETECTION* (LLD)	ALL INDICATOR LOCATIONS MEAN* (RANGE)*	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN* (RANGE)*	CONTROL LOCATION MEAN* (RANGE)*	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
5. Surface Water (pCi/l)	Gross Beta	42	4	3.3(21/28) (1.1-9.5)	SWG-2 2.0 miles ESE	4.2(12/14) (2.3-9.5)	SWP-7 3.9(9/14) (1.1-7.6)	0
	I-131	78	1	<LLD (0/52) (-)	NA	NA	SWP-7 <LLD (0/26) (-)	0
	Gamma	39	(d)	<LLD (0/26) (-)	NA	NA	SWP-7 <LLD (0/13) (-)	0
	Tritium	12	2000	260(1/8) (-)	SWE-5 4.5 miles E	NA	SWP-7 <LLD (0/4) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility Waterford 3 SES Docket No 50-382

Location of Facility St. Charles, Louisiana (Parish, State) Reporting Period January 1 to December 31, 1991

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN[b] (RANGE)[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN[b] (RANGE)[b]	CONTROL LOCATION MEAN[b] (RANGE)[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
6. Groundwater (pCi/l)	Gamma 4	(d)	<LLD (0/4) (-)	NA	NA	NONE	0
	Tritium 4	2000	270(2/4) (200-340)	GWK-1	270(2/4) (200-340)	NONE	0
7. Shoreline Sediment (pCi/kg-dry)	Gamma 4 Cs-137	180	41(2/4) (32-49)	SHWK-1 1.0 miles S	49(1/2) (-)	NONE	0

NOTE: Footnotes at end of table.

TABLE A-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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

Location of Facility St. Charles, Louisiana (Parish, State) Reporting Period January 1 to December 31, 1991

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED		LOWER LIMIT OF DETECTION* (LLD)	ALL INDICATOR LOCATIONS MEAN* (RANGE)*	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN* (RANGE)*	CONTROL LOCATION MEAN* (RANGE)*	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
8. Milk (pCi/l)	I-131	48	1	LLD (0/24) (-)	NA	NA	MKO-45 <LLD (0/24) (-)	0
	Gamma Cs-137	48	18	<LLD (0/24) (-)	MKO-45 42 miles NW	3.5(1/24) (-)	MKO-45 (2/24) (-)	0
9. Fish (pCi/kg-wet)	Gamma	20	(d)	<LLD (0/10) (-)	NA	NA	FH-1 <LLD (0/10) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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

Location of Facility St. Charles, Louisiana (Parish, State) Reporting Period January 1 to December 31, 1991

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED		LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN[b] (RANGE)[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN[b] (RANGE)[b]	CONTROL LOCATION MEAN[b] (RANGE)[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
10. Broad Leaf Vegetation (pCi/kg-wet)	I-131	36	60	<LLD (0/24) (-)	NA	NA	BLK-15 <LLD (0/12) (-)	0
	Gamma	36	(d)	<LLD (0/24) (-)	NA	NA	BLK-15 <LLD (0/12) (-)	0
11. Food/Garden Crop (pCi/kg-wet)	Gamma	4	(d)	<LLD (0/3) (-)	NA	NA	NONE	0

NOTE: Footnotes at end of table.

TABLE A-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

FOOTNOTES

[a]Nominal Lower Limit of Detection (LLD) as defined in the Waterford 3 Offsite Dose Calculation Manual.

[b]Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthesis.

[c]Lower Limit of Detection (LLD) not defined in Waterford 3 Offsite Dose Calculation Manual.

[d]Lower Limit of Detection (LLD) for individual radionuclides using gamma spectroscopy are given in Waterford 3 Offsite Dose Calculation Manual.

APPENDIX B
REMP DATA

TABLE B-1

QUARTERLY TLD DOSE RATES

LOCATION	1ST QUARTER (01/12-04/06) DOSE RATE (mrem/std qtr)	2ND QUARTER (04/06-07/06) DOSE RATE (mrem/std qtr)	3RD QUARTER (07/06-10/05) DOSE RATE (mrem std qtr)	4TH QUARTER (10/05-01/04) DOSE RATE (mrem/std qtr)	AVERAGE DOSE RATE (mrem/std qtr)
A-2	14	15	N/A*	16	15
A-5	13	14	12	14	13
B-1	13	14	12	14	13
B-4	13	14	12	14	13
C-1	08	09	08	10	09
D-2	09	10	09	11	10
D-5	11	13	N/A*	14	13
E-1	10	11	10	11	11
E-5	15	13	14	12	14
E-15	09	13	11	13	12
E-30	11	11	13	12	12
F-2	12	12	11	12	12
F-4	14	15	13	15	14
F-9	13	13	12	14	13
G-2	15	16	14	16	15
G-4	12	11	11	11	11
G-9	19	14	13	13	15
H-2	13	14	13	14	14
H-6	12	13	14	12	13
J-2	14	11	14	13	13
J-15	12	13	12	13	13
K-1	10	11	10	11	11
L-1	12	13	11	13	12
M-1	11	12	13	13	12
N-1	13	14	12	13	13
P-1	09	11	09	10	10
P-6	14	15	13	15	14
Q-1	12	14	13	12	13
Q-5	14	15	14	14	14
R-1	10	12	11	10	11
R-6	14	15	N/A*	11	13
Average	12	13	12	13	

* - TLD stolen, replaced - See Table C-5

TABLE B-2

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APC-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
910046	12/31/90	01/07/91	0.022 +/-0.003	< 0.019
910109	01/07/91	01/14/91	0.011 +/-0.002	< 0.019
910157	01/14/91	01/21/91	0.016 +/-0.002	< 0.013
910194	01/21/91	01/28/91	0.019 +/-0.002	< 0.018
910246	01/28/91	02/04/91	0.017 +/-0.002	< 0.020
910302	02/04/91	02/11/91	0.016 +/-0.002	< 0.020
910311	02/11/91	02/18/91	0.021 +/-0.002	< 0.021
910353	02/18/91	02/25/91	0.012 +/-0.002	< 0.016
910404	02/25/91	03/04/91	0.019 +/-0.002	< 0.012
910466	03/04/91	03/11/91	0.022 +/-0.003	< 0.012
910497	03/11/91	03/18/91	0.015 +/-0.002	< 0.011
910529	03/18/91	03/25/91	0.015 +/-0.003	< 0.021
910613	03/25/91	04/01/91	0.017 +/-0.002	< 0.022
910656	04/01/91	04/08/91	0.014 +/-0.003	< 0.014
910700	04/08/91	04/15/91	0.014 +/-0.002	< 0.011
910739	04/15/91	04/22/91	0.013 +/-0.002	< 0.012
910782	04/22/91	04/29/91	0.013 +/-0.002	< 0.015
910815	04/29/91	05/06/91	0.015 +/-0.003	< 0.014
910863	05/06/91	05/13/91	0.016 +/-0.002	< 0.016
910884	05/13/91	05/20/91	0.013 +/-0.002	< 0.012
910945	05/20/91	05/28/91	0.011 +/-0.002	< 0.021
910961	05/28/91	06/03/91	0.012 +/-0.003	< 0.029
911048	06/03/91	06/10/91	0.011 +/-0.002	< 0.023
911066	06/10/91	06/17/91	0.009 +/-0.002	< 0.019
911104	06/17/91	06/24/91	0.018 +/-0.002	< 0.016

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APC-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
911145	06/24/91	07/01/91	0.017 +/-0.002	< 0.017
911260	07/01/91	07/09/91	0.013 +/-0.002	< 0.020
911275	07/09/91	07/15/91	0.016 +/-0.003	< 0.019
911313	07/15/91	07/22/91	0.018 +/-0.002	< 0.011
911342	07/22/91	07/29/91	0.018 +/-0.002	< 0.016
911382	07/29/91	08/05/91	0.024 +/-0.002	< 0.016
911406	08/05/91	08/12/91	0.013 +/-0.002	< 0.011
911451	08/12/91	08/19/91	0.016 +/-0.002	< 0.018
911490	08/19/91	08/26/91	0.020 +/-0.003	< 0.017
911530	08/26/91	09/03/91	0.006 +/-0.002	< 0.015
911559	09/03/91	09/09/91	0.007 +/-0.003	< 0.025
911607	09/09/91	09/16/91	0.017 +/-0.003	< 0.012
911649	09/16/91	09/24/91	0.017 +/-0.002	< 0.015
911680	09/24/91	09/30/91	0.016 +/-0.003	< 0.029
911735	09/30/91	10/08/91	0.018 +/-0.002	< 0.026
911781	10/08/91	10/14/91	0.032 +/-0.003	< 0.024
911836	10/14/91	10/22/91	0.026 +/-0.002	< 0.029
911900	10/22/91	10/28/91	0.013 +/-0.002	< 0.014
911958	10/28/91	11/05/91	0.023 +/-0.002	< 0.017
911999	11/05/91	11/11/91	0.032 +/-0.003	< 0.021
912033	11/11/91	11/19/91	0.030 +/-0.002	< 0.014
912067	11/19/91	11/25/91	0.022 +/-0.003	< 0.013
912089	11/25/91	12/03/91	0.015 +/-0.002	< 0.014
912135	12/03/91	12/10/91	0.025 +/-0.002	< 0.021
912186	12/10/91	12/17/91	0.016 +/-0.002	< 0.026

