Maine Yankee

RELIABLE ELECTRICITY FOR MAINE SINCE 1972

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

2002

Maine Yankee Atomic Power Station
Maine Yankee Atomic Power Company
Wiscasset, Maine

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MAINE YANKEE NUCLEAR POWER STATION

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

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EXECUTIVE SUMMARY

During 2002, as in all previous years of plant operation, a program was conducted to assess the levels of radiation or radioactivity in the Maine Yankee environment. More than 400 samples were collected (including TLDs) over the course of the year, with over 1200 radionuclide or exposure rate analyses being performed on them. The samples collected as part of this program include bi-weekly air particulate, ground water, estuary water, sediment, marine algae, fish, mussels, clams, crabs, lobsters, mixed vegetation and milk. In addition to these samples, the air surrounding the plant was sampled continuously and the radiation levels were measured continuously with environmental TLDs.

Low levels of radioactivity from naturally-occurring, fallout and plant emission sources were detected. Most samples had measurable concentrations of K-40, Be-7, Th-232 or Radon daughter products. These are the most common of the naturally-occurring radionuclides. Some milk and sediment samples contained fallout radioactivity from atmospheric nuclear weapons tests conducted primarily from the late 1950's through 1980. A few samples had low levels of radioactivity resulting from emissions from Maine Yankee. These were all collected in the immediate vicinity of the plant or from on-site locations. In all cases, the possible radiological impact was negligible with respect to exposure from natural background radiation. In no case did the detected levels approach or exceed the most restrictive federal regulatory or plant license limits for radionuclides in the environment. Consequently, there was judged to be no environmental or health impact.

Maine Yankee shutdown in December of 1996. In August 1997 the decision was made to permanently cease power operation. The plant has since been in the process of decommissioning which involves the disassembly and removal of plant components and structures. This process is taking place in strict conformance with USNRC regulations. Oversight also continues from the State of Maine.

During 2002, there were a couple of minor changes made to the radiological environmental monitoring program. As part of change number 22 to the ODCM, demolition particulate sampling was added to the sampling program. The purpose is to monitor airborne activity levels around buildings that are being demolished as well as within buildings which are no longer tied into existing ventilation systems, have large permanent openings to the environment and are subject to active demolition activities as part of the decommissioning process. In addition, during September, the composite sampler at the plant outfall (WE-12) was removed and replaced by grab sampling at the boat dock (WE-14).

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1.0 INTRODUCTION

This report summarizes the findings of the Radiological Environmental Monitoring Program (REMP) conducted by Maine Yankee Atomic Power Company in the vicinity of the Maine Yankee Nuclear Power Station in Wiscasset, Maine during the calendar year 2002. It is submitted annually in compliance with Appendix C, item 1 of the Offsite Dose Calculation Manual (ODCM). The remainder of this report is organized as follows:

Section 2: Provides an introduction to the background radioactivity and radiation that is detected in the Maine Yankee environs.

Section 3: Provides a brief description of the Maine Yankee site and its environs.

Section 4: Provides a description of the overall REMP design. Included is a summary of the ODCM requirements for REMP sampling, tables listing routine sampling and TLD monitoring locations with compass sectors and distances from the plant, and maps showing the location of each of the sampling and TLD monitoring locations. Tables listing Lower Limit of Detection requirements and Reporting Levels are also included.

Section 5: Consists of the summarized data as required by the ODCM, in the format specified by the NRC Branch Technical Position on Environmental Monitoring (Reference 1). Also included are complete environmental TLD data. Included in this data are the exposure-rate monitoring results for the ISFSI area.

Section 6: Provides the results of the 2002 monitoring program. The performance of the program in meeting ODCM requirements is discussed, and the data acquired during the year is analyzed.

Section 7: Provides an overview of the Quality Assurance programs used at the Framatome ANP Environmental Laboratory (FANPEL). The results of the Laboratory participation in an Interlaboratory Comparison Program required by ODCM section 2.4 are also given.

Section 8: Summarizes the requirements and the results of the 2002 Land Use Census.

Section 9: References

2.0 NATURALLY OCCURRING AND MAN-MADE BACKGROUND RADIOACTIVITY

Radiation or radioactivity potentially detected in the Maine Yankee environment can be grouped into three categories. The first is "naturally-occurring" radiation and radioactivity. The second is "man-made" radioactivity from sources other than the Maine Yankee plant. The third potential source of radioactivity is due to emissions from the Maine Yankee plant. For the purposes of the Maine Yankee REMP, the first two categories are classified as "background" radiation, and are the subject of discussion in this section of the report. The third category is the one that the REMP is designed to detect and evaluate.

2.1 Naturally Occurring Background Radioactivity

Natural radiation and radioactivity in the environment, which provide the major source of human radiation exposure, may be subdivided into three separate categories: "primordial radioactivity," "cosmogenic radioactivity" and "cosmic radiation." "Primordial radioactivity" is made up of those radionuclides that were created with the universe and that have a sufficiently long half-life to be still present on the earth. Included in this category are the radionuclides that these elements have decayed into. A few of the more important radionuclides in this category are Uranium-238 (U-238), Thorium-232 (Th-232), Rubidium-87 (Rb-87), Potassium-40 (K-40), Radium-226 (Ra-226), and Radon-222 (Rn-222). Uranium-238 and Thorium-232 are readily detected in soil and rock, whether through direct field measurements or through laboratory analysis of samples. Radium-226 in the earth can find its way from the soil into ground water, and is often detectable there. Radon-222 is one of the components of natural background in air, and its daughter products are detectable on air sampling filters. Potassium-40 comprises about 0.01 percent of all natural potassium in the earth, and is consequently detectable in most biological substances, including the human body. There are many more primordial radionuclides found in the environment in addition to the major ones discussed above (Reference 2).

The second category of naturally-occurring radiation and radioactivity is "cosmogenic radioactivity." This is produced through the nuclear interaction of high energy cosmic radiation with elements in the earth's atmosphere, and to a much lesser degree in the earth's crust. These radioactive elements are then incorporated into the entire geosphere and atmosphere, including the earth's soil, surface rock, biosphere, sediments, ocean floors, polar ice and atmosphere. The major radionuclides in this category are Carbon-14 (C-14), Hydrogen-3 (H-3 or Tritium), Sodium-22 (Na-22), and Beryllium-7 (Be-7). Beryllium-7 is the one most readily detected, and is found on air sampling filters and occasionally in biological media (Reference 2).

The third category of naturally-occurring radiation and radioactivity is "cosmic radiation." This consists of high energy atomic or sub-atomic particles of extra-terrestrial origin and the secondary particles and radiation that are produced through their interaction in the earth's atmosphere. The primary radiation comes mostly from outside of our solar system, and to a lesser degree from the sun. We are protected

from most of this radiation by the earth's atmosphere, which absorbs the radiation. Consequently, one can see that with increasing elevation one would be exposed to more cosmic radiation as a direct result of a thinner layer of air for protection. This "direct radiation" is detected in the field with gamma spectroscopy equipment, high pressure ion chambers and thermoluminescent dosimeters (TLDs).

2.2 Man-Made Background Radioactivity

The second source of "background" radioactivity in the Maine Yankee environment is from "man-made" sources not related to the power plant. The most recent contributor to this category was the fallout from the Chernobyl accident in April of 1986, which was detected in the Maine Yankee environment and other parts of the world. A much greater contributor to this category, however, has been fallout from atmospheric nuclear weapons tests. Tests were conducted from 1945 through 1980 by the United States, the Soviet Union, the United Kingdom, China and France, with the large majority of testing occurring during the periods 1954-1958 and 1961-1962. (A test ban treaty was signed in 1963 by the United States, Soviet Union and United Kingdom, but not by France and China.) Atmospheric testing was conducted by the People's Republic of China as recently as October 1980. Much of the fallout detected today is due to this explosion and the last large scale one, done in November of 1976 (Reference 3).

The radioactivity produced by these detonations was deposited worldwide. The amount of fallout deposited in any given area is dependent on many factors, such as the explosive yield of the device, the latitude and altitude of the detonation, the season in which it occurred, and the timing of subsequent rainfall which washes fallout from the troposphere (Reference 4). Most of this fallout has decayed into stable elements, but the residual radioactivity is still detectable at low levels in environmental samples worldwide. The two predominant radionuclides are Cesium-137 (Cs-137) and Strontium-90 (Sr-90). They are found in soil and in vegetation, and since cows and goats graze large areas of vegetation, these radionuclides can also be detected in the milk.

Other potential "man-made" sources of environmental "background" radioactivity include other nuclear power plants, coal-fired power plants, national defense installations, hospitals, research laboratories and industry. These collectively are insignificant on a global scale when compared to the sources discussed above (natural and fallout).

3.0 GENERAL PLANT AND SITE INFORMATION

The Maine Yankee Nuclear Power Station is located in the town of Wiscasset, Lincoln County, Maine, approximately six miles northeast of Bath, Maine. The site vicinity is rural and lightly populated.

The plant site is located on Bailey Point, a peninsula bounded to the east by the Back River and to the west by a shallow inlet known as Bailey Cove, both of which are part of the Montsweag Bay-Sheepscot River Estuary. (See the maps in Figures 4.1 to 4.4) Bailey point is an elongated bedrock ridge with flat or gently rolling topography rising to an average elevation of about 25 feet above sea level (Reference 5).

The single 900 megawatt PWR (Pressurized Water Reactor) unit at Maine Yankee began commercial operation in 1972. The Radiological Environmental Monitoring Program (REMP) began pre-operational measurements in 1970, two years prior to commercial operation. The REMP has been in continuous operation since that date.

Maine Yankee shut down in December 1996. In August 1997 the decision was made to permanently cease power operation after 24 years of operation. The plant has since been in the process of decommissioning, which involves the disassembly and removal of the plant components and structures. This process is taking place in strict conformance with USNRC regulations. Oversight also continues from the State of Maine.

The radiological environmental monitoring program for Maine Yankee continued to operate during 2002.

4.0 PROGRAM DESIGN

The Radiological Environmental Monitoring Program (REMP) for the Maine Yankee Nuclear Power Station was designed with the following specific objectives in mind. These objectives will continue to be in force, to varying degrees, throughout decommissioning activities at the Maine Yankee site.

- To provide an early indication of the appearance or accumulation of any radioactive material in the environment caused by the operation of the station.
- To provide assurance to regulatory agencies and the public that the station's environmental impact is known and within anticipated limits.
- To verify the adequacy and proper functioning of station effluent controls and monitoring systems.
- To provide standby monitoring capability for rapid assessment of risk to the general public in the event of unanticipated or accidental releases of radioactive material.

The program was initiated in 1970, approximately two years before the plant began commercial operation in 1972. It has been in operation continuously since that time, with improvements made periodically over those years.

Prior to January 1992, the requirements for the Radiological Environmental Monitoring Program (REMP) were stated in the Radiological Effluent Technical Specifications (RETS). In January 1992, the REMP specifications were removed from the RETS and placed in the Offsite Dose Calculation Manual (ODCM) pursuant to NRC Generic Letter 89-01 (Reference 6).

The REMP is a requirement of the ODCM. The detailed sampling requirements of the REMP are given in Table 2.3 of ODCM Section 2.4. This table is summarized in this report as Table 4.1.

The required sampling locations are identified in Section 5 of the ODCM. The locations actually monitored in 2002 are shown on Tables 4.2 and 4.3, as well as Figures 4.1 through 4.4 of this report. The locations in these tables and figures consist of the required locations specified in the ODCM, as well as any regularly sampled locations. Sampling sites that were used on only one occasion during 2002 are not shown in the tables or maps, but are discussed in the text. The environmental sampling and TLD locations were determined using a differential Global Positioning System (GPS), with a typical accuracy of less than 5 meters. The reference point chosen for direction and distance was the plant Primary Vent Stack (PVS).

4.1 Monitoring Zones

The REMP is designed to allow comparison of levels of radioactivity in samples from the area possibly influenced by the plant to levels found in areas not influenced by the plant. The first area is called Zone 1, and its monitoring locations are called "indicators." The second area is called Zone 2, and its monitoring locations are called "controls." The distinction between the two zones, depending on the type of sample or sample pathway, is based on one or more of several factors, such as site meteorological history, meteorological dispersion calculations, relative direction from the plant, river flow, and distance. Analysis of survey data from the two zones aids in determining if there is a significant difference between the two areas. It can also help in differentiating between radioactivity or radiation due to plant releases and that due to other fluctuations in the environment, such as atmospheric nuclear weapons test fallout or seasonal variations in the natural background.

4.2 Pathways Monitored

Four pathway categories are monitored by the REMP. They are the direct radiation, airborne, waterborne, and ingestion pathways. Each of these four categories is monitored by the collection of one or more sample media, which are listed below, and are described in more detail in this section:

Airborne Pathway
- Air Particulate Sampling
- Demolition Particulate Sampling

Waterborne Pathways
- Estuary Water Sampling
- Ground Water Sampling
- Shoreline Sediment Sampling
- Marine Algae Sampling

Ingestion Pathways
- Milk Sampling
- Fish and Invertebrate Sampling
- Mixed Vegetation Sampling

Direct Radiation Pathway
- TLD Monitoring

4.3 Descriptions of Monitoring Programs

4.3.1 Air Sampling

Continuous air samplers are operated at five locations. The sampling pumps at these locations operate continuously at a flow rate of approximately one to two cubic feet per minute. Airborne particulates are collected by passing air through a 47 mm glass-fiber filter. A dry-gas meter is incorporated in the sampling stream to measure the total amount of air sampled in a given interval. The entire air sampling system is housed in a weatherproof structure. The filters, which are collected on a biweekly basis, are held for at least 100 hours at the Framatome ANP Environmental Laboratory (FANPEL) before being analyzed for gross-beta radioactivity. The filters are composited by location at the laboratory for a quarterly gamma spectroscopy analysis.

During 2002, demolition particulate sampling was added to the program. The purpose is to monitor airborne activity levels surrounding buildings that are being demolished as well as within buildings which are no longer tied into existing ventilation systems, have large permanent openings to the environment and are subject to active demolition activities as part of the decommissioning process. The number and location of sampling points is dependent on activities performed. Collection frequency is at least once weekly, or as required by dust loading. All filters are analyzed for gross beta and composited quarterly for gamma isotopic analysis.

4.3.2 Estuary Water Sampling

During the months of January through August, an automatic composite sampler was located at the discharge forebay to monitor water discharged to the Back River. (In-plant systems monitor water prior to release to the discharge forebay.) The sampler was controlled by a timer that collects an aliquot of this water at least every two hours. Every week a one-liter sample was gathered from this composited sample. These one-liter samples were again composited at the Environmental Services laboratory before shipping to the FANPEL at the end of the month. During September, the composite sampler at the plant outfall was removed and replaced by grab sampling at the boat dock. In addition, a weekly grab sample is collected at the control location in the Kennebec River. These weekly grab samples are composited for a monthly sample at the Environmental Services Laboratory. All estuary water samples are preserved with HCl to prevent the plate out of radionuclides on the container walls. Each monthly composite or grab sample is analyzed for gamma-emitting radionuclides. These are composited again by location at the FANPEL for a quarterly H-3 analysis.

4.3.3 Ground Water Sampling

Due to the hydraulic gradient at the Maine Yankee site, whereby the ground water flow is southward down the peninsula and toward the water on the east and west sides, ground water sampling is not required at the Maine Yankee site, pursuant to ODCM Table 2.3. Nevertheless, grab samples are

collected quarterly from one on-site location and one control location. All ground water samples are preserved with HCl to prevent the plate out of radionuclides on the container walls. Each sample is analyzed for gamma-emitting radionuclides.

4.3.4 Sediment Sampling

Shoreline sediment cores are collected semiannually from two locations on Bailey Point. At each location, six 5-cm I.D. plastic coring tubes are driven into the sediment to a depth of at least fifteen centimeters. The cores are then kept in an upright position and frozen prior to delivery to FANPEL. At the laboratory, the frozen cores are cut into 5-cm segments. For each location, the 0-5 cm segments are blended into a single sample, as are the 5-10 cm and 10-15 cm segments. These composite samples are then analyzed for gamma-emitting radionuclides.

4.3.5 Marine Algae Sampling

Mixed samples of *Fucus* and *Ascophyllum* marine algae are collected at least semiannually from a location near the plant diffuser discharge. Each sample is frozen for shipment to FANPEL. At the laboratory, they are analyzed for gamma-emitting radionuclides. Sampling of this media is not required by ODCM Table 2.3.

4.3.6 Milk Sampling

Milk samples are collected on a monthly schedule from two locations – one indicator and one control. The indicator location is chosen as a result of the annual Land Use Census, based on a hypothetical potential dose commitment. The second location is a control, which is located sufficiently far away from the plant to be outside any potential influence from it.

Samples of milk are chilled after collection and shipped to the FANPEL on ice. Methimazole and formaldehyde are added to the milk upon receipt at the Laboratory. Each sample is analyzed for gamma-emitting radionuclides. Although not required by the ODCM, Sr-89 and Sr-90 analyses are also performed on quarterly composited samples.

4.3.7 Fish and Invertebrate Sampling

Samples of commercially important fish and invertebrates are collected two times seasonally at two locations (near the plant discharge and at a control location on the Sheepscot River). Maine Yankee Environmental Services staff collect samples of fish, crabs, lobsters and Molluscs (blue mussels). All samples are separated by species and are then frozen and delivered to the FANPEL, where the edible portions are analyzed for gamma-emitting radionuclides.

In 1995, the Town of Wiscasset re-opened several clam flats, including Bailey Cove that had been closed to clam digging for many years. During 2002, two seasonal samples of soft-shell clam (*Mya arenaria*) were collected from two locations within Bailey Cove. The clam samples were frozen and analyzed for gamma emitting radionuclides at the FANPEL. These samples are not required by Maine Yankee ODCM.

4.3.8 Mixed Vegetation Sampling

Although there is no ODCM requirement for mixed vegetation sampling, a sample is collected from an on-site location twice during the growing season. To collect this sample, all grass is cut to a height of one inch above ground level from a 4 square-meter plot. The grass is shipped to the FANPEL, where it is analyzed for gamma-emitting radionuclides.

4.3.9 TLD Monitoring

Direct gamma radiation exposure was continuously monitored with the use of thermoluminescent dosimeters (TLDs). Specifically, Panasonic UD-801AS1 and UD-814AS1 calcium sulfate dosimeters were used, with a total of five elements in place at each monitoring location. Each pair of dosimeters is sealed in a plastic bag, which is in turn housed in a plastic-screened container. This container is attached to an object such as a tree, fence or utility pole. The plant staff posts and retrieves all TLDs quarterly. All TLDs are processed at the FANPEL.

In addition to these environmental TLDs, additional TLDs were placed within about 340 meters of the Independent Spent Fuel Storage Insulation (ISFSI) starting the fourth quarter of 1999. The ISFSI is located approximately 450 meters NE of the containment dome. The ISFSI TLDs are classified as TL-I-# in Table 5.3. Also, location TL-3(Bailey House) was changed to location TL-I-5 and TL-5 (MY Information Center) was changed to TL-I-10.

4.3.10 Special Monitoring

On occasion, special interest samples are taken that are not required as a part of the Radiological Environmental Monitoring Program (REMP). The sample locations vary from year to year and do not appear in Table 2.3 of the Offsite Dose Calculation Manual, nor do they appear in Table 4.1 or 4.2 of this report. The analysis results may be discussed in Section 5 of this report, as appropriate.

TABLE 4.1

Radiological Environmental Surveillance Program
(as required during 2002 by ODCM Table 2.3)

Exposure Pathway and/or Sample Media	Collection			Analysis	
	Number of Sample Locations	Routine Sampling Mode	Collection Frequency	Analysis Type	Analysis Frequency
1. Direct Radiation (TLDs)	Total Locations: 38	Continuous	Quarterly	Gamma dose	Each TLD
2. Airborne					
a) Routine Particulate	Total Locations: 5	Continuous	Biweekly	Particulate Sample: Gross Beta	Each Sample
				Gamma Isotopic	Quarterly Composite (by location)
b) Demolition Particulate	Dependent[T]	Continuous	Continuous operation[TT] of sampler with sample collection as required by dust loading but at least once weekly.	Gross beta[+]	Each sample
				Gamma Isotopic	Quarterly Composite[++]
3. Waterborne					
a. Estuary Water	Total Locations: 2	Weekly grab sample for a monthly composite sample*	Monthly	Gamma Isotopic Tritium (H-3)	Each Sample Quarterly Composite
b. Ground Water[**]	Total Locations: 2	Grab	Quarterly	Gamma Isotopic Tritium (H-3)	Each Sample Each Sample
c. Shoreline Sediment	Total Locations: 2	Grab	Semiannually	Gamma Isotopic	Each Sample

* For the indicator station, grab samples shall be collected on the tide cycle when the direction of river flow is from the point of discharge toward the collection point.

** Groundwater samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where hydraulic gradient or recharge properties are suitable for contamination.

T The number and location of sampling points is dependent on the activities performed. Air samplers are placed in or within close proximity of buildings undergoing demolition activities to provide reasonable assessment of the airborne activity that may be generated.

TT Continuous operation during periods when a building is no longer tied into existing ventilation systems, has large permanent openings to the environment, and is subject to active demolition activities.

+ Analyze for gross beta at least 24 hours following filter change.

