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PR

April 21, 1993

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 1992 annual report on radiological environmental monitoring which covers the period of January 1 through December 31, 1992. This report is submitted per Section 6.9.1.7 in the Waterford 3 Technical Specification (NUREG-1117).

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

Very truly yours,

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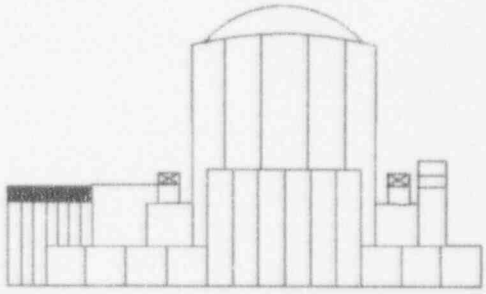

WATERFORD SES - UNIT3

LEADING THE WAY TO EXCELLENCE

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT 1992

Entergy Operations, Inc.

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

FOR WATERFORD 3 STEAM ELECTRIC STATION

JANUARY 1 THROUGH DECEMBER 31, 1992

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 1992, 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 1992.

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1.0 INTRODUCTION

This report describes the Radiological Environmental Monitoring Program (REMP) for the Waterford 3 Steam Electric Station and discusses the results obtained during the calendar year 1992. 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 Allemands, 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 (1978-1982) and was initiated in April of 1983. Equipment, procedures, techniques, and sampling locations used during the pre-operational survey were incorporated into the operational program. Further, the environmental data collected during the first two years of the REMP (1983 and 1984), prior to initial criticality, were used to supplement the baseline established during the PERS Program.

2.2 Responsibilities

Waterford 3 personnel are responsible for implementing and 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, Entergy Services, Inc. (ESI) System Chemistry 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 are illustrated in Figures 2.1 through 2.3. Any stations deviations (i.e., unavailable samples and missed lower limits of detection) or changes made to the REMP during 1992 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 1992 (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 ESI System Chemistry 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 1992, the ESI System Chemistry Laboratory performed between 5% and 10% of all analyses for quality assurance purposes. Spiked and blank samples were prepared in-house. In addition, the laboratory 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 ESI System Chemistry 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 1992 results of the laboratory's participation in the cross-check program.

TABLE 2.1
RADIOLOGICAL ENVIRONEMNTAL 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
Radioiodine and Particulates	APP-1, APQ-1, APG-1, APC-1, APE-30	Gross beta, I-131 gamma isotopic	Weekly Qrtly composite
Drinking Water[b]	DWG-2, DWE-5, DWP-7	H-3 Gross beta, gamma isotopic, I-131	Qrtly composite Monthly composite Bi-wkly composite
Surface Water[b]	SWG-2, SWE-5, SWP-7	H-3 gamma isotopic	Qrtly composite Monthly composite
Ground Water	GWK-1	gamma isotopic, H-3	Qrtly
Shoreline Sediment	SHWE-3, SHWK-1	gamma isotopic	Semi-annually
Milk	MKE-4, MKQ-5, MKQ-1, MKQ-45	gamma isotopic, I-131	Semi-mntly/mntly
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 0.6 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) at LP&L General Office on Delaronde St. in Algiers. TLD's are in the courtyard at the south entrance to the building.	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	WNW
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 92 which is at the Waterford 3 Training Center. The canal is northwest of the shell access road/railroad track intersection.	0.5	SSW
INGESTION			
MILK			
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 plani 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

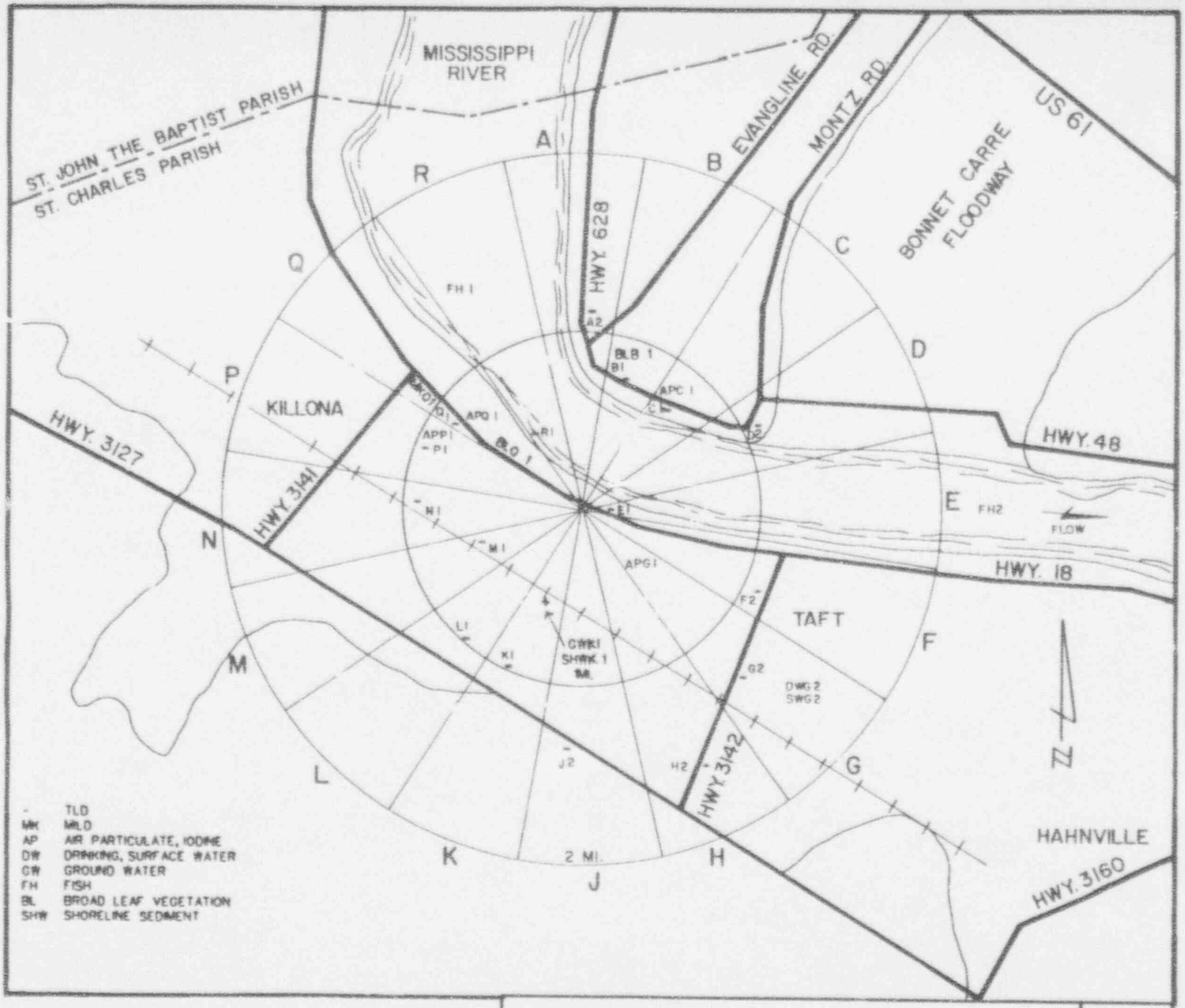
DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

LOWER LIMIT OF DETECTION (LLD) [a]

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GAS (pCi/m^3)	FISH (pCi/kg-wet)	MILK (pCi/l)	FOOD PRODUCTS[b] (pCi/kg-wet)	SEDIMENT (pCi/kg-dry)
gross beta	4	0.01				
H-3	2000					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 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		

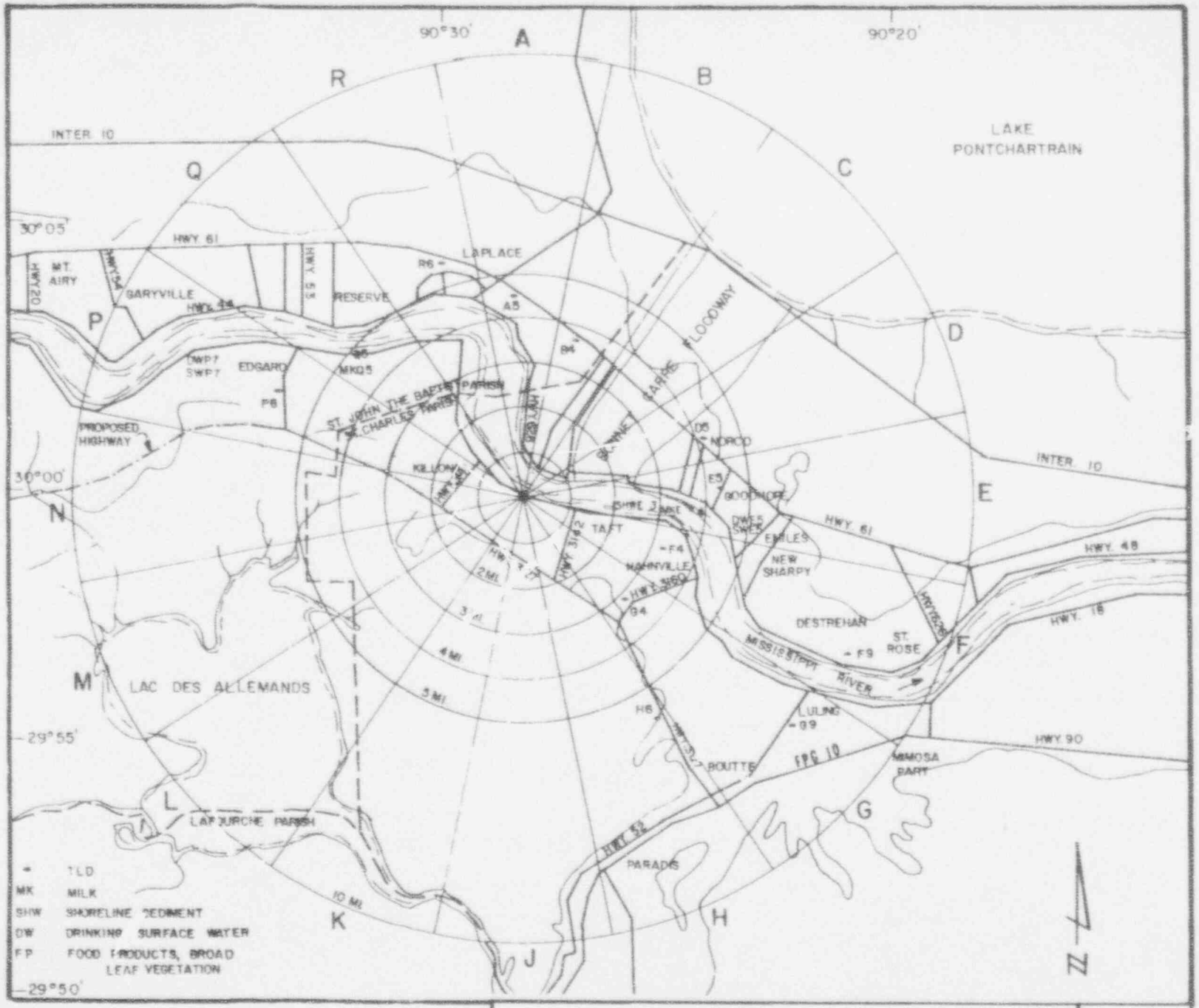
a. From Table 5.8-3 of Waterford 3 SES Offsite Dose Calculation Manual.

b. Applicable to broad leaf vegetation.