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APC-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
912217	12/17/91	12/23/91	0.016 +/-0.002	< 0.040
920017	12/23/91	12/31/91	0.026 +/-0.002	< 0.019

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APQ-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
910044	12/31/90	01/07/91	0.028 +/-0.003	< 0.019
910107	01/07/91	01/14/91	0.011 +/-0.002	< 0.019
910155	01/14/91	01/21/91	0.016 +/-0.006	< 0.013
910192	01/21/91	01/28/91	0.017 +/-0.002	< 0.018
910244	01/28/91	02/04/91	0.015 +/-0.002	< 0.020
910300	02/04/91	02/11/91	0.014 +/-0.002	< 0.020
910309	02/11/91	02/18/91	0.024 +/-0.003	< 0.021
910351	02/18/91	02/25/91	0.012 +/-0.002	< 0.016
910402	02/25/91	03/04/91	0.015 +/-0.002	< 0.012
910464	03/04/91	03/11/91	0.027 +/-0.003	< 0.012
910495	03/11/91	03/18/91	0.015 +/-0.002	< 0.011
910527	03/18/91	03/25/91	0.021 +/-0.003	< 0.021
910611	03/25/91	04/01/91	0.019 +/-0.002	< 0.022
910654	04/01/91	04/08/91	0.013 +/-0.003	< 0.014
910698	04/08/91	04/15/91	0.015 +/-0.002	< 0.011
910737	04/15/91	04/22/91	0.011 +/-0.002	< 0.012
910780	04/22/91	04/29/91	0.013 +/-0.002	< 0.015
910813	04/29/91	05/06/91	0.017 +/-0.003	< 0.014
910861	05/06/91	05/13/91	0.015 +/-0.002	< 0.016
910882	05/13/91	05/20/91	0.010 +/-0.002	< 0.012
910943	05/20/91	05/28/91	0.010 +/-0.002	< 0.021
910959	05/28/91	06/03/91	0.016 +/-0.003	< 0.029
911046	06/03/91	06/10/91	0.012 +/-0.002	< 0.023
911064	06/10/91	06/17/91	0.009 +/-0.002	< 0.019
911102	06/17/91	06/24/91	0.022 +/-0.002	< 0.016

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APQ-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
911143	06/24/91	07/01/91	0.020 +/- 0.002	< 0.017
911258	07/01/91	07/09/91	0.011 +/-0.002	< 0.020
911273	07/09/91	07/15/91	0.016 +/-0.003	< 0.019
911311	07/15/91	07/22/91	0.022 +/-0.002	< 0.011
911340	07/22/91	07/29/91	0.017 +/-0.002	< 0.016
911380	07/29/91	08/05/91	0.023 +/-0.002	< 0.016
911404	08/05/91	08/12/91	0.012 +/-0.002	< 0.011
911449	08/12/91	08/19/91	0.015 +/-0.002	< 0.018
911488	08/19/91	08/26/91	0.019 +/-0.002	< 0.017
911528	08/26/91	09/03/91	0.005 +/-0.002	< 0.015
911557	09/03/91	09/09/91	0.008 +/-0.002	< 0.025
911605	09/09/91	09/16/91	0.021 +/-0.002	< 0.012
911647	09/16/91	09/24/91	0.017 +/-0.002	< 0.015
911678	09/24/91	09/30/91	0.016 +/-0.003	< 0.029
911733	09/30/91	10/08/91	0.017 +/-0.002	< 0.026
911779	10/08/91	10/14/91	0.027 +/-0.003	< 0.024
911834	10/14/91	10/22/91	0.027 +/-0.002	< 0.029
911898	10/22/91	10/28/91	0.015 +/-0.002	< 0.014
911956	10/28/91	11/05/91	0.023 +/-0.002	< 0.017
911997	11/05/91	11/11/91	0.036 +/-0.003	< 0.021
912031	11/11/91	11/19/91	0.025 +/-0.002	< 0.014
912065	11/19/91	11/25/91	0.334 +/-0.003	< 0.013
912087	11/25/91	12/03/91	0.018 +/-0.002	< 0.014
912133	12/03/91	12/10/91	0.035 +/-0.003	< 0.021
912184	12/10/91	12/17/91	0.016 +/-0.002	< 0.026

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APQ-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
912215	12/17/91	12/23/91	0.019 +/-0.003	< 0.040
920015	12/23/91	12/31/91	0.025 +/-0.002	< 0.019

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APG-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
910043	12/31/90	01/07/91	0.031 +/-0.003	< 0.019
910106	01/07/91	01/14/91	0.013 +/-0.002	< 0.019
910154	01/14/91	01/21/91	0.014 +/-0.002	< 0.013
910191	01/21/91	01/28/91	0.024 +/-0.002	< 0.018
910243	01/28/91	02/04/91	0.014 +/-0.002	< 0.020
910299	02/04/91	02/11/91	0.020 +/-0.003	< 0.020
910308	02/11/91	02/18/91	0.022 +/-0.003	< 0.021
910350	02/18/91	02/25/91	0.013 +/-0.002	< 0.016
910401	02/25/91	03/04/91	0.017 +/-0.002	< 0.012
910463	03/04/91	03/11/91	0.028 +/-0.003	< 0.012
910494	03/11/91	03/18/91	0.017 +/-0.003	< 0.011
910526	03/18/91	03/25/91	0.020 +/-0.003	< 0.021
910610	03/25/91	04/01/91	0.017 +/-0.002	< 0.022
910653	04/01/91	04/08/91	0.013 +/-0.003	< 0.014
910697	04/08/91	04/15/91	0.015 +/-0.002	< 0.011
910736	04/15/91	04/22/91	0.015 +/-0.002	< 0.012
910779	04/22/91	04/29/91	0.014 +/-0.002	< 0.015
910812	04/29/91	05/06/91	0.019 +/-0.003	< 0.014
910860	05/06/91	05/13/91	0.015 +/-0.002	< 0.016
910881	05/13/91	05/20/91	0.012 +/-0.002	< 0.012
910942	05/20/91	05/28/91	0.011 +/-0.002	< 0.021
910958	05/28/91	06/03/91	0.016 +/-0.002	< 0.029
911045	06/03/91	06/10/91	0.012 +/-0.002	< 0.023
911063	06/10/91	06/17/91	0.010 +/-0.002	< 0.019
911101	06/17/91	06/24/91	0.022 +/-0.003	< 0.016

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APG-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
911142	06/24/91	07/01/91	0.022 +/-0.003	< 0.017
911257	07/01/91	07/09/91	0.010 +/-0.002	< 0.020
911272	07/09/91	07/15/91	0.018 +/-0.003	< 0.019
911310	07/15/91	07/22/91	0.017 +/-0.002	< 0.011
911339	07/22/91	07/29/91	0.017 +/-0.003	< 0.016
911379	07/29/91	08/05/91	0.025 +/-0.003	< 0.016
911403	08/05/91	08/12/91	0.015 +/-0.002	< 0.011
911448	08/12/91	08/19/91	0.018 +/-0.002	< 0.018
911487	08/19/91	08/26/91	0.025 +/-0.003	< 0.017
911527	08/26/91	09/03/91	0.006 +/-0.002	< 0.015
911556	09/03/91	09/09/91	0.012 +/-0.003	< 0.025
911604	09/09/91	09/16/91	0.022 +/-0.003	< 0.012
911646	09/16/91	09/24/91	0.020 +/-0.002	< 0.015
911677	09/24/91	09/30/91	0.020 +/-0.003	< 0.029
911732	09/30/91	10/08/91	0.016 +/-0.002	< 0.026
911778	10/08/91	10/14/91	0.030 +/-0.003	< 0.024
911833	10/14/91	10/22/91	0.025 +/-0.003	< 0.029
911897	10/22/91	10/28/91	0.013 +/-0.002	< 0.014
911955	10/28/91	11/05/91	0.022 +/-0.002	< 0.017
911996	11/05/91	11/11/91	0.035 +/-0.003	< 0.021
912030	11/11/91	11/19/91	0.029 +/-0.002	< 0.014
912064	11/19/91	11/25/91	0.037 +/-0.003	< 0.013
912086	11/25/91	12/03/91	0.014 +/-0.002	< 0.014
912132	12/03/91	12/10/91	0.033 +/-0.003	< 0.021
912183	12/10/91	12/17/91	0.015 +/-0.002	< 0.026

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APG-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
912214	12/17/91	12/23/91	0.016 +/-0.002	< 0.040
920014	12/23/91	12/31/91	0.029 +/-0.002	< 0.019