++ Perform gamma isotopic analysis on any filter indicating activity greater than 5 times the yearly mean of the control samples

TABLE 4.1
(continued)

Radiological Environmental Surveillance Program
(as required during 2002 by ODCM Table 2.3)

Exposure Pathway and/or Sample Media	Collection			Analysis	
	Nominal Number of Sample Locations	Routine Sampling Mode	Nominal Collection Frequency	Analysis Type	Analysis Frequency
4. Ingestion					
a. Milk*	Total Locations: 2	Grab	Monthly	Gamma Isotopic	Each sample
b. Fish and Invertebrates (commercially or recreationally important species)	Total Locations: 2	Grab	Semiannually (or seasonal if appropriate)	Gamma Isotopic on edible portions	Each sample
c. Food Products (3 types of broad-leaf vegetation). Performed only if milk sampling is not done.	Total Locations: 3	Grab	Monthly when available	Gamma Isotopic	Each sample

* Food Product may be substituted for milk samples

TABLE 4.2

Radiological Environmental Monitoring Locations (non-TLD) in 2002
Maine Yankee Nuclear Power Station

Exposure Pathway	Station Code	Station Description	Zone[a]	Distance From Plant (km)	Direction From Plant
1. Airborne					
a. Air Particulate	AP-11	Montsweag Brook	1	2.7	NW
	AP-13	Bailey Farm (ESL)	1	0.7	NE
	AP-14	Mason Steam Station	1	4.8	NNE
	AP-16	Westport Firehouse	1	1.8	S
	AP-29	Dresden Substation	2	20.1	N
b. Demolition Particulate[b]	AP-3X		N/A	Various	Various
2. Waterborne					
a. Surface Water	WE-12	Plant Outfall (Composite Sample)	1	0.3	SSW
	WE-14	Boat Dock	1	0.5	NE
	WE-20	Kennebec River (Grab Sample)	2	9.5	WSW
b. Ground Water	WG-13	Bailey Farm (ESL)	1	0.7	NE
	WG-24	Morse Well	2	9.9	W
c. Sediment	SE-16	Old Outfall Area	1	0.6	S
	SE-18	Foxbird Island	1	0.6	S
d. Clam [c]	MA-16	Old Outfall Area	1	0.65	S
	MA-18	Foxbird Island	1	0.65	S
e. Marine Algae	AL-11	Long Ledge Area	1	0.9	S
3. Ingestion					
a. Milk	TM-18	Chewonki Foundation	1	1.9	WSW
	TM-25	Hanson Farm	2	18.3	W

TABLE 4.2
(continued)

Radiological Environmental Monitoring Locations (non-TLD) in 2002
Maine Yankee Nuclear Power Station

Exposure Pathway	Station Code	Station Description	Zone[a]	Distance From Plant (km)	Direction From Plant
3. Ingestion, continued b. Fish & Invertebrates	FH-11[d] MU-11 CA-11 HA-11	Long Ledge Area	1	0.9	S
	FH-24 MU-24 CA-24 HA-24	Sheepscot River	2	11.1	S
c. Food Crop Vegetation[e]	N/A	N/A	N/A	N/A	N/A

[a] 1 = Indicator Stations; 2 = Control Stations
[b] The number and location of Demolition sampling points is dependent on the activities performed. Air samplers are placed in or within close proximity of buildings undergoing demolition activities to provide reasonable assessment of the airborne activity may be generated
[c] MA = Soft-Shell Clams (*Mya arenaria*).
[d] FH = Fish, MU = Mussels, CA = Crabs, HA = Lobsters
[e] Food crop sampling is not required while milk sampling is being done.

ESL = Environmental Services Laboratory

TABLE 4.3

Radiological Environmental Monitoring Locations (TLD) in 2002
Maine Yankee Nuclear Power Station

Station Code	Station Description	Zone*	Distance From Plant (km)	Direction From Plant
TL-1	Old Ferry Rd.	I	0.9	N
TL-2	Old Ferry Rd.	I	0.8	NNE
TL-3	Bailey House (ESL)	I	0.7	NE
TL-4	Westport Island, Rt. 144	I	1.3	ENE
TL-5	MY Information Center	I	0.2	ENE
TL-6	Rt. 144 & Greenleaf Rd.	I	1.0	E
TL-7	Westport Island, Rt. 144	I	0.9	ESE
TL-8	MY Screenhouse	I	0.2	ESE
TL-9	Westport Island, Rt. 144	I	0.8	SE
TL-10	Bailey Point	I	0.3	SSE
TL-11	Mason Station	O	4.8	NNE
TL-12	Westport Firehouse	I	1.7	S
TL-13	Foxbird Island	I	0.3	SSW
TL-14	Eaton Farm	I	0.7	SW
TL-15	Eaton Farm	I	0.8	WSW
TL-16	Eaton Farm	I	0.7	W
TL-17	Eaton Farm Rd.	I	0.6	WNW
TL-18	Eaton Farm Rd.	I	0.8	NW
TL-19	Eaton Farm Rd.	I	0.9	NNW
TL-20	Bradford Rd., Wiscasset	O	6.4	N
TL-21	Federal St., Wiscasset	O	7.1	NNE
TL-22	Cochran Rd., Edgecomb	O	8.3	NE
TL-23	Middle Rd., Edgecomb	O	6.4	ENE
TL-24	River Rd., Edgecomb	O	7.8	E
TL-25	River Rd. & Rt. 27	O	7.7	ESE
TL-26	Rt. 27 & Boothbay RR Museum	O	7.9	SE
TL-27	Barters Island	O	7.2	SSE
TL-28	Westport Island, Rt. 144 & E.Shore Rd.	O	7.9	S
TL-29	Harrison's Trailer	O	6.2	SSW
TL-30	Leeman Farm, Woolwich	O	7.8	SW

TABLE 4.3
(continued)

Radiological Environmental Monitoring Locations (TLD) in 2002
Maine Yankee Nuclear Power Station

Station Code	Station Description	Zone*	Distance From Plant (km)	Direction From Plant
TL-31	Barley Neck Rd., Woolwich	O	6.8	WSW
TL-32	Baker Farm, Woolwich	O	7.3	W
TL-33	Rt. 127, Woolwich	O	7.4	WNW
TL-34	Rt. 127, Woolwich	O	7.9	NW
TL-35	Rt. 127, Dresden	O	9.1	NNW
TL-36	Boothbay Harbor Fire Station	2	12.2	SSE
TL-37	Bath Fire Station	2	10.7	WSW
TL-38	Dresden Substation	2	20.1	N

* I = Inner Ring TLD; O = Outer Ring TLD; 2 = Control TLD.

ISFSI TLDs:		Direction From Centerline of ISFSI
TL-I-01	Spent Fuel Storage	N
TL-I-02	Spent Fuel Storage	NNE
TL-I-03	Spent Fuel Storage	NE
TL-I-04	Spent Fuel Storage	ENE
TL-I-05	Spent Fuel Storage	E
TL-I-06	Spent Fuel Storage	ESE
TL-I-07	Spent Fuel Storage	SE
TL-I-08	Spent Fuel Storage	SSE
TL-I-09	Spent Fuel Storage	S
TL-I-10	Spent Fuel Storage	SSW
TL-I-11	Spent Fuel Storage	SW
TL-I-12	Spent Fuel Storage	WSW
TL-I-13	Spent Fuel Storage	W
TL-I-14	Spent Fuel Storage	NNW
TL-I-15	Spent Fuel Storage	NW
TL-I-16	Spent Fuel Storage	NNW
TL-I-17	Spent Fuel Storage	SE

TABLE 4.4

Environmental Lower Limit of Detection (LLD) Sensitivity Requirements

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish & Invertebrates (pCi/kg wet)	Milk (pCi/l)	Food Products (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 **					
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140	15			15		

* If no drinking water pathway exists, a value of 3000 pCi/l may be used.
** If no drinking water pathway exists, a value of 15 pCi/l may be used.

TABLE 4.5

Reporting Levels for Radioactivity Concentrations In Environmental Samples

Analysis	Water (pCi/l)	Airborne Particulates or Gases (pCi/m^3)	Fish & Invertebrates (pCi/kg wet)	Milk (pCi/l)	Food Products (pCi/l)
H-3	20,000 [a]				
Mn-54	1000		30,000		
Fe-59	400		10,000		
Co-58	1000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400 [b]				
I-131	2 [c]				
Cs-134	30	10	1000	60	1000
Cs-137	50	20	2000	70	2000
Ba-La-140	200 **			300	

[a] If no drinking water pathway exists, a value of 30,000 pCi/l may be used.
[b] Parent only.
[c] If no drinking water pathway exists, a value of 20 pCi/l may be used.

Figure 4.1

Environmental Radiological Sampling Locations (within 1 km)

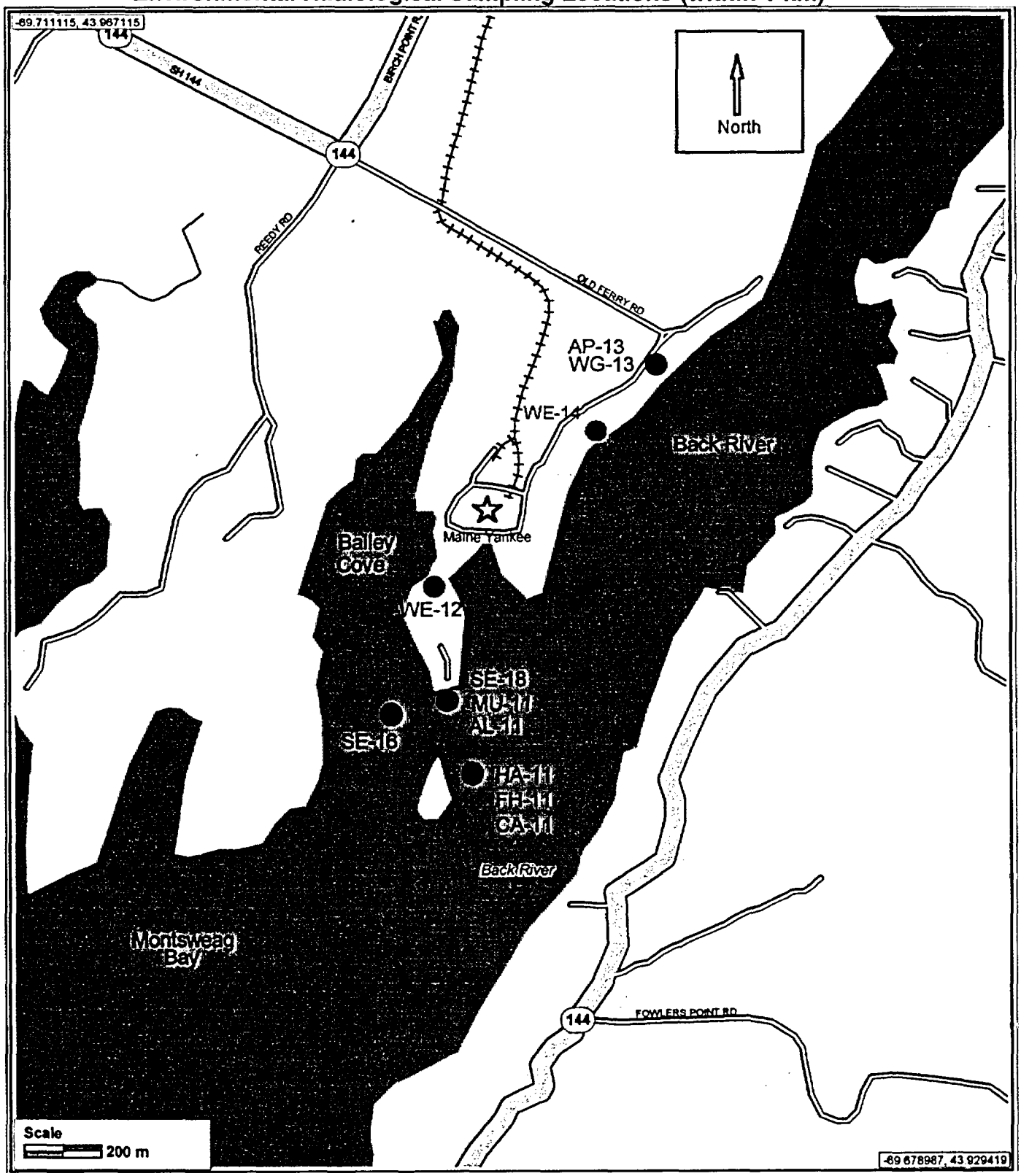
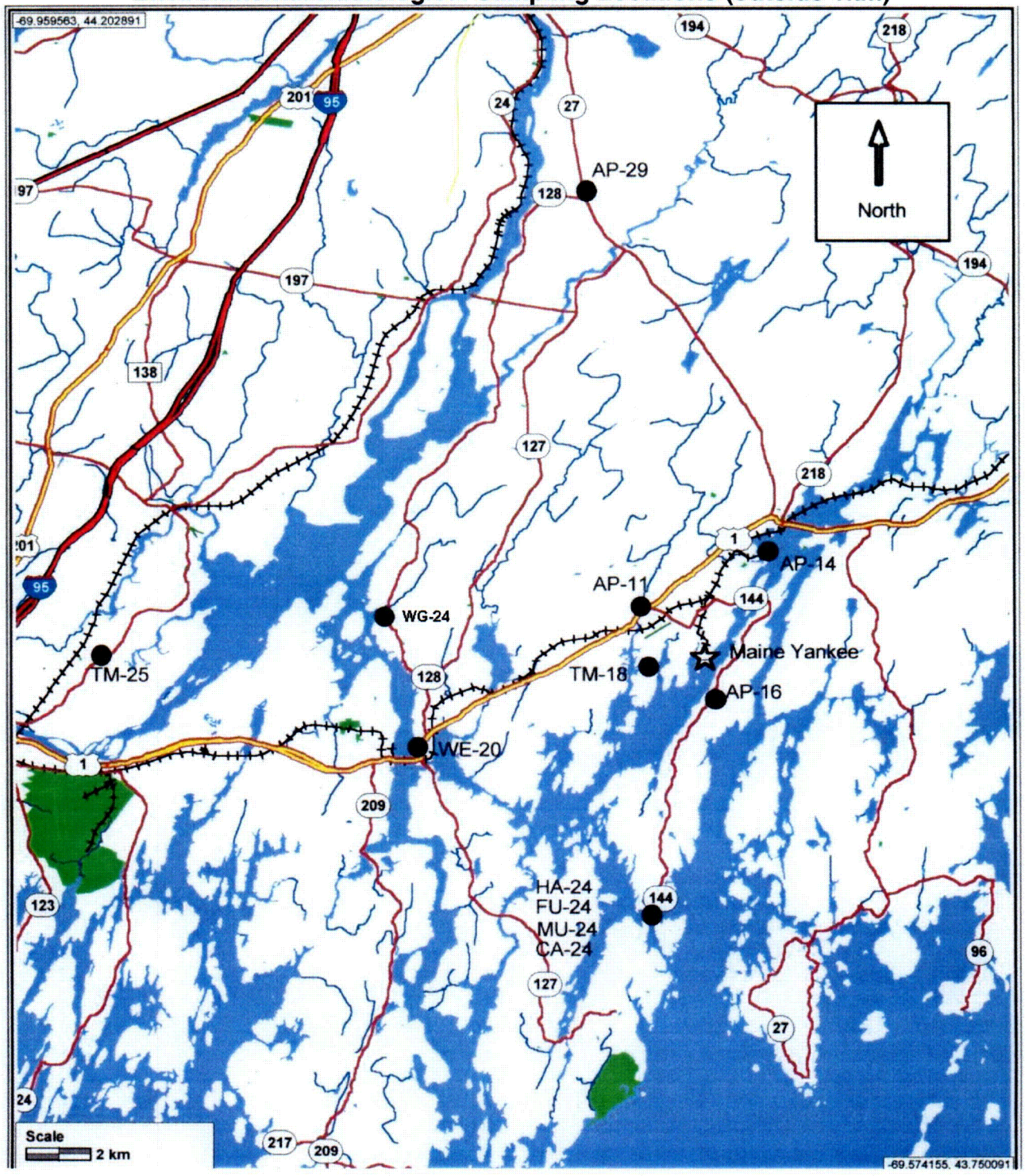


Figure 4.2

Environmental Radiological Sampling Locations (outside 1km)



C01

Figure 4.3

Direct Radiation Monitoring Locations (within 1 km)

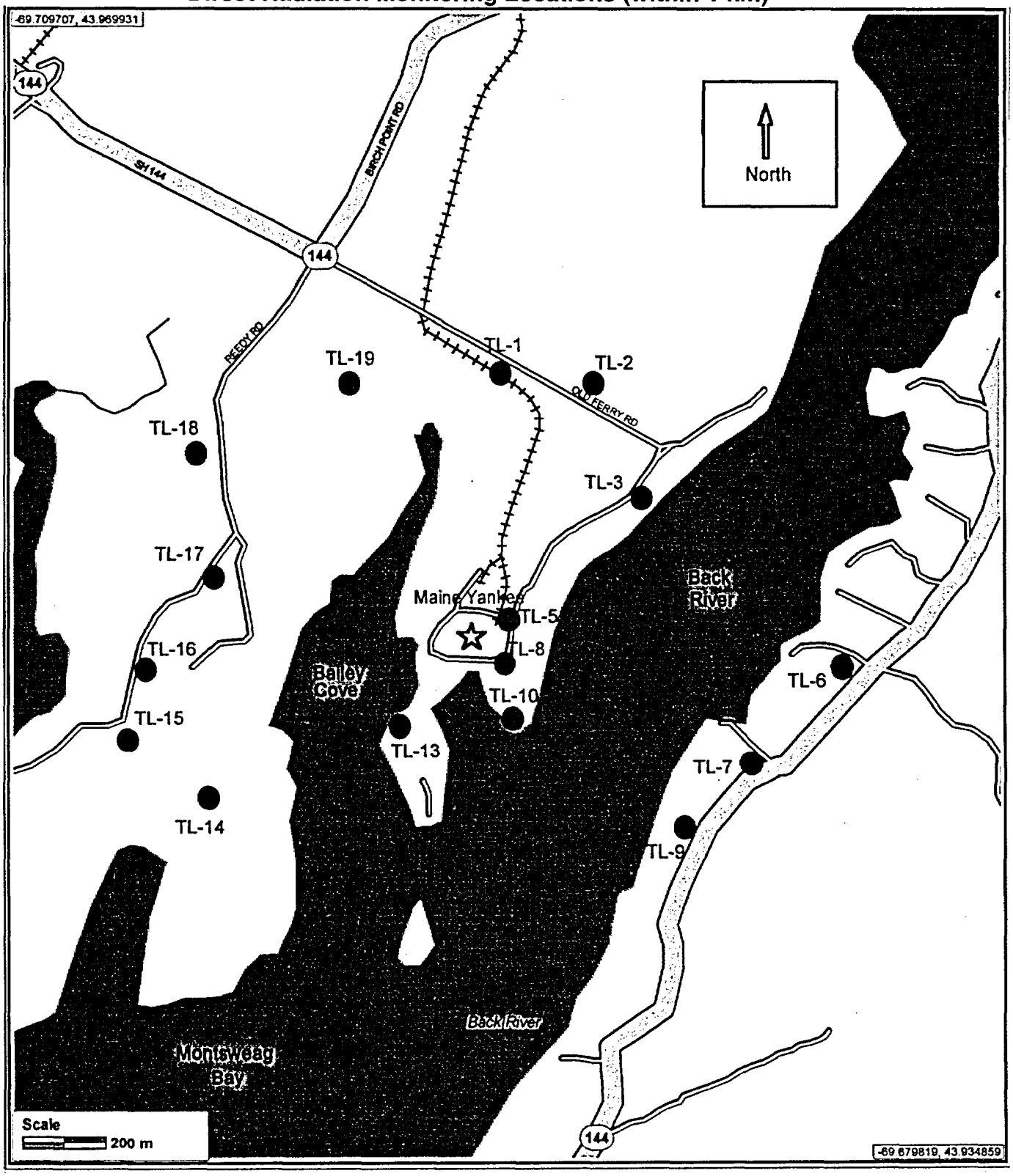
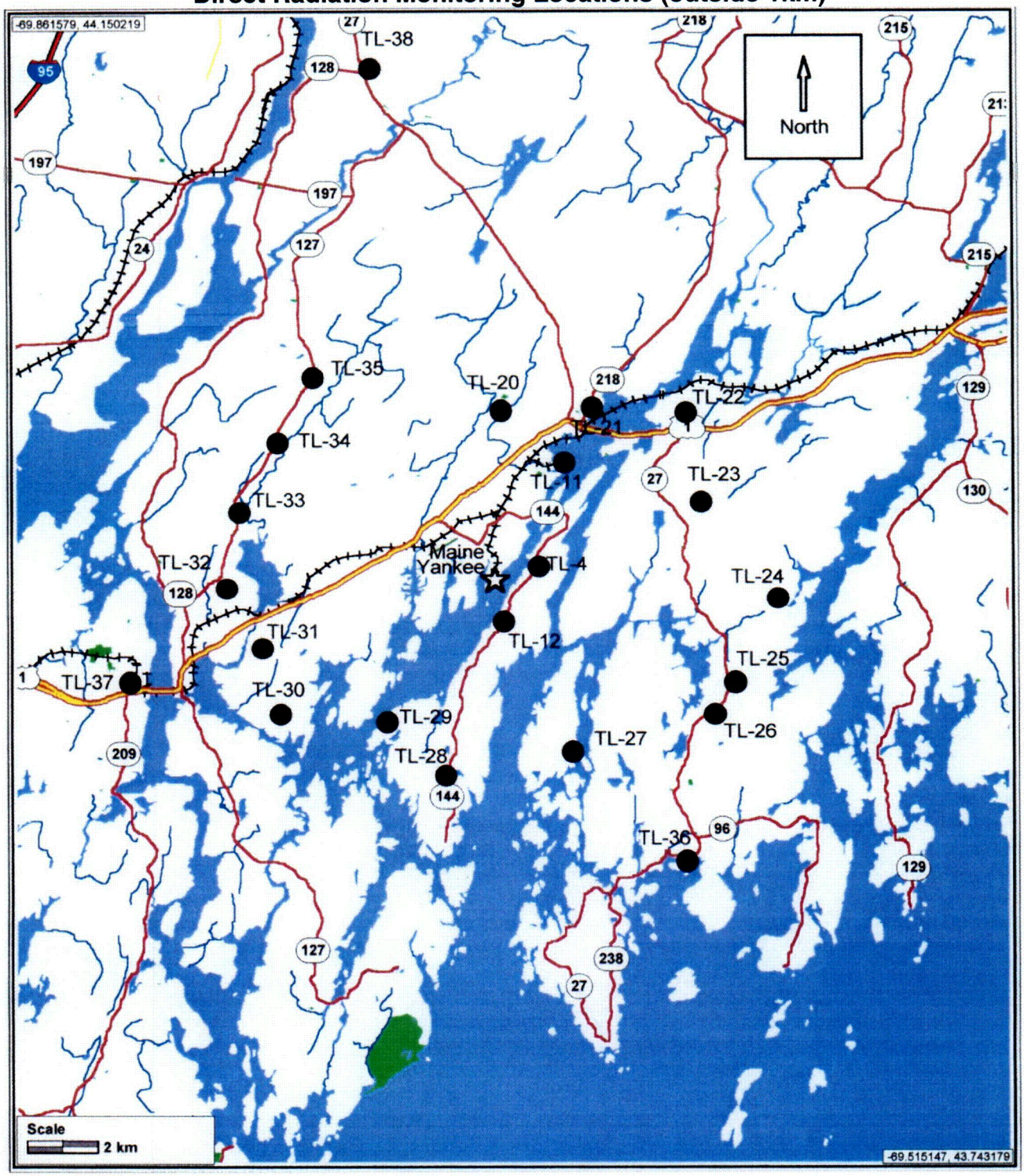


Figure 4.4

Direct Radiation Monitoring Locations (outside 1km)



C02

5.0 RADIOLOGICAL DATA SUMMARY TABLES

This section summarizes the analytical results of the environmental samples, which were collected during 2002. These results, shown in Table 5.1, are presented in a format similar to that prescribed in the NRC's Radiological Assessment Branch Technical Position on Environmental Monitoring (Reference 1). The results are ordered by sample media type and then by radionuclide. The units for each media type are also given.