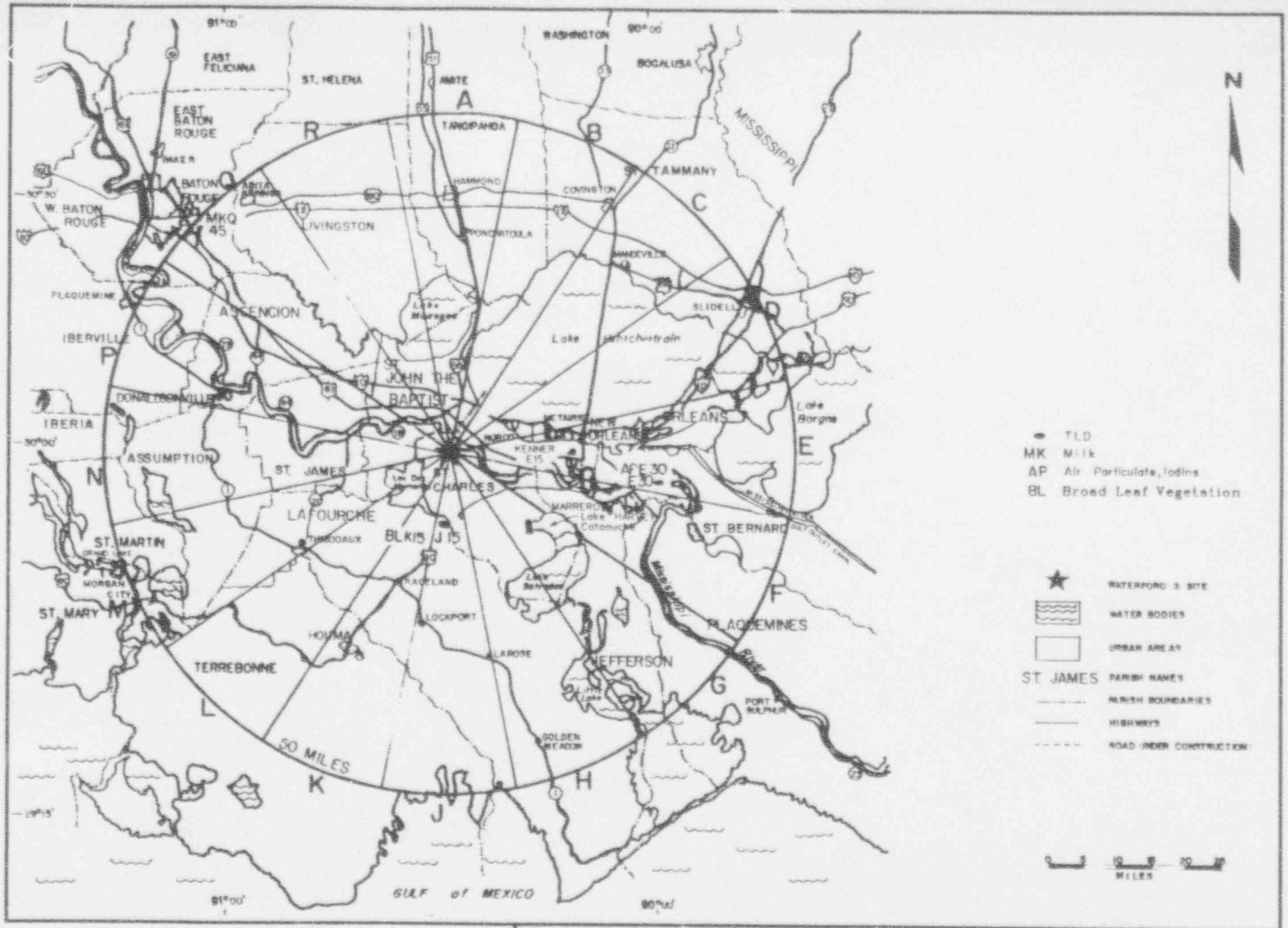
REMP SAMPLE LOCATIONS WITHIN 2 MILES OF WATERFORD 3

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 1992 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 11, 12, 12, and 12 mrem/standard quarter for the first, second, third, and fourth quarters of 1992 respectively. The average exposure rate of the 119 indicator TLD locations was 12 mrem/standard quarter compared to 11 mrem/standard quarter average exposure rate at the control location. The lowest and highest individual exposure rates were 7 mrem/standard quarter (C-1 and D-2, 1st quarter) and 17 mrem/standard quarter (K-6, 4th quarter), respectively, for all locations. Table 3 1 compares the indicator TLD results by directional sector and distance from the facility. A comparison of directional sectors indicates the highest average exposure rate in 1992 to be 14 mrem/standard quarter in Sectors A and Q.

The average exposure rates during 1992 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 with an average of 20 mrem/standard quarter. Similarly, the range indicated during the previous five years of operation was from 7 to 24 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 0.006 pCi/m^3 (APE-30, 8/18-8/25 and 9/22-9/29 and APP-1) to 0.039 pCi/m^3 (APC-1, 12/31-1/7) with an average of 0.018 pCi/m^3 for 259 measurements from all five locations. The average gross beta activity for the indicator (APG-1, APQ-1, APP-1, APC-1) locations was 0.018 pCi/m^3 compared to 0.019 pCi/m^3 at the control (APE-30) location.

The gross beta activity results obtained during 1992 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 0.007 and 0.48 pCi/m^3 with an average of .08 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 (0.010 to 0.043 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-seven composite drinking/surface water samples were analyzed by a radiochemical procedure for iodine-131 (Table B-4). Iodine was detected in three indicator samples (DWG-2, 7/14-7/28 and DWE-5, 1/14-1/28 and 7/14-7/28) and in one control sample (DWP-7, 7/14-7/28) at an average concentration of 0.3 pCi/l. Iodine-131 was detected in several preoperational samples at an average concentration of 0.4 pCi/l. The levels detected in the 1992 samples were well below reporting levels and the LLD required by the Waterford 3 ODCM and has a high degree of uncertainty associated with it. Therefore, the radiological impact to the environment, in this instance, is insignificant.

Gross beta activity was detected in thirty-one of the thirty-nine composites with a range of 1.3 (DWE-5, 1/28-2/11) to 8.5 (DWE-5, 6/2-6/30) pCi/l and an average activity of 3.9 pCi/l. The average activity for the control location, DWP-7, was 3.4 pCi/l compared to the averages of 4.8 and 3.4 pCi/l for indicator stations DWG-2 and DWE-5 respectively.

Analyses for gross beta in drinking/surface water were not performed during the pre-operational survey. However, in order to fulfill comparison requirements, 1992 data will be compared to data from the 1983 report and the previous five years of operation.

The gross beta activity results obtained during 1992 are consistent with those from the 1983 reporting period 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 45 pCi/l with an average activity of 4.8 pCi/l.

Tritium analysis of drinking/surface water samples indicate that all of the twelve measurements were below the calculated LLD.

3.3.2 Groundwater

Four groundwater samples were collected from one sampling location, GWK-1, and analyzed for tritium and gamma emitters. Results from these analyses indicate that no activity was detected above the calculated LLD for tritium or gamma emitters.

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-3 at concentrations of 43, 36, and 18 pCi/kg(dry). No other man-made radionuclides were detected in any of the samples.

The cesium-137 results obtained during 1992 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 9 of 14 soil samples at concentrations ranging between 30 and 890 pCi/kg(dry) with an average concentration of 164 pCi/kg (dry). Similarly, the range indicated during the previous five years of operation was from 21 to 142 pCi/kg (dry) with an average activity of 50 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. 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.

3.4.2 Fish

Eighteen fish samples, nine upstream and nine 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

Two food products samples were collected and analyzed by a radiochemical procedure for iodine-131. Results indicated iodine-131 concentrations to be below the calculated 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)

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

(F-2)

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

where:

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)

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

where:

t = calculated "t" value,
x = mean of first data set,
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)

$$t = \frac{\overline{d}\,(n)^{0.5}}{s_d}$$

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 at indicator station DWG-2 to be statistically higher and indicator station DWE-5 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. One TLD was discovered missing from location F-2 during dosimeter change-out at the end of the third quarter. Consequently, the missing TLD was replaced and the deviation recorded.

One air particulate filter from a control location (APE-30) was lost in transit from the sample site to the plant. The deviation was recorded and a new method of transit has been implemented to reduce the possibility of recurrence.

A blown fuse in a water sample pump resulted in one missed drinking/surface water sample from an indicator location (DWG-2). The deviation was recorded, the fuse replaced, and the sampler calibration tested.

Additionally, six drinking/surface water samples failed to meet the requirement for sample continuity. Two sample pump malfunctions, one clogged tubing, one disconnected tubing, one blown fuse, and one power failure at the sample site accounted for the lack of continuity in the samples. Sample volumes in all instances were sufficient to complete analysis.

Milk samples were not available during 1992 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.

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 1992.

3.7 Annual Land Use Census

In compliance with Waterford 3 ODCM, the annual land use census was conducted on August 18, 20, and 21, 1992. 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 locations remained unchanged from the 1991 census, minor changes in garden locations were observed as recorded on Table 3.6. Additionally, large tracts of sugar cane are still being cultivated near the plant and remain classified as food products.

No new milking animals were identified as a result of this census. However, all goats located during the 1991 census have been sold and removed from the 5-mile radius surrounding the plant. This information was ascertained by verbal inquiry with the former owners of the animals. Additionally, the owner of the milk cows in Sector G was questioned about the status of his animals. He stated that the animals are not currently providing milk for human consumption but he would agree to provide milk samples for Waterford 3 in the event of an emergency.

TABLE 3.1

1992 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	0.83	8
B	NNE	13	0.83	8
C	NE	8	0.83	4
D	ENE	11	1.09	8
E*	E	12	1.12	12
F	ESE	13	1.48	11
G	SE	13	1.09	12
H	SSE	13	0.83	8
J	S	13	0.87	8
K	SSW	11	0.43	4
L	SW	12	0.71	4
M	WSW	12	0.50	4
N	W	13	0.71	4
P	WNW	12	0.43	8
Q	NW	14	1.30	8
R	NNW	13	1.41	8
CONTROL	E	11	1.48	4

BY DISTANCE FROM PLANT

DISTANCE FROM PLANT (MILES)	AVERAGE DOSE RATE (mrem/std qtr)	STANDARD DEVIATION (mrem/std qtr)	NUMBER IN GROUP
0 - 2	12	1.93	63
2 - 5	13	1.64	27
5(a)	13	1.75	27
CONTROL	11	1.48	4

* Does not include control station data.

TABLE 3.2

STATISTICAL COMPARISON OF 1992 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.)	11.94(12)	12.96(13)	12.86(13)
Standard Deviation (mrem/std. qtr.)	1.93	1.64	1.75
Number in Sample	63	28	28
Calculated "t" Value to Comparisons with Stations Located more than 5 miles from the Plant	2.16	0.24	NA*
Tabular "t" Value at 95% Confidence ($t_{0.025,n}$)	1.986(a)	2.006(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.