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APP-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
910045	12/31/90	01/07/91	0.030 +/-0.003	< 0.019
910108	01/07/91	01/14/91	0.011 +/-0.002	< 0.019
910156	01/14/91	01/21/91	0.014 +/-0.002	< 0.013
910193	01/21/91	01/28/91	0.016 +/-0.002	< 0.018
910245	01/28/91	02/04/91	0.014 +/-0.002	< 0.020
910301	02/04/91	02/11/91	0.012 +/-0.002	< 0.020
910310	02/11/91	02/18/91	0.022 +/-0.003	< 0.021
910352	02/18/91	02/25/91	0.014 +/-0.002	< 0.016
910403	02/25/91	03/04/91	0.016 +/-0.002	< 0.012
910465	03/04/91	03/11/91	0.032 +/-0.003	< 0.012
910496	03/11/91	03/18/91	0.016 +/-0.002	< 0.011
910528	03/18/91	03/25/91	0.023 +/-0.003	< 0.021
910612	03/25/91	04/01/91	0.019 +/-0.002	< 0.022
910655	04/01/91	04/08/91	0.016 +/-0.003	< 0.014
910699	04/08/91	04/15/91	0.014 +/-0.002	< 0.011
910738	04/15/91	04/22/91	0.012 +/-0.002	< 0.012
910781	04/22/91	04/29/91	0.013 +/-0.002	< 0.015
910814	04/29/91	05/06/91	0.015 +/-0.002	< 0.014
910862	05/06/91	05/13/91	0.017 +/-0.002	< 0.016
910883	05/13/91	05/20/91	0.012 +/-0.002	< 0.012
910944	05/20/91	05/28/91	0.009 +/-0.002	< 0.021
910960	05/28/91	06/03/91	0.016 +/-0.003	< 0.029
911047	06/03/91	06/10/91	0.012 +/-0.002	< 0.023
911065	06/10/91	06/17/91	0.008 +/-0.002	< 0.019
911103	06/17/91	06/24/91	0.019 +/-0.002	< 0.016

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APP-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
911144	06/24/91	07/01/91	0.020 +/-0.002	< 0.017
911259	07/01/91	07/09/91	0.009 +/-0.002	< 0.020
911274	07/09/91	07/15/91	0.017 +/-0.002	< 0.019
911312	07/15/91	07/22/91	0.024 +/-0.003	< 0.011
911341	07/22/91	07/29/91	0.016 +/-0.002	< 0.016
911381	07/29/91	08/05/91	0.019 +/-0.002	< 0.016
911405	08/05/91	08/12/91	0.012 +/-0.002	< 0.011
911450	08/12/91	08/19/91	0.015 +/-0.002	< 0.018
911489	08/19/91	08/26/91	0.023 +/-0.002	< 0.017
911529	08/26/91	09/03/91	0.005 +/-0.002	< 0.015
911558	09/03/91	09/09/91	0.010 +/-0.002	< 0.025
911606	09/09/91	09/16/91	0.020 +/-0.002	< 0.012
911648	09/16/91	09/24/91	0.017 +/-0.002	< 0.015
911679	09/24/91	09/30/91	0.017 +/-0.003	< 0.029
911734	09/30/91	10/08/91	0.015 +/-0.002	< 0.026
911780	10/08/91	10/14/91	0.030 +/-0.003	< 0.024
911835	10/14/91	10/22/91	0.025 +/-0.002	< 0.029
911899	10/22/91	10/28/91	0.013 +/-0.002	< 0.014
911957	10/28/91	11/05/91	0.023 +/-0.002	< 0.017
911998	11/05/91	11/11/91	0.036 +/-0.003	< 0.021
912032	11/11/91	11/19/91	0.027 +/-0.002	< 0.014
912066	11/19/91	11/25/91	0.033 +/-0.003	< 0.013
912088	11/25/91	12/03/91	0.019 +/-0.002	< 0.014
912134	12/03/91	12/10/91	0.037 +/-0.003	< 0.021
912185	12/10/91	12/17/91	0.016 +/-0.002	< 0.026

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APP-1

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
912216	12/17/91	12/23/91	0.019 +/-0.003	< 0.040
920016	12/23/91	12/31/91	0.024 +/-0.002	< 0.019

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APE-30

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
910047	12/31/90	01/07/91	0.035 +/-0.003	< 0.019
910110	01/07/91	01/14/91	0.010 +/-0.002	< 0.019
910158	01/14/91	01/21/91	0.016 +/-0.002	< 0.013
910195	01/21/91	01/28/91	0.021 +/-0.003	< 0.018
910247	01/28/91	02/04/91	0.014 +/-0.002	< 0.020
910303	02/04/91	02/11/91	0.016 +/-0.002	< 0.020
910312	02/11/91	02/18/91	0.017 +/-0.002	< 0.021
910354	02/18/91	02/25/91	0.012 +/-0.003	< 0.016
910405	02/25/91	03/04/91	0.015 +/-0.002	< 0.012
910467	03/04/91	03/11/91	0.023 +/-0.003	< 0.012
910498	03/11/91	03/18/91	0.018 +/-0.003	< 0.011
910530	03/18/91	03/25/91	0.013 +/-0.003	< 0.021
910614	03/25/91	04/01/91	0.020 +/-0.003	< 0.022
910657	04/01/91	04/08/91	0.014 +/-0.003	< 0.014
910701	04/08/91	04/15/91	0.016 +/-0.003	< 0.011
910740	04/15/91	04/22/91	0.012 +/-0.002	< 0.012
910783	04/22/91	04/29/91	0.011 +/-0.003	< 0.015
910816	04/29/91	05/06/91	0.015 +/-0.003	< 0.014
910864	05/06/91	05/13/91	0.016 +/-0.003	< 0.016
910885	05/13/91	05/20/91	0.013 +/-0.002	< 0.012
910946	05/20/91	05/28/91	0.013 +/-0.003	< 0.021
910962	05/28/91	06/03/91	0.015 +/-0.003	< 0.029
911049	06/03/91	06/10/91	0.010 +/-0.002	< 0.023
911067	06/10/91	06/17/91	0.010 +/-0.002	< 0.019
911105	06/17/91	06/24/91	0.016 +/-0.002	< 0.016

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APE-30

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
911146	06/24/91	07/01/91	0.015 +/-0.002	< 0.017
911261	07/01/91	07/09/91	0.014 +/-0.002	< 0.020
911276	07/09/91	07/15/91	0.018 +/-0.003	< 0.019
911214	07/15/91	07/22/91	0.017 +/-0.002	< 0.011
911343	07/22/91	07/29/91	0.012 +/-0.003	< 0.016
911383	07/29/91	08/05/91	0.021 +/-0.003	< 0.016
911407	08/05/91	08/12/91	0.012 +/-0.002	< 0.011
911452	08/12/91	08/19/91	0.017 +/-0.002	< 0.018
911491	08/19/91	08/26/91	0.023 +/-0.003	< 0.017
911531	08/26/91	09/03/91	0.008 +/-0.002	< 0.015
911560	09/03/91	09/09/91	0.009 +/-0.003	< 0.025
911608	09/09/91	09/16/91	0.022 +/-0.003	< 0.012
911650	09/16/91	09/24/91	0.021 +/-0.002	< 0.015
911681	09/24/91	09/30/91	0.020 +/-0.003	< 0.029
911736	09/30/91	10/08/91	0.018 +/-0.002	< 0.026
911782	10/08/91	10/14/91	0.037 +/-0.003	< 0.024
911837	10/14/91	10/22/91	0.030 +/-0.002	< 0.029
911901	10/22/91	10/28/91	0.014 +/-0.002	< 0.014
911959	10/28/91	11/05/91	0.024 +/-0.002	< 0.017
912000	11/05/91	11/11/91	0.034 +/-0.003	< 0.021
912034	11/11/91	11/19/91	0.027 +/-0.002	< 0.014
912068	11/19/91	11/25/91	0.024 +/-0.003	< 0.013
912090	11/25/91	12/03/91	0.017 +/-0.002	< 0.014
912136	12/03/91	12/10/91	0.026 +/-0.003	< 0.021
912187	12/10/91	12/17/91	0.017 +/-0.002	< 0.026

TABLE B-2 (continued)

AIR PARTICULATE FILTERS AND CHARCOAL CARTRIDGES
GROSS BETA AND IODINE-131 ANALYSES

SAMPLE LOCATION: APE-30

UNITS: pCi/CUBIC METER

Lab No.	Begin Date	End Date	Gross-Beta	I-131
912218	12/17/91	12/23/91	0.020 +/-0.003	< 0.040
920018	12/23/91	12/31/91	0.032 +/-0.003	< 0.019