The left-most column contains the radionuclide of interest, the total number of analyses for that radionuclide in 2002, and the number of measurements which exceeded the Reporting Levels found in Table 2.5 of the ODCM. Measurements exceeding the Reporting Levels are classified as "Non-Routine" measurements. The second column lists the required Lower Limit of Detection (LLD) for those radionuclides that have detection capability requirements as specified in the ODCM Table 2.4. The absence of a value in this column indicates that no LLD is specified in the ODCM for that radionuclide in that media. The target LLD for any analysis is typically 30-40 percent of the most restrictive required LLD. Occasionally, the required LLD is not met. This is usually due to malfunctions in sampling equipment, which results in low sample volume. Such cases, if any, are addressed in Section 6.2.

For each radionuclide and media type, the remaining three columns summarize the data for the following categories of monitoring locations: (1) the indicator or Zone 1 stations, which are within the range of influence of the plant and which could conceivably be affected by its operation; (2) the station within Zone 1 or Zone 2 which had the highest mean concentration during 2002 for that radionuclide; and (3) the control or Zone 2 stations, which are beyond the influence of the plant. Environmental TLD or direct radiation monitoring stations are grouped into either an Inner Ring, an Outer Ring, or Control category.

In each of these columns, for each radionuclide, the following statistical values are given:

- The mean value of all concentrations, including negative values and values considered "not detectable".
- The lowest and highest concentration.
- The number of detectable measurements divided by the total number of measurements. For example, (4/20) would indicate that 4 of the 20 samples collected in 2002, for that sample type and that radionuclide, contained detectable radioactivity.

A sample is considered to yield a "detectable measurement" when the concentration exceeds three times

its associated standard deviation. The standard deviation on each measurement represents only the random uncertainty associated with the radioactive decay process (counting statistics), and not the propagation of all possible uncertainties in the analytical procedure.

The radionuclides reported in this section represent those that: 1) had an LLD requirement in Table 2.4 of the ODCM, or a Reporting Level listed in Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally-occurring or man-made; or 3) were of specific interest for any other reason. The radionuclides routinely analyzed and reported by the FANPEL for a gamma spectroscopy analysis are: Ac-Th-228, Ag-108m, Ag-110m, Ba-140, Be-7, Ce-141, Ce-144, Co-57, Co-58, Co-60, Cr-51, Cs-134, Cs-137, Fe-59, I-131, K-40, La-140, Mn-54, Nb-95, Ru-103, Ru-106, Sb-124, Sb-125, Se-75, Zn-65 and Zr-95. In no case did a radionuclide not shown in Table 5.1 appear as a "detectable measurement" during 2002.

Data from direct radiation measurements made by TLDs are provided in Table 5.2 in a format essentially the same as above. The complete listing of quarterly TLD data is provided in Table 5.3.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Air Particulates (AP) UNITS: pCi/cubic meter

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
GR-B	(135)	0.01	2.8E -2	16	4.3E -2	2.3E -2
	(0)		(1.0 - 51.0)E -2 (107/ 108)		(1.3 - 51.0)E -2 (26/ 27)	(1.4 - 7.2)E -2 (27/ 27)
Be-7	(20)		7.8E -2	16	1.0E -1	7.7E -2
	(0)		(5.2 - 15.3)E -2 (16/ 16)		(7.4 - 15.3)E -2 (4/ 4)	(6.0 - 9.1)E -2 (4/ 4)
Mn-54	(20)		9.7E -5	16	3.8E -4	-9.0E -5
	(0)		(-4.8 - 15.8)E -4 (0/ 16)		(-2.1 - 15.8)E -4 (0/ 4)	(-4.5 - 2.8)E -4 (0/ 4)
Co-58	(20)		-7.5E -5	13	1.2E -4	-8.2E -5
	(0)		(-1.7 - 2.0)E -3 (0/ 16)		(-4.8 - 6.7)E -4 (0/ 4)	(-1.2 - 0.9)E -3 (0/ 4)
Fe-59	(20)		-8.1E -5	16	3.5E -3	-1.9E -3
	(0)		(-6.0 - 5.7)E -3 (0/ 16)		(2.3 - 5.7)E -3 (0/ 4)	(-5.6 - 1.6)E -3 (0/ 4)
Co-60	(20)		0.0E 0	29	2.2E -4	2.2E -4
	(0)		(-4.5 - 4.7)E -4 (0/ 16)		(-4.1 - 5.3)E -4 (0/ 4)	(-4.1 - 5.3)E -4 (0/ 4)
Cs-134	(20)	0.05	0.0E 0	14	1.9E -4	-2.6E -4
	(0)		(-5.3 - 3.7)E -4 (0/ 16)		(-1.2 - 3.7)E -4 (0/ 4)	(-3.6 - -1.0)E -4 (0/ 4)
Cs-137	(20)	0.06	-9.4E -5	16	5.5E -5	2.0E -5
	(0)		(-7.0 - 3.2)E -4 (0/ 16)		(-1.1 - 2.6)E -4 (0/ 4)	(-3.4 - 3.7)E -4 (0/ 4)

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Mixed Grass (TG) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
Be-7	(2)		2.7E 3	11	2.7E 3	**NO DATA**
	(0)		(1.2 - 4.2)E 3 (2/ 2)		(1.2 - 4.2)E 3 (2/ 2)	
K-40	(2)		1.6E 4	11	1.6E 4	**NO DATA**
	(0)		(1.0 - 2.3)E 4 (2/ 2)		(1.0 - 2.3)E 4 (2/ 2)	
I-131	(2)		4.0E 0	11	4.0E 0	**NO DATA**
	(0)		(-1.0 - 1.1)E 2 (0/ 2)		(-1.0 - 1.1)E 2 (0/ 2)	
Cs-134	(2)		1.0E 0	11	1.0E 0	**NO DATA**
	(0)		(-1.2 - 1.4)E 1 (0/ 2)		(-1.2 - 1.4)E 1 (0/ 2)	
Cs-137	(2)		4.8E 0	11	4.8E 0	**NO DATA**
	(0)		(-1.2 - 2.2)E 1 (0/ 2)		(-1.2 - 2.2)E 1 (0/ 2)	

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Estuary Water (WE) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station With Highest Mean Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
H-3	(9)	3000	7.3E 2	12	1.1E 3	1.6E 2
	(0)		(2.0 - 270.0)E 1 (1/ 5)		(1.3 - 27.0)E 2 (1/ 3)	(-4.0 - 5.0)E 2 (0/ 4)
K-40	(24)		2.4E 2	14	2.5E 2	4.4E 1
	(0)		(1.7 - 3.1)E 2 (12/ 12)		(2.2 - 2.9)E 2 (4/ 4)	(-3.3 - 10.6)E 1 (6/ 12)
Mn-54	(24)	15	-7.3E -1	20	2.5E -3	2.5E -3
	(0)		(-3.8 - 0.2)E 0 (0/ 12)		(-1.0 - 1.4)E 0 (0/ 12)	(-1.0 - 1.4)E 0 (0/ 12)
Co-58	(24)	15	-8.8E -2	12	-5.6E -2	-5.3E -1
	(0)		(-1.1 - 2.0)E 0 (0/ 12)		(-1.1 - 2.0)E 0 (0/ 8)	(-3.8 - 2.1)E 0 (0/ 12)
Fe-59	(24)	30	-9.7E -1	12	-9.6E -1	-9.8E -1
	(0)		(-5.0 - 6.5)E 0 (0/ 12)		(-5.0 - 6.5)E 0 (0/ 8)	(-4.7 - 2.1)E 0 (0/ 12)
Co-60	(24)	15	5.6E -1	12	9.3E -1	2.5E -1
	(0)		(-8.9 - 20.0)E -1 (0/ 12)		(-2.0 - 20.0)E -1 (0/ 8)	(-1.4 - 1.3)E 0 (0/ 12)
Zn-65	(24)	30	9.9E -1	14	2.0E 0	-5.2E -1
	(0)		(-5.1 - 12.8)E 0 (0/ 12)		(1.0 - 2.9)E 0 (0/ 4)	(-7.6 - 6.5)E 0 (0/ 12)
Zr-95	(24)	15	-3.8E -1	14	2.5E -2	-8.2E -1
	(0)		(-3.2 - 2.2)E 0 (0/ 12)		(-1.1 - 1.5)E 0 (0/ 4)	(-3.1 - 1.7)E 0 (0/ 12)
I-131	(24)	15	5.2E -1	20	2.4E 0	2.4E 0
	(0)		(-3.1 - 4.5)E 0 (0/ 12)		(-4.3 - 10.4)E 0 (0/ 12)	(-4.3 - 10.4)E 0 (0/ 12)
Cs-134	(24)	15	-7.7E -2	20	4.2E -1	4.2E -1
	(0)		(-1.7 - 1.9)E 0 (0/ 12)		(-2.5 - 2.5)E 0 (0/ 12)	(-2.5 - 2.5)E 0 (0/ 12)
Cs-137	(24)	18	1.9E -1	12	6.9E -1	-1.7E -1
	(0)		(-1.8 - 3.4)E 0 (0/ 12)		(-8.0 - 34.0)E -1 (0/ 8)	(-1.5 - 1.6)E 0 (0/ 12)
Ba-140	(24)	15	-3.3E -2	20	8.6E -1	8.6E -1
	(0)		(-4.3 - 2.7)E 0 (0/ 12)		(-4.0 - 9.8)E 0 (0/ 12)	(-4.0 - 9.8)E 0 (0/ 12)

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Ground Water (WG) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station With Highest Mean Station	Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
H-3	(8)	3000	-1.7E 2	24	5.8E 1	5.8E 1
	(0)		(-8.5 - 3.8)E 2 (0/ 4)		(-5.7 - 5.8)E 2 (0/ 4)	(-5.7 - 5.8)E 2 (0/ 4)
Mn-54	(8)	15	-7.0E -1	24	1.0E 0	1.0E 0
	(0)		(-2.4 - 1.0)E 0 (0/ 4)		(-8.0 - 24.0)E -1 (0/ 4)	(-8.0 - 24.0)E -1 (0/ 4)
Co-58	(8)	15	-1.5E 0	24	-1.6E -1	-1.6E -1
	(0)		(-2.0 - -1.2)E 0 (0/ 4)		(-1.2 - 1.0)E 0 (0/ 4)	(-1.2 - 1.0)E 0 (0/ 4)
Fe-59	(8)	30	-1.6E 0	24	1.9E 0	1.9E 0
	(0)		(-3.3 - 1.0)E 0 (0/ 4)		(-9.0 - 51.0)E -1 (0/ 4)	(-9.0 - 51.0)E -1 (0/ 4)
Co-60	(8)	15	1.0E -1	24	1.5E 0	1.5E 0
	(0)		(-5.0 - 11.0)E -1 (0/ 4)		(6.0 - 28.0)E -1 (0/ 4)	(6.0 - 28.0)E -1 (0/ 4)
Zn-65	(8)	30	7.4E 0	13	7.4E 0	7.2E 0
	(0)		(-5.7 - 22.1)E 0 (0/ 4)		(-5.7 - 22.1)E 0 (0/ 4)	(3.3 - 9.3)E 0 (0/ 4)
Zr-95	(8)	15	-3.2E -1	24	5.0E -2	5.0E -2
	(0)		(-2.5 - 2.2)E 0 (0/ 4)		(-1.5 - 1.3)E 0 (0/ 4)	(-1.5 - 1.3)E 0 (0/ 4)
I-131	(8)	15	3.5E -1	24	1.6E 0	1.6E 0
	(0)		(-3.4 - 2.7)E 0 (0/ 4)		(-4.0 - 32.0)E -1 (0/ 4)	(-4.0 - 32.0)E -1 (0/ 4)
Cs-134	(8)	15	-5.6E -1	24	-3.0E -2	-3.0E -2
	(0)		(-3.2 - 1.1)E 0 (0/ 4)		(-1.1 - 0.7)E 0 (0/ 4)	(-1.1 - 0.7)E 0 (0/ 4)
Cs-137	(8)	18	-9.2E -2	13	-9.2E -2	-6.2E -1
	(0)		(-1.5 - 1.3)E 0 (0/ 4)		(-1.5 - 1.3)E 0 (0/ 4)	(-2.4 - 0.1)E 0 (0/ 4)
Ba-140	(8)	15	9.0E -1	13	9.0E -1	-1.0E 0
	(0)		(-3.0 - 19.0)E -1 (0/ 4)		(-3.0 - 19.0)E -1 (0/ 4)	(-4.6 - 1.8)E 0 (0/ 4)

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Sediment (SE) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
Be-7	(12)		2.3E 2	16	3.4E 2	NO DATA
	(0)		(-3.7 - 7.7)E 2 (0/ 12)		(8.0 - 77.0)E 1 (0/ 6)	
K-40	(12)		2.2E 4	18	2.3E 4	NO DATA
	(0)		(2.1 - 2.4)E 4 (12/ 12)		(2.1 - 2.4)E 4 (6/ 6)	
Co-58	(12)		-1.7E 1	18	-1.1E 1	NO DATA
	(0)		(-5.0 - 2.2)E 1 (0/ 12)		(-5.0 - 2.2)E 1 (0/ 6)	
Co-60	(12)		2.1E 1	16	2.1E 1	NO DATA
	(0)		(-2.9 - 5.7)E 1 (0/ 12)		(-3.0 - 35.0)E 0 (0/ 6)	
Cs-134	(12)	150	-9.4E 0	18	-3.8E 0	NO DATA
	(0)		(-8.7 - 4.2)E 1 (0/ 12)		(-5.7 - 4.2)E 1 (0/ 6)	
Cs-137	(12)	180	1.9E 2	18	1.9E 2	NO DATA
	(0)		(8.0 - 27.7)E 1 (11/ 12)		(1.3 - 2.8)E 2 (6/ 6)	
Th-232	(12)		9.8E 2	16	9.9E 2	NO DATA
	(0)		(7.5 - 12.5)E 2 (12/ 12)		(7.5 - 12.5)E 2 (6/ 6)	

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Marine Algae (AL) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)	Required LLD	Indicator Stations Mean Range (No. Detected***)	Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
Be-7 (12) (0)		1.5E 2 (-7.0 - 5.0)E 2 (0/ 12)	11	2.7E 2 (2.0 - 50.0)E 1 (0/ 9)	**NO DATA**
K-40 (12) (0)		5.3E 3 (3.7 - 7.7)E 3 (12/ 12)	11	5.4E 3 (3.7 - 7.7)E 3 (9/ 9)	**NO DATA**
Mn-54 (12) (0)		-2.3E 0 (-2.5 - 1.1)E 1 (0/ 12)	14	2.9E 0 (0.0 - 7.2)E 0 (0/ 3)	**NO DATA**
Co-58 (12) (0)		1.4E 0 (-2.2 - 5.9)E 1 (0/ 12)	14	1.5E 1 (-1.2 - 5.9)E 1 (0/ 3)	**NO DATA**
Fe-59 (12) (0)		5.0E -1 (-1.0 - 0.7)E 2 (0/ 12)	14	3.6E 1 (0.0 - 6.1)E 1 (0/ 3)	**NO DATA**
Co-60 (12) (0)		6.9E 0 (-7.0 - 23.0)E 0 (0/ 12)	14	1.1E 1 (-1.0 - 17.0)E 0 (0/ 3)	**NO DATA**
Zn-65 (12) (0)		-2.6E 1 (-1.1 - 0.3)E 2 (0/ 12)	11	-2.3E 1 (-8.2 - 2.7)E 1 (0/ 9)	**NO DATA**
Cs-134 (12) (0)		8.7E -1 (-6.9 - 11.0)E 0 (0/ 12)	11	1.6E 0 (-6.7 - 11.0)E 0 (0/ 9)	**NO DATA**
Cs-137 (12) (0)		1.0E 0 (-1.8 - 1.3)E 1 (0/ 12)	11	1.9E 0 (-1.8 - 1.3)E 1 (0/ 9)	**NO DATA**

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Milk (TM) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
K-40	(24)		1.3E 3	18	1.3E 3	1.2E 3
	(0)		(1.2 - 1.5)E 3 (12/ 12)		(1.2 - 1.5)E 3 (12/ 12)	(9.2 - 14.7)E 2 (12/ 12)
Sr-89	(8)		-3.7E 0	25	5.0E -2	5.0E -2
	(0)		(-6.4 - 0.5)E 0 (0/ 4)		(-8.1 - 4.3)E 0 (0/ 4)	(-8.1 - 4.3)E 0 (0/ 4)
Sr-90	(8)		1.8E 0	25	2.3E 0	2.3E 0
	(0)		(6.7 - 26.0)E -1 (3/ 4)		(1.6 - 3.0)E 0 (4/ 4)	(1.6 - 3.0)E 0 (4/ 4)
Cs-134	(24)	15	-4.2E -1	25	1.8E -1	1.8E -1
	(0)		(-3.2 - 2.0)E 0 (0/ 12)		(-1.9 - 1.7)E 0 (0/ 12)	(-1.9 - 1.7)E 0 (0/ 12)
Cs-137	(24)	18	2.4E 0	25	3.0E 0	3.0E 0
	(0)		(-5.0 - 49.0)E -1 (0/ 12)		(-1.0 - 100.0)E-1 (1/ 12)	(-1.0 - 100.0)E-1 (1/ 12)
Ba-140	(24)	15	-1.1E -1	25	-9.2E -2	-9.2E -2
	(0)		(-6.0 - 2.2)E 0 (0/ 12)		(-2.7 - 2.4)E 0 (0/ 12)	(-2.7 - 2.4)E 0 (0/ 12)

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Fish (FH) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station With Highest Mean Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
Be-7	(4)		1.5E 1	11	1.5E 1	-7.4E 1
	(0)		(0.0 - 3.0)E 1 (0/ 2)		(0.0 - 3.0)E 1 (0/ 2)	(-2.1 - 0.6)E 2 (0/ 2)
K-40	(4)		2.5E 3	24	3.3E 3	3.3E 3
	(0)		(2.1 - 2.9)E 3 (2/ 2)		(2.9 - 3.7)E 3 (2/ 2)	(2.9 - 3.7)E 3 (2/ 2)
Mn-54	(4)	130	1.1E 1	11	1.1E 1	6.9E 0
	(0)		(1.0 - 1.2)E 1 (0/ 2)		(1.0 - 1.2)E 1 (0/ 2)	(4.8 - 9.0)E 0 (0/ 2)
Co-58	(4)	130	1.7E 1	11	1.7E 1	-5.9E 0
	(0)		(1.4 - 1.9)E 1 (0/ 2)		(1.4 - 1.9)E 1 (0/ 2)	(-9.0 - -2.8)E 0 (0/ 2)
Fe-59	(4)	260	-1.3E 1	24	2.1E 1	2.1E 1
	(0)		(-1.4 - -1.2)E 1 (0/ 2)		(1.0 - 3.2)E 1 (0/ 2)	(1.0 - 3.2)E 1 (0/ 2)
Co-60	(4)	130	3.8E 0	11	3.8E 0	-1.2E 1
	(0)		(1.6 - 6.0)E 0 (0/ 2)		(1.6 - 6.0)E 0 (0/ 2)	(-1.6 - -0.8)E 1 (0/ 2)
Zn-65	(4)	260	-7.0E 0	11	-7.0E 0	-4.1E 1
	(0)		(-4.6 - 3.2)E 1 (0/ 2)		(-4.6 - 3.2)E 1 (0/ 2)	(-7.4 - -0.8)E 1 (0/ 2)
Cs-134	(4)	130	-7.5E -1	11	-7.5E -1	-2.7E 0
	(0)		(-7.0 - 5.5)E 0 (0/ 2)		(-7.0 - 5.5)E 0 (0/ 2)	(-9.3 - 4.0)E 0 (0/ 2)
Cs-137	(4)	150	1.2E 1	11	1.2E 1	-1.5E 1
	(0)		(7.0 - 16.2)E 0 (0/ 2)		(7.0 - 16.2)E 0 (0/ 2)	(-2.0 - -1.0)E 1 (0/ 2)

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Lobster and Rock Crab (CR) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station With Highest Mean Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
Be-7	(8)		-1.5E 1	24	3.4E 1	3.4E 1
	(0)		(-1.6 - 3.3)E 2 (0/ 4)		(-5.5 - 16.0)E 1 (0/ 4)	(-5.5 - 16.0)E 1 (0/ 4)
K-40	(8)		2.4E 3	24	2.4E 3	2.4E 3
	(0)		(1.3 - 3.3)E 3 (4/ 4)		(2.1 - 2.8)E 3 (4/ 4)	(2.1 - 2.8)E 3 (4/ 4)
Mn-54	(8)	130	-3.3E -1	24	2.4E 0	2.4E 0
	(0)		(-9.3 - 6.0)E 0 (0/ 4)		(-1.6 - 1.9)E 1 (0/ 4)	(-1.6 - 1.9)E 1 (0/ 4)
Co-58	(8)	130	2.0E 0	11	2.0E 0	2.5E -1
	(0)		(-3.9 - 7.0)E 0 (0/ 4)		(-3.9 - 7.0)E 0 (0/ 4)	(-3.0 - 5.0)E 0 (0/ 4)
Fe-59	(8)	260	-3.8E 0	24	1.4E 1	1.4E 1
	(0)		(-4.6 - 3.7)E 1 (0/ 4)		(-3.0 - 37.0)E 0 (0/ 4)	(-3.0 - 37.0)E 0 (0/ 4)
Co-60	(8)	130	1.8E 0	11	1.8E 0	7.2E -1
	(0)		(-9.8 - 16.0)E 0 (0/ 4)		(-9.8 - 16.0)E 0 (0/ 4)	(-9.9 - 7.8)E 0 (0/ 4)
Zn-65	(8)	260	-8.5E 0	11	-8.5E 0	-2.5E 1
	(0)		(-2.0 - 1.0)E 1 (0/ 4)		(-2.0 - 1.0)E 1 (0/ 4)	(-3.7 - -0.7)E 1 (0/ 4)
Cs-134	(8)	130	-3.5E 0	24	-1.3E -1	-1.3E -1
	(0)		(-1.8 - 0.5)E 1 (0/ 4)		(-2.9 - 4.0)E 0 (0/ 4)	(-2.9 - 4.0)E 0 (0/ 4)
Cs-137	(8)	150	-5.8E -1	11	-5.8E -1	-9.4E 0
	(0)		(-1.6 - 1.4)E 1 (0/ 4)		(-1.6 - 1.4)E 1 (0/ 4)	(-1.2 - -0.6)E 1 (0/ 4)