*Not Applicable

TABLE 3.3

STATISTICAL COMPARISONS OF GROSS BETA ACTIVITY
ON AIR PARTICULATE FILTERS FOR 1992

SAMPLE STATION	APC-1	APG-1	APP-1	APQ-1	APE-30
Mean (10^{-3}pCi/m^3)	19.4	17.4	17.9	18.1	18.5
Standard Deviation (10^{-3}pCi/m^3)	6.25	6.59	6.36	5.94	6.02
Number in Sample	52	52	52	52	51
Calculated "t" Value Comparing Control Station (APE-30) to Indicator Station	0.76	0.91	0.48	0.40	NA*
Tabular "t" Value at 95% Confidence ($t_{0.025,n}$)	1.986	1.986	1.986	1.986	NA*

* Not Applicable

TABLE 3.4

STATISTICAL COMPARISON OF GROSS BETA ACTIVITY
IN MONTHLY DRINKING WATER COMPOSITES FOR 1992

SAMPLE STATION	DWG-2	DWE-5	DWP-7
Mean (pCi/l)	4.8	3.4	3.4
Standard Deviation (pCi/l)	1.6	2.1	1.2
Number in Sample	11	10	10
Calculated "t" Value Comparing Control Station (DWP-7) to Indicator Station	2.36	0.01	NA*
Tabular "t" Value at 95% Confidence ($t_{0.025,n}$)	2.093	2.101	NA*

* Not Applicable

TABLE 3.5

SUMMARY OF 1992 REMP DEVIATIONS

SAMPLE TYPE	ANALYSIS	LOCATION	DATE	EXPLANATION OF DEVIATION
MISSED SAMPLES				
1. Direct Radiation	N/A*	F-2	Third Quarter	TLD Missing
2. Air	Gross Beta	APE-30	02/25/92-03/04/92	Sample lost in transit from sample site to plant
3. Water	I-131	DWG-2	12/31/91-01/14/92	Blown fuse in sampler.
LACK OF SAMPLE CONTINUITY				
1. Water	N/A*	DWG-2	12/31/91-01/14/92	Clogged tubing.
2. Water	N/A*	DWG-5	01/21/92-01/28/92	Blown fuse in sampler.
3. Water	N/A*	DWG-2	06/02/92-06/09/92	Sample pump malfunction.
4. Water	N/A*	DWG-2	09/08/92-09/15/92	Tubing found disconnected.
5. Water	N/A*	DWG-2	11/02/92-11/10/92	Power failure at sample site.
6. Water	N/A*	DWG-5	12/22/92-12/29/92	Sample pump malfunction.
MISSED LLDs				
NONE	N/A*	N/A*	N/A*	N/A*

*Not Applicable.

TABLE 3.6

1992 ANNUAL LAND USE CENSUS RESULTS

SECTOR	DIRECTION	DISTANCE FROM PLANT IN MILES					
		BEEF COW	MILK COW	MILK GOAT	GARDEN	FOOD 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	-	-	-	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	4.6[c]	-	2.3	4.0	0.3
H	SSE	-	-	-	-	-	0.3
J	S	-	-	-	-	-	0.5
K	SSW	-	-	-	-	-	0.5
L	SW	-	-	-	-	-	0.5
M	WSW	1.0	-	-	1.4	-	0.5
N	W	-	-	-	1.2	1.0	0.6
P	WNW	0.9	-	-	0.9	0.9	0.6
Q	NW	0.9	4.9[a,b]	-	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 Cows located in Sector G 4.6 miles from the plant 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 1992 are consistent with the data obtained during the previous five years of plant operation (1987-91), 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 1992 were cesium-137, and iodine-131.

Cesium-137 was detected in three 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.

In conclusion, based on the evaluation of the REMP data collected during 1992 the operation of Waterford 3 had no discernable radiological impact on the environment.

FIGURE 3.1

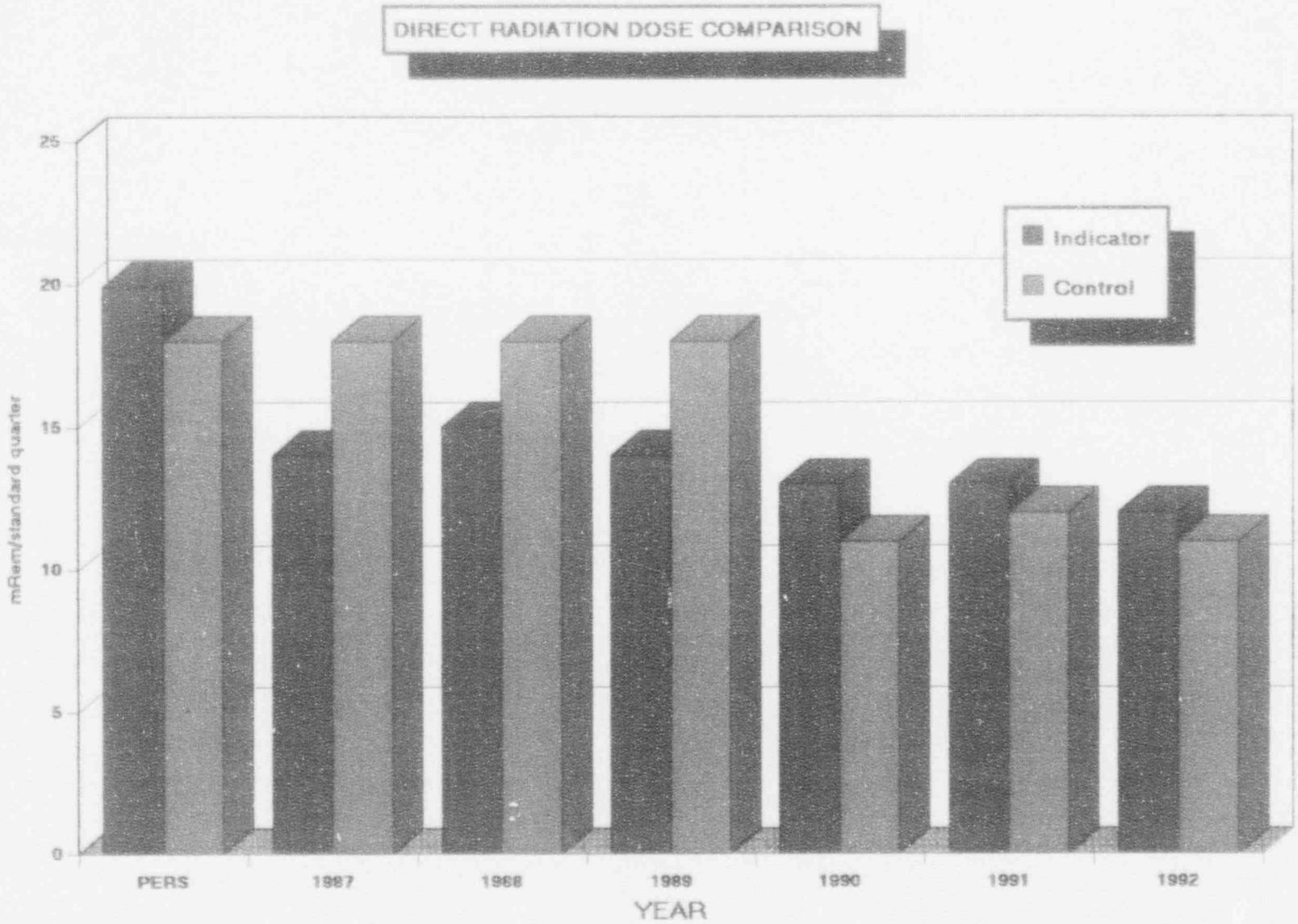

DIRECT RADIATION DOSE COMPARISON
Indicator
Control
mRem/standard quarter
25
20
15
10
5
0
PERS
1987
1988
1989
1990
1991
1992
YEAR