TABLE B-3

AIR PARTICULATE FILTERS
GAMMA ISOTOPIC ANALYSIS ON QUARTERLY COMPOSITES

SAMPLE LOCATION: ALL SAMPLE SITES

UNITS: pCi/CUBIC METER

Location	Lab No.	Begin Date	End Date	Cs-134	Cs-137
APC-1	910586	12/31/90	04/01/91	< 0.0011	< 0.0009
APC-1	911169	04/01/91	07/01/91	< 0.0013	< 0.0012
APC-1	911849	07/01/91	09/30/91	< 0.0011	< 0.0009
APC-1	920134	09/30/91	12/31/91	< 0.0019	< 0.0015
APE-30	910587	12/31/90	04/01/91	< 0.0008	< 0.0006
APE-30	911170	04/01/91	07/01/91	< 0.0008	< 0.0007
APE-30	911850	07/01/91	09/30/91	< 0.0012	< 0.0010
APE-30	920135	09/30/91	12/31/91	< 0.0013	< 0.0013
APG-1	910583	12/31/90	04/01/91	< 0.0010	< 0.0007
APG-1	911166	04/01/91	07/01/91	< 0.0013	< 0.0011
APG-1	911846	07/01/91	09/30/91	< 0.0010	< 0.0008
APG-1	920131	09/30/91	12/31/91	< 0.0019	< 0.0018
APP-1	910585	12/31/90	04/01/91	< 0.0016	< 0.0013
APP-1	911168	04/01/91	07/01/91	< 0.0015	< 0.0015
APP-1	911848	07/01/91	09/30/91	< 0.0006	< 0.0005
APP-1	920133	09/30/91	12/31/91	< 0.0013	< 0.0011
APQ-1	910584	12/31/90	04/01/91	< 0.0020	< 0.0014
APQ-1	911167	04/01/91	07/01/91	< 0.0008	< 0.0007
APQ-1	911847	07/01/91	09/30/91	< 0.0010	< 0.0009
APQ-1	920132	09/30/91	12/31/91	< 0.0011	< 0.0011

TABLE B-4

DRINKING WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: DWG-2

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
910105	12/31/90	01/14/91	< 0.5
910198	01/14/91	01/28/91	< 0.7
910306	01/28/91	02/11/91	< 0.5
910357	02/11/91	02/25/91	< 0.3
910470	02/25/91	03/11/91	< 0.3
910532	03/11/91	03/25/91	< 0.2
910659	03/25/91	04/08/91	< 0.3
910742	04/08/91	04/22/91	< 0.3
910818	04/22/91	05/06/91	< 0.3
910888	05/06/91	05/20/91	< 0.3
910967	05/20/91	06/03/91	< 0.2
911070	06/03/91	06/17/91	< 0.3

Lab. No.	Begin Date	End Date	I-131*
911140	06/17/91	07/01/91	< 0.2
911279	07/01/91	07/15/91	< 0.2
911346	07/15/91	07/29/91	< 0.2
911408	07/29/91	08/12/91	< 0.2
911494	08/12/91	08/26/91	< 0.2
911563	08/26/91	09/09/91	< 0.2
911653	09/09/91	09/24/91	< 0.2
911739	09/24/91	10/08/91	< 0.3
911840	10/08/91	10/22/91	< 0.4
911951	10/22/91	11/05/91	< 0.3
912037	11/05/91	11/19/91	< 0.2
912093	11/19/91	12/03/91	< 0.2
912182	12/03/91	12/17/91	< 0.6
920021	12/17/91	12/31/91	< 0.3

TABLE B-4 (continued)

DRINKING WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: DWE-5

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
910104	12/31/90	01/14/91	< 0.4
910305	01/28/91	02/11/91	< 0.5
910356	02/11/91	02/25/91	< 0.3
910469	02/25/91	03/11/91	< 0.3
910531	03/11/91	03/25/91	< 0.2
910660	03/25/91	04/08/91	< 0.3
910743	04/08/91	04/22/91	< 0.3
910819	04/22/91	05/06/91	< 0.3
910887	05/06/91	05/20/91	< 0.3
910966	05/20/91	06/03/91	< 0.2
911059	06/03/91	06/17/91	< 0.3
911141	06/17/91	07/01/91	< 0.3
911278	07/01/91	07/15/91	< 0.2
911345	07/15/91	07/29/91	< 0.2
911409	07/29/91	08/12/91	< 0.2
911493	08/12/91	08/26/91	< 0.2
911562	08/26/91	09/09/91	< 0.2
911652	09/09/91	09/24/91	< 0.2
911738	09/24/91	10/08/91	< 0.3
911839	10/08/91	10/22/91	< 0.4
911950	10/22/91	11/05/91	< 0.3
912036	11/05/91	11/19/91	< 0.2
912092	11/19/91	12/03/91	< 0.3
912181	12/03/91	12/17/91	< 0.6
920020	12/17/91	12/31/91	< 0.3

TABLE B-4 (continued)

DRINKING WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: DWP-7

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
910103	12/31/90	01/14/91	0.2 +/-0.2
910304	01/28/91	02/11/91	< 0.5
910355	02/11/91	02/25/91	< 0.3
910468	02/25/91	03/11/91	< 0.3
910533	03/11/91	03/25/91	< 0.3
910658	03/25/91	04/08/91	< 0.2
910741	04/08/91	04/22/91	< 0.3
910817	04/22/91	05/06/91	< 0.3
910886	05/06/91	05/20/91	< 0.3
910965	05/20/91	06/03/91	< 0.2
911068	06/03/91	06/17/91	< 0.3
911139	06/17/91	07/01/91	< 0.2
911277	07/01/91	07/15/91	< 0.2
911344	07/15/91	07/29/91	< 0.2
911410	07/29/91	08/12/91	< 0.2
911492	08/12/91	08/26/91	< 0.2
911561	08/26/91	09/09/91	< 0.2
911651	09/09/91	09/24/91	< 0.2
911737	09/24/91	10/08/91	< 0.3
911838	10/08/91	10/22/91	< 0.4
911949	10/22/91	11/05/91	< 0.3
912035	11/05/91	11/19/91	< 0.2
912091	11/19/91	12/03/91	< 0.2
912180	12/03/91	12/17/91	< 0.5
920019	12/17/91	12/31/91	< 0.3

TABLE B-5

DRINKING WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWG-2

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Beta
910199	12/31/90	01/28/91	< 3.0
910360	01/28/91	02/25/91	6.5 +/-1.8
910535	02/25/91	03/25/91	6.6 +/-2.2
910659	03/25/91	04/08/91	2.3 +/-2.2
910821	04/08/91	05/06/91	< 3.7
910970	05/06/91	06/03/91	2.3 +/-2.3
911137	06/03/91	07/01/91	< 3.4
911347	07/01/91	07/29/91	< 2.9
911497	07/29/91	08/26/91	9.5 +/-2.1
911656	08/26/91	09/24/91	< 3.4
911739	09/24/91	10/08/91	2.3 +/-1.0
911954	10/08/91	11/05/91	3.0 +/-1.0
912096	11/05/91	12/03/91	2.8 +/-1.1
920024	12/03/91	12/31/91	2.6 +/-1.0

TABLE B-5 (continued)

DRINKING WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWE-5

UNITS: pCi/LITER

Lab. No.	Begin Dat	End Date	Beta
910200	12/31/90	01/28/91	< 3.0
910359	01/28/91	02/25/91	6.7 +/-1.8
910534	02/25/91	03/25/91	3.2 +/-2.0
910660	03/25/91	04/08/91	< 4
910822	04/08/91	05/06/91	< 3.6
910969	05/06/91	06/03/91	< 3.6
911138	06/03/91	07/01/91	4.7 +/-
911348	07/01/91	07/29/91	< 2.9
911496	07/29/91	08/26/91	5.8 +/-2
911655	08/26/91	09/24/91	< 3.
911738	09/24/91	10/08/91	2.2 +/-1.0
911953	10/08/91	11/05/91	1.6 +/-0.9
912095	11/05/91	12/03/91	< 1.5
920023	12/03/91	12/31/91	1.1 +/-1.