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Mussel (MU) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station With Highest Mean Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
Be-7	(4)		-6.0E 1	24	-2.5E 1	-2.5E 1
	(0)		(-1.2 - 0.0)E 2 (0/ 2)		(-1.5 - 1.0)E 2 (0/ 2)	(-1.5 - 1.0)E 2 (0/ 2)
K-40	(4)		1.3E 3	11	1.3E 3	6.6E 2
	(0)		(8.8 - 17.4)E 2 (2/ 2)		(8.8 - 17.4)E 2 (2/ 2)	(4.9 - 8.3)E 2 (1/ 2)
Mn-54	(4)	130	-6.0E 0	24	1.3E 1	1.3E 1
	(0)		(-6.0 - -6.0)E 0 (0/ 2)		(9.0 - 16.0)E 0 (0/ 2)	(9.0 - 16.0)E 0 (0/ 2)
Co-58	(4)	130	-1.3E 1	24	5.5E 0	5.5E 0
	(0)		(-1.6 - -0.9)E 1 (0/ 2)		(-1.0 - 2.1)E 1 (0/ 2)	(-1.0 - 2.1)E 1 (0/ 2)
Fe-59	(4)	260	-1.2E 1	11	-1.2E 1	-7.0E 1
	(0)		(-3.9 - 1.5)E 1 (0/ 2)		(-3.9 - 1.5)E 1 (0/ 2)	(-9.6 - -4.3)E 1 (0/ 2)
Co-60	(4)	130	-5.0E -1	24	0.0E 0	0.0E 0
	(0)		(-3.0 - 2.0)E 0 (0/ 2)		(-1.0 - 1.0)E 0 (0/ 2)	(-1.0 - 1.0)E 0 (0/ 2)
Zn-65	(4)	260	-1.8E 1	11	-1.8E 1	-2.3E 1
	(0)		(-3.6 - 0.0)E 1 (0/ 2)		(-3.6 - 0.0)E 1 (0/ 2)	(-4.4 - -0.2)E 1 (0/ 2)
Cs-134	(4)	130	1.3E 1	11	1.3E 1	2.5E 0
	(0)		(1.2 - 1.3)E 1 (0/ 2)		(1.2 - 1.3)E 1 (0/ 2)	(2.1 - 3.0)E 0 (0/ 2)
Cs-137	(4)	150	-2.2E 0	11	-2.2E 0	-3.5E 0
	(0)		(-3.4 - -1.0)E 0 (0/ 2)		(-3.4 - -1.0)E 0 (0/ 2)	(-1.4 - 0.7)E 1 (0/ 2)

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1
Radiological Environmental Program Summary
Maine Yankee Nuclear Power Station, Wiscasset, ME
(January - December 2002)

MEDIUM: Soft Shell Clams (MA) UNITS: pCi/kg

Radionuclides* (No. Analyses) (Non-Routine**)	Required LLD	Indicator Stations Mean Range (No. Detected***)	Station With Highest Mean Station	Station With Highest Mean Mean Range (No. Detected***)	Control Stations Mean Range (No. Detected***)
Be-7 (4)		5.3E 1	18	9.0E 1	NO DATA
(0)		(-4.8 - 15.0)E 1 (0/ 4)		(3.0 - 15.0)E 1 (0/ 2)	
K-40 (4)		1.4E 3	16	1.4E 3	NO DATA
(0)		(1.1 - 1.6)E 3 (4/ 4)		(1.1 - 1.6)E 3 (2/ 2)	
Mn-54 (4)	130	-2.8E 0	16	0.0E 0	NO DATA
(0)		(-9.0 - 8.2)E 0 (0/ 4)		(-8.2 - 8.2)E 0 (0/ 2)	
Co-58 (4)	130	1.0E 0	18	2.8E 0	NO DATA
(0)		(-1.2 - 1.7)E 1 (0/ 4)		(-1.2 - 1.7)E 1 (0/ 2)	
Fe-59 (4)	260	1.3E 0	18	2.1E 1	NO DATA
(0)		(-2.9 - 2.3)E 1 (0/ 4)		(1.9 - 2.3)E 1 (0/ 2)	
Co-60 (4)	130	2.2E 0	18	2.8E 0	NO DATA
(0)		(-7.7 - 13.3)E 0 (0/ 4)		(-7.7 - 13.3)E 0 (0/ 2)	
Zn-65 (4)	260	-4.5E 0	18	5.0E -1	NO DATA
(0)		(-2.7 - 0.8)E 1 (0/ 4)		(-1.0 - 2.0)E 0 (0/ 2)	
Cs-134 (4)	130	-2.6E 0	16	2.6E 0	NO DATA
(0)		(-1.7 - 0.4)E 1 (0/ 4)		(1.2 - 4.0)E 0 (0/ 2)	
Cs-137 (4)	150	-3.5E 0	16	-2.3E 0	NO DATA
(0)		(-8.0 - 2.8)E 0 (0/ 4)		(-7.3 - 2.8)E 0 (0/ 2)	

* The radionuclides reported in this table are those that: 1) had an LLD requirement in ODCM Table 2.4, or a Reporting Level in ODCM Table 2.5, or 2) had a positive measurement of radioactivity, whether it was naturally occurring or man-made; or 3) were of specific interest for any other reason.

** Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table 2.5.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

TABLE 5.2

ENVIRONMENTAL TLD DATA SUMMARY
MAINE YANKEE NUCLEAR POWER STATION, WISCASSET, ME
(JANUARY - DECEMBER 2002)
(μR/hr)

INNER RING TLDs	OUTER RING TLDs	STATION WITH HIGHEST MEAN	CONTROL TLDs
MEAN ± S.D.	MEAN ± S.D.	STA. MEAN ± S.D.	MEAN ± S.D.
RANGE	RANGE	NO. RANGE	RANGE
(NO. MEASUREMENTS)*	(NO. MEASUREMENTS)*	(NO. MEASUREMENTS)*	(NO. MEASUREMENTS)*
7.1 ± 0.7	7.4 ± 0.8	37 9.7 ± 0.4	8.1 ± 1.3
5.4 - 9.8	6.1 - 9.5	9.5 - 10.2	6.7 - 10.2
72	68	4	12

* Each "measurement" is based on quarterly readings from five TLD elements.
NOTE: S.D. = standard deviation.

TABLE 5.3

2002 Environmental TLD Measurements (Micro-R per hour)

Sta. No.	Description	1st Quarter Exp.	S.D.	2nd Quarter Exp.	S.D.	3rd Quarter Exp.	S.D.	4th Quarter Exp.	S.D.	Annual Ave. Exp.
TL-01	Old Ferry Rd.	8.1	0.5	8.1	0.3	9.8	0.8	6.7	0.2	8.2
TL-02	Old Ferry Rd.	6.5	0.4	6.7	0.3	6.6	0.4	7.7	0.3	6.9
TL-03	Bailey House (ESL)	6.2	0.6	7.0	0.3	7.2	0.3	7.4	0.3	7.0
TL-04	Westport Isl./Rt. 144	5.4	0.4	6.1	0.3	6.6	0.3	5.8	0.3	6.0
TL-05	MY Information Center	6.8	0.7	7.0	0.3	7.1	0.5	7.7	0.3	7.1
TL-06	Rt. 144/Greenleaf Rd.	7.4	0.4	7.6	0.4	7.4	0.4	7.4	0.3	7.4
TL-07	Westport Isl./Rt. 144	6.7	0.5	6.9	0.4	6.9	0.4	6.8	0.3	6.8
TL-08	MY Screenhouse	6.9	0.5	6.5	0.3	6.6	0.4	6.7	0.3	6.7
TL-09	Westport Isl./Rt. 144	6.6	0.4	7.2	0.3	7.2	0.4	6.9	0.2	7.0
TL-10	Bailey Point	6.7	0.5	6.5	0.3	6.2	0.3	6.6	0.3	6.5
TL-11	Mason Station	7.3	0.4	7.8	0.4	7.7	0.3	7.3	0.3	7.5
TL-12	Westport Firehouse	6.8	0.5	7.3	0.4	6.9	0.3	7.1	0.4	7.0
TL-13	Foxbird Island	7.2	0.5	7.5	0.4	7.2	0.3	7.3	0.3	7.3
TL-14	Eaton Farm	6.7	0.5	6.5	0.3	6.8	0.3	6.6	0.5	6.7
TL-15	Eaton Farm	7.0	0.5	6.8	0.3	7.2	0.4	6.7	0.3	6.9
TL-16	Eaton Farm	7.1	0.5	7.3	0.4	7.0	0.4	6.8	0.3	7.1
TL-17	Eaton Farm Rd.	8.4	0.7	8.8	0.7	8.4	0.4	7.9	0.4	8.4
TL-18	Eaton Farm Rd.	7.4	0.5	7.3	0.4	7.2	0.3	7.0	0.3	7.2
TL-19	Eaton Farm Rd.	7.7	0.5	7.2	0.3	7.4	0.3	7.2	0.4	7.4
TL-20	Bradford Rd.	6.3	0.4	6.9	0.3	6.8	0.4	6.9	0.3	6.7
TL-21	Federal St.	7.2	0.4	6.5	0.2	7.0	0.4	7.0	0.3	6.9
TL-22	Cochran Rd.	7.2	0.5	6.9	0.4	7.3	0.7	7.1	0.3	7.1
TL-23	Middle Rd.	9.5	0.7	9.2	0.8	9.4	0.8	9.1	0.4	9.3
TL-24	River Rd.	7.7	0.5	7.2	0.3	7.5	0.5	7.3	0.3	7.4
TL-25	River Rd./Rt. 27	7.4	0.6	7.1	0.3	7.3	0.5	7.5	0.5	7.3
TL-26	Boothbay RR Museum	7.9	0.5	7.0	0.5	7.2	0.4	7.1	0.5	7.3
TL-27	Barters Island	7.3	0.5	6.4	0.3	7.5	0.6	7.1	0.3	7.1
TL-28	Rt. 144/E. Shore Rd.	6.4	0.7	7.0	0.2	7.2	0.5	6.8	0.3	6.8
TL-29	Harrison's Trailer	6.5	0.5	6.9	0.3	6.6	0.4	6.9	0.4	6.7
TL-30	Leeman Farm	8.3	0.5	8.2	0.3	8.2	0.6	8.1	0.4	8.2
TL-31	Barley Neck Rd.	8.6	0.6	8.5	0.4	8.7	0.5	8.6	0.3	8.6
TL-32	Baker Farm	7.5	0.5	7.8	0.3	7.8	0.7	7.6	0.2	7.7
TL-33	Rt. 127	7.5	0.5	7.2	0.3	6.9	0.5	7.9	1.3	7.3
TL-34	Rt. 127	7.0	0.5	7.3	0.3	7.8	0.4	7.1	0.3	7.3
TL-35	Rt. 127	6.3	0.4	6.4	0.3	7.1	0.5	6.1	0.3	6.5
TL-36	Boothbay Hbr.Fire Sta.	7.7	0.6	6.9	0.3	6.7	0.3	7.2	0.4	7.1
TL-37	Bath Fire Sta.	10.2	0.6	9.5	0.4	9.5	0.5	9.6	0.5	9.7
TL-38	Dresden Station	7.0	0.5	7.4	0.3	7.8	0.5	7.3	0.4	7.3

Note:
Exp. = Exposure Rate in MicroR/hr
S.D. = Standard Deviation
S.E. = Standard Error of the Mean

TABLE 5.3
(continued)

2002 Environmental TLD Measurements
(Micro-R per hour)

Sta. No.	Direction From Centerline of ISFSI	1st Quarter Exp.	1st Quarter S.D.	2nd Quarter Exp.	2nd Quarter S.D.	3rd Quarter Exp.	3rd Quarter S.D.	4th Quarter Exp.	4th Quarter S.D.	Annual Ave. Exp.
TL-I-01	N	6.5	0.4	7.6	0.5	7.8	0.3	7.2	0.3	7.3
TL-I-02	NNE	6.8	0.4	7.1	0.3	7.5	0.5	7.5	0.3	7.2
TL-I-03	NE	7.5	0.6	8.0	0.4	8.1	0.4	8.1	0.3	7.9
TL-I-04	ENE	6.7	0.5	7.2	0.3	7.3	0.4	7.7	0.3	7.2
TL-I-05	E	6.2	0.6	7.0	0.3	7.2	0.3	7.4	0.3	7.0
TL-I-06	ESE	7.8	0.6	8.4	0.3	8.6	0.5	8.6	0.2	8.3
TL-I-07	SE	6.9	0.4	7.3	0.5	7.0	0.4	7.4	0.3	7.2
TL-I-08	SSE	6.6	0.5	7.2	0.4	7.0	0.4	7.5	0.3	7.1
TL-I-09	S	7.1	0.7	7.9	0.3	7.8	0.4	7.9	0.4	7.7
TL-I-10	SSW	6.8	0.7	7.0	0.3	7.1	0.5	7.7	0.3	7.1
TL-I-11	SW	8.1	0.5	8.4	0.4	8.7	0.5	9.0	0.3	8.5
TL-I-12	WSW	7.9	0.6	9.1	0.4	8.5	0.5	8.8	0.5	8.6
TL-I-13	W	7.9	0.6	8.3	0.3	9.3	0.4	9.2	0.4	8.6
TL-I-14	WNW	7.8	0.7	8.4	0.3	8.5	0.5	8.1	0.5	8.2
TL-I-15	NW	8.3	0.6	8.9	0.3	8.8	0.3	8.3	0.3	8.6
TL-I-16	NNW	8.8	0.7	9.5	0.4	9.4	0.7	9.1	0.5	9.2
TL-I-17	SE	5.3	0.5	5.2	0.3	5.5	0.3	6.3	0.3	5.6

6.0 ANALYSIS OF ENVIRONMENTAL RESULTS

6.1 Sampling Program Deviations

Table 2.3 of the Offsite Dose Calculation Manual (ODCM) allows for deviations in the REMP sampling schedule "if specimens are unobtainable due to hazardous conditions, to seasonal unavailability or to malfunction of sampling equipment." Such deviations do not compromise the program's effectiveness and in fact are considered insignificant with respect to what is normally anticipated for any radiological environmental monitoring program. The deviations for 2002 were as follows:

- During the sampling period ending January 23rd, the air samplers at stations AP-11, AP-13, AP-14, AP-16 lost power. However, the sample volume collected during the sampling period was sufficient for analysis.
- On January 15th, the ISCO sampler for estuary water sampling station WE-12 (Plant Outfall) was found to be inoperable due to a power pack failure. The power pack was replaced and no sample was collected for this week.
- On January 22nd, the ISCO sampler for estuary water sampling station WE-12 had failed to sample for the entire week. No grab sample could be taken due to ice build-up at this location.
- On February 12th, the ISCO sampler at estuary water sampling station WE-12 was found to be turned off by a construction crew working around the forebay. The ISCO pump was turned on and re-programmed. A grab sample was unable to be obtained due to ice build-up. Therefore, no sample was collected during this week.
- On February 19th, the ISCO sampler at estuary water sampling station WE-12 had failed to sample for the entire 1 week sampling period. The sampler was reprogrammed. No grab sample was collected for the week due to ice build-up.
- On May 28th, the ISCO sampler at station WE-12 experienced a loss of power. As a corrective action, a back-up power supply was established for the ISCO sampler. A condition report was also written on the issue.
- During June 3rd – 4th, the ISCO sampler for station WE-12 experienced a loss of power, which interrupted sampling for 22 hours. The reduced sampling was directly related to an improper adjustment made to the programmed sampling period and a wearing of the sample suction line. As a corrective action, the sampler was observed and adjustments were made accordingly to ensure proper sample quantity. In addition, the sample line was changed out.
- During the sampling period ending June 5th, the vacuum pump failed at air particulate sampling station 16. The unit was replaced, but no sample was collected for this period.

6.2 Comparison of Achieved LLDs with Requirements

Table 2.4 of the ODCM gives the required Lower Limits of Detection (LLDs) for environmental sample analyses. (This table is duplicated in Table 4.4 of this report.) Occasionally an LLD is not achievable due to a situation such as a low sample volume caused by sampling equipment malfunction. In such a case, ODCM Appendix C, Section 1 requires a discussion of the situation. At the FANPEL, the target LLD for any analysis is typically 30-40 percent of the most restrictive required LLD. Expressed differently, the typical sensitivities achieved for each analysis are at least 2.5 to 3 times greater than that required by the Maine Yankee ODCM.

For each analysis having an LLD requirement in ODCM Table 2.4, the *a posteriori* (after the fact) LLD calculated for that analysis was compared with the required LLD. During 2002, over 700 analyses had an LLD requirement listed in Table 2.4. The following samples did not meet the required LLD:

- For the sampling period ending February 12th, the LLD was not met for air particulate sampling stations AP-11, AP-13, AP-14, AP-16 and AP-29 due to low sample volume.
- For the sampling period ending June 5th, the LLD was not met for air particulate sampling station AP-15 due to low sample volume.
- For the April sampling period, the I-131 LLD was not met for both estuary water sampling stations.

6.3 Comparison of Results against Reporting Levels

Section 2.4.3.3 of the ODCM requires the notification of the NRC (via the Annual Radioactive Effluent Release Report) whenever a Reporting Level in ODCM Table 2.5 is exceeded. Reporting Levels are the environmental concentrations that relate to the ALARA design dose objectives of 10 CFR 50, Appendix I. It should be noted that environmental concentrations are averaged over calendar quarters for the purposes of this comparison, and that Reporting Levels apply only to measured levels of radioactivity due to plant effluents. During 2002, no Reporting Levels were exceeded.

6.4 Data Analysis by Media Type

The 2002 REMP data for each media type is discussed below. Whenever a specific measurement result is presented, it is given as the concentration plus or minus one standard deviation. This standard deviation represents only the random uncertainty associated with the radioactive decay process (counting statistics), and not the propagation of all possible uncertainties in the analytical procedure. A sample is considered to yield a "detectable measurement" when the concentration exceeds three times its associated standard deviation. With respect to data plots, it should be noted that all values for a given graph are plotted, whether or not they are considered statistically significant (detectable).

associated standard deviation. With respect to data plots, it should be noted that all values for a given graph are plotted, whether or not they are considered statistically significant (detectable).

6.4.1 Airborne Pathways

6.4.1.1 Air Particulates

The air particulate filters from each of the five sampling sites were analyzed bi-weekly for gross-beta radioactivity and are designated GR-B in Table 5.1. At the end of each quarter, the filters from each sampling site were composited for a gamma analysis. The results of the air particulate sampling program are provided in Table 5.1 and are plotted in Figure 6.1 through Figure 6.5. As shown in Figure 6.1, there has been no significant difference between the quarterly average concentration at the indicator (near-plant) stations and the control (distant from plant) stations. Also notable is a distinct annual cycle, with the minimum concentration in the second quarter, and the maximum concentration in the first quarter.

Figures 6.2 through 6.5 show the gross beta concentration at each air particulate sampling location alongside the control sampling location at AP-29 (Dresden Substation) for the same period. It can be readily seen that the gross-beta measurements on air particulate filters fluctuate significantly over the course of a year. The measurements from control station AP-29 vary similarly, indicating that these fluctuations are due to regional changes in naturally-occurring airborne radioactive materials, and not due to Maine Yankee activities. Table 5.1 shows that the mean gross beta concentrations from indicator stations are similar to those from control locations, further supporting this conclusion. The only gamma emitting radionuclide detected on air particulate filters was Be-7, a naturally-occurring cosmogenic radionuclide.

6.4.1.2 Mixed Grasses

Although not required by the Maine Yankee ODCM, mixed grass samples were collected twice at the Bailey Farm during 2002. As expected, naturally occurring K-40 and Be-7 were detected in the samples.

6.4.2 Waterborne Pathways

6.4.2.1 Estuary Water

Aliquots of estuary water were automatically collected in the discharge canal outfall every two hours during January through August 2002. These composited samples were collected monthly and sent to the FANPEL for analysis. During September, the composite sampler at the plant outfall (WE-12) was

removed and replaced by grab sampling at the boat dock (WE-14). Monthly grab samples were also collected at the control location. Table 5.1 shows that naturally-occurring K-40 was detected in samples collected at the WE-12 (plant outfall), as is typical with estuary water. The monthly samples were composited by FANPEL each quarter, by station, for Tritium (H-3) analyses. The second quarter composite for station WE-12 showed a positive tritium concentration of 2700 pCi/L. This can be attributed to a reactor cavity release that was performed during during April and May. Figure 6.6 provides a trend plot for quarterly composite H-3 concentrations at WE-12. All concentrations are plotted regardless of whether they are considered "detectable" or "not detectable". Those concentrations determined to be positive as defined in Section 5 are indicated with a black symbol. As shown in Figure 6.6, all detectable tritium concentrations were well below the Reporting Level for tritium in non-drinking water of 30,000 pCi/L.

6.4.2.2 Ground Water

Although not a requirement of the Maine Yankee REMP, quarterly ground water samples were collected from the well at the Environmental Services building and at a control location. The results of the gamma isotopic analyses are shown in Table 5.1. None of these off-site samples contained detectable radioactivity.

6.4.2.3 Shoreline Sediment

Semiannual sediment core samples were collected from two on-site locations during 2002. Each set of samples was segmented by depth (0-5, 5-10, 10-15 cm) and analyzed for gamma-emitting radionuclides. The results presented in Table 5.1 show that, as expected, naturally occurring K-40 and Th-232 was detected in all samples. In addition, Cs-137 was detected in 11 out of the 12 segments. Although some Cs-137 is expected to be present from worldwide weapons testing fallout, much of the Cs-137 is due to early plant operations. In the early years of plant operation, routine liquid effluents were discharged in the sediment collection area. Due to poor diffusion with this method, an underwater diffuser was installed, and now the liquid effluents are discharged into the Back River. The Cs-137 levels in each sediment core section are plotted in Figures 6.7 and 6.8. These graphs show a range of Cs-137 concentrations across core sections. The two figures show that the levels have not changed significantly over the past several years.

Although there is no Reporting Level for Cs-137 in sediment samples, one might appreciate the negligible dose consequence when the measured concentrations are conservatively compared against the reporting levels for the fish ingestion pathway. The mean and maximum Cs-137 measurements were 200 and 277 pCi/kg (dry), respectively, both well under the Cs-137 Reporting Level in fish of 2000 pCi/kg.

6.4.2.4 Marine Algae

Although not required by the Maine Yankee ODCM, mixed samples of *Fucus* and *Ascophyllum* marine algae (seaweed) were collected at Long Ledge every month during 2002. All samples were analyzed for gamma-emitting radionuclides. As expected, naturally-occurring K-40 was detected in all of the samples.

6.4.3 Ingestion Pathways

6.4.3.1 Milk

Milk samples were collected monthly when available during 2002 at one indicator and one control location. Each sample collected was analyzed for gamma-emitting radionuclides. Although not an ODCM requirement, the samples were composited quarterly by location and analyzed for Sr-89 and Sr-90.