FIGURE 3 2

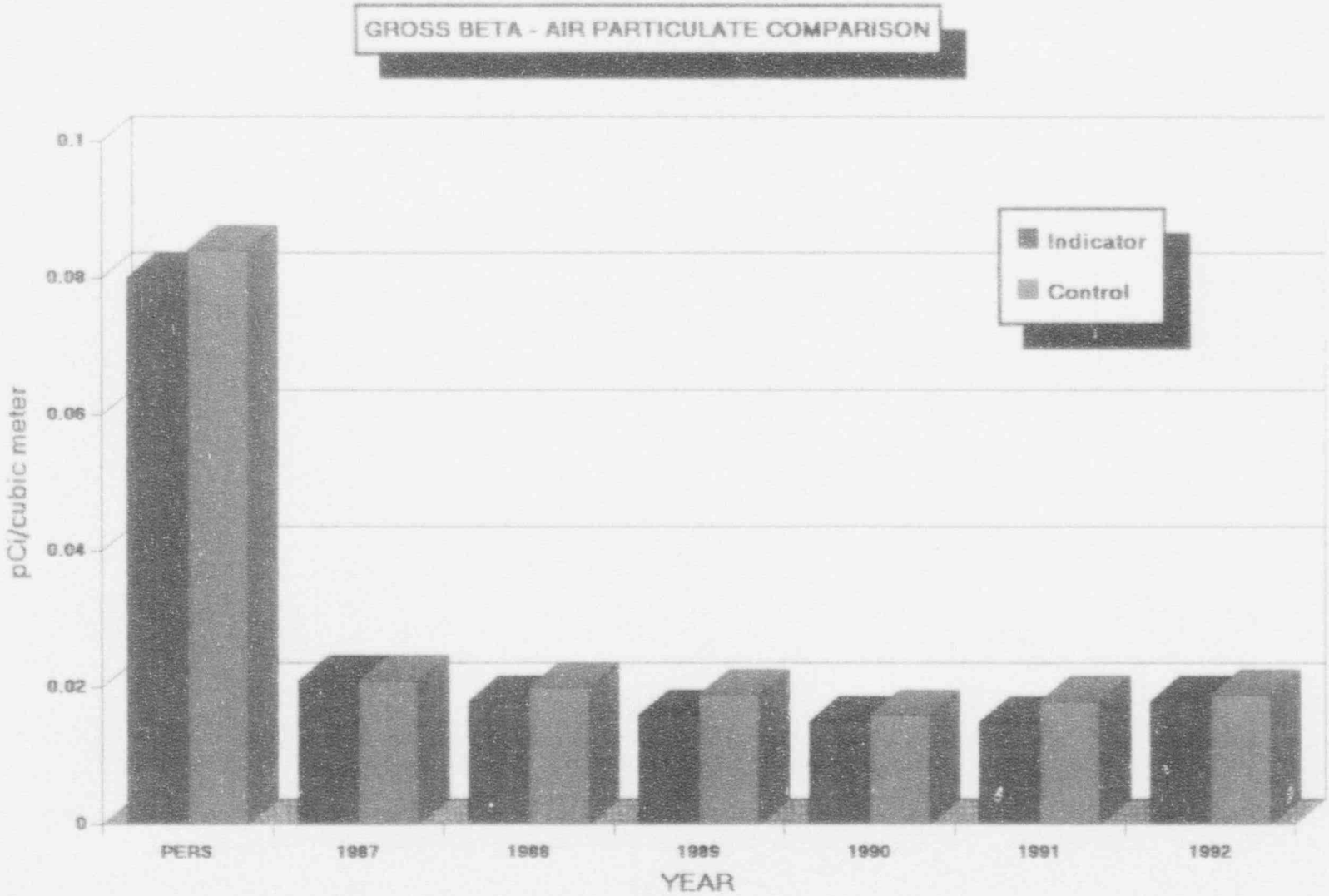
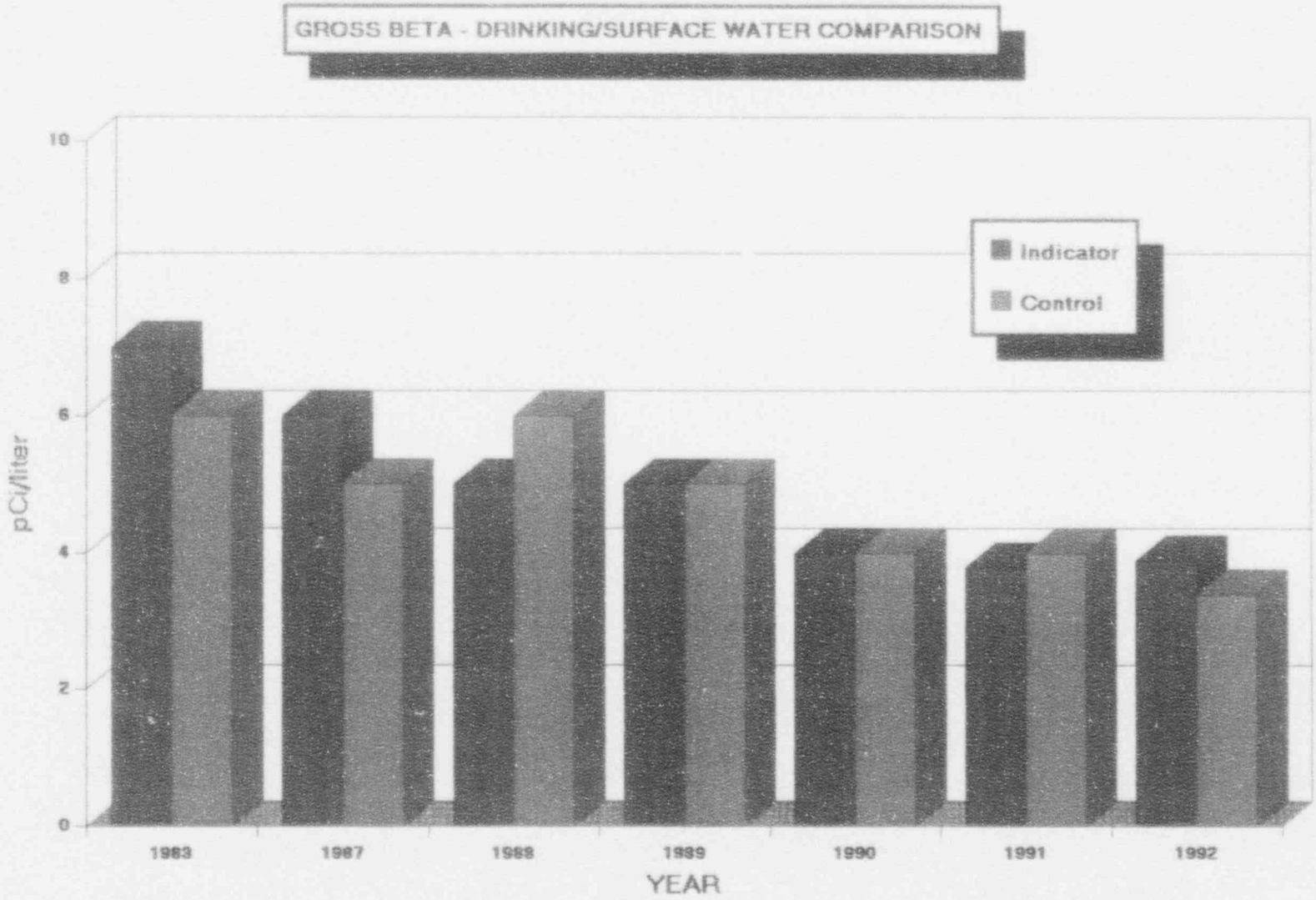

GROSS BETA - AIR PARTICULATE COMPARISON
Indicator
Control
pCi/cubic meter
0.1
0.08
0.06
0.04
0.02
0
PERS
1987
1988
1989
1990
1991
1992
YEAR

FIGURE 3.3


GROSS BETA - DRINKING/SURFACE WATER COMPARISON
Indicator
Control
pCi/liter
10
8
6
4
2
0
1983
1987
1988
1989
1990
1991
1992
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, 1992

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES		LOWER LIMIT OF DETECTION* PERFORMED	ALL INDICATOR LOCATIONS MEAN[b] (RANGE)[b] (LLD)	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN[b] (RANGE)[b]	CONTROL LOCATION MEAN[b] (RANGE)[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
1. Direct Radiation (mrem/Std. Qtr.)	TLD	123	(c)	12(119/119) (7-17)	R-6 5.3 miles NNW	15(4/4) (11-17)	E-30 12(4/4) (11-13)	0
2. Airborne Particulates (10^{-3}pCi/m^3)	Gross Beta	259	10	18(208/208) (6-39)	APG-1 0.5 miles SE	19(52/52) (9-36)	APE-30 19(51/51) (9-36)	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	259	70	<LLD (0/208) (-)	NA	NA	APE-30 <LLD (0/52) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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

Location of Facility St. Charles, Louisiana (Parish, State) Reporting Period January 1 to December 31, 1992

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES	LOWER LIMIT OF DETECTION[a] PERFORMED	ALL INDICATOR LOCATIONS MEAN[b] (RANGE)[b] (LLD)	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/Surface Water (pCi/l)	Gross Beta 39	4	3.9(21/26) (1.3-8.5)	DWG-2 2.0 miles ESE (1.9-4.7)	4.8(11/13) (2.8-8.0)	DWP-7 3.9(10/13)	0
	I-131 78	1	0.3 (3/52) (0.2-0.3)	DWG-2 2.0 miles ESE	0.3(1/25) (-)	DWP-7 0.3(1/26) (-)	0
	Gamma 39	(d)	<LLD (0/26) (-)	NA	NA	DWP-7 <LLD (0/13) (-)	0
	Tritium 12	2000	<LLD (0/8) (-)	NA	NA	DWP-7 <LLD (0/4) (-)	0

NOTE: Footnotes at end of table.

TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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

Location of Facility St. Charles, Louisiana (Parish, State) Reporting Period January 1 to December 31, 1992

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES	LOWER LIMIT OF DETECTION[a] PERFORMED	ALL INDICATOR LOCATIONS MEAN[b] (RANGE)[b] (LLD)	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN[b] (RANGE)[b]	CONTROL LOCATION MEAN[b] (RANGE)[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
5. Groundwater (pCi/l)	Gamma 4	(d)	<LLD(0/4) (-)	NA	NA	NONE	0
	Tritium 4	2000	<LLD(0/4) (-)	NA	NA	NONE	0
6. Shoreline Sediment (pCi/kg-dry)	Gamma 4 Cs-137	180	32(3/4) (18-36)	SHWK-1 1.0 miles S	43(2/2) (36-43)	NONE	0

NOTE: Footnotes at end of table.

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, 1992

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

NOTE: Footnotes at end of table.

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, 1992

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES		LOWER LIMIT OF DETECTION[a] PERFORMED	ALL INDICATOR LOCATIONS MEAN[b] (RANGE)[b] (LLD)	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN[b] (RANGE)[b]	CONTROL LOCATION MEAN[b] (RANGE)[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
9. 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
10. Food/Garden Crop (pCi/kg-wet)	Gamma	4	(d)	<LLD (0/2) (-)	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 DOSE RATE (mrem/std qtr)	2ND QUARTER DOSE RATE (mrem/std qtr)	3RD QUARTER DOSE RATE (mrem/std qtr)	4TH QUARTER DOSE RATE (mrem std qtr)	AVERAGE DOSE RATE\ (mrem/std qtr)
A-2	13	15	15	15	15
A-5	13	13	15	15	14
B-1	12	12	13	13	13
B-4	13	12	13	14	13
C-1	07	09	08	09	08
D-2	07	11	10	10	10
D-5	11	12	12	13	12
E-1	10	11	11	12	11
E-5	10	11	11	13	11
E-15	10	12	13	14	12
E-30	09	11	13	12	11
F-2	11	11	N/A*	13	12
F-4	12	15	15	16	15
F-9	11	13	13	13	13
G-2	15	15	15	15	15
G-4	11	11	11	12	11
G-9	09	12	12	13	12
H-2	13	13	13	15	14
H-6	12	11	11	12	12
J-2	12	12	12	13	12
J-15	12	13	13	15	13
K-1	11	11	11	12	11
L-1	12	12	11	13	12
M-1	11	12	11	12	12
N-1	13	12	13	14	13
P-1	10	10	10	11	10
P-6	14	14	14	15	14
Q-1	12	12	15	13	13
Q-5	13	14	15	16	15
R-1	11	10	11	12	11
R-6	11	16	15	17	15
Average	11	12	12	12	

* - TLD missing, 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
920072	12/31/91	01/07/92	0.039 +/-0.003	< 0.020
920124	01/07/92	01/14/92	0.022 +/-0.002	< 0.015
920189	01/14/92	01/21/92	0.018 +/-0.002	< 0.018
920220	01/21/92	01/28/92	0.020 +/-0.002	< 0.015
920269	01/28/92	02/04/92	0.017 +/-0.002	< 0.028
920299	02/04/92	02/11/92	0.020 +/-0.003	< 0.020
920339	02/11/92	02/18/92	0.013 +/-0.003	< 0.019
920380	02/18/92	02/25/92	0.017 +/-0.002	< 0.017
920413	02/25/92	03/04/92	0.025 +/-0.002	< 0.010
920431	03/04/92	03/10/92	0.017 +/-0.003	< 0.015
920487	03/10/92	03/17/92	0.020 +/-0.003	< 0.043
920522	03/17/92	03/24/92	0.023 +/-0.002	< 0.011
920558	03/24/92	03/31/92	0.012 +/-0.003	< 0.032
920614	03/31/92	04/07/92	0.022 +/-0.002	< 0.023
920670	04/07/92	04/14/92	0.015 +/-0.003	< 0.021
920704	04/14/92	04/21/92	0.019 +/-0.003	< 0.016
920767	04/21/92	04/28/92	0.023 +/-0.003	< 0.015
920797	04/28/92	05/05/92	0.017 +/-0.003	< 0.030
920857	05/05/92	05/12/92	0.021 +/-0.003	< 0.012
920886	05/12/92	05/19/92	0.026 +/-0.003	< 0.012
920921	05/19/92	05/26/92	0.022 +/-0.003	< 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
920975	05/26/92	06/02/92	0.018 +/-0.003	< 0.021
921011	06/02/92	06/09/92	0.012 +/-0.003	< 0.027
921062	06/09/92	06/16/92	0.017 +/-0.003	< 0.016
921100	06/16/92	06/23/92	0.018 +/-0.003	< 0.016
921178	06/23/92	06/30/92	0.019 +/-0.003	< 0.029
921249	06/30/92	07/07/92	0.031 +/-0.003	< 0.030
921281	07/07/92	07/14/92	0.024 +/-0.003	< 0.021
921319	07/14/92	07/21/92	0.014 +/-0.003	< 0.017
921359	07/21/92	07/28/92	0.006 +/-0.002	< 0.012
921383	07/28/92	08/04/92	0.015 +/-0.003	< 0.027
921415	08/04/92	08/11/92	0.009 +/-0.002	< 0.028
921465	08/11/92	08/18/92	0.014 +/-0.002	< 0.030
921493	08/18/92	08/27/92	0.009 +/-0.002	< 0.017
921530	08/27/92	09/01/92	0.016 +/-0.003	< 0.051
921567	09/01/92	09/08/92	0.009 +/-0.002	< 0.011
921608	09/08/92	09/15/92	0.018 +/-0.002	< 0.014
921625	09/15/92	09/22/92	0.011 +/-0.002	< 0.036
921686	09/22/92	09/29/92	0.009 +/-0.002	< 0.025
921770	09/29/92	10/06/92	0.021 +/-0.002	< 0.029
921806	10/06/92	10/13/92	0.019 +/-0.002	< 0.014
921853	10/13/92	10/20/92	0.024 +/-0.002	< 0.039
921904	10/20/92	10/27/92	0.029 +/-0.003	< 0.028