TABLE B-5 (continued)

DRINKING WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWP-7

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Beta
910201	12/31/90	01/28/91	1.9 +/-1.9
910358	01/28/91	02/25/91	6.6 +/-1.8
910536	02/25/91	03/25/91	7.6 +/-2.1
910658	03/25/91	04/08/91	2.6 +/-2.2
910820	04/08/91	05/06/91	2.2 +/-2.2
910968	05/06/91	06/03/91	< 3.6
911136	06/03/91	07/01/91	< 3.2
911349	07/01/91	07/29/91	< 2.9
911495	07/29/91	08/26/91	6.7 +/-2.0
911654	08/26/91	09/24/91	< 3.4
911737	09/24/91	10/08/91	2.8 +/-1.0
911952	10/08/91	11/05/91	3.2 +/-1.0
912094	11/05/91	12/03/91	1.1 +/-0.9
920022	12/03/91	12/31/91	< 1.5

TABLE B-5 (continued)

DRINKING WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWG-2

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
910199	12/31/90	01/28/91	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 2	< 6	< 2
910360	01/28/91	02/25/91	< 3	< 2	< 3	< 3	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 2
910535	02/25/91	03/25/91	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 3
910659	03/25/91	04/08/91	< 2	< 2	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 6	< 2
910821	04/08/91	05/06/91	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 4	< 4	< 4	< 15	< 5
910970	05/06/91	06/03/91	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 2	< 2	< 9	< 3
911137	06/03/91	07/01/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 8	< 2
911347	07/01/91	07/29/91	< 2	< 2	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 6	< 2
911497	07/29/91	08/26/91	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 2	< 6	< 2
911656	08/26/91	09/24/91	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 3	< 2	< 2	< 8	< 3
911739	09/24/91	10/08/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 4	< 2	< 2	< 10	< 3
911954	10/08/91	11/05/91	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 3
912096	11/05/91	12/03/91	< 4	< 3	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 4	< 14	< 4
920024	12/03/91	12/31/91	< 3	< 3	< 4	< 3	< 6	< 3	< 7	< 5	< 4	< 3	< 15	< 5

TABLE B-5 (continued)

DRINKING WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWE-5

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
910197	01/14/91	01/28/91												
910200	12/31/90	01/28/91	< 3	< 3	< 3	< 3	< 6	< 2	< 6	< 3	< 3	< 3	< 9	< 3
910359	01/28/91	02/25/91	< 2	< 2	< 4	< 2	< 7	< 2	< 4	< 2	< 2	< 2	< 7	< 2
910534	02/25/91	03/25/91	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 3	< 3	< 2	< 7	< 2
910660	03/25/91	04/08/91	< 2	<	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 3
910822	04/08/91	05/06/91	< 4	< 4	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 3	< 14	< 4
910969	05/06/91	06/03/91	< 2	< 2	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 6	< 4
911138	06/03/91	07/01/91	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 6
911348	07/01/91	07/29/91	< 4	< 3	< 4	< 3	< 8	< 4	< 8	< 5	< 4	< 4	< 14	< 4
911496	07/29/91	08/26/91	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 7	< 2
911655	08/26/91	09/24/91	< 2	< 2	< 2	< 3	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 2
911738	09/24/91	10/08/91	< 1	< 2	< 2	< 1	< 3	< 2	< 3	< 2	< 2	< 1	< 7	< 3
911953	10/08/91	11/05/91	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 2
912095	11/05/91	12/03/91	< 2	< 2	< 3	< 2	< 5	< 2	< 4	< 3	< 3	< 2	< 8	< 2
920023	12/03/91	12/31/91	< 2	< 3	< 3	< 2	< 5	< 3	< 5	< 4	< 3	< 2	< 11	< 5

TABLE B-5 (continued)

DRINKING WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWP-7

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
910196	01/14/91	01/28/91												
910201	12/31/90	01/28/91	< 3	< 4	< 5	< 4	< 8	< 3	< 8	< 4	< 4	< 3	< 12	< 5
910358	01/28/91	02/25/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 7	< 2
910536	02/25/91	03/25/91	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 4	< 5	< 4	< 14	< 4
910658	03/25/91	04/08/91	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 3
910820	04/08/91	05/06/91	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 4	< 2	< 2	< 11	< 3
910968	05/06/91	06/03/91	< 4	< 4	< 5	< 4	< 8	< 4	< 9	< 5	< 4	< 4	< 16	< 4
911136	06/03/91	07/01/91	< 3	< 3	< 4	< 3	< 6	< 3	< 7	< 4	< 4	< 3	< 13	< 4
911349	07/01/91	07/29/91	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 2	< 6	< 2
911495	07/29/91	08/26/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 8	< 3
911654	08/26/91	09/24/91	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 5	< 4	< 4	< 15	< 4
911737	09/24/91	10/08/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 9	< 6
911952	10/08/91	11/05/91	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 5	< 5	< 4	< 17	< 4
912094	11/05/91	12/03/91	< 3	< 2	< 3	< 3	< 6	< 3	< 5	< 3	< 3	< 3	< 9	< 3
920022	12/03/91	12/31/91	< 3	< 3	< 4	< 4	< 5	< 3	< 7	< 4	< 4	< 3	< 13	< 4

TABLE B-6

DRINKING WATER
TRITIUM ANALYSIS ON QUARTERLY COMPOSITES

SAMPLE LOCATION: ALL SAMPLE SITES

UNITS: pCi/LITER

Location	Lab No.	Begin Date	End Date	H-3
DWE-5	910663	12/31/90	04/08/91	260 +/-180
DWE-5	911135	04/08/91	07/01/91	< 490
DWE-5	911742	07/01/91	10/08/91	< 350
DWE-5	920129	10/08/91	12/31/91	< 660
DWG-2	910662	12/31/90	04/08/91	< 300
DWG-2	911134	04/08/91	07/01/91	< 490
DWG-2	911743	07/01/91	10/08/91	< 350
DWG-2	920130	10/08/91	12/31/91	< 660
DWP-7	910661	12/31/90	04/08/91	< 300
DWP-7	911133	04/08/91	07/01/91	< 490
DWP-7	911741	07/01/91	10/08/91	< 350
DWP-7	920128	10/08/91	12/31/91	< 660

TABLE B-7

SURFACE WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: SWG-2

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
910105	12/31/90	01/14/91	< 0.5
910198	01/14/91	01/28/91	< 0.7
910306	01/28/91	02/11/91	< 0.5
910357	02/11/91	02/25/91	< 0.3
910470	02/25/91	03/11/91	< 0.3
910532	03/11/91	03/25/91	< 0.2
910659	03/25/91	04/08/91	< 0.3
910742	04/08/91	04/22/91	< 0.3
910818	04/22/91	05/06/91	< 0.3
910888	05/06/91	05/20/91	< 0.3
910967	05/20/91	06/03/91	< 0.2
911070	06/03/91	06/17/91	< 0.3
91[illegible]140	06/17/91	07/01/91	< 0.2
911279	07/01/91	07/15/91	< 0.2
911346	07/15/91	07/29/91	< 0.2
911408	07/29/91	08/12/91	< 0.2
911494	08/12/91	08/26/91	< 0.2
911563	08/26/91	09/09/91	< 0.2
911653	09/09/91	09/24/91	< 0.2
911739	09/24/91	10/08/91	< 0.3
911840	10/08/91	10/22/91	< 0.4
911951	10/22/91	11/05/91	< 0.3
912037	11/05/91	11/19/91	< 0.2
912093	11/19/91	12/03/91	< 0.2
912182	12/03/91	12/17/91	< 0.6
920021	12/17/91	12/31/91	< 0.3

TABLE B-7 (continued)

SURFACE WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: SWE-5

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
910104	12/31/90	01/14/91	< 0.4
910197	01/14/91	01/28/91	< 0.4
910305	01/28/91	02/11/91	< 0.5
910356	02/11/91	02/25/91	< 0.3
910469	02/25/91	03/11/91	< 0.3
910531	03/11/91	03/25/91	< 0.2
910660	03/25/91	04/08/91	< 0.3
910743	04/08/91	04/22/91	< 0.3
910819	04/22/91	05/06/91	< 0.3
910887	05/06/91	05/20/91	< 0.3
910966	05/20/91	06/03/91	< 0.2
911069	06/03/91	06/17/91	< 0.3
911141	06/17/91	07/01/91	< 0.3
911278	07/01/91	07/15/91	< 0.2
911345	07/15/91	07/29/91	< 0.2
911409	07/29/91	08/12/91	< 0.2
911493	08/12/91	08/26/91	< 0.2
911562	08/26/91	09/09/91	< 0.2
911652	09/09/91	09/24/91	< 0.2
911738	09/24/91	10/08/91	< 0.3
911839	10/08/91	10/22/91	< 0.4
911950	10/22/91	11/05/91	< 0.3
912036	11/05/91	11/19/91	< 0.2
912092	11/19/91	12/03/91	< 0.3
912181	12/03/91	12/17/91	< 0.6
920020	12/17/91	12/31/91	< 0.3

TABLE B-7 (continued)

SURFACE WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: SWP-7

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
910103	12/31/90	01/14/91	0.2 +/-0.2
910196	01/14/91	01/28/91	< 0.7
910304	01/28/91	02/11/91	< 0.5
910355	02/11/91	02/25/91	< 0.3
910468	02/25/91	03/11/91	< 0.3
910533	03/11/91	03/25/91	< 0.3
910658	03/25/91	04/08/91	< 0.2
910741	04/08/91	04/22/91	< 0.3
910817	04/22/91	05/06/91	< 0.3
910886	05/06/91	05/20/91	< 0.3
910965	05/20/91	06/03/91	< 0.2
911068	06/03/91	06/17/91	< 0.3
911139	06/16/91	07/01/91	< 0.2
911277	07/01/91	07/15/91	< 0.2
911344	07/15/91	07/29/91	< 0.2
911410	07/29/91	08/12/91	< 0.2
911492	08/12/91	08/26/91	< 0.2
911561	08/26/91	09/09/91	< 0.2
911651	09/09/91	09/24/91	< 0.2
911737	09/24/91	10/08/91	< 0.3
911838	10/08/91	10/22/91	< 0.4
911949	10/22/91	11/05/91	< 0.3
912035	11/05/91	11/19/91	< 0.2
912091	11/19/91	12/03/91	< 0.2
912180	12/03/91	12/17/91	< 0.5
920019	12/17/91	12/31/91	< 0.3