Cs-137 was detected in one of the control samples. Figures 6.9 and 6.10 show the Cs-137 concentration in cow milk for 2002. The annual average Cs-137 concentrations in cow milk are similar to previous years. All Cs-137 concentrations, whether considered "detectable" or "non-detectable", are plotted in Figure 6.9.

Sr-90 activity was detected in three out of four indicator samples, as well as all of the control samples. Figure 6.11 shows the Sr-90 concentrations in quarterly composited cow milk for 2002. The amount of strontium in milk is a function of many dietary factors, primarily calcium concentration and the degree of mineral exchange in the bones, and may be observed in the milk once an uptake has occurred. Neither the cesium nor strontium in the milk is attributable to plant activities but rather is due to residual weapons fallout concentrations of Cs-137 and Sr-90.

6.4.3.2 Fish & Invertebrates

Semiannual samples of fish (FH) and invertebrates (lobster (HA), rock crab (CA) and blue mussel (MU)) were collected from locations -11 and -24 during 2002. The media code for the combined category of lobster and rock crab has been designated as CR in Table 5.1. Soft-shell clams (*Mya arenaria* - MA) were collected from two locations within Bailey Cove. The edible portions of each of these biota were analyzed for gamma-emitting radionuclides. As expected in biological matter, naturally occurring K-40 was detected in 19 out of 20 fish and invertebrate samples. No other radionuclides were detected.

6.4.4 Direct Radiation Pathway

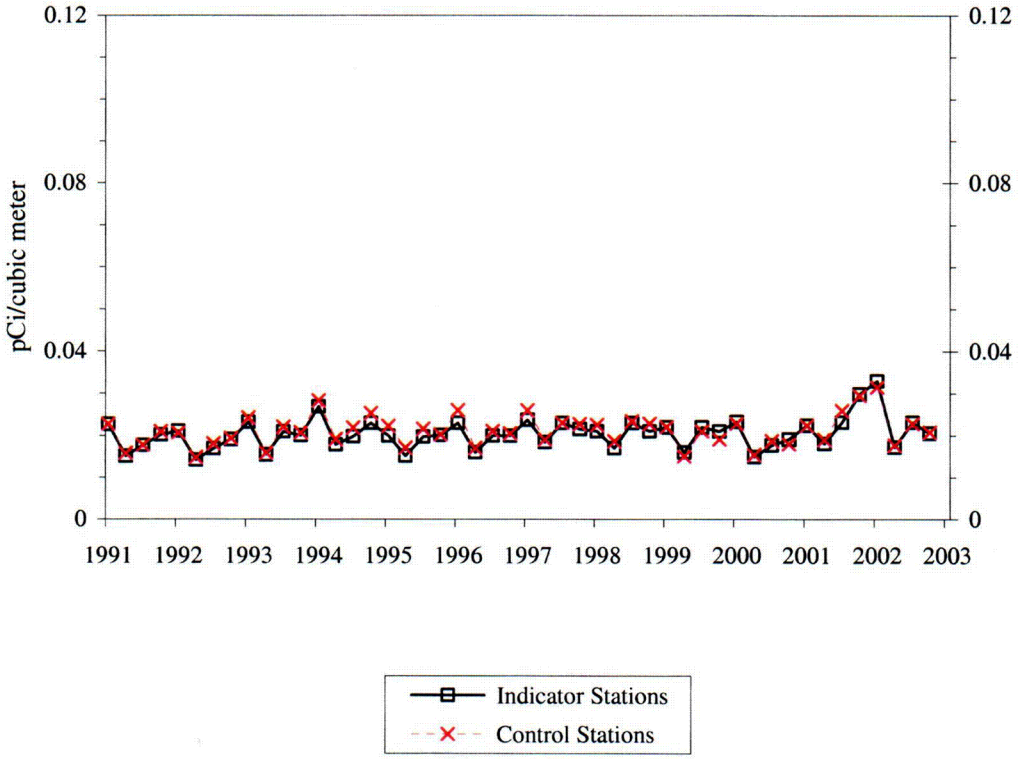
Direct radiation is continuously measured at 38 locations surrounding the Maine Yankee plant with the use of thermoluminescent dosimeters (TLDs). These are collected every calendar quarter for readout at the FANPEL.

As can be seen in Figures 6.13 to 6.23, there is a distinct annual cycle at both indicator and control locations. The lowest point of the cycle occurs during the winter months. This is due primarily to the attenuating effect of the snow cover on radon emissions and on direct irradiation by naturally-occurring radionuclides in the soil. Differing amounts of these naturally-occurring radionuclides in the underlying soil, rock or nearby building materials result in different radiation levels between one field site and another. It can be seen from Figure 6.20 that the TLD at Middle Road in Edgecomb (TL-23) has historically given slightly elevated readings. This is apparently due to its close proximity to a ledge outcrop.

From Tables 5.2 and 5.3, as well as from Figure 6.13, it can be seen that the Inner and Outer Ring TLD mean exposure rates were not substantially different in 2002, and that the Control TLD mean exposure rate was slightly greater than that at the Inner and Outer Rings.

FIGURE 6.1

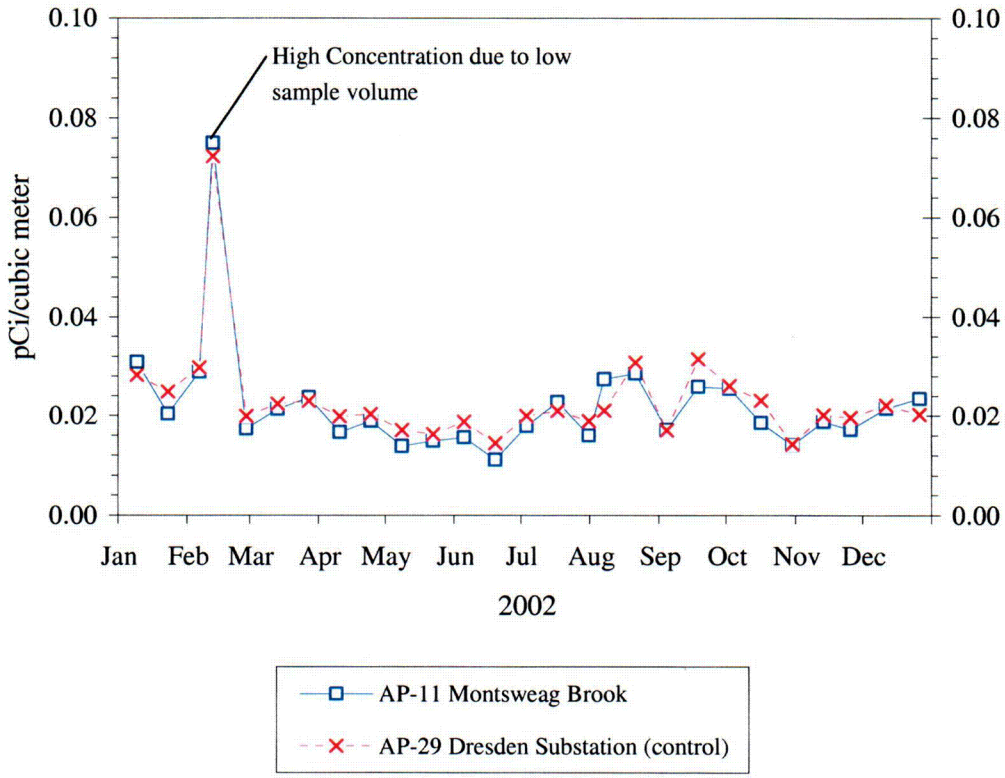
GROSS-BETA MEASUREMENTS
ON AIR PARTICULATE FILTERS
QUARTERLY AVERAGE CONCENTRATIONS