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
921926	10/27/92	11/03/92	0.021 +/-0.003	< 0.041
921960	11/03/92	11/10/92	0.013 +/-0.002	< 0.015
921996	11/10/92	11/17/92	0.015 +/-0.002	< 0.012
922045	11/17/92	11/24/92	0.014 +/-0.002	< 0.020
922068	11/24/92	12/01/92	0.017 +/-0.003	< 0.021
922121	12/01/92	12/08/92	0.018 +/-0.003	< 0.029
922146	12/08/92	12/15/92	0.014 +/-0.002	< 0.021
922169	12/15/92	12/22/92	0.014 +/-0.002	< 0.019
922211	12/22/92	12/29/92	0.023 +/-0.002	< 0.020

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
920070	12/31/91	01/07/92	0.034 +/-0.003	< 0.020
920122	01/07/92	01/14/92	0.022 +/-0.002	< 0.015
920187	01/14/92	01/21/92	0.020 +/-0.002	< 0.018
920218	01/21/92	01/28/92	0.019 +/-0.002	< 0.015
920267	01/28/92	02/04/92	0.018 +/-0.002	< 0.028
920297	02/04/92	02/11/92	0.032 +/-0.003	< 0.020
920337	02/11/92	02/18/92	0.013 +/-0.003	< 0.019
920378	02/18/92	02/25/92	0.019 +/-0.002	< 0.017
920411	02/25/92	03/04/92	0.033 +/-0.003	< 0.010
920429	03/04/92	03/10/92	0.017 +/-0.003	< 0.015
920485	03/10/92	03/17/92	0.022 +/-0.003	< 0.043
920520	03/17/92	03/24/92	0.019 +/-0.002	< 0.011
920556	03/24/92	03/31/92	0.013 +/-0.003	< 0.032
920612	03/31/92	04/07/92	0.020 +/-0.002	< 0.023
920668	04/07/92	04/14/92	0.013 +/-0.002	< 0.021
920702	04/14/92	04/21/92	0.015 +/-0.003	< 0.016
920765	04/21/92	04/28/92	0.023 +/-0.003	< 0.015
920795	04/28/92	05/05/92	0.020 +/-0.003	< 0.030
920855	05/05/92	05/12/92	0.021 +/-0.003	< 0.012
920884	05/12/92	05/19/92	0.022 +/-0.003	< 0.012
920919	05/19/92	05/26/92	0.022 +/-0.003	< 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
920973	05/26/92	06/02/92	0.013 +/-0.003	< 0.021
921009	06/02/92	06/09/92	0.016 +/-0.003	< 0.027
921060	06/09/92	06/16/92	0.018 +/-0.003	< 0.016
921098	06/16/92	06/23/92	0.014 +/-0.003	< 0.016
921176	06/23/92	06/30/92	0.019 +/-0.003	< 0.029
921247	06/30/92	07/07/92	0.027 +/-0.003	< 0.030
921279	07/07/92	07/14/92	0.024 +/-0.003	< 0.021
921317	07/14/92	07/21/92	0.011 +/-0.002	< 0.017
921357	07/21/92	07/28/92	0.010 +/-0.003	< 0.012
921381	07/28/92	08/04/92	0.015 +/-0.003	< 0.027
921413	08/04/92	08/11/92	0.011 +/-0.002	< 0.028
921463	08/11/92	08/18/92	0.014 +/-0.002	< 0.030
921491	08/18/92	08/25/92	0.009 +/-0.002	< 0.017
921528	08/25/92	09/01/92	0.013 +/-0.002	< 0.051
921565	09/01/92	09/08/92	0.009 +/-0.002	< 0.011
921606	09/08/92	09/15/92	0.015 +/-0.002	< 0.014
921623	09/15/92	09/22/92	0.009 +/-0.002	< 0.036
921684	09/22/92	09/29/92	0.011 +/-0.002	< 0.025
921768	09/29/92	10/06/92	0.015 +/-0.002	< 0.029
921804	10/06/92	10/13/92	0.020 +/-0.002	< 0.014
921851	10/13/92	10/20/92	0.028 +/-0.002	< 0.039
921902	10/20/92	10/27/92	0.030 +/-0.003	< 0.028

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
921924	10/27/92	11/03/92	0.016 +/-0.003	< 0.041
921958	11/03/92	11/10/92	0.011 +/-0.002	< 0.015
921994	11/10/92	11/17/92	0.012 +/-0.003	< 0.012
922043	11/17/92	11/24/92	0.008 +/-0.002	< 0.020
922066	11/24/92	12/01/92	0.017 +/-0.003	< 0.021
922119	12/01/92	12/08/92	0.011 +/-0.002	< 0.029
922144	12/08/92	12/15/92	0.008 +/-0.002	< 0.021
922167	12/15/92	12/22/92	0.009 +/-0.002	< 0.019
922209	12/22/92	12/29/92	0.025 +/-0.003	< 0.020

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
920069	12/31/91	01/07/92	0.036 +/-0.003	< 0.020
920121	01/07/92	01/14/92	0.021 +/-0.002	< 0.015
920186	01/14/92	01/21/92	0.025 +/-0.002	< 0.018
920217	01/21/92	01/28/92	0.019 +/-0.002	< 0.015
920266	01/28/92	02/04/92	0.018 +/-0.002	< 0.028
920296	02/04/92	02/11/92	0.026 +/-0.003	< 0.020
920336	02/11/92	02/18/92	0.018 +/-0.003	< 0.019
920377	02/18/92	02/25/92	0.014 +/-0.002	< 0.017
920410	02/25/92	03/04/92	0.030 +/-0.002	< 0.010
920428	03/04/92	03/10/92	0.018 +/-0.003	< 0.015
920484	03/10/92	03/17/92	0.025 +/-0.003	< 0.043
920519	03/17/92	03/24/92	0.021 +/-0.002	< 0.011
920555	03/24/92	03/31/92	0.015 +/-0.003	< 0.032
920611	03/31/92	04/07/92	0.021 +/-0.003	< 0.023
920667	04/07/92	04/14/92	0.015 +/-0.003	< 0.021
920701	04/14/92	04/21/92	0.019 +/-0.003	< 0.016
920764	04/21/92	04/28/92	0.028 +/-0.003	< 0.015
920794	04/28/92	05/05/92	0.023 +/-0.003	< 0.030
920854	05/05/92	05/12/92	0.024 +/-0.003	< 0.012
920883	05/12/92	05/19/92	0.026 +/-0.003	< 0.012
920918	05/19/92	05/26/92	0.020 +/-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
920972	05/26/92	06/02/92	0.021 +/-0.003	< 0.021
921008	06/02/92	06/09/92	0.013 +/-0.003	< 0.027
921059	06/09/92	06/16/92	0.029 +/-0.003	< 0.016
921097	06/16/92	06/23/92	0.015 +/-0.003	< 0.016
921175	06/23/92	06/30/92	0.023 +/-0.003	< 0.029
921246	06/30/92	07/07/92	0.025 +/-0.003	< 0.030
921278	07/07/92	07/14/92	0.030 +/-0.003	< 0.021
921316	07/14/92	07/21/92	0.012 +/-0.003	< 0.017
921356	07/21/92	07/28/92	0.013 +/-0.003	< 0.012
921380	07/28/92	08/04/92	0.015 +/-0.003	< 0.027
921412	08/04/92	08/11/92	0.017 +/-0.003	< 0.028
921462	08/11/92	08/18/92	0.014 +/-0.002	< 0.030
921490	08/18/92	08/25/92	0.010 +/-0.002	< 0.017
921527	08/25/92	09/01/92	0.015 +/-0.002	< 0.051
921564	09/01/92	09/08/92	0.010 +/-0.002	< 0.011
921605	09/08/92	09/15/92	0.017 +/-0.002	< 0.014
921622	09/15/92	09/22/92	0.011 +/-0.002	< 0.036
921683	09/22/92	09/29/92	0.011 +/-0.002	< 0.025
921767	09/29/92	10/06/92	0.026 +/-0.002	< 0.029
921803	10/06/92	10/13/92	0.021 +/-0.002	< 0.014
921850	10/13/92	10/20/92	0.024 +/-0.002	< 0.039
921901	10/20/92	10/27/92	0.033 +/-0.003	< 0.028

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
921923	10/27/92	11/03/92	0.024 +/-0.003	< 0.041
921957	11/03/92	11/10/92	0.018 +/-0.002	< 0.015
921993	11/10/92	11/17/92	0.017 +/-0.003	< 0.012
922042	11/17/92	11/24/92	0.014 +/-0.002	< 0.020
922065	11/24/92	12/01/92	0.009 +/-0.002	< 0.021
922118	12/01/92	12/08/92	0.015 +/-0.002	< 0.029
922143	12/08/92	12/15/92	0.014 +/-0.002	< 0.021
922166	12/15/92	12/22/92	0.014 +/-0.002	< 0.019
922208	12/22/92	12/29/92	0.019 +/-0.002	< 0.020