TABLE B-8

SURFACE WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: SWG-2

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Beta
910199	12/31/90	01/28/91	< 3.0
910360	01/28/91	02/25/91	6.5 +/-1.8
910535	02/25/91	03/25/91	6.6 +/-2.2
910659	03/25/91	04/08/91	2.3 +/-2.2
910821	04/08/91	05/06/91	< 3.7
910970	05/06/91	06/03/91	2.3 +/-2.3
911137	06/03/91	07/01/91	< 3.4
911347	07/01/91	07/29/91	< 2.9
911497	07/29/91	08/26/91	9.5 +/-2.1
911656	08/26/91	09/24/91	< 3.4
911739	09/24/91	10/08/91	2.3 +/-1.0
911954	10/08/91	11/05/91	3.0 +/-1.0
912096	11/05/91	12/03/91	2.8 +/-1.1
920024	12/03/91	12/31/91	2.6 +/-1.0

TABLE B-6 (continued)

SURFACE WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: SWE-5

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Beta
910200	12/31/90	01/28/91	< 3.0
910359	01/28/91	02/25/91	6.7 +/-1.8
910534	02/25/91	03/25/91	3.2 +/-2.0
910660	03/25/91	04/08/91	< 3
910822	04/08/91	05/06/91	< 3.6
910969	05/06/91	06/03/91	< 3.6
911138	06/03/91	07/01/91	2.7 +/-2.0
911348	07/01/91	07/29/91	< 2.9
911496	07/29/91	08/26/91	5.8 +/-2.0
911655	08/26/91	09/24/91	< 3.4
911738	09/24/91	10/08/91	2.2 +/-1.0
911953	10/08/91	11/05/91	1.6 +/-0.9
912095	11/05/91	12/03/91	< 1.5
920023	12/03/91	12/31/91	1.1 +/-1.0

TABLE B-8 (continued)

SURFACE WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: SWP-7

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Beta
910201	12/31/90	01/28/91	1.9 +/-1.9
910358	01/28/91	02/25/91	6.6 +/-1.8
910536	02/25/91	03/25/91	7.6 +/-2.1
910658	03/25/91	04/08/91	2.6 +/-2.2
910820	04/08/91	05/06/91	2.2 +/-2.2
910968	05/06/91	06/03/91	< 3.6
910968	05/06/91	06/03/91	< 3.6
911136	06/03/91	07/01/91	< 3.2
911349	07/01/91	07/29/91	< 2.9
911495	07/29/91	08/26/91	6.7 +/-2.0
911654	08/26/91	09/24/91	< 3.4
911737	09/24/91	10/08/91	2.8 +/-1.0
911952	10/08/91	11/05/91	3.2 +/-1.0
912094	11/05/91	12/03/91	1.1 +/-0.9
920022	12/03/91	12/31/91	< 1.5

TABLE B-8 (continued)

SURFACE WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: SWG-2

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
910199	12/31/90	01/28/91	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 2	< 6	< 2
910360	01/28/91	02/25/91	< 3	< 2	< 3	< 3	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 2
910535	02/25/91	03/25/91	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 3
910659	03/25/91	04/08/91	< 2	< 2	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 6	< 2
910821	04/08/91	05/06/91	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 4	< 4	< 4	< 15	< 5
910970	05/06/91	06/03/91	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 2	< 2	< 9	< 3
911137	06/03/91	07/01/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 8	< 2
911347	07/01/91	07/29/91	< 2	< 2	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 6	< 2
911497	07/29/91	08/26/91	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 2	< 6	< 2
911656	08/26/91	09/24/91	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 3	< 2	< 2	< 8	< 3
911739	09/24/91	10/08/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 4	< 2	< 2	< 10	< 3
911954	10/08/91	11/05/91	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 3
912096	11/05/91	12/03/91	< 4	< 3	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 4	< 14	< 4
920024	12/03/91	12/31/91	< 3	< 3	< 4	< 3	< 6	< 3	< 7	< 5	< 4	< 3	< 15	< 5

TABLE B-8 (continued)

SURFACE WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: SWE-5

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
910200	12/31/90	01/28/91	< 3	< 3	< 3	< 3	< 6	< 2	< 6	< 3	< 3	< 3	< 9	< 3
910359	01/28/91	02/25/91	< 2	< 2	< 4	< 2	< 7	< 2	< 4	< 2	< 2	< 2	< 7	< 2
910534	02/25/91	03/25/91	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 3	< 3	< 2	< 7	< 2
910660	03/25/91	04/08/91	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 3
910822	04/08/91	05/06/91	< 4	< 4	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 3	< 14	< 4
910969	05/06/91	06/03/91	< 2	< 2	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 6	< 4
911138	06/03/91	07/01/91	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 6
911348	07/01/91	07/29/91	< 4	< 3	< 4	< 3	< 8	< 4	< 8	< 4	< 4	< 4	< 14	< 4
911496	07/29/91	08/26/91	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 7	< 2
911655	08/26/91	09/24/91	< 2	< 2	< 2	< 3	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 2
911738	09/24/91	10/08/91	< 1	< 2	< 2	< 1	< 3	< 2	< 3	< 2	< 2	< 1	< 7	< 3
911953	10/08/91	11/05/91	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 2
912095	11/05/91	12/03/91	< 2	< 2	< 3	< 2	< 5	< 2	< 4	< 3	< 3	< 2	< 8	< 2
920023	12/03/91	12/31/91	< 2	< 3	< 3	< 2	< 5	< 3	< 5	< 4	< 3	< 2	< 11	< 5

TABLE B-8 (continued)

SURFACE WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: SWP-7 UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
910201	12/31/90	01/28/91	< 3	< 4	< 5	< 4	< 8	< 3	< 8	< 4	< 4	< 3	< 12	< 5
910358	01/28/91	02/25/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 7	< 2
910536	02/25/91	03/25/91	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 4	< 5	< 4	< 14	< 4
910658	03/25/91	04/08/91	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 3
910820	04/08/91	05/06/91	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 4	< 2	< 2	< 11	< 3
910968	05/06/91	06/03/91	< 4	< 4	< 5	< 4	< 8	< 4	< 9	< 5	< 4	< 4	< 16	< 4
911136	06/03/91	07/01/91	< 3	< 3	< 4	< 3	< 6	< 3	< 7	< 4	< 4	< 3	< 13	< 4
911349	07/01/91	07/29/91	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 2	< 6	< 2
911495	07/29/91	08/26/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 8	< 3
911654	08/26/91	09/24/91	< 4	< 4	< 5	< 4	< 8	< 4	< 8	< 5	< 4	< 4	< 15	< 4
911737	09/24/91	10/08/91	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 9	< 6
911952	10/08/91	11/05/91	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 5	< 5	< 4	< 17	< 4
912094	11/05/91	12/03/91	< 3	< 2	< 3	< 3	< 6	< 3	< 7	< 3	< 3	< 3	< 9	< 3
920022	12/03/91	12/31/91	< 3	< 3	< 4	< 4	< 5	< 3	< 7	< 4	< 4	< 3	< 13	< 4

TABLE B-9

SURFACE WATER
TRITIUM ANALYSIS ON QUARTERLY COMPOSITES

SAMPLE LOCATION: ALL SAMPLE SITES

UNITS: pCi/LITER

Location	Lab No.	Begin Date	End Date	H-3
SWE-5	910663	12/31/90	04/08/91	260 +/-180
SWE-5	911135	04/08/91	07/01/91	< 490
SWE-5	911742	07/01/91	10/08/91	< 350
SWE-5	920129	10/08/91	12/31/91	< 660
SWG-2	910662	12/31/90	04/08/91	< 300
SWG-2	911134	04/08/91	07/01/91	< 490
SWG-2	911743	07/01/91	10/08/91	< 350
SWG-2	920130	10/08/91	12/31/91	< 660
SWP-7	910661	12/31/90	04/08/91	< 300
SWP-7	911133	04/08/91	07/01/91	< 490
SWP-7	911741	07/01/91	10/08/91	< 350
SWP-7	920128	10/08/91	12/31/91	< 660

TABLE B-10

GROUNDWATER
TRITIUM AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: GWJ-1

UNITS: pCi/LITER

Lab. No.	Collection Date	H-3	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
910048	01/07/91	< 350	< 2	< 3	< 4	< 3	< 6	< 6	< 3	< 5	< 3	< 3	< 11	< 4
910615	03/31/91	200 +/-180	< 2	< 2	< 3	< 2	< 5	< 5	< 2	< 3	< 3	< 2	< 9	< 3
911147	07/01/91	< 490	< 2	< 2	< 3	< 3	< 5	< 6	< 3	< 3	< 3	< 2	< 9	< 3
911740	10/08/91	340 +/-220	< 2	< 2	< 3	< 2	< 5	< 5	< 3	< 5	< 3	< 2	< 12	< 4