C03

FIGURE 6.2

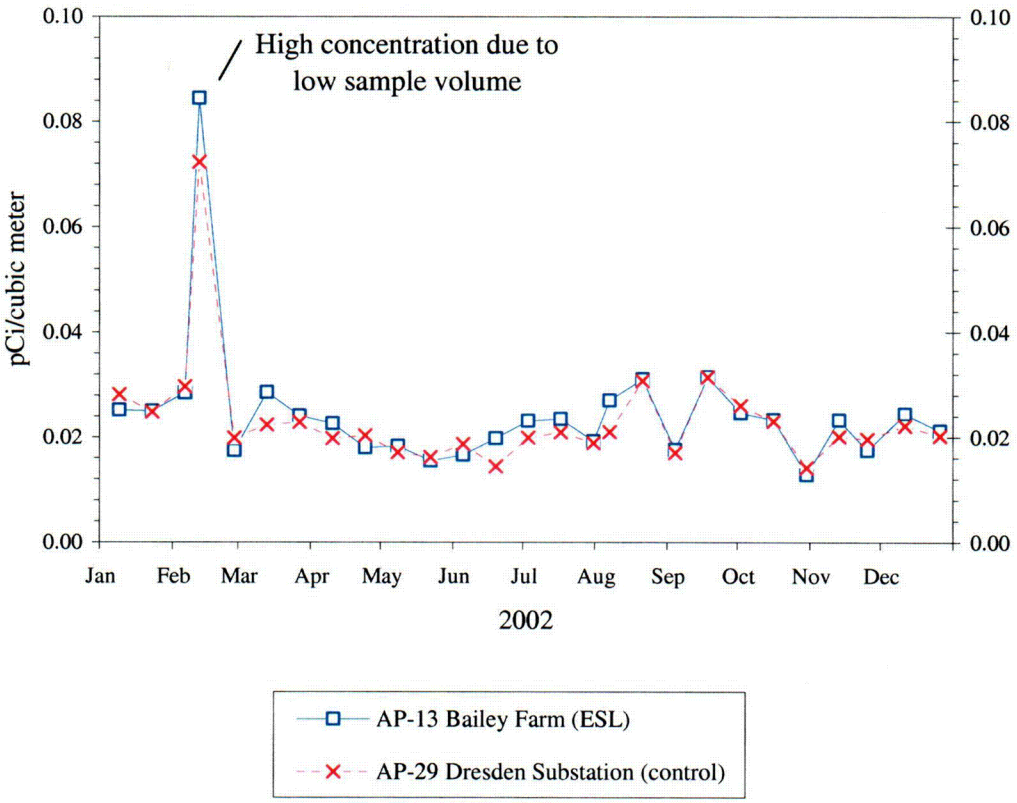
GROSS-BETA MEASUREMENTS
ON AIR PARTICULATE FILTERS



C04

FIGURE 6.3

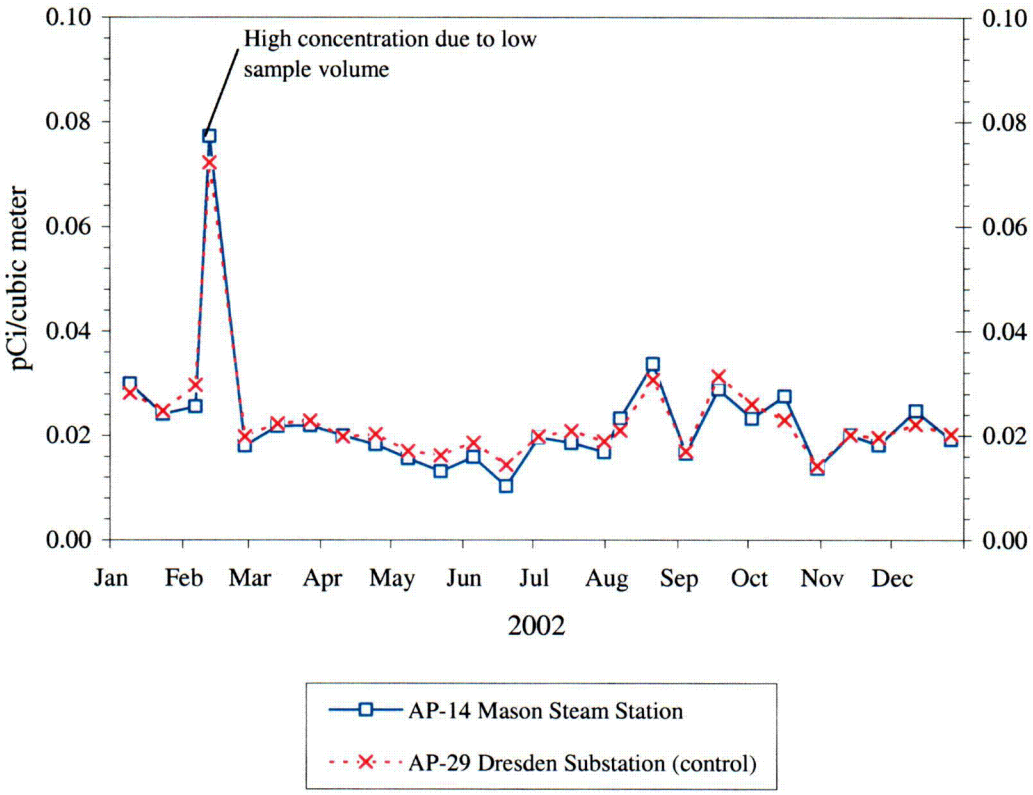
GROSS-BETA MEASUREMENTS ON AIR PARTICULATE FILTERS



C05

FIGURE 6.4

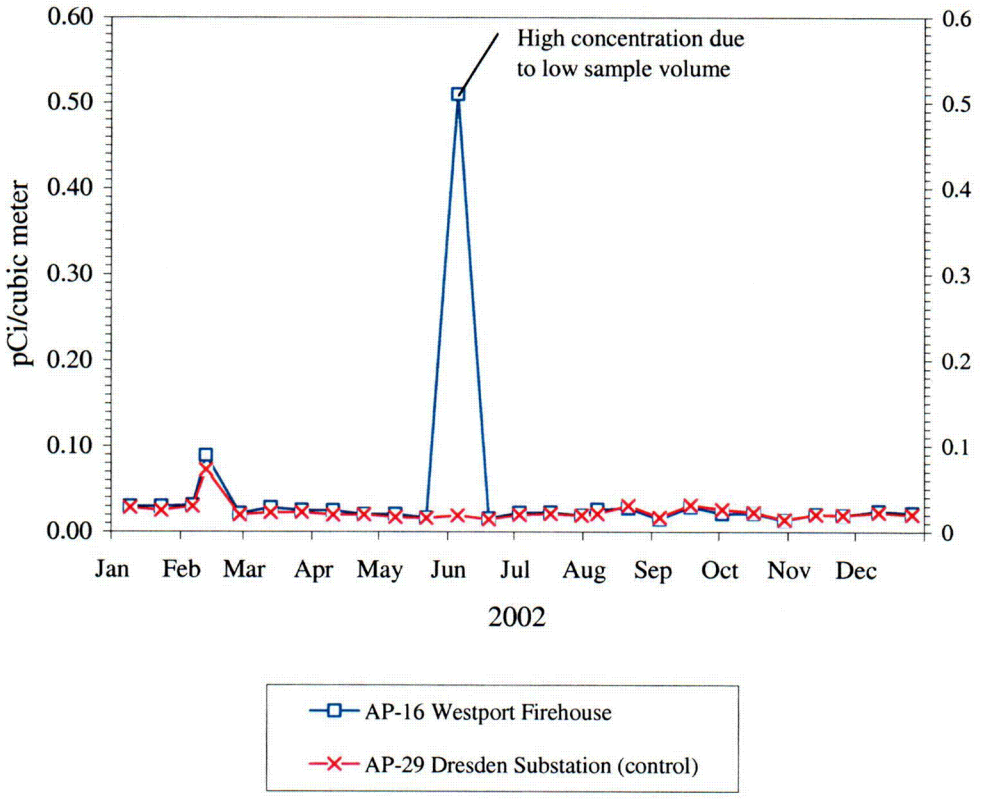
GROSS-BETA MEASUREMENTS
ON AIR PARTICULATE FILTERS



C06

FIGURE 6.5

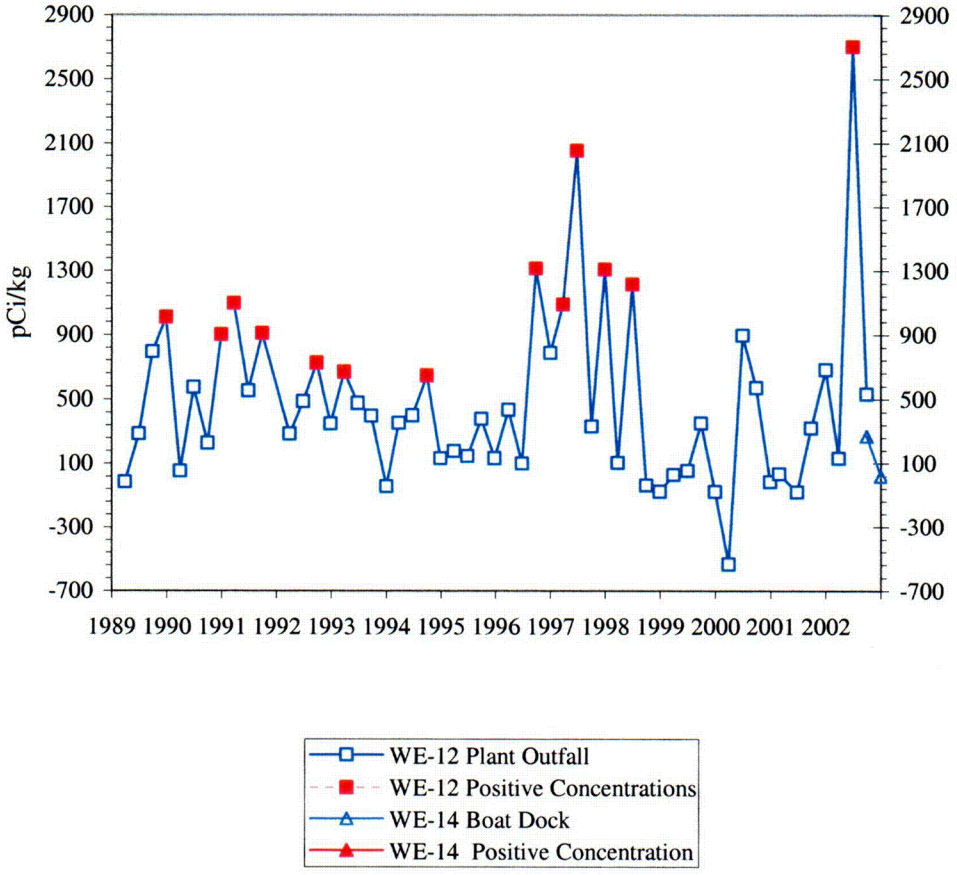
GROSS-BETA MEASUREMENTS
ON AIR PARTICULATE FILTERS



C07

FIGURE 6.6

H-3 IN ESTUARY WATER



C08

FIGURE 6.7

CESIUM-137 IN SHORELINE SEDIMENT
STATION SE-16, OLD OUTFALL AREA

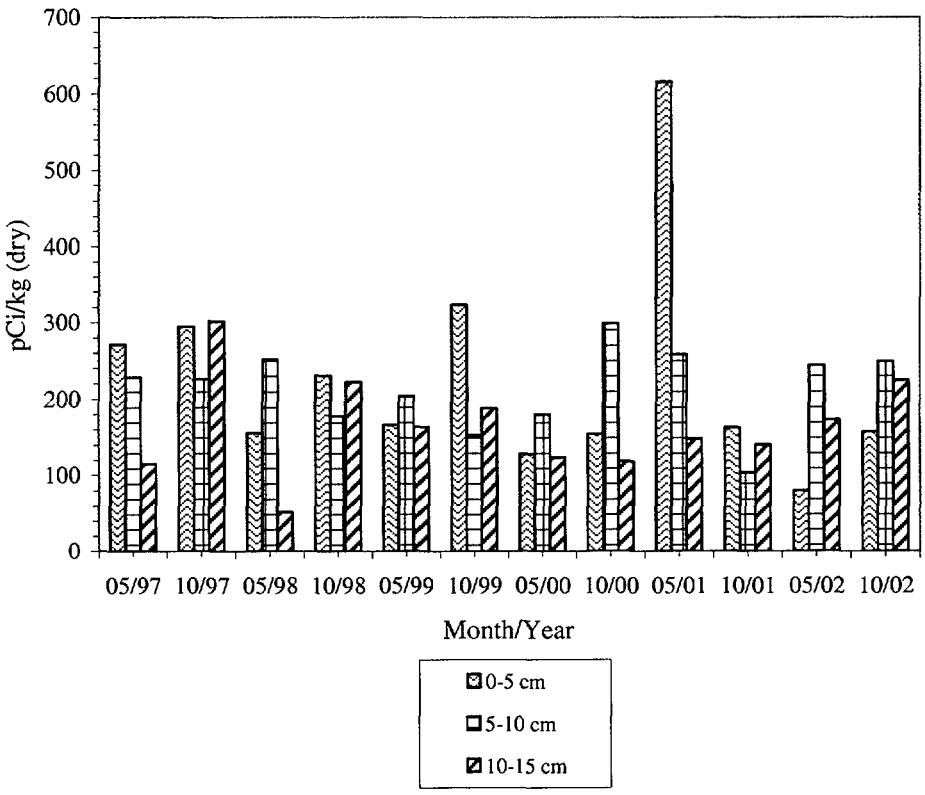


FIGURE 6.8

CESIUM-137 IN SHORELINE SEDIMENT
STATION SE-18, FOXBIRD ISLAND

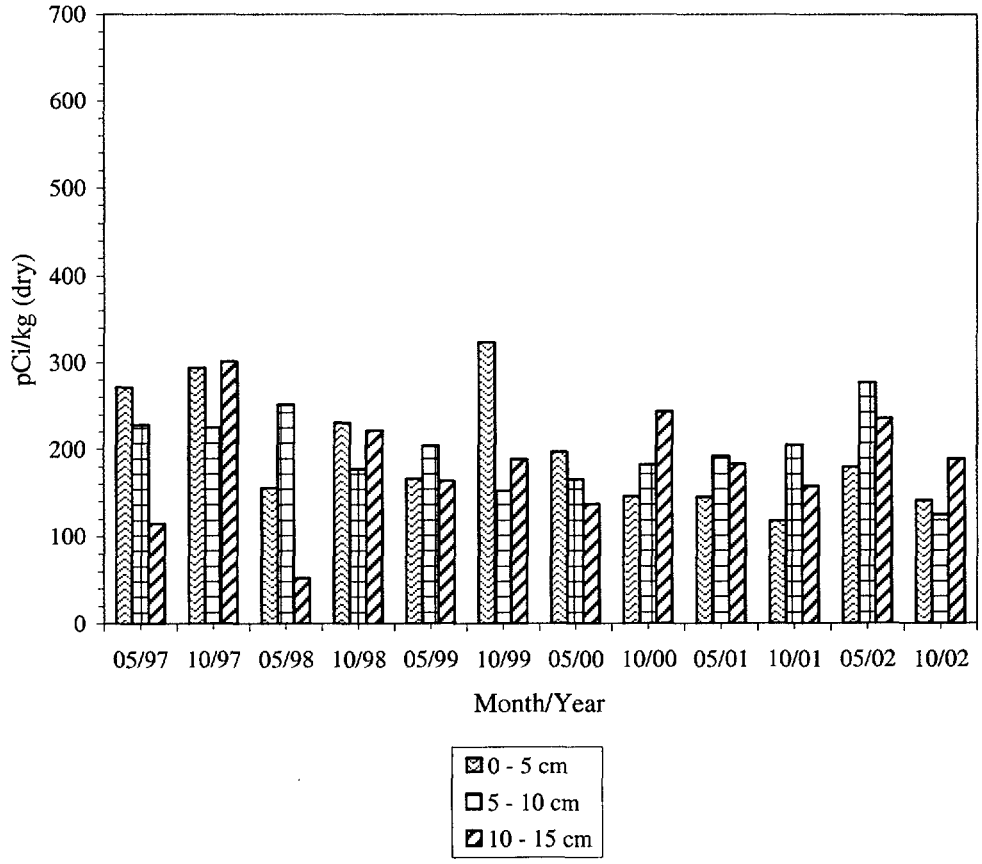


FIGURE 6.9

CESIUM-137 IN MILK

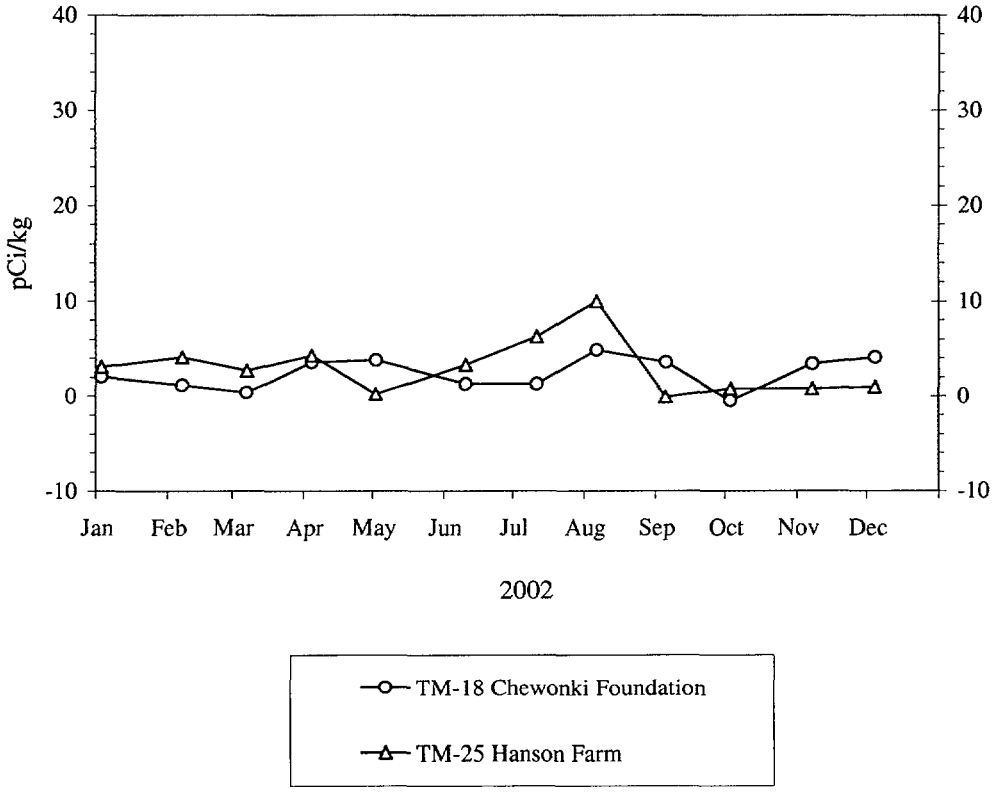
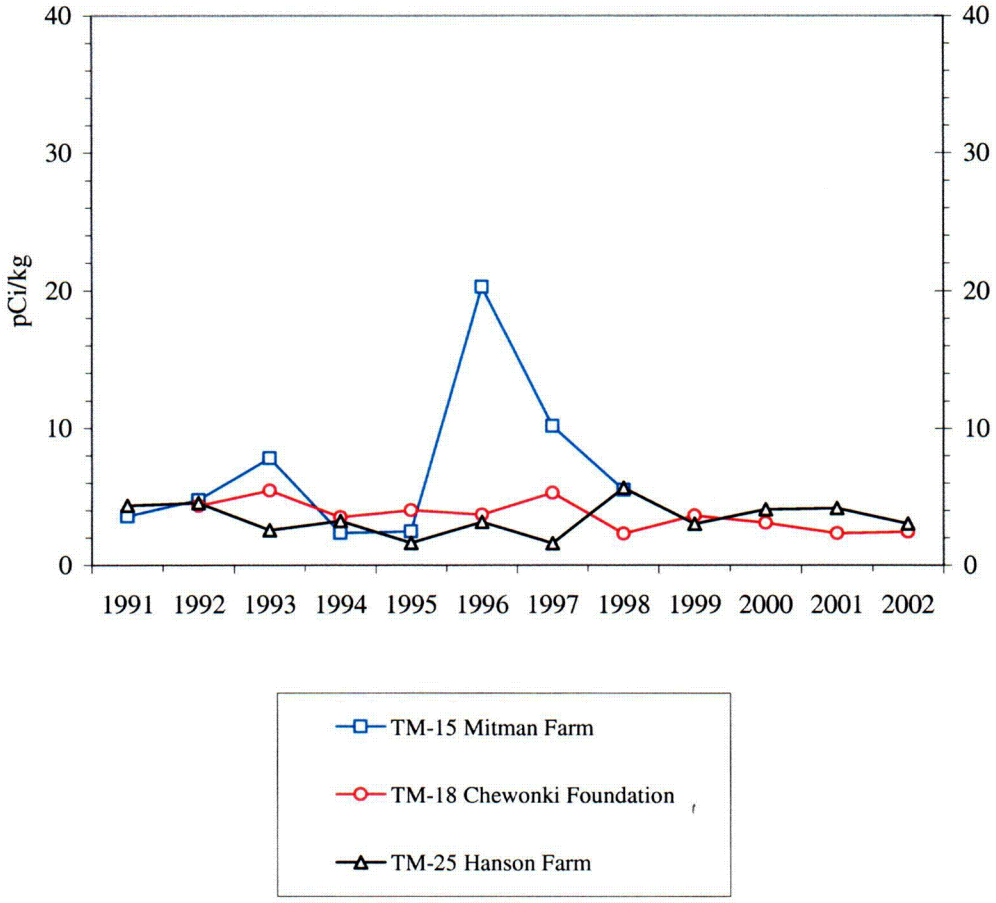


FIGURE 6.10

CESIUM-137 IN MILK
ANNUAL AVERAGE CONCENTRATIONS



C09

FIGURE 6.11

STRONTIUM - 90 IN MILK
2002 QUARTERLY COMPOSITES

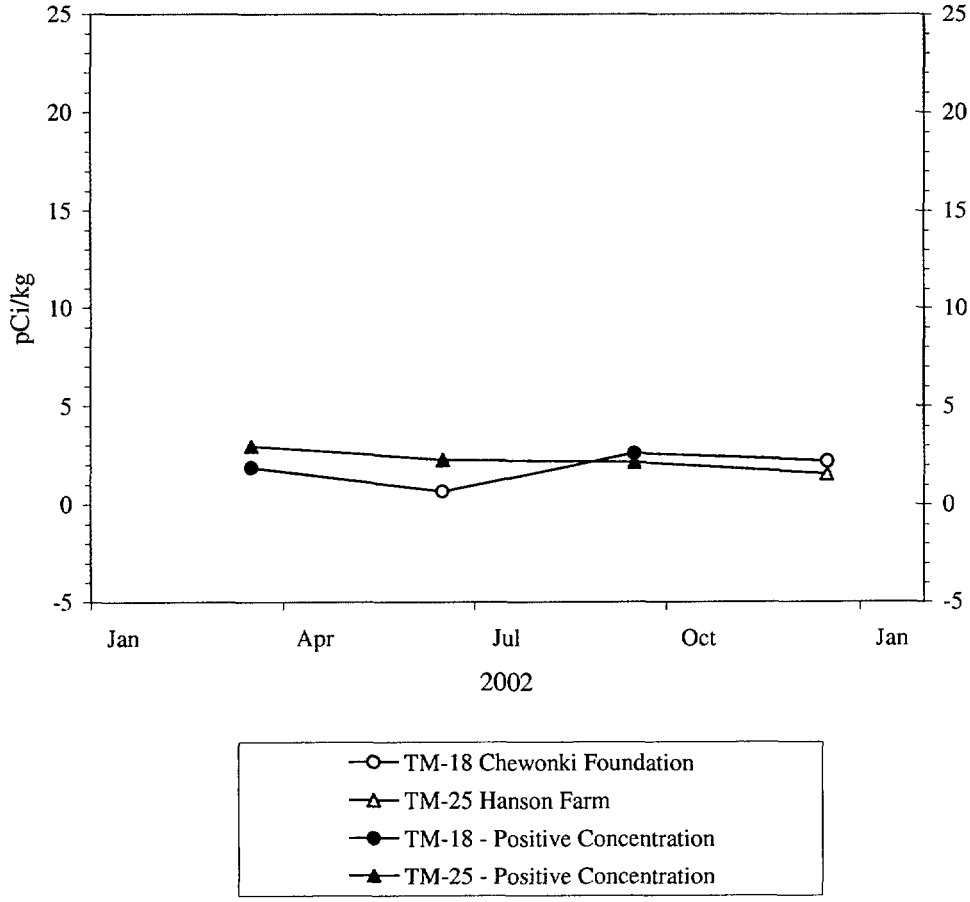
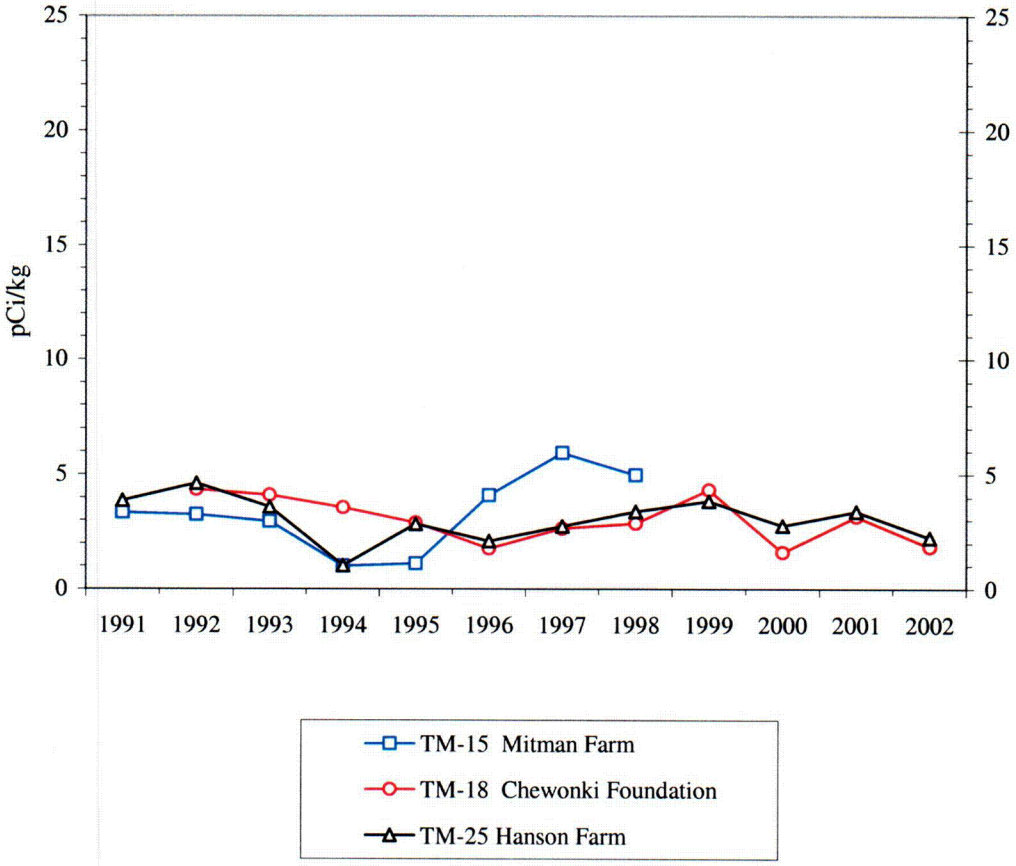


FIGURE 6.12

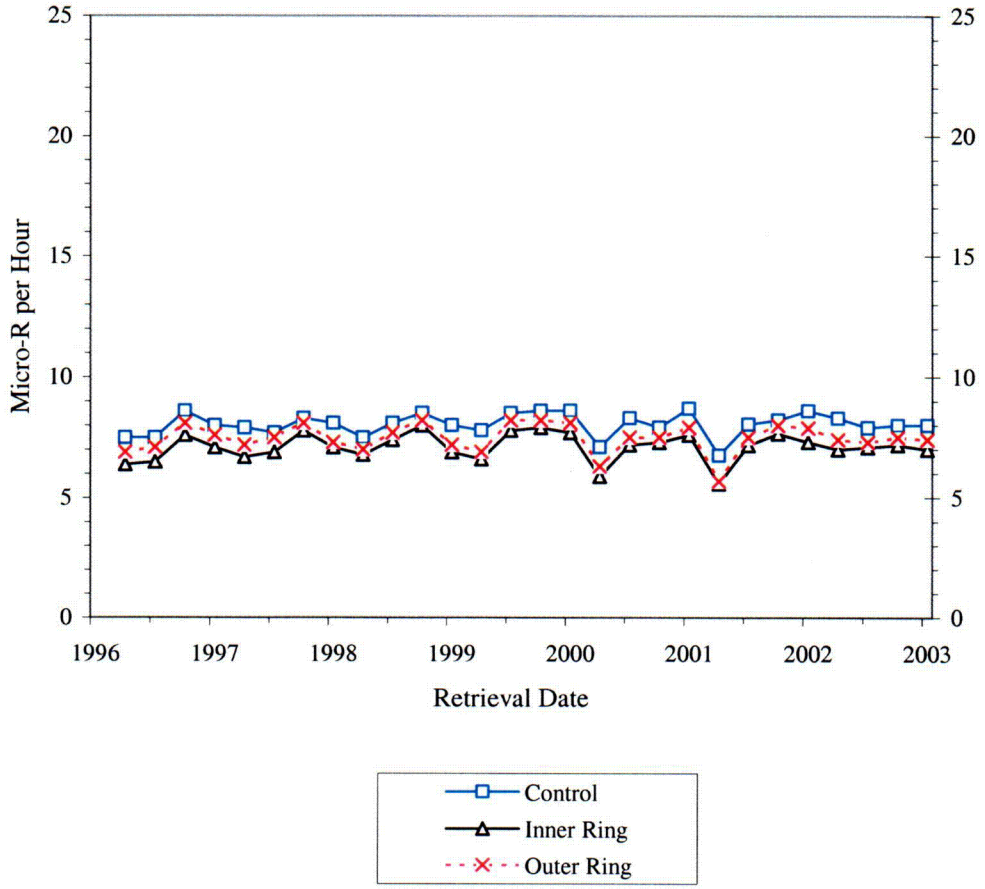
STRONTIUM-90 IN MILK
ANNUAL AVERAGE CONCENTRATIONS



C10

FIGURE 6.13

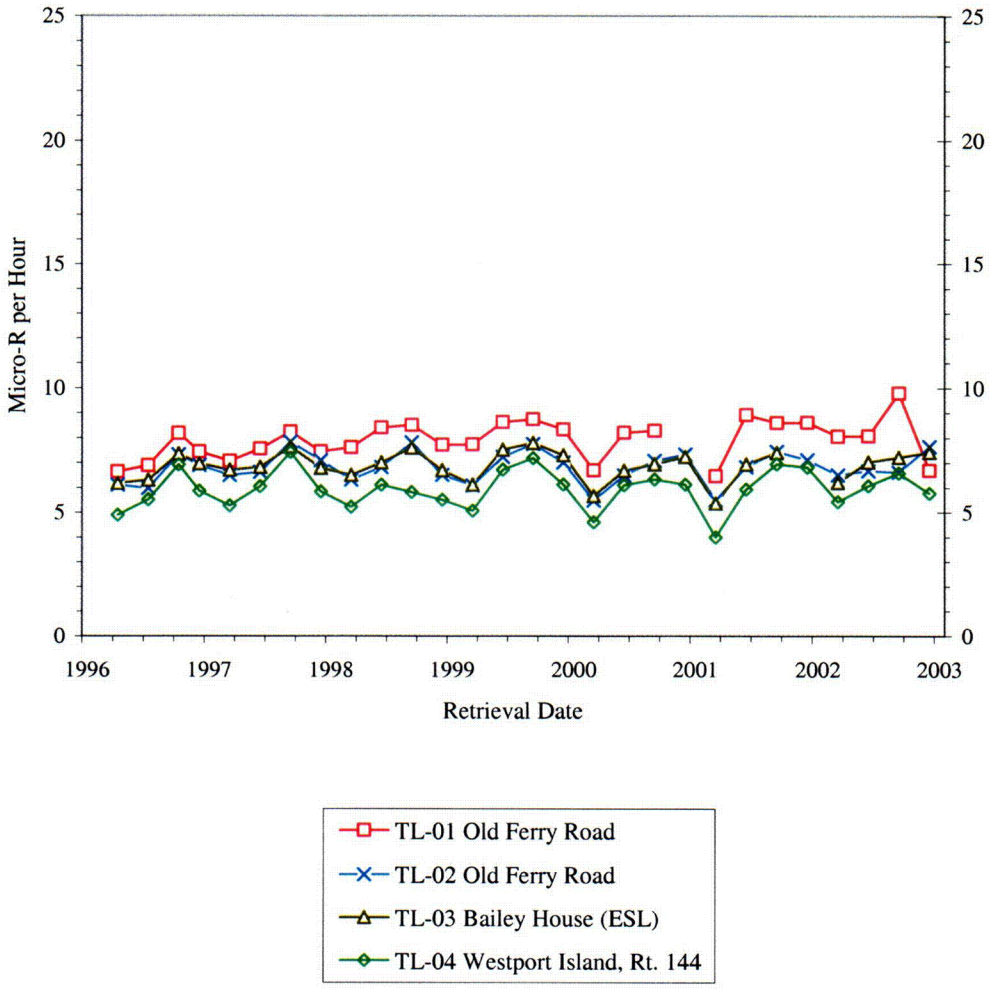
EXPOSURE RATE AT INNER RING, OUTER RING AND CONTROL TLDS



C11

FIGURE 6.14

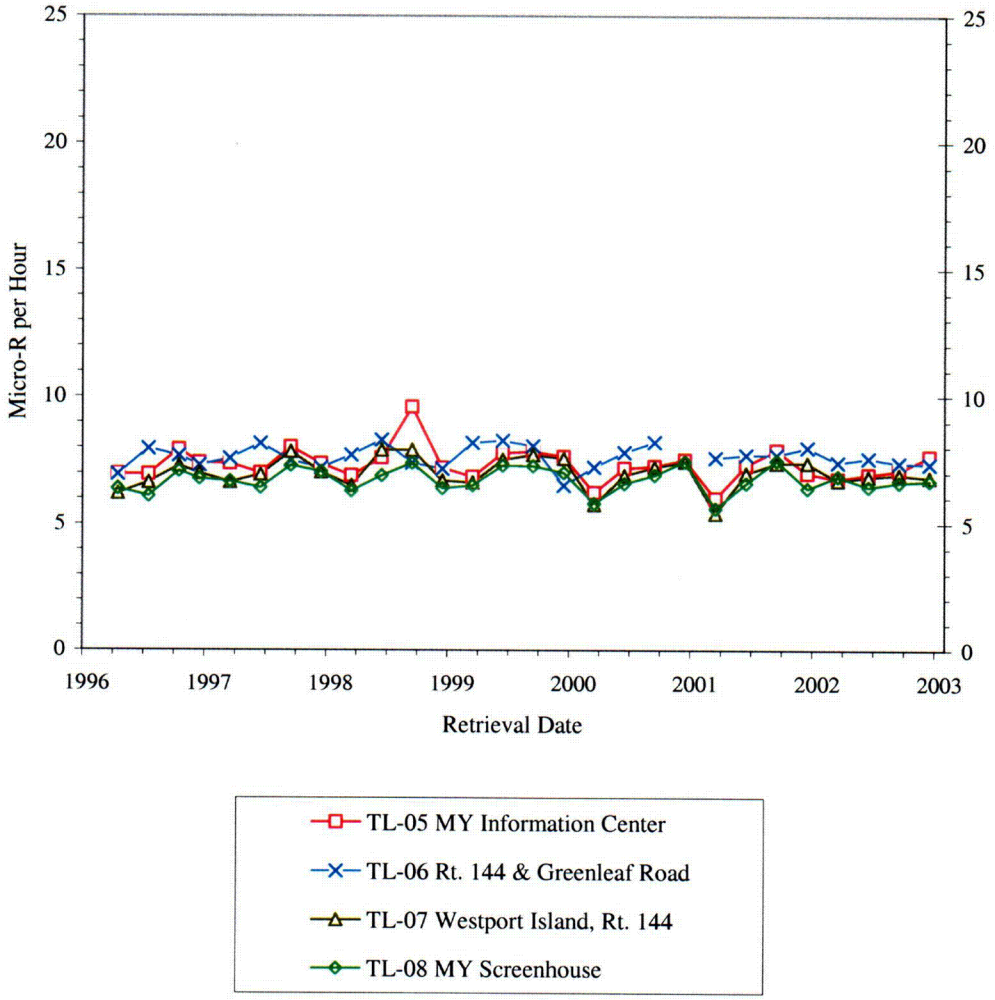
EXPOSURE RATE AT INNER RING TLDS, TL 01-04