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
920071	12/31/91	01/07/92	0.033 +/-0.003	< 0.020
920123	01/07/92	01/14/92	0.021 +/-0.002	< 0.015
920188	01/14/92	01/21/92	0.019 +/-0.002	< 0.018
920219	01/21/92	01/28/92	0.020 +/-0.002	< 0.015
920268	01/28/92	02/04/92	0.016 +/-0.002	< 0.028
920298	02/04/92	02/11/92	0.032 +/-0.003	< 0.020
920338	02/11/92	02/18/92	0.012 +/-0.003	< 0.019
920379	02/18/92	02/25/92	0.016 +/-0.002	< 0.017
920412	02/25/92	03/04/92	0.029 +/-0.002	< 0.010
920430	03/04/92	03/10/92	0.018 +/-0.003	< 0.015
920486	03/10/92	03/17/92	0.021 +/-0.003	< 0.043
920521	03/17/92	03/24/92	0.018 +/-0.002	< 0.011
920557	03/24/92	03/31/92	0.015 +/-0.003	< 0.032
920613	03/31/92	04/07/92	0.021 +/-0.002	< 0.023
920669	04/07/92	04/14/92	0.016 +/-0.003	< 0.021
920703	04/14/92	04/21/92	0.016 +/-0.003	< 0.016
920766	04/21/92	04/28/92	0.023 +/-0.003	< 0.015
920796	04/28/92	05/05/92	0.017 +/-0.003	< 0.030
920856	05/05/92	05/12/92	0.021 +/-0.003	< 0.012
920885	05/12/92	05/19/92	0.022 +/-0.003	< 0.012
920920	05/19/92	05/26/92	0.022 +/-0.003	< 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
920974	05/26/92	06/02/92	0.016 +/-0.003	< 0.021
921010	06/02/92	06/09/92	0.013 +/-0.003	< 0.027
921061	06/09/92	06/16/92	0.019 +/-0.003	< 0.016
921099	06/16/92	06/23/92	0.018 +/-0.003	< 0.016
921177	06/23/92	06/30/92	0.019 +/-0.003	< 0.029
921248	06/30/92	07/07/92	0.028 +/-0.003	< 0.030
921280	07/07/92	07/14/92	0.026 +/-0.003	< 0.021
921318	07/14/92	07/21/92	0.010 +/-0.002	< 0.017
921358	07/21/92	07/28/92	0.008 +/-0.003	< 0.012
921382	07/28/92	08/04/92	0.018 +/-0.003	< 0.027
921414	08/04/92	08/11/92	0.009 +/-0.002	< 0.028
921464	08/11/92	08/18/92	0.013 +/-0.002	< 0.030
921492	08/18/92	08/25/92	0.008 +/-0.002	< 0.017
921529	08/25/92	09/01/92	0.013 +/-0.002	< 0.051
921566	09/01/92	09/08/92	0.011 +/-0.002	< 0.011
921607	09/08/92	09/15/92	0.016 +/-0.002	< 0.014
921624	09/15/92	09/22/92	0.009 +/-0.002	< 0.036
921685	09/22/92	09/29/92	0.007 +/-0.002	< 0.025
921769	09/29/92	10/06/92	0.019 +/-0.002	< 0.029
921805	10/06/92	10/13/92	0.023 +/-0.002	< 0.014
921852	10/13/92	10/20/92	0.023 +/-0.002	< 0.039
921903	10/20/92	10/27/92	0.038 +/-0.003	< 0.028

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
921925	10/27/92	11/03/92	0.019 +/-0.003	< 0.041
921959	11/03/92	11/10/92	0.015 +/-0.002	< 0.015
921995	11/10/92	11/17/92	0.017 +/-0.002	< 0.012
922044	11/17/92	11/24/92	0.014 +/-0.002	< 0.020
922067	11/24/92	12/01/92	0.016 +/-0.002	< 0.021
922120	12/01/92	12/08/92	0.015 +/-0.002	< 0.029
922145	12/08/92	12/15/92	0.012 +/-0.002	< 0.021
922168	12/15/92	12/22/92	0.013 +/-0.002	< 0.019
922210	12/22/92	12/29/92	0.020 +/-0.002	< 0.020

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
920073	12/31/91	01/07/92	0.038 +/-0.003	< 0.020
920125	01/07/92	01/14/92	0.024 +/-0.003	< 0.015
920190	01/14/92	01/21/92	0.019 +/-0.002	< 0.018
920221	01/21/92	01/28/92	0.020 +/-0.002	< 0.015
920270	01/28/92	02/04/92	0.020 +/-0.003	< 0.028
920300	02/04/92	02/11/92	0.019 +/-0.003	< 0.020
920340	02/11/92	02/18/92	0.013 +/-0.003	< 0.019
920381	02/18/92	02/25/92	0.018 +/-0.002	< 0.017
920414	02/25/92	03/04/92	NO SAMPLE	< 0.010
920432	03/04/92	03/10/92	0.019 +/-0.003	< 0.015
920488	03/10/92	03/17/92	0.021 +/-0.003	< 0.043
920523	03/17/92	03/24/92	0.021 +/-0.002	< 0.011
920559	03/24/92	03/31/92	0.016 +/-0.003	< 0.032
920615	03/31/92	04/07/92	0.023 +/-0.003	< 0.023
920671	04/07/92	04/14/92	0.014 +/-0.003	< 0.021
920705	04/14/92	04/21/92	0.015 +/-0.003	< 0.016
920768	04/21/92	04/28/92	0.021 +/-0.003	< 0.015
920798	04/28/92	05/05/92	0.023 +/-0.003	< 0.030
920858	05/05/92	05/12/92	0.018 +/-0.003	< 0.012
920887	05/12/92	05/19/92	0.023 +/-0.003	< 0.012
920922	05/19/92	05/26/92	0.020 +/-0.003	< 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
920976	05/26/92	06/02/92	0.018 +/-0.003	< 0.021
921012	06/02/92	06/09/92	0.013 +/-0.003	< 0.027
921063	06/09/92	06/16/92	0.017 +/-0.003	< 0.016
921101	06/16/92	06/23/92	0.021 +/-0.003	< 0.016
921179	06/23/92	06/30/92	0.023 +/-0.003	< 0.029
921250	06/30/92	07/07/92	0.034 +/-0.003	< 0.030
921282	07/07/92	07/14/92	0.024 +/-0.003	< 0.021
921320	07/14/92	07/21/92	0.012 +/-0.002	< 0.017
921360	07/21/92	07/28/92	0.009 +/-0.003	< 0.012
921384	07/28/92	08/04/92	0.025 +/-0.003	< 0.027
921416	08/04/92	08/11/92	0.013 +/-0.002	< 0.028
921466	08/11/92	08/18/92	0.012 +/-0.002	< 0.030
921494	08/18/92	08/27/92	0.007 +/-0.002	< 0.017
921531	08/27/92	09/01/92	0.018 +/-0.003	< 0.051
921568	09/01/92	09/08/92	0.014 +/-0.002	< 0.011
921609	09/08/92	09/15/92	0.018 +/-0.002	< 0.014
921626	09/15/92	09/22/92	0.011 +/-0.002	< 0.036
921687	09/22/92	09/29/92	0.007 +/-0.002	< 0.025
921771	09/29/92	10/06/92	0.018 +/-0.002	< 0.029
921807	10/06/92	10/13/92	0.024 +/-0.002	< 0.014
921854	10/13/92	10/20/92	0.025 +/-0.002	< 0.039
921905	10/20/92	10/27/92	0.031 +/-0.003	< 0.028

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
921927	10/27/92	11/03/92	0.021 +/-0.003	< 0.041
921961	11/03/92	11/10/92	0.015 +/-0.002	< 0.015
921997	11/10/92	11/17/92	0.017 +/-0.002	< 0.012
922046	11/17/92	11/24/92	0.015 +/-0.002	< 0.020
922069	11/24/92	12/01/92	0.012 +/-0.002	< 0.021
922122	12/01/92	12/08/92	0.018 +/-0.003	< 0.029
922147	12/08/92	12/15/92	0.015 +/-0.002	< 0.021
922170	12/15/92	12/22/92	0.012 +/-0.002	< 0.019
922212	12/22/92	12/29/92	0.021 +/-0.002	< 0.020

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	920609	12/31/91	03/31/92	< 0.0014	< 0.0012
APC-1	921121	03/31/92	06/30/92	< 0.0010	< 0.0007
APC-1	921729	06/30/92	09/29/92	< 0.0019	< 0.0015
APC-1	922234	09/29/92	12/29/92	< 0.0009	< 0.0009
APE-30	920610	12/31/91	03/31/92	< 0.0014	< 0.0009
APE-30	921122	03/31/92	06/30/92	< 0.0014	< 0.0011
APE-30	921730	06/30/92	09/29/92	< 0.0008	< 0.0007
APE-30	922235	09/29/92	12/29/92	< 0.0005	< 0.0006
APG-1	920606	12/31/91	03/31/92	< 0.0019	< 0.0015
APG-1	921118	03/31/92	06/30/92	< 0.0014	< 0.0010
APG-1	921726	06/30/92	09/29/92	< 0.0017	< 0.0015
APG-1	922231	09/29/92	12/29/92	< 0.0007	< 0.0007
APP-1	920608	12/31/91	03/31/92	< 0.0015	< 0.0014
APP-1	921120	03/31/92	06/30/92	< 0.0013	< 0.0012
APP-1	921728	06/30/92	09/29/92	< 0.0012	< 0.0010
APP-1	922233	09/29/92	12/29/92	< 0.0007	< 0.0006
APQ-1	920607	12/31/91	03/31/92	< 0.0019	< 0.0014
APQ-1	921119	03/31/92	06/30/92	< 0.0010	< 0.0007
APQ-1	921727	06/30/92	09/29/92	< 0.0009	< 0.0006
APQ-1	922232	09/29/92	12/29/92	< 0.0012	< 0.0012

TABLE B-4

DRINKING/SURFACE WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: DWG/SWG-2

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
	12/31/91	01/14/92	NO SAMPLE
920224	01/14/92	01/28/92	< 0.2
920303	01/28/92	02/11/92	< 0.3
920384	02/11/92	02/25/92	< 0.3
920435	02/25/92	03/10/92	< 0.3
920526	03/10/92	03/24/92	< 0.3
920618	03/24/92	04/07/92	< 0.2
920708	04/07/92	04/21/92	< 0.2
920790	04/21/92	05/05/92	< 0.2
920890	05/05/92	05/19/92	< 0.2
920979	05/19/92	06/02/92	< 0.3
921066	06/02/92	06/16/92	< 0.2
921182	06/16/92	06/30/92	< 0.5
921285	06/30/92	07/14/92	< 0.5
921363	07/14/92	07/28/92	0.300 +/-0.2
921419	07/28/92	08/11/92	< 0.2
921497	08/11/92	08/27/92	< 0.3
921571	08/27/92	09/08/92	< 0.3
921629	09/08/92	09/22/92	< 0.2
921774	09/22/92	10/06/92	< 0.3
921857	10/06/92	10/20/92	< 0.2
921929	10/20/92	11/03/92	< 0.3
921999	11/03/92	11/17/92	< 0.2
922063	11/17/92	12/01/92	< 0.3
922149	12/01/92	12/15/92	< 0.3
922214	12/15/92	12/29/92	< 0.4

TABLE B-4 (continued)

DRINKING/SURFACE WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: DWE/SWE-5

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
920127	12/31/91	01/14/92	< 0.2
920223	01/14/92	01/28/92	0.300 +/-0.1
920302	01/28/92	02/11/92	< 0.4
920383	02/11/92	02/25/92	< 0.4
920434	02/25/92	03/10/92	< 0.2
920525	03/10/92	03/24/92	< 0.3
920617	03/24/92	04/07/92	< 0.2
920707	04/07/92	04/21/92	< 0.2
920789	04/21/92	05/05/92	< 0.2
920889	05/05/92	05/19/92	< 0.2
920978	05/19/92	06/02/92	< 0.3
921065	06/02/92	06/16/92	< 0.3
921181	06/16/92	06/30/92	< 0.3
921284	06/30/92	07/14/92	< 0.4
921362	07/14/92	07/28/92	0.200 +/-0.2
921418	07/28/92	08/11/92	< 0.2
921496	08/11/92	08/27/92	< 0.3
921570	08/27/92	09/08/92	< 0.3
921628	09/08/92	09/22/92	< 0.2
921773	09/22/92	10/06/92	< 0.4
921856	10/06/92	10/20/92	< 0.2
921930	10/20/92	11/03/92	< 0.3
922000	11/03/92	11/17/92	< 0.2
922064	11/17/92	12/01/92	< 0.3
922130	12/01/92	12/15/92	< 0.2
922215	12/15/92	12/29/92	< 0.3