TABLE B-11

SHORELINE SOIL
GAMMA ISOTOPIC ANALYSIS

SAMPLE LOCATIONS: ALL SAMPLE SITES

UNITS: pCi/Kg

Location	Lab No.	Collection Date	Mn-54	Co-58	Co-60	Cs-134	Cs-137
SHWE-3	910616	03/31/91	< 13	< 13	< 13	< 16	< 11
SHWE-3	911745	10/08/91	< 15	< 15	< 14	< 20	32 +/-10
SHWJ-1	910617	03/31/91	< 11	< 11	< 11	< 14	49 +/-9
SHWJ-1	911744	10/08/91	< 16	< 15	< 15	< 19	< 15

TABLE B-12

MILK
IODINE-131 AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: MKQ-5

UNITS: pCi/LITER

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
910016	01/02/91	< 0.4	< 3	< 3	< 12	< 4
910133	01/15	< 0.5	< 4	< 3	< 10	< 4
910228	02/05/91	< 0.5	< 3	< 3	< 9	< 3
910325	02/19/91	< 0.5	< 3	< 2	< 9	< 3
910425	03/05/91	< 0.3	< 3	< 2	< 8	< 3
910500	03/19/91	< 0.3	< 3	< 2	< 8	< 2
910625	04/02/91	< 0.2	< 2	< 2	< 7	< 2
910707	04/16/91	< 0.3	< 3	< 3	< 9	< 2
910836	05/07/91	< 0.5	< 2	< 2	< 7	< 2
910904	05/21/91	< 0.3	< 5	< 5	< 19	< 5
910963	06/04/91	< 0.29	< 3	< 3	< 9	< 3
911071	06/18/91	< 0.24	< 3	< 3	< 9	< 3
911154	07/02/91	< 0.3	< 4	< 4	< 15	< 4
911280	07/16/91	< 0.3	< 2	< 2	< 8	< 2
911384	08/06/91	< 0.2	< 2	< 2	< 6	< 2
911453	08/20/91	< 0.2	< 4	< 3	< 10	< 3
911525	09/04/91	< 0.3	< 4	< 3	< 10	< 8
911614	09/17/91	< 0.2	< 3	< 2	< 9	< 2
911730	10/09/91	< 0.4	< 2	< 2	< 7	< 3
911873	10/24/91	< 0.5	< 3	< 3	< 10	< 3

TABLE B-12 (continued)

MILK
IODINE-131 AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: MKQ-5

UNITS: pCi/LITER

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
911968	11/06/91	< 0.6	< 2	< 2	< 7	< 2
912028	11/20/91	< 0.3	< 2	< 2	< 5	< 2
912099	12/04/91	< 0.3	< 5	< 4	< 15	< 4
912188	12/18/91	< 0.6	< 3	< 2	< 7	< 2

TABLE B-12 (continued)

MILK
IODINE-131 AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: MKQ-45 UNITS: pCi/LITER

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
910017	01/02/91	< 0.4	< 2	< 2	< 8	< 2
910134	01/15/91	< 0.6	< 2	< 2	< 7	< 3
910229	02/04/91	< 0.4	< 2	< 2	< 7	< 1
910326	02/18/91	< 0.7	< 3	< 3	< 11	< 3
910426	03/04/91	< 0.3	< 3	< 3	< 9	< 3
910501	03/18/91	< 0.3	< 3	< 3	< 9	< 3
910626	04/01/91	< 0.3	< 3	< 2	< 9	< 2
910708	04/15/91	< 0.3	< 2	< 2	< 8	< 3
910837	05/06/91	< 0.4	< 3	< 3	< 10	< 3
910905	05/20/91	< 0.3	< 3	< 3	< 10	< 3
910964	06/03/91	< 0.30	< 4	< 4	< 11	< 9
911072	06/17,91	< 0.27	< 3	< 2	< 8	< 2
911155	07/01/91	< 0.3	< 2	< 2	< 6	< 2
911281	07/15/91	< 0.3	< 3	< 3	< 9	< 3
911385	08/05/91	< 0.2	< 3	< 3	< 9	< 3
911454	08/19/91	< 0.2	< 2	< 2	< 8	< 2
911526	09/03/91	< 0.3	< 3	3+/-3.2	< 7	< 4
911615	09/16/91	< 0.3	< 3	< 2	< 8	< 2
911731	10/08/91	< 0.35	< 3	< 3	< 9	< 3
911874	10/22/91	< 0.7	< 2	< 2	< 9	< 3

TABLE B-12 (continued)

MILK
IODINE-131 AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: MKQ-45 UNITS: pCi/LITER

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
911961	11/04/91	< 0.4	< 4	< 4	< 12	< 4
912029	11/18/91	< 0.3	< 2	4+/-1.5	< 7	< 2
912100	12/03/91	< 0.3	< 2	< 2	< 8	< 3
912189	12/17/91	< 0.6	< 3	< 3	< 10	< 4

TABLE B-13

FISH
GAMMA ISOTOPIC ANALYSIS

SAMPLE LOCATION: FH-1

UNITS: pCi/Kg

Lab No.	Collection Date	Sample type	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
910896	05/17/91	CATFISH	< 10	< 10	< 15	< 10	< 24	< 12	< 11
910897	05/17/91	SHAD	< 6	< 6	< 9	< 6	< 12	< 6	< 5
910898	05/17/91	DRUM	< 6	< 7	< 10	< 7	< 16	< 7	< 7
910899	05/17/91	MULLET	< 11	< 12	< 16	< 12	< 30	< 14	< 10
911825	10/11/91	CATFISH	< 6	< 6	< 10	< 6	< 15	< 7	< 6
911826	10/11/91	MULLET	< 6	< 7	< 11	< 6	< 15	< 7	< 6
911827	10/11/91	[illegible]	< 5	< 6	< 9	< 6	< 13	< 6	< 5
911828	10/11/91		< 4	< 5	< 7	< 4	< 10	< 5	< 4

TABLE B-13 (continued)

FISH
GAMMA ISOTOPIC ANALYSIS

SAMPLE LOCATION: FH-2

UNITS: pCi/Kg

Lab No.	Collection Date	Sample type	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
910900	05/17/91	CATFISH	< 11	< 10	< 16	< 12	< 26	< 12	< 11
910901	05/17/91	SHAD	< 29	< 30	< 40	< 26	< 66	< 31	< 30
910902	05/17/91	DRUM	< 14	< 13	< 20	< 15	< 31	< 18	< 12
910903	05/17/91	MULLET	< 19	< 17	< 23	< 18	< 39	< 20	< 18
911829	10/11/91	CATFISH	< 9	< 10	< 15	< 9	< 24	< 11	< 10
911830	10/11/91	MULLET	< 4	< 4	< 7	< 4	< 10	< 4	< 4
911831	10/11/91	SHAD	< 6	< 7	< 11	< 6	< 18	< 7	< 6
911832	10/11/91	BASS	< 4	< 5	< 8	< 5	< 11	< 5	< 4

TABLE B-14

BROAD LEAF VEGETATION
IODINE-131 AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: BLQ-1 UNITS: pCi/Kg

Lab No.	Collection Date	I-131	Cs-134	Cs-137
910179	01/25/91	< 8	< 7	< 7
910344	02/21/91	< 7	< 13	< 11
910514	03/21/91	< 14	< 17	< 15
910764	04/25/91	< 5	< 6	< 5
910916	05/23/91	< 17	< 13	< 11
911088	06/20/91	< 10	< 9	< 7
911329	07/25/91	< 18	< 18	< 17
911477	08/22/91	< 23	< 22	< 19
911671	09/26/91	< 18	< 16	< 14
911882	10/25/91	< 40	< 34	< 32
912069	11/26/91	< 34	< 24	< 19
912219	12/26/91	< 12	< 13	< 12

TABLE B-14 (continued)

BROAD LEAF VEGETATION
IODINE-131 AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: BLB-1

UNITS: pCi/Kg

Lab No.	Collection Date	I-131	Cs-134	Cs-137
910180	01/25/91	< 9	< 7	< 6
910345	02/21/91	< 21	< 15	< 14
910515	03/21/91	< 11	< 12	< 10
910765	04/25/91	< 6	< 7	< 6
910917	05/23/91	< 16	< 12	< 11
911089	06/20/91	< 12	< 9	< 8
911330	07/25/91	< 27	< 24	< 24
911478	08/22/91	< 20	< 16	< 15
911672	09/26/91	< 20	< 16	< 15
911883	10/25/91	< 16	< 14	< 13
912070	11/26/91	< 35	< 22	< 20
912220	12/26/91	< 9	< 12	< 10

TABLE B-14 (continued)