C12

FIGURE 6.15

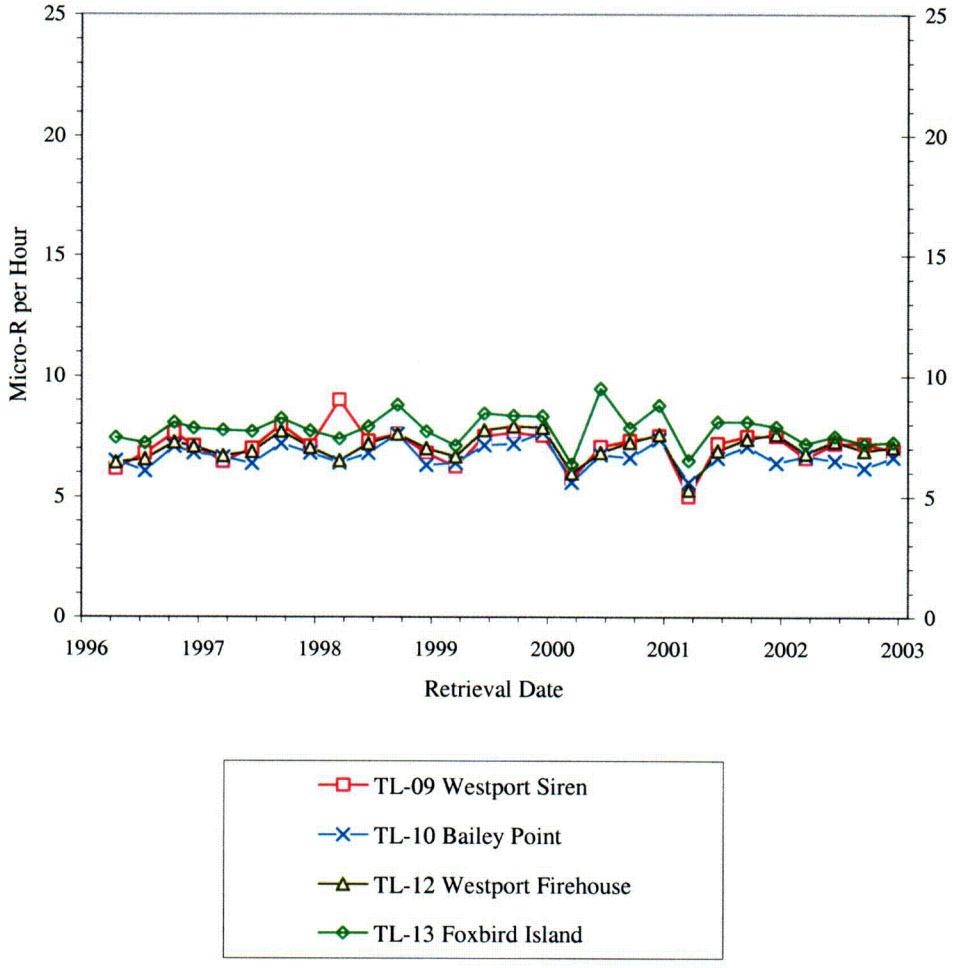
EXPOSURE RATE AT INNER RING TLDS, TL 05-08



C13

FIGURE 6.16

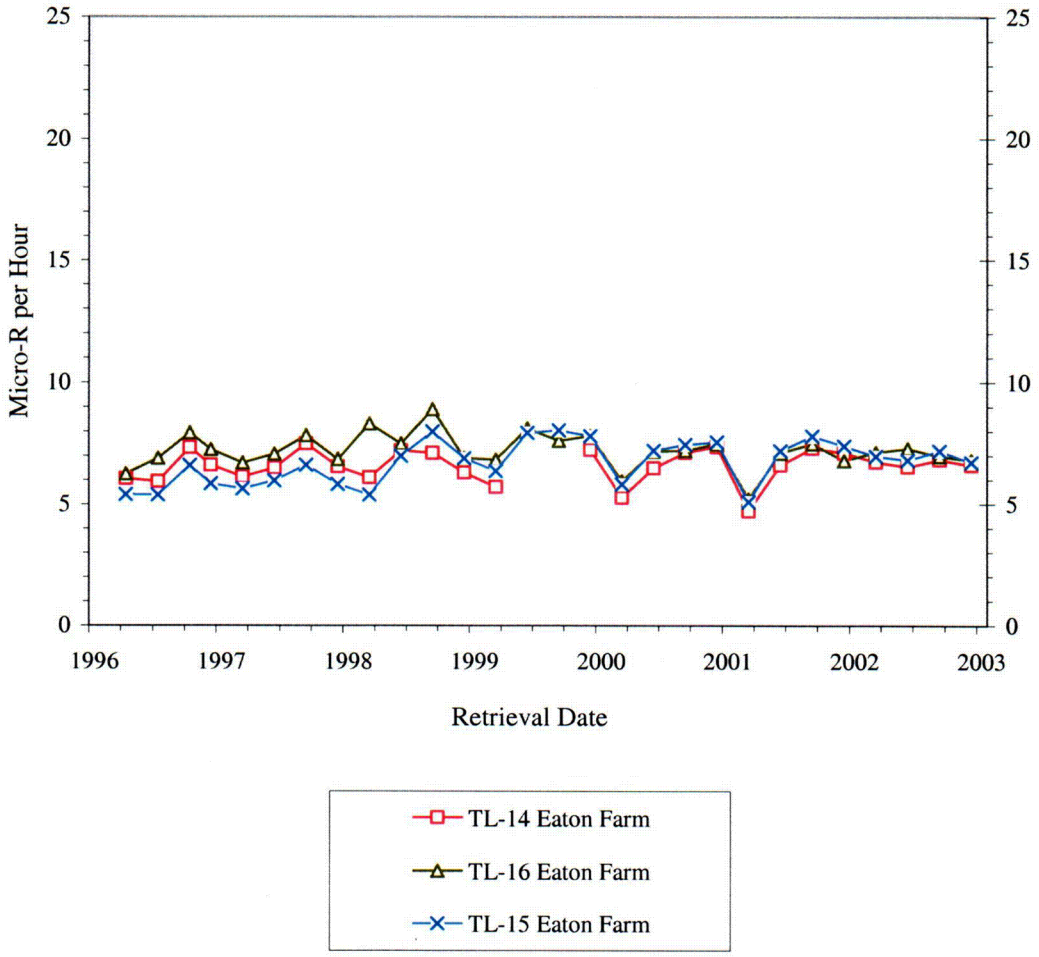
EXPOSURE RATE AT INNER RING TLDS, TL 09-10, 12-13



C14

FIGURE 6.17

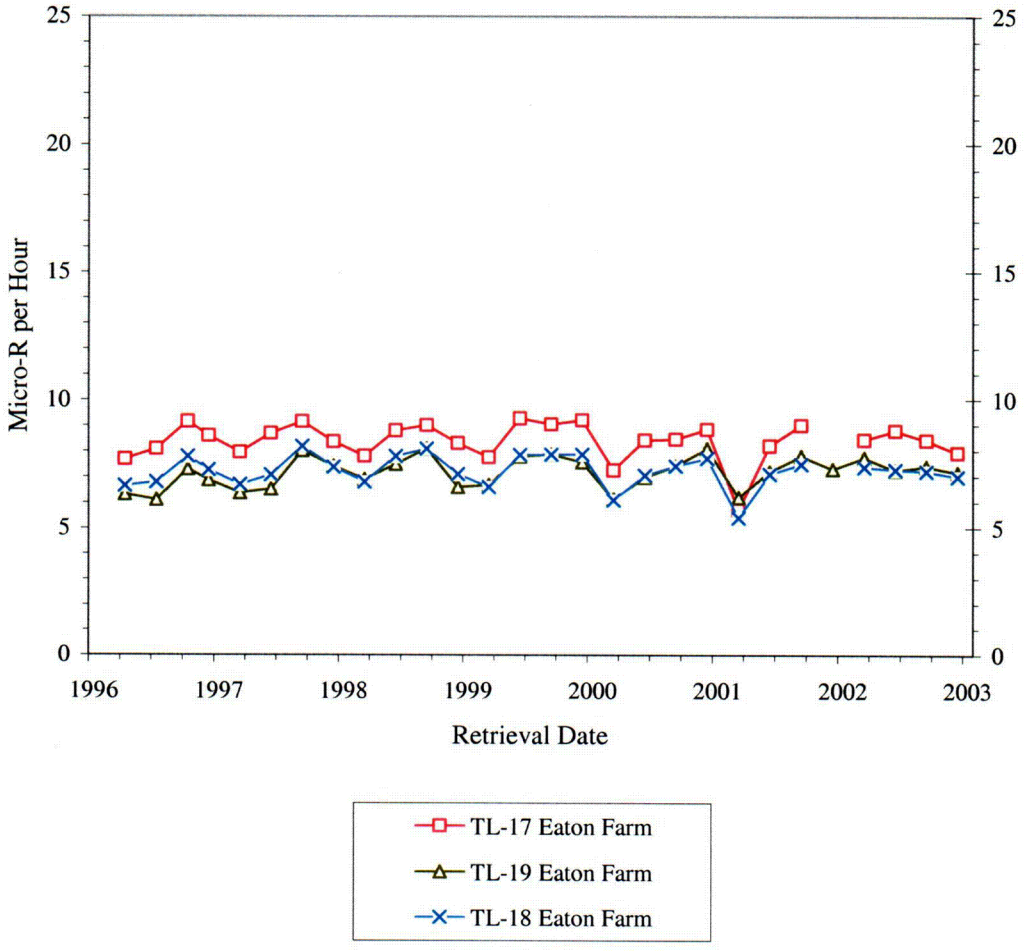
EXPOSURE RATE AT INNER RING TLDS, TL 14-16



C15

FIGURE 6.18

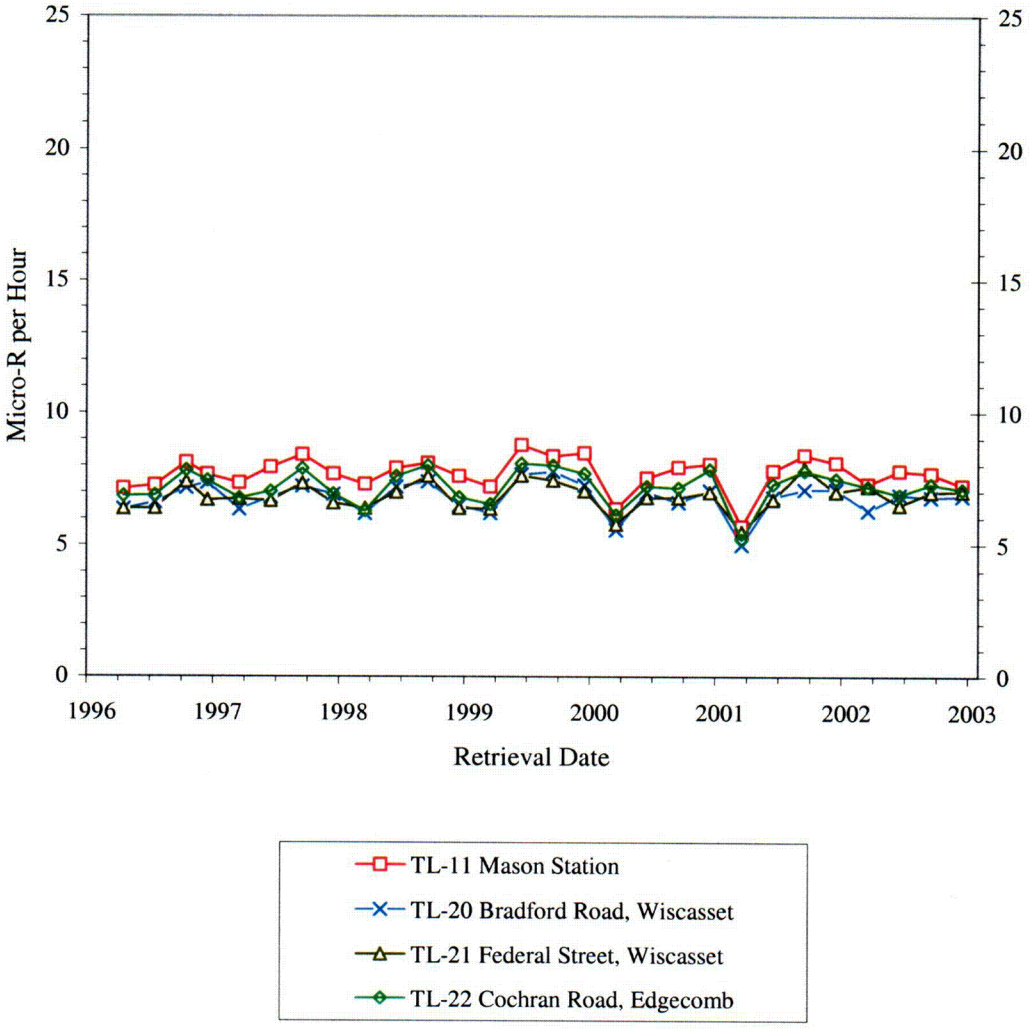
EXPOSURE RATE AT INNER RING TLDS, TL 17-19



C16

FIGURE 6.19

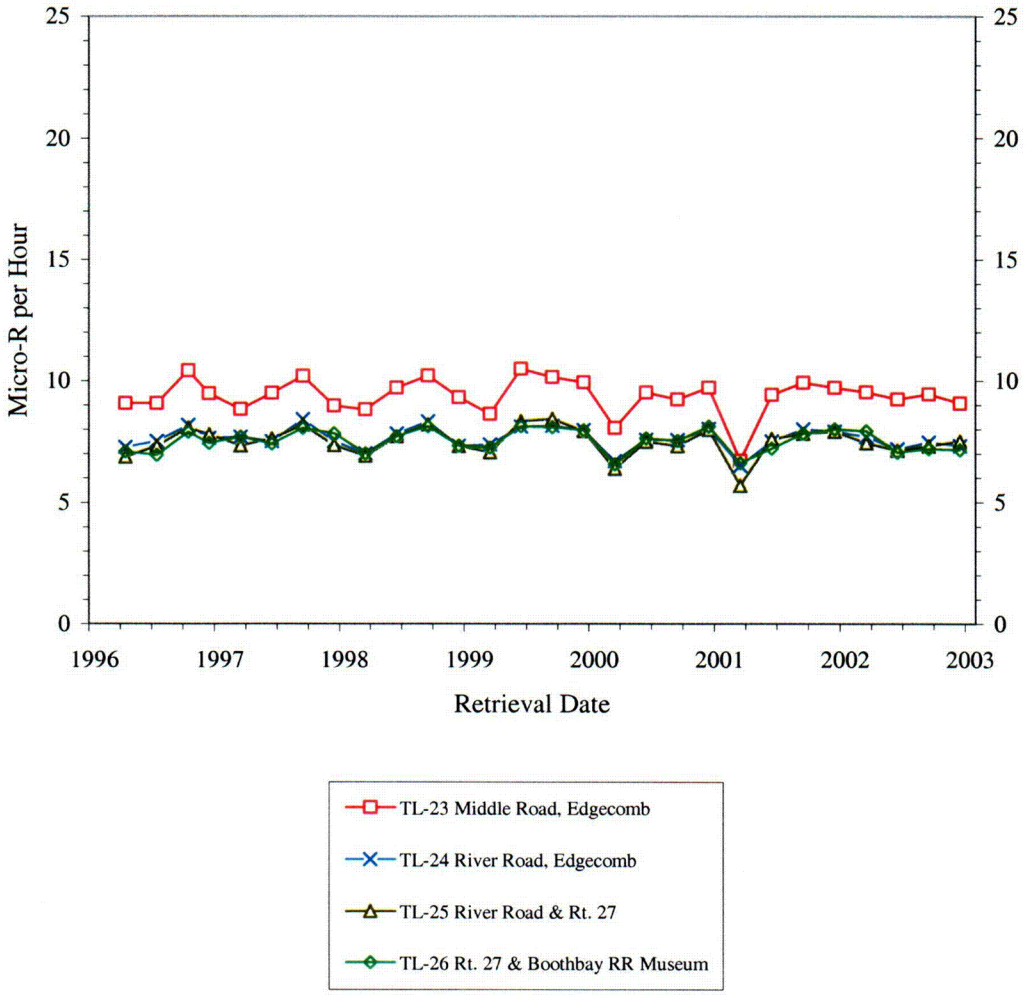
EXPOSURE RATE AT OUTER RING TLDS, TL 11, 20-22



C17

FIGURE 6.20

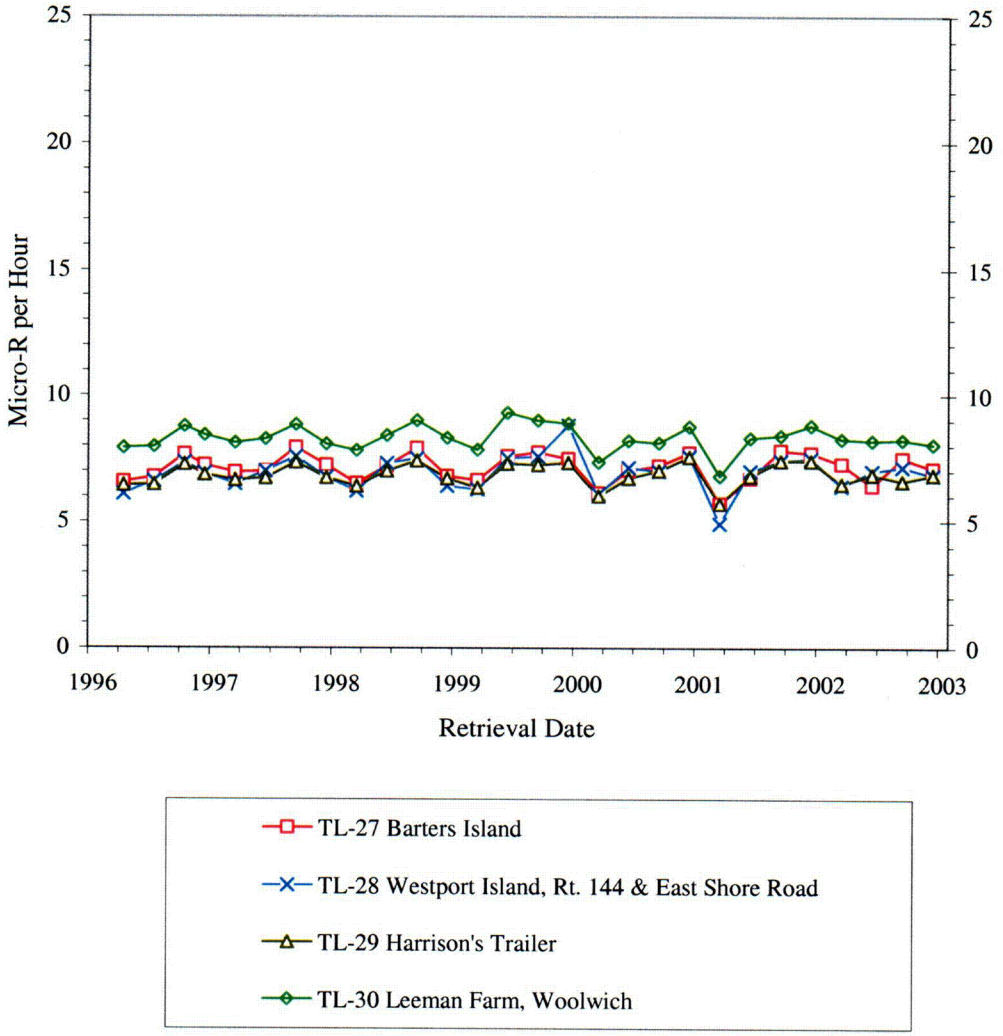
EXPOSURE RATE AT OUTER RING TLDS, TL 23-26



C18

FIGURE 6.21

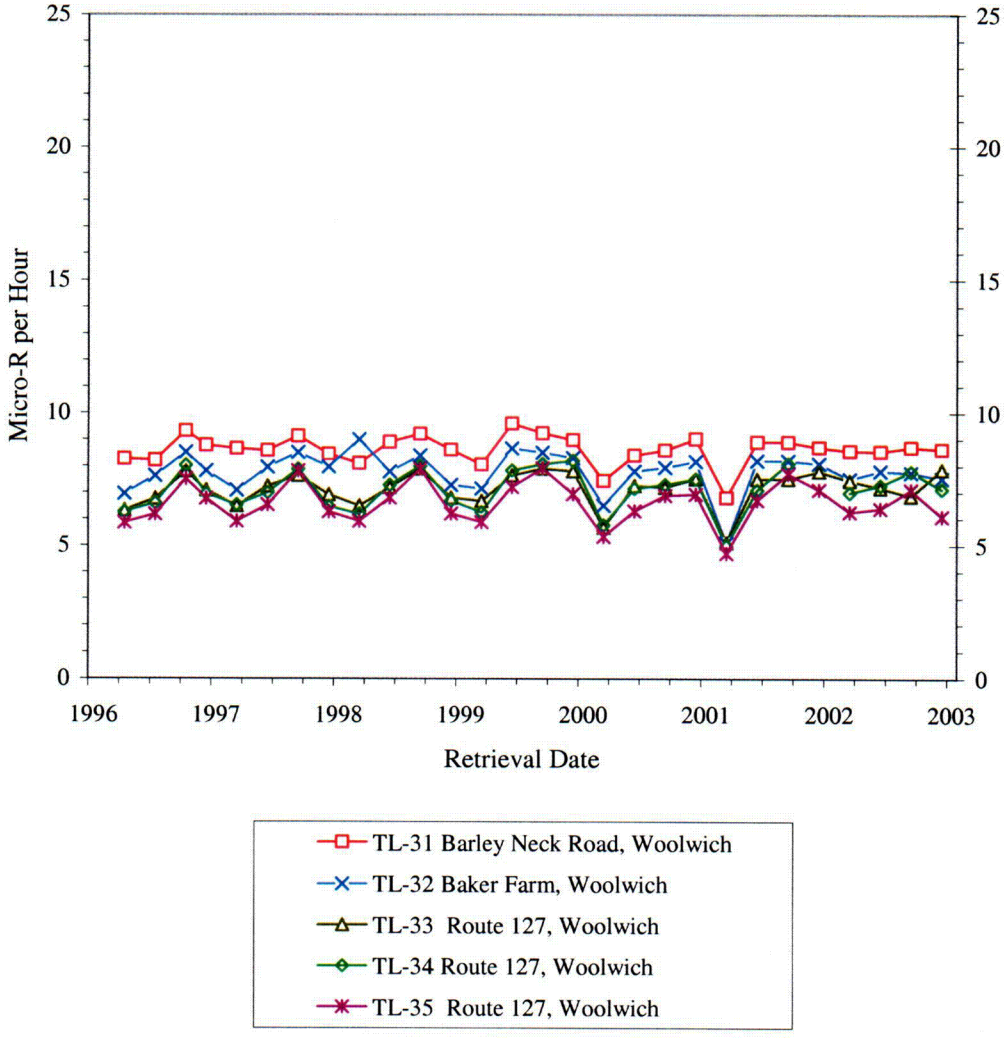
EXPOSURE RATE AT OUTER RING TLDS, TL 27-30