TABLE B-4 (continued)

DRINKING/SURFACE WATER
IODINE-131 ANALYSIS

SAMPLE LOCATION: DWP/SWP-7

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	I-131*
920126	12/31/91	01/14/92	< 0.2
920222	01/14/92	01/28/92	< 0.2
920301	01/28/92	02/11/92	< 0.4
920382	02/11/92	02/25/92	< 0.3
920433	02/25/92	03/10/92	< 0.2
920524	03/10/92	03/24/92	< 0.3
920616	03/24/92	04/07/92	< 0.2
920706	04/07/92	04/21/92	< 0.2
920788	04/21/92	05/05/92	< 0.2
920888	05/05/92	05/19/92	< 0.2
920977	05/19/92	06/02/92	< 0.3
921064	06/02/92	06/16/92	< 0.3
921180	06/16/92	06/30/92	< 0.3
921283	06/30/92	07/14/92	< 0.5
921361	07/14/92	07/28/92	0.300 +/-0.2
921417	07/28/92	08/11/92	< 0.2
921495	08/11/92	08/27/92	< 0.2
921569	08/27/92	09/08/92	< 0.3
921627	09/08/92	09/22/92	< 0.2
921772	09/22/92	10/06/92	< 0.3
921855	10/06/92	10/20/92	< 0.2
921928	10/20/92	11/03/92	< 0.3
921998	11/03/92	11/17/92	< 0.2
922062	11/17/92	12/01/92	< 0.3
922148	12/01/92	12/15/92	< 0.2
922213	12/15/92	12/29/92	< 0.4

TABLE B-5

DRINKING/SURFACE WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWG/SWG-2

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Beta
920227	01/14/92	01/28/92	2.9 +/-1.0
920306	01/28/92	02/11/92	4.9 +/-1.0
920438	02/11/92	03/10/92	2.8 +/-0.9
920621	03/10/92	04/07/92	< 3.7
920793	04/07/92	05/05/92	< 3.7
920982	05/05/92	06/02/92	4.1 +/-1.5
921185	06/02/92	06/30/92	5.2 +/-1.5
921366	06/30/92	07/28/92	4.8 +/-2.5
921500	07/28/92	08/27/92	6.7 +/-2.8
921632	08/27/92	09/22/92	4.8 +/-1.9
921860	09/22/92	10/20/92	6.1 +/-1.8
922002	10/20/92	11/17/92	3.0 +/-1.3
922152	11/17/92	12/15/92	8.0 +/-1.5

TABLE B-5 (continued)

DRINKING/SURFACE WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWE/SWE-5

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Beta
920226	12/31/91	01/28/92	1.6 +/-0.9
920305	01/28/92	02/11/92	1.3 +/-0.8
920437	02/11/92	03/10/92	2.8 +/-0.9
920620	03/10/92	04/07/92	< 3.5
920792	04/07/92	05/05/92	2.8 +/-2.3
920981	05/05/92	06/02/92	4.8 +/-1.8
921184	06/02/92	06/30/92	8.5 +/-2.0
921365	06/30/92	07/28/92	< 3.2
921499	07/28/92	08/27/92	5.1 +/-2.4
921631	08/27/92	09/22/92	2.5 +/-1.5
921859	09/22/92	10/20/92	2.3 +/-1.3
922003	10/20/92	11/17/92	2.5 +/-1.3
922153	11/17/92	12/15/92	< 2.3

TABLE B-5 (continued)

DRINKING/SURFACE WATER
GROSS BETA ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWP/SWP-7

UNITS: pCi/LITER

Lab. No.	Begin Date	End Date	Beta
920225	12/31/91	01/28/92	2.0 +/-0.9
920304	01/28/92	02/11/92	1.9 +/-0.8
920436	02/11/92	03/10/92	2.8 +/-0.9
920619	03/10/92	04/07/92	< 3.5
920791	04/07/92	05/05/92	< 3.5
920980	05/05/92	06/02/92	2.0 +/-1.3
921183	06/02/92	06/30/92	4.6 +/-1.6
921364	06/30/92	07/28/92	< 3.2
921498	07/28/92	08/27/92	5.3 +/-2.4
921630	08/27/92	09/22/92	3.7 +/-1.6
921858	09/22/92	10/20/92	4.0 +/-1.5
922001	10/20/92	11/17/92	3.3 +/-1.4
922151	11/17/92	12/15/92	4.7 +/-1.5

TABLE B-5 (continued)

DRINKING/SURFACE WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWG/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
920227	01/14/92	01/28/92	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 7	< 2
920306	01/28/92	02/11/92	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 8	< 3
920438	02/11/92	03/10/92	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 3	< 2	< 2	< 10	< 3
920621	03/10/92	04/07/92	< 2	< 2	< 3	< 3	< 5	< 2	< 5	< 4	< 2	< 2	< 11	< 4
920793	04/07/92	05/05/92	< 2	< 2	< 6	< 3	< 12	< 3	< 5	< 4	< 3	< 2	< 11	< 4
920982	05/05/92	06/02/92	< 2	< 3	< 4	< 3	< 5	< 3	< 6	< 5	< 3	< 3	< 14	< 4
921185	06/02/92	06/30/92	< 5	< 5	< 7	< 5	< 10	< 6	< 13	< 10	< 5	< 6	< 26	< 8
921366	06/30/92	07/28/92	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 8	< 3
921500	07/28/92	08/27/92	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 8	< 2
921632	08/27/92	09/22/92	< 2	< 2	< 2	< 2	< 3	< 2	< 4	< 2	< 2	< 2	< 7	< 3
921860	09/22/92	10/20/92	< 4	< 4	< 5	< 4	< 8	< 4	< 9	< 5	< 4	< 4	< 16	< 5
922002	10/20/92	11/17/92	< 2	< 2	< 4	< 2	< 6	< 2	< 4	< 2	< 2	< 2	< 8	< 3
922152	11/17/92	12/15/92	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 9	< 3

TABLE B-5 (continued)

DRINKING/SURFACE WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWE/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
920226	12/31/91	01/28/92	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 6	< 2
920305	01/28/92	02/11/92	< 3	< 3	< 4	< 3	< 6	< 3	< 6	< 4	< 3	< 3	< 13	< 4
920437	02/11/92	03/10/92	< 2	< 2	< 3	< 3	< 4	< 2	< 4	< 2	< 2	< 2	< 8	< 3
920620	03/10/92	04/07/92	< 2	< 2	< 2	< 4	< 4	< 2	< 4	< 3	< 2	< 2	< 8	< 3
920792	04/07/92	05/05/92	< 3	< 4	< 5	< 4	< 8	< 4	< 8	< 5	< 4	< 4	< 15	< 4
920981	05/05/92	06/02/92	< 2	< 2	< 3	< 2	< 3	< 2	< 4	< 4	< 2	< 2	< 10	< 3
921184	06/02/92	06/30/92	< 3	< 4	< 6	< 4	< 8	< 4	< 9	< 7	< 4	< 4	< 18	< 6
921365	06/30/92	07/28/92	< 3	< 4	< 5	< 3	< 8	< 4	< 8	< 5	< 4	< 3	< 14	< 4
921499	07/28/92	08/27/92	< 1	< 1	< 2	< 2	< 3	< 1	< 3	< 2	< 2	< 2	< 6	< 2
921631	08/27/92	09/22/92	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 6	< 4	< 4	< 15	< 4
921859	09/22/92	10/20/92	< 4	< 4	< 4	< 3	< 8	< 4	< 8	< 5	< 4	< 4	< 14	< 4
922003	10/20/92	11/17/92	< 2	< 2	< 4	< 3	< 5	< 3	< 6	< 3	< 3	< 3	< 9	< 3
922153	11/17/92	12/15/92	< 1	< 2	< 2	< 2	< 3	< 2	< 4	< 2	< 2	< 2	< 7	< 2

TABLE B-5 (continued)

DRINKING/SURFACE WATER
GAMMA ISOTOPIC ANALYSIS
ON MONTHLY COMPOSITES

SAMPLE LOCATION: DWP/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
920225	12/31/91	01/28/92	< 2	< 2	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 6	< 2
920304	01/28/92	02/11/92	< 3	< 3	< 4	< 3	< 6	< 3	< 5	< 3	< 3	< 2	< 10	< 3
920436	02/11/92	03/10/92	< 4	< 4	< 5	< 4	< 8	< 4	< 9	< 5	< 4	< 4	< 16	< 4
920619	03/10/92	04/07/92	< 4	< 4	< 6	< 4	< 9	< 5	< 10	< 8	< 5	< 4	< 22	< 6
920791	04/07/92	05/05/92	< 3	< 2	< 6	< 3	< 8	< 2	< 6	< 3	< 3	< 3	< 10	< 4
920980	05/05/92	06/02/92	< 3	< 3	< 4	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 14	< 4
921183	06/02/92	06/30/92	< 3	< 3	< 4	< 3	< 7	< 3	< 7	< 5	< 3	< 3	< 16	< 4
921364	06/30/92	07/28/92	< 2	< 1	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 2	< 7	< 2
921498	07/28/92	08/27/92	< 3	< 3	< 4	< 3	< 7	< 4	< 7	< 4	< 4	< 4	< 13	< 4
921630	08/27/92	09/22/92	< 2	< 3	< 3	< 3	< 5	< 3	< 6	< 3	< 3	< 3	< 9	< 3
921858	09/22/92	10/20/92	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 2	< 2	< 9	< 3
922001	10/20/92	11/17/92	< 2	< 2	< 4	< 3	< 5	< 3	< 6	< 4	< 3	< 3	< 13	< 4
922151	11/17/92	12/15/92	< 2	< 2	< 3	< 3	< 5	< 3	< 6	< 4	< 3	< 3	< 12	< 4

TABLE B-6

DRINKING/SURFACE WATER
TRITIUM ANALYSIS ON QUARTERLY COMPOSITES

SAMPLE LOCATION: ALL SAMPLE SITES

UNITS: pCi/LITER

Location	Lab No.	Begin Date	End Date	H-3
DWE/SWE-5	920541	12/31/91	03/24/92	< 670
DWE/SWE-5	921187	03/24/92	06/30/92	< 630
DWE/SWE-5	921634	06/30/92	10/06/92	< 490
DWE/SWE-5	922219	10/06/92	12/29/92	< 470
DWG/SWG-2	920540	01/14/92	03/24/92	< 670
DWG/SWG-2	921188	03/24/92	06/30/92	< 630
DWG/SWG-2	921635	06/30/92	10/06/92	< 490
DWG/SWG-2	922218	10/06/92	12/29/92	< 470
DWP/SWP-7	920542	12/31/91	03/24/92	< 670
DWP/SWP-7	921186	03/24/92	06/30/92	< 630
DWP/SWP-7	921633	06/30/92	10/06/92	< 490
DWP/SWP-7	922217	10/06/92	12/29/92	< 470

TABLE B-7

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
920074	01/07/92	< 650	< 2	< 2	< 3	< 2	< 5	< 4	< 2	< 3	< 3	< 2	< 9	< 3
920672	04/14/92	< 620	< 2	< 2	< 3	< 2	< 5	< 5	< 2	< 3	< 3	< 2	< 8	< 3
921286	07/14/92	< 600	< 3	< 3	< 3	< 3	< 6	< 6	< 3	< 4	< 3	< 2	< 10	< 3
921808	10/13/92	< 490	< 2	< 2	< 3	< 2	< 5	< 4	< 2	< 2	< 2	< 2	< 7	< 2