BROAD LEAF VEGETATION
IODINE-131 AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: BLK-15

UNITS: pCi/Kg

Lab No.	Collection Date	I-131	Cs-134	Cs-137
910181	01/25/91	< 12	< 12	< 1u
910346	02/21/91	< 14	< 10	< 10
910516	03/21/91	< 11	< 14	< 11
910766	04/25/91	< 12	< 14	< 12
910918	05/23/91	< 14	< 13	< 11
911090	06/20/91	< 23	< 18	< 16
911331	07/25/91	< 15	< 18	< 16
911479	08/22/91	< 20	< 16	< 15
911673	09/26/91	< 12	< 12	< 11
911884	10/25/91	< 27	< 24	< 20
912071	11/26/91	< 28	< 24	< 18
912221	12/26/91	< 12	< 11	< 11

TABLE B-15

VEGETATION - FOOD PRODUCTS
IODINE-131 AND GAMMA ISOTOPIC ANALYSES

SAMPLE LOCATION: ALL SAMPLE SITES

UNITS: pCi/Kg

Location	Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
FPG-1	911564	09/09/91	SUGAR CANE	< 6	< 5	< 5
FPP-1	911566	09/05/91	SUGAR CANE	< 4	< 3	< 3
FPQ-1	911565	09/05/91	SUGAR CANE	< 4	< 3	< 3

APPENDIX C
SUMMARY OF INTERLABORATORY COMPARISONS

EPA CROSS CHECK RESULTS

EPA PREP DATE	DATE EPA ISSUED RESULTS	MEDIA	NUCLIDE	EPA RESULTS	AP&L RESULTS	NORM DEV KNOWN
4th Qtr. 1190						
CC36036-7	1/11/91	Analytic, Inc. Iodine Cartridge (uCi/cc)	I-131	3.18E-2	3.43E-2	1.08 Ratio
02/08/91	04/15/91	Water (pCi/L)	Co-60	40.0	40.67	0.23
			Zn-65	149.0	145.67	-0.38
			Ru-106	186.0	196.67	0.97
			Cs-134	8.0	9.00	0.35
			Cs-137	8.0	9.00	0.35
			Ba-133	75.0	85.33	2.24
02/22/91	04/16/91	Water (pCi/L)	H-3	4418.0	4613.33	0.77
03/29/91	07/19/91	Air Filter (pCi/Filter)	Beta	124.0	122.33	-0.40
			Cs-137	40.0	59.33	6.70**[1]
05/17/91	07/22/91	Water (pCi/L)	Beta	46.0	47.00	0.35
04/16/91	07/25/91	Water Blind B (pCi/L)	Beta	115.0	73.33	-4.25**[2]
			Cs-134	24.0	23.33	-0.23
			Cs-137	25.0	25.67	0.23
06/07/91	09/11/91	Water (pCi/L)	Co-60	10.0	10.33	0.12
			Zn-65	108.0	106.00	-0.31
			Ru-106	149.0	146.00	-0.35
			Cs-134	15.0	14.67	-0.12
			Cs-137	14.0	14.67	0.23
			Ba-133	62.0	63.67	0.48
08/30/91	11/15/91	Air Filter (pCi/Filter)	Beta	92.0	93.67	0.29
			Cs-137	30.0	30.00	0
09/09/91	10/25/91	Water (pCi/L)	I-131	20.0	17.67	-0.67
10/04/91	12/02/91	Water (pCi/L)	Co-60	29.0	28.00	-0.35
			Zn-65	73.0	73.33	0.08
			Ru-106	199.0	194.00	-0.43
			Cs-134	10.0	9.67	-0.12
			Cs-137	10.0	10.33	0.12
			Ba-133	98.0	100.00	0.35

EPA CROSS CHECK RESULTS

EPA PREP DATE	DATE EPA ISSUED RESULTS	MEDIA	NUCLIDE	EPA RESULTS	AP&L RESULTS	NORM DEV KNOWN
10/18/91	12/05/91	Water (pCi/L)	H-3	2454.0	2336.67	-0.58
09/27/91	01/03/92	Milk (pCi/L)	I-131	108.0	102.00	-0.94
			Cs-137	30.0	30.33	0.12
			K	1740.0	1570.00	-3.38**3
10/22/91	01/24/92	Water Blind B (pCi/L)	Beta	65.0	52.00	-2.25
			Cs-134	10.0	11.00	0.35
			Cs-137	11.0	11.00	0.00
			Co-60	20.0	20.33	0.12

**1 A new efficiency curve was constructed using a blank EPA plastic air filter. Efficiencies calculated using this air filter geometry were approximately 30% higher than previous geometries using air particulate filters.

**2 Blind water samples contain several isotopes which have different beta energies. The efficiency curve for beta in water was constructed using Cs-137. Because the strontium isotopes have different beta energies than Cs-137, the results may not always agree with the standard beta in water efficiency using only Cs-137.

**3 The results submitted by System Chemistry for Total Potassium (K) were less than the lower control unit established by EPA for this sample. System Chemistry will investigate possible sources of error within the gamma spectrometer efficiency curves and the calculations used to convert K-40 measurements into Total Potassium results. The results of these investigations will be included in the next monthly report.

It should be noted that the mean result submitted by 63 laboratories whose results were included in the Grand Average was 1.5 standard deviations below the value used by the EPA as the "known value" for Total Potassium for this cross-check sample. Of the results classified as outside the control limits by EPA, 17 were outside of the lower control limit set by the EPA while only 3 results were outside of the higher control limit. The submitted results were drastically shifted below the EPA established "known value". A request will be made to EPA to recheck the published "known value" for Total Potassium of this sample. Results of this inquiry will be included in the next monthly report after receipt of a reply from the EPA.

The U.S. EPA was contacted and confirmed that the "known value" for Total Potassium was correct. An independent experiment was developed to measure Total Potassium using a known mass on Potassium Nitrate dissolved in 3.5L of water. The experimented value was calculated to be 0.993 of the theoretical value.

APPENDIX D
SYNOPSES OF ANALYTICAL PROCEDURES

D-1.0 ANALYSIS OF SAMPLES FOR GROSS BETA ACTIVITY

D-1.1 Air Particulates

After allowing for the radon-222 and radon-220 daughter products to decay, the particulate filters were counted in a gas-flow proportional counter.

D-1.2 Water

A known volume of water, usually 200 milliliters, was reduced by evaporation, transferred to a two inch diameter planchet, and evaporated to dryness. The planchet was counted for 100 minutes in an automatic alpha-beta counter.

D-2.0 ANALYSIS OF WATER SAMPLES FOR TRITIUM

A known volume of water, 5 milliliters, was added to 15 milliliters of liquid scintillation solution in a 25 milliliter vial. The sample was counted for 500 minutes in a liquid scintillation counter.

D-3.0 ANALYSIS OF SAMPLES FOR IODINE-131

D-3.1 Milk and Water

Up to four liters of sample were mixed with a stable iodine carrier solution and eluded through an anion exchange resin column to remove iodine from the sample. The iodine was stripped from the resin with sodium hypochlorite solution, reduced with hydroxylamine hydrochloride, and extracted into carbon tetrachloride as free iodine. It was back-extracted as iodide into sodium bisulfite solution and precipitated as palladium iodide. The precipitate, palladium iodide, was weighed for chemical yield and mounted on a nylon planchet level beta analysis. The chemical yield was corrected by measuring the stable iodide content of the milk or water with a specific ion electrode.

D-3.2 Broad Leaf Vegetation

Iodine analysis was performed using gamma spectroscopy. The time between sample receipt and analysis, the sample size and count times were adjusted in order to attain the required lower limit of detection. Refer to Section E-4.2 for a description of gamma spectroscopy procedure.

D-4.0 GAMMA SPECTROSCOPY ANALYSIS

Air particulate filters and iodine cartridges, water, milk, broadleaf vegetation, sediment, food products and fish samples are analyzed by gamma spectroscopy. Initially, the samples are prepared in containers, using the appropriate geometry for its sample type. Secondly, the sample is counted in a shielded high purity germanium (HPGE) or germanium lithium (GeLi) detector coupled to a computer based data acquisition system that performs pulse height analysis.

The computer software program defines peaks by changes in the slope of the spectrum. Additionally, after comparing each specific peak energy with a library of peaks for isotopic identification the program performs the radioactivity calculation using the appropriate fractional gamma ray abundance, half life, detector efficiency and net counts in the peak region.

D-5.0 ENVIRONMENTAL DOSIMETRY

Thermoluminescent Dosimeters (TLDs) manufactured by Panasonic (model UD-814AQ) were used for environmental dosimetry. Although the Panasonic TLDs contain one lithium borate and three calcium sulfate phosphor elements, only the calcium sulfate phosphor elements were used. For placement in field, two annealed dosimeters are placed inside a plastic bag and mounted in an aluminum frame. The dosimeters are checked monthly and exchanged for analysis each quarter using an automatic TLD reader manufactured by Panasonic (Model UD-710).