C19

FIGURE 6.22

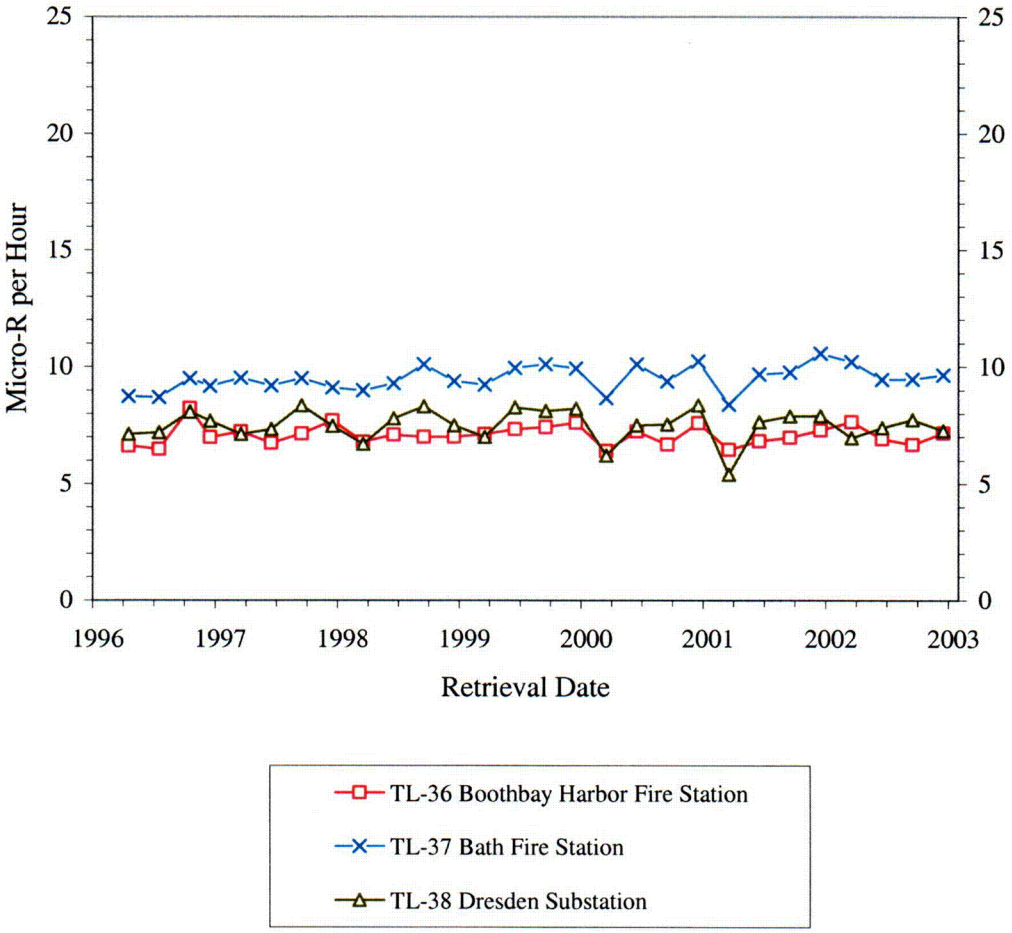
EXPOSURE RATE AT OUTER RING TLDS, TL 31-35



C20

FIGURE 6.23

EXPOSURE RATE AT CONTROL RING TLDS, TL 36-38



C21

7.0 QUALITY ASSURANCE PROGRAM

The quality assurance program at the Framatome ANP Environmental Laboratory (FANPEL) is designed to serve two overall purposes: 1) Establish a measure of confidence in the measurement process to assure the licensee, regulatory agencies and the public that analytical results are accurate and precise; and 2) Identify deficiencies in the sampling and/or measurement process to those responsible for these operations so that corrective action can be taken. Quality assurance is applied to all steps of the measurement process, including the collection, measurement and reporting of data, as well as the record keeping of the final results. Quality control, as part of the quality assurance program, provides a means to control and measure the characteristics of the measurement equipment and processes, relative to established requirements.

The FANPEL employs a comprehensive quality assurance program designed to monitor the quality of analytical processing to ensure reliable environmental monitoring data. The program includes the use of controlled procedures for all work activities, a nonconformance and corrective action tracking system, systematic internal audits, audits by external groups, a laboratory quality control program, and a staff training program. Monitoring programs include the Intralaboratory Quality Control Program administered by the Laboratory QA Officer (used in conjunction with the National Institute of Standards and Technology Measurement Assurance Program, NIST MAP) and a third party cross check program administered by Analytics, Inc. Together these programs are targeted to supply QC/QA sources at 5% of the client sample analysis load. In addition the Laboratory Quality Control Audit Committee administers a blind duplicate program conducted through client environmental monitoring programs.

This summary reports all intralaboratory and third party results received by FANPEL on or before December 31, 2002.

7.1 Intralaboratory Quality Control Program

The FANPEL QA Officer administers an extensive intralaboratory quality control program in which process check samples are submitted for analysis. These samples are submitted either in duplicate to evaluate the precision of a measurement process or are "spiked" with a known amount of radioactive material to assess the bias in the measurement. Table 7.1 provides the summary of the process check results for January to December 2002. Of the 510 analyses, 99.2% passed the bias criteria and 97.4% of the results evaluated for precision were acceptable.

7.2 Third Party Cross Check Program

The FANPEL participates in a third party cross check program managed by Analytics Inc. to satisfy the requirement of the Environmental Technical Specification/ODCM. The FANPEL Analytics program was originally used to augment the EPA Intercomparison Program that it now replaces. The current program is designed to be comparable to the pre-1996 EPA PE Program in terms of the number of samples, matrices and nuclides. The results for the 4th quarter 2001 through the 3rd quarter 2002 are summarized in Table 7.2. Each sample is analyzed in triplicate and the results are evaluated against the internal acceptance criteria described in the FANPEL Manual 100-Laboratory Quality Assurance Plan. This acceptance protocol is used for all interlaboratory programs with no pre-set acceptance criteria. When results fall outside of the acceptance criteria, an investigation is initiated to determine the cause of the problem and if appropriate, corrective measures are taken. The FANPEL internal acceptance criteria are summarized at the end of Table B.2.

7.3 Blind Duplicate Program

The Laboratory Quality Control Audit Committee (LQCAC) is comprised of representatives from several New England FANPEL clients. Two of the primary functions of the LQCAC have been to conduct an annual audit of Laboratory operations and to coordinate the Blind Duplicate Quality Assurance Program. Under the Blind Duplicate Quality Assurance Program, samples are split from homogeneous environmental media by the client and sent to the FANPEL for analysis. They are "blind" in that the identification of the matching sample is not identified to the Laboratory.

Participating clients submitted a total of 28 paired samples in 2002. The measurements evaluated include twenty-six gamma emitting radionuclides, H-3, and gross-beta. All measurements are evaluated, whether the results are statistically positive or not, and whether the net concentration is positive or negative.

The samples submitted as part of this program are listed in Table B.3. For the 2002 program, 99.1% of the measurements met the FANPEL internal acceptance criteria.

7.4 Environmental TLD Quality Assurance Program

Performance documentation of the routine processing of the Panasonic environmental TLDs (thermoluminescent dosimeter) program at the FANPEL is provided by the dosimetry quality assurance testing program. This program includes the National Voluntary Laboratory

Accreditation Program, independent third party performance testing by Battelle Pacific Northwest Labs and internal performance testing conducted by the Laboratory QA Officer. Under these programs, dosimeters are irradiated to ANSI specified testing criteria and submitted for processing to the Dosimetry Services Group as "unknowns". The bias and precision of TLD processing is measured against this standard and is used to indicate trends and changes in performance. Instrumentation checks, although routinely performed by the Dosimetry Services Group and representing between 5-10% of the TLDs processed, are not presented in this report because they do not represent a true process check sample since the doses are known to the processor.

Eighty-four performance tests were conducted in 2002 by FANPEL and the third party tester. Of these, 100% of the dosimeter evaluations met the FANPEL Internal Acceptance Criteria for bias (± 20.1%) and precision (±12.8%). In addition 14 TLD test sets passed the control limits set by the LQCAC in 1998 to evaluate the sum of the bias and precision values. A tolerance limit of ± 30% applies to environmental dosimeters. Third Party QC results are summarized below.

Percentage of Individual Analyses which passed FANPEL Internal Criteria

Dosimeter Type	Number Tested	Shallow (7mg/cm^2)	
		% passed bias criteria	% passed precision criteria
Panasonic Environmental	84	100	100

Summary of Third Party Testing

Dosimeter Type	Exposure Period	NVLAB Category	Shallow (7mg/cm^2)	
			% (Bias ± SD)	|B| + S*
Panasonic Environmental	Q1/2002	IV, high energy	5.6 ± 1.2	0.068
"	Q2/2002	IV, high energy	8.8 ± 1.1	0.099
"	Q3/2002	IV, high energy	7.1 ± 3.1	0.102

* American National Standards Institute (ANSI) Performance Statistic as referenced in the Dosimetry Services Semi-Annual QA Status Report.
Note: Results are expressed as the delivered exposure for environmental TLD. NVLAB Category IV, High energy photons (Cs-137 or Co-60).

TABLE 7.1

FANPEL RESULTS IN THE INTRALABORATORY PROCESS CONTROL PROGRAM
January - December 2002

Media Analysis	Bias Criteria (1)				Precision Criteria (2)			
	1	2	3	4	1	2	3	4
I. Air Charcoal								
Gamma	85	14	1	2	0	0	0	0
II. Air Filter								
Alpha								
Beta	221	9	1	0	0	0	0	0
Gamma								
III. Milk								
Gamma	6	0	0	0	6	0	0	0
Iodine-LL	3	2	0	0	5	0	0	0
Strontium-89	0	1	2	0	3	0	0	0
Strontium-90								
IV. Water								
Gross Alpha	10	11	17	1	5	4	3	0
Gross Beta	33	9	4	0	10	0	0	0
Gamma	18	12	0	0	36	0	2	0
Iodine-LL								
Ni-63	3	0	0	0	3	0	0	0
Radium 226	8	8	2	0	4	1	0	0
Radium-228								
Tritium	10	0	0	0	10	0	0	0
U-234	4	1	0	0	5	0	0	0
U-235	3	2	0	0	5	0	0	0
U-238	4	1	0	0	5	0	0	0
V. Sediment/Soil								
Gamma								
Pu-239	0	0	1	0	0	2	0	2
Am-241	0	0	0	1	0	0	2	1
VI. Vegetation								
Gamma								
Total Number in Range	408	70	28	4	97	7	7	3
Percentage of Total Processed	80.0	13.7	5.5	0.8	85.1	6.1	6.1	2.6
Sum of Analyses	510				114			

(1) Percent Bias Criteria by Bias Category
Bias Category = 1 > 0% and < = 5%
Bias Category = 2 > 5% and < = 10%
Bias Category = 3 > 10% and < = 15%, or within 2 sigma of known
Gross alpha and beta, Sr 89/90 > 10% and < = 25%
Transuranics > 10% and < = 20%
Bias Category = 4 Outside Criteria

(2) Percent Precision Criteria by Precision Category
Precision Category = 1 > 0% and < = 5%
Precision Category = 2 > 5% and < = 10%
Precision Category = 3 > 10% and < = 15%, or within 2 sigma of mean
Precision Category = 4 Outside Criteria

TABLE 7.2

FANPEL RESULTS IN THE ANALYTICS INC. CROSS CHECK PROGRAM
Quarter 4, 2001 - Quarter 3, 2002

Sample Number	Quarter/ Year	Sample Media	Nuclide	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E2901-162	4th/01	Water	H-3	13510	14060	0.96	Agreement
E2903-162	4th/01	Filter	Gross Alpha	14	16	0.88	Agreement
			Gross Beta	50	48	1.04	Agreement
E2902A-162	4th/01	Filter	Sr-89	66	82	0.80	Agreement
E2902A-162	4th/01	Filter	Sr-90	54	61	0.89	Agreement
E2904-162	4th/01	Milk	I-131	62	61	1.02	Agreement
			Ce-141	384	379	1.01	Agreement
			Cr-51	527	497	1.06	Agreement
			Cs-134	198	199	0.99	Agreement
			Cs-137	325	318	1.02	Agreement
			Co-58	94	90	1.04	Agreement
			Mn-54	158	149	1.06	Agreement
			Fe-59	109	102	1.07	Agreement
			Zn-65	231	206	1.12	Agreement
			Co-60	353	353	1.00	Agreement
E3096-186	1st/02	Milk	I-131LL	99	90	1.09	Agreement
			Ce-141	32	29	1.10	Agreement
			Cr-51	262	241	1.09	Agreement
			Cs-134	103	110	0.94	Agreement
			Cs-137	248	240	1.03	Agreement
			Mn-54	224	202	1.11	Agreement
			Fe-59	112	104	1.08	Agreement
			Zn-65	215	199	1.08	Agreement
			Co-60	144	142	1.01	Agreement
E3097-186	1st/02	Charcoal	I-131	74	77	0.96	Agreement
E3098-186	1st/02	Charcoal	I-131	65	69	0.94	Agreement
E3099-186	1st/02	Charcoal	I-131	91	87	1.05	Agreement
E3023-162	1st/02	Water	Gross Alpha	56.7	53	1.08	Acceptable
			Gross Beta	310.3	313	0.99	Acceptable
E3024-162	1st/02	Water	I-131	54.5	61	0.90	Acceptable
			I-131LL	63.4	61	1.04	Acceptable
			Ce-141	239.4	242	0.99	Acceptable
			Cr-51	175.7	198	0.89	Acceptable
			Cs-134	87.8	91	0.97	Acceptable
			Cs-137	197.7	197	1.01	Acceptable
			Mn-54	168.5	166	1.02	Acceptable
			Fe-59	87.6	86	1.02	Acceptable
			Zn-65	157.2	164	0.96	Acceptable
			Co-60	114.6	117	0.98	Acceptable

* pCi/Liter (Filters in pCi)

TABLE 7.2 (cont'd)

FANPEL RESULTS IN THE ANALYTICS INC. CROSS CHECK PROGRAM
Quarter 4, 2001 - Quarter 3, 2002

Sample Number	Quarter/ Year	Sample Media	Nuclide	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E3025-162	1st/02	Soil	Ce-141	350.7	383	0.92	Acceptable
			AcTh-228	448.3	-	-	-
			Cr-51	274	314	0.87	Acceptable
			Cs-134	136.6	143	0.96	Acceptable
			Cs-137	405.7	439	0.92	Acceptable
			Mn-54	245.8	263	0.94	Acceptable
			Fe-59	140.2	136	1.03	Acceptable
			Zn-65	248.1	259	0.96	Acceptable
			Co-60	168.1	185	0.91	Acceptable
E3026-162	1st/02	Filter	Gross Alpha	21.8	23	0.96	Acceptable
			Gross Beta	149	136	1.1	Acceptable
E3027-162	1st/02	Milk	I-131	87.9	92	0.96	Acceptable
			I-131LL	93	92	1.01	Acceptable
			Ce-141	317.8	326	0.98	Acceptable
			Cr-51	277	267	1.04	Acceptable
			Cs-134	119	122	0.98	Acceptable
			Cs-137	271.2	266	1.02	Acceptable
			Mn-54	231.2	224	1.03	Acceptable
			Fe-59	123.6	116	1.07	Acceptable
			Zn-65	225.9	221	1.02	Acceptable
			Co-60	152.9	158	0.97	Acceptable
E3028-162	1st/02	Milk	Sr-89	79.9	83	0.96	Acceptable
			Sr-90	24.7	27	0.93	Acceptable
E3148-162	2nd/02	Water	H-3	6970	6970	1.00	Acceptable
E3149-162	2nd/02	Water	Sr-89	42	64	0.66	Unacceptable(1)
			Sr-90	36	39	0.92	Acceptable
E3150-162	2nd/02	Filter	Gross Alpha	(2)	(2)	(2)	(2)
			Gross Beta	(2)	(2)	(2)	(2)
E3151-162	2nd/02	Filter	Ce-141	59	61	0.97	Acceptable
			Cr-51	165	160	1.03	Acceptable
			Cs-134	77	82	0.94	Acceptable
			Cs-137	64	62	1.03	Acceptable
			Co-58	68	68	1.00	Acceptable
			Mn-54	69	65	1.06	Acceptable
			Fe-59	62	55	1.13	Acceptable
			Zn-65	131	122	1.07	Acceptable
			Co-60	82	85	0.96	Acceptable
E3152-162	2nd/02	Filter	Sr-90	41	48	0.85	Acceptable

*Units in pCi/Liter (filter in pCi)

(1) - CR 02-43 issued to investigate failures for Sr-89
(2) - Filter damaged during sample preparation. No results issued.

TABLE 7.2 (cont'd)

FANPEL RESULTS IN THE ANALYTICS INC. CROSS CHECK PROGRAM
Quarter 4, 2001 - Quarter 3, 2002

Sample Number	Quarter/ Year	Sample Media	Nuclide	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E3153-162	2nd/02	Milk	I-131	88	87	1.01	Acceptable
			I-131LL	85	87	0.98	Acceptable
			Ce-141	86	90	0.96	Acceptable
			Cr-51	230	235	0.98	Acceptable
			Cs-134	121	120	1.01	Acceptable
			Cs-137	89	91	0.98	Acceptable
			Co-58	100	100	1.00	Acceptable
			Mn-54	97	95	1.02	Acceptable
			Fe-59	83	81	1.02	Acceptable
			Zn-65	179	180	0.99	Acceptable
			Co-60	127	125	1.02	Acceptable
E3288-162	3rd/02	Water	Gross Alpha	73	92	0.79	Acceptable
			Gross Beta	204	239	0.85	Acceptable
E3289-162	3rd/02	Water	I-131	68	79	0.86	Acceptable
			I-131LL	77	79	0.97	Acceptable
			Ce-141	209	214	0.98	Acceptable
			Cr-51	289	304	0.95	Acceptable
			Cs-134	169	176	0.96	Acceptable
			Cs-137	167	169	0.99	Acceptable
			Co-58	129	130	0.99	Acceptable
			Mn-54	206	204	1.01	Acceptable
			Fe-59	118	119	0.99	Acceptable
			Zn-65	251	251	1.00	Acceptable
			Co-60	187	199	1.04	Acceptable
E3291-162	3rd/02	Filter	Gross Alpha	58	59	0.98	Acceptable
			Gross Beta	144	155	0.93	Acceptable
E3292-162	3rd/02	Milk	I-131	79	80	0.99	Acceptable
			I-131LL	77	80	0.96	Acceptable
			Ce-141	156	160	0.98	Acceptable
			Cr-51	231	227	1.02	Acceptable
			Cs-134	128	132	0.97	Acceptable
			Cs-137	122	127	0.96	Acceptable
			Co-58	95	97	0.98	Acceptable
			Mn-54	151	152	0.99	Acceptable
			Fe-59	94	89	1.06	Acceptable
			Zn-65	180	187	0.96	Acceptable
			Co-60	142	149	0.95	Acceptable
E3293-162	3rd/02	Milk	Sr-89	84	92	0.91	Acceptable
			Sr-90	36	39	0.92	Acceptable

*Units in pCi/Liter (filter in pCi)

Bias Acceptance Criteria ± 15% or as noted.
Gross alpha and beta, Sr 89/90 ± 25%
Transuranics and Radium ± 20% or,

Precision Acceptance Criteria ± 15%, or as noted.
Gross alpha and beta, Sr 89/90 ± 25%
Transuranics and Radium ± 20%

If known value falls within 2 sigma range acceptance criteria is met

TABLE 7.3

SUMMARY OF BLIND DUPLICATE SAMPLES
January - December 2002

TYPE OF SAMPLE	NUMBER OF PAIRED SAMPLES SUBMITTED
Milk	8
Ground Water	2
Surface Water	12
Algae	2
Mussels	4
Food Product	0
TOTAL	28

8.0 LAND USE CENSUS

Maine Yankee ODCM section 2.4.4 requires that a Land Use Census be conducted annually. The Census identifies the locations of the nearest milk animal, the nearest residence and the nearest garden of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of five miles of the plant. The 2002 Land Use Census was conducted during September, 2002.

Pursuant to Section 2.4.4 of the ODCM, a dosimetric analysis is performed, using site specific meteorological data, to determine which milk animal locations would provide the optimal sampling locations. If any location has twice the potential dose commitment of a currently-sampled location, the new location is added to the routine environmental sampling program in replacement of the location with the lowest calculated dose (which is eliminated from the program). For the 2002 Census, no such new milk animal location was identified. Consequently, no changes were made in the milk sampling program.

The results of the 2002 Land Use Census are included in this report in compliance with ODCM Section 2.4.4.3 and ODCM Appendix C, item 1. The locations identified during the Census may be found in Table 8.1.

TABLE 8.1

2002 LAND USE CENSUS LOCATIONS

SECTOR	NEAREST RESIDENCE km (miles)	NEAREST GARDEN km (miles)	NEAREST MILK ANIMAL km (miles)
N	1.26 (0.78)	1.86 (1.16)	*
NNE	2.23 (1.38)	2.40 (1.49)	2.7(1.7) (Cows)
NE	1.27 (0.79)	1.47 (0.91)	*
ENE	0.92 (0.57)	1.25 (0.78)	*
E	0.90 (0.56)	0.9 (0.56)	*
ESE	0.70 (0.43)	2.64 (1.64)	*
SE	0.70 (0.43)	0.9 (0.56)	*
SSE	0.9 (0.56)	0.9 (0.56)	*
S	1.7 (1.06)	1.7 (1.06)	*
SSW	3.0 (1.86)	5.0 (3.11)	*
SW	1.50 (0.93)	4.0 (2.48)	*
WSW	0.96 (0.60)	1.94 (1.20)	1.9 (1.2) (Cows)
W	0.81 (0.50)	2.71 (1.68)	*
WNW	1.90 (1.18)	1.87 (1.16)	*
NW	1.93 (1.20)	1.93 (1.20)	*
NNW	1.06 (0.66)	1.18 (0.73)	*

* No location was identified within 5 miles of the plant.

9.0 REFERENCES

1. USNRC Radiological Assessment Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," Revision 1, November 1979.

2. NCRP Report No. 94, *Exposure of the Population in the United States and Canada from Natural Background Radiation*, National Council on Radiation Protection and Measurements, 1987.

3. *Ionizing Radiation: Sources and Biological Effects*, United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), 1982 Report to the General Assembly.

4. Kathren, Ronald L., *Radioactivity and the Environment - Sources, Distribution, and Surveillance*, Harwood Academic Publishers, New York, 1984.

5. *Maine Yankee Final Safety Analysis Report.*

6. NRC Generic Letter 89-01, Subject: Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose Calculation Manual or to the Process Control Program. Dated January 31, 1989.

7. USNRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977.