TABLE B-8

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	920674	04/14/92	< 9	< 9	< 9	< 12	< 8
SHWE-3	921810	10/13/92	< 7	< 7	< 7	< 9	18 +/-6
SHWK-1	920673	04/14/92	< 10	< 10	< 10	< 13	43 +/-11
SHWK-1	921809	10/13/92	< 9	< 8	< 8	< 11	36 +/-7

TABLE B-9

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
920075	01/08/92	< 0.2	< 5	< 4	< 17	< 4
920215	01/22/92	< 0.3	< 2	< 2	< 7	< 2
920271	02/05/92	< 0.3	< 2	< 2	< 7	< 2
920334	02/19/92	< 0.2	< 4	< 4	< 15	< 4
920415	03/05/92	< 0.3	< 3	< 2	< 7	< 2
920502	03/18/92	< 0.3	< 3	< 3	< 13	< 5
920553	04/01/92	< 0.2	< 3	< 3	< 11	< 3
920665	04/15/92	< 0.3	< 5	< 5	< 18	< 5
920819	05/06/92	< 0.3	< 2	< 2	< 7	< 2
920901	05/20/92	< 0.2	< 3	< 2	< 7	< 2
920987	06/04/92	< 0.3	< 5	< 4	< 23	< 6
921077	06/17/92	< 0.4	< 2	< 2	< 9	< 3
921173	07/01/92	< 0.4	< 3	< 2	< 8	< 2
921296	07/15/92	< 0.3	< 3	< 2	< 8	< 4
921387	08/05/92	< 0.3	< 3	< 3	< 14	< 3
921468	08/19/92	< 0.4	< 5	< 4	< 15	< 4
921543	09/02/92	< 0.3	< 3	< 3	< 15	< 4
921617	09/16/92	< 0.3	< 2	< 2	< 8	< 2
921775	10/07/92	< 0.4	< 3	< 2	< 9	< 3
921867	10/21/92	< 0.2	< 5	< 4	< 17	< 5

TABLE B-9 (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
921942	11/04/92	< 0.3	< 5	< 4	< 13	< 5
922011	11/18/92	< 0.2	< 3	< 3	< 11	< 3
922070	12/02/92	< 0.3	< 2	< 2	< 7	< 2
922155	12/16/92	< 0.3	< 3	< 3	< 12	< 3

TABLE B-9 (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
920076	01/07/92	< 0.2	< 3	< 2	< 8	< 3
920216	01/21/92	< 0.5	< 3	< 2	< 9	< 3
920272	02/04/92	< 0.3	< 3	< 2	< 9	< 2
920335	02/18/92	< 0.2	< 2	< 2	< 8	< 2
920416	03/04/92	< 0.3	< 3	< 2	< 8	< 2
920503	03/17/92	< 0.3	< 3	< 2	< 12	< 3
920554	03/31/92	< 0.2	< 3	< 2	< 8	< 3
920666	04/14/92	< 0.4	< 2	< 2	< 8	< 2
920820	05/05/92	< 0.4	< 3	< 2	< 9	< 3
920902	05/19/92	< 0.2	< 3	< 3	< 11	< 3
920988	06/03/92	< 0.3	< 3	< 3	< 14	< 4
921078	06/16/92	< 0.4	< 3	< 3	< 11	< 3
921174	06/30/92	< 0.4	< 3	< 3	< 10	< 3
921297	07/14/92	< 0.4	< 3	< 3	< 14	< 3
921388	08/04/92	< 0.3	< 2	< 2	< 8	< 2
921469	08/18/92	< 0.4	< 3	< 3	< 13	< 3
921544	09/01/92	< 0.3	< 4	< 4	< 18	< 5
921618	09/15/92	< 0.3	< 3	< 2	< 9	< 3
921776	10/06/92	< 0.3	< 2	< 2	< 7	< 2
921868	10/20/92	< 0.2	< 4	< 3	< 15	< 3

TABLE B-9 (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
921943	11/04/92	< 0.3	< 4	< 3	< 13	< 3
922012	11/17/92	< 0.3	< 3	< 2	< 11	< 3
922071	12/01/92	< 0.3	< 2	< 2	< 8	< 3
922156	12/15/92	< 0.3	< 3	< 3	< 15	< 4

TABLE B-10

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
920835	05/07/92	CATFISH	< 4	< 4	< 6	< 4	< 10	< 4	< 3
920836	05/07/92	SHAD	< 5	< 5	< 8	< 6	< 12	< 6	< 6
920837	05/07/92	DRUM	< 12	< 12	< 21	< 12	< 34	< 13	< 12
920838	05/07/92	MULLET	< 6	< 6	< 10	< 7	< 15	< 7	< 6
920839	05/07/92	STRIPPED BASS	< 6	< 7	< 11	< 8	< 17	< 7	< 6
921831	10/15/92	CATFISH	< 12	< 13	< 18	< 12	< 27	< 13	< 11
921833	10/15/92	MULLET	< 10	< 11	< 18	< 11	< 24	< 12	< 10
921835	10/15/92	SHAD	< 13	< 13	< 20	< 13	< 32	< 14	< 14
921837	10/15/92	STRIPPED BASS	< 9	< 9	< 16	< 10	< 21	< 11	< 9

TABLE B-10 (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
920840	05/07/92	CATFISH	< 5	< 6	< 8	< 6	< 14	< 7	< 6
920841	05/07/92	SHAD	< 12	< 11	< 17	< 12	< 29	< 13	< 13
920842	05/07/92	DRUM	< 5	< 5	< 9	< 6	< 14	< 6	< 5
920843	05/07/92	MULLET	< 8	< 8	< 13	< 8	< 19	< 10	< 9
920844	05/07/92	STRIPPED BASS	< 8	< 9	< 12	< 9	< 19	< 10	< 9
921832	10/15/92	CATFISH	< 9	< 9	< 14	< 10	< 21	< 10	< 10
921834	10/15/92	MULLET	< 13	< 12	< 18	< 13	< 29	< 16	< 13
921836	10/15/92	SHAD	< 9	< 10	< 13	< 10	< 21	< 10	< 10
921838	10/15/92	STRIPPED BASS	< 6	< 7	< 9	< 6	< 15	< 7	< 6

TABLE B-11

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
920212	01/23/92	< 10	< 9	< 9
920348	02/20/92	< 7	< 6	< 5
920530	03/25/92	< 21	< 23	< 17
920719	04/23/92	< 15	< 16	< 13
920936	05/27/92	< 15	< 12	< 11
921112	06/24/92	< 18	< 16	< 12
921343	07/22/92	< 27	< 17	< 15
921508	08/28/92	< 15	< 13	< 11
921654	09/23/92	< 23	< 16	< 16
921908	10/28/92	< 41	< 26	< 25
922025	11/23/92	< 9	< 9	< 8
922185	12/21/92	< 10	< 6	< 5

TABLE B-11 (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
920213	01/23/92	< 24	< 19	< 16
920349	02/20/92	< 11	< 9	< 8
920531	03/25/92	< 17	< 19	< 16
920720	04/23/92	< 12	< 14	< 13
920937	05/27/92	< 30	< 22	< 18
921114	06/24/92	< 22	< 17	< 16
921345	07/22/92	< 29	< 9	< 10
921509	08/28/92	< 23	< 23	< 19
921655	09/23/92	< 14	< 12	< 9
921909	10/28/92	< 21	< 14	< 13
922026	11/23/92	< 11	< 10	< 9
922186	12/21/92	< 10	< 6	< 6

TABLE B-11 (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
920214	01/23/92	< 14	< 12	< 10
920350	02/20/92	< 32	< 26	< 23
920532	03/25/92	< 14	< 14	< 13
920721	04/23/92	< 27	< 27	< 27
920938	05/27/92	< 30	< 22	< 21
921113	06/24/92	< 25	< 20	< 20
921344	07/22/92	< 18	< 11	< 10
9211510	08/28/92	< 34	< 30	< 26
921656	09/23/92	< 18	< 14	< 11
921910	10/28/92	< 21	< 14	< 14
922027	11/23/92	< 10	< 9	< 8
922187	12/21/92	< 14	< 8	< 7

TABLE B-12

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	921546	09/03/92	SUGAR CANE	< 5	< 3	< 3
FPP-1	921545	09/03/92	SUGAR CANE	< 4	< 3	< 3

APPENDIX C
SUMMARY OF INTERLABORATORY COMPARISONS

EPA CROSS CHECK RESULTS

EPA PREP DATE	DATE RESULTS ISSUED	MEDIA	NUCLIDE	EPA RESULTS	ESI, SYSTEM CHEMISTRY RESULTS	NORM DEV. KNOWN
01/31/92	04/01/92	WATER (pCi/L)	Beta	30.0	20.67	-3.23**1
02/07/92	04/15/92	WATER (pCi/L)	I-131	59.0	60.33	0.38
02/14/92	04/10/92	WATER (pCi/L)	Co-60	40.0	39.67	-0.12
			Zn-65	148.0	148.00	0.00
			Ru-106	203.0	184.67	-1.59
			Cs-134	31.0	29.33	-0.58
			Cs-137	49.0	50.33	0.46
			Ba-133	76.0	80.33	0.94
02/21/92	04/10/92	WATER (pCi/L)	H-3	7904.0	8340.00	0.96
03/27/92	07/15/92	AIR FILTER (pCi/FILTER)	Beta	41.0	50.33	3.23**2
			Cs-137	10.0	10.33	0.12
04/14/92	08/04/92	WATER BLIND B (pCi/L)	Beta	140.0	115.33	-2.03
			Cs-134	24.0	22.00	-0.69
			Cs-137	22.0	23.33	0.46
04/24/92	08/04/92	MILK (pCi/L)	I-131	78.0	78.67	0.14
			Cs-137	39.0	40.67	0.58
			K	1710.0	1763.33	1.07
04/24/92	08/25/92	WATER (pCi/L)	Co-60	20.0	20.33	0.12
			Zn-65	99.0	100.67	0.29
			Ru-106	141.0	132.67	-1.03
			Cs-134	15.0	15.33	0.12
			Cs-137	15.0	14.67	-0.12
			Ba-133	98.0	99.67	0.29
05/15/92	07/15/92	WATER (pCi/L)	Beta	44.0	43.67	-0.12
06/19/92	08/19/92	WATER (pCi/L)	H-3	2125.0	2503.33	1.89
08/07/92	10/28/92	WATER (pCi/L)	I-131	45.0	49.00	1.15
08/28/92	12/29/92	AIR FILTER (pCi/FILTER)	Beta	69.0	70.33	0.23
			Cs-137	18.0	18.00	0.00
09/25/92	01/12/93	MILK (pCi/L)	I-131	100.0	98.00	-0.35
			Cs-137	15.0	16.00	0.35
			K	1750.0	1706.67	-0.85
10/23/92	12/21/92	WATER (pCi/L)	H-3	5962.0	5703.33	-0.75

**1 A new efficiency curve was determined for the beta courter. Recalculation of the 01/31/92 beta in water sample using the new efficiency curve gives results within the control limits.

**2 A new efficiency curve was determined for air filter samples. Recalculation of the 03/27/92 air filter sample using the new efficency value gives results within the control limits.

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-814) 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).