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Dominion Energy®

U.S. Nuclear Regulatory Commission
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DOMINION ENERGY NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNITS 1, 2, AND 3
2022 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

This letter transmits the Annual Radiological Environmental Operating Report for the Millstone Power Station, for the period January 1, 2022, through December 31, 2022. This satisfies the provisions of Section 5.7.2 of Millstone Power Station Unit 1 Permanently Defueled Technical Specifications (PDTS), and Sections 6.9.1.6A and 6.9.1.3 of the Millstone Power Station Units 2 and 3 Technical Specifications, respectively.

Should you have any questions, please contact Mr. Dean E. Rowe at (860) 444-5292.

Sincerely,

L. J. Armstrong
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Attachments: 1

Commitments made in this letter:

1. None.

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ATTACHMENT 1

2022 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

MILLSTONE POWER STATION UNITS 1, 2, AND 3
DOMINION ENERGY NUCLEAR CONNECTICUT, INC. (DENC)

Millstone Power Station

2022

Radiological Environmental Operating Report

January 1, 2022 – December 31, 2022

Dominion Energy Nuclear Connecticut, Inc.

Unit	License	Docket
1	DPR-21	50-245
2	DPR-65	50-336
3	NPF-49	50-423

Dominion Energy

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

MILLSTONE POWER STATION

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

2022

Millstone Power Station Unit 1, DOCKET NO. 50-245
Millstone Power Station Unit 2, DOCKET NO. 50-336
Millstone Power Station Unit 3, DOCKET NO. 50-423

Dominion Energy Nuclear Connecticut, Inc.
Waterford, Connecticut

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EXECUTIVE SUMMARY

INTRODUCTION

This report summarizes the results of the Radiological Environmental Monitoring Program (REMP) conducted in the vicinity of the Millstone Power Station (MPS) during the period from January 1, 2022, to December 31, 2022. This document has been prepared in accordance with the requirements of the separate MPS Unit 1 (MPS1) Permanently Defueled Technical Specifications and the Technical Specifications for Millstone Units 2 and 3 (MPS2 and MPS3).

The REMP has been established to monitor the radiation and radioactivity released to the environment as a result of MPS operation. This program, initiated in April 1967, includes the collection, analysis, and evaluation of radiological data to assess the impact of MPS on the environment and on the general public.

SAMPLING AND ANALYSIS

The environmental sampling media collected in the vicinity of MPS and at distant locations included aquatic, atmospheric, and terrestrial samples. These samples were air particulate filters, charcoal cartridges, soil, well water, broadleaf vegetation, fruits and vegetables, seawater, bottom sediment, aquatic flora, fish, oysters, clams, and lobsters.

During 2022, there were 533 samples collected from the atmospheric, aquatic, and terrestrial environments. In addition, 172 exposure measurements were obtained using environmental thermo luminescent dosimeters (TLDs). A discussion of all discrepancies from the sample collection requirements in the MPS Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODCM) is given in Section 2.3 of this report. Teledyne Brown Engineering, Inc. of Knoxville, Tennessee performed the sample analyses and Environmental Dosimetry Company of Sterling, Massachusetts, performed the TLD analyses.

LAND USE CENSUS

The annual land use census in the vicinity of MPS was conducted as required by the MPS REMODCM. To determine the dairy exposure pathway, a list of cow milk and goat milk locations is established. The list of cow milk locations is identified by a review of the annual registration information obtained from the State of Connecticut Department of Agriculture. The list of goat milk locations is identified by the information obtained from the American Dairy Goat Association list and by inspections performed in the field. Although broadleaf sampling was performed and may be used in lieu of a garden census, gardens were included in the 2022 census. Only vegetable gardens having an area of more than 500 square feet were identified. Due to the difficulty of measuring individual gardens, the nearest garden within each directional sector identified by a drive-by survey is listed. However, for dose calculation, garden distances are based on nearest resident assuming that a resident may plant a new garden. This gives a more conservative dose estimate.

RADIOLOGICAL IMPACT TO THE ENVIRONMENT

The radionuclides detected in some samples were from non-station, naturally occurring radionuclides.

All terrestrial samples collected as part of the MPS REMP did not show any station related isotopes.

The seawater exiting the stations quarry is monitored for all station generated radionuclides. Tritium was only found in seawater onsite inside the mixing zone of the quarry discharge at levels that were expected from routine station operation.

Offsite ambient radiation measurements using environmental TLDs beyond the site boundary ranged between 41 - 104 milliroentgens (mrem) per year. The range of ambient radiation levels observed with the TLDs is consistent with natural background radiation levels for Connecticut.

RADIOLOGICAL IMPACT TO THE GENERAL PUBLIC

During 2022, radiation doses to the general public as a result of Millstone's operation continued to be well below the federal limits and much less than the dose due to other sources of man-made (e.g., X-rays, medical) and naturally occurring (e.g., cosmic, radon) radiation.

The calculated total body (whole body) dose to the maximally exposed member of the public from radioactive effluents and ambient radiation resulting from MPS operations for 2022 was approximately 0.340 mrem for the year. This conservative estimate is well below the Environmental Protection Agency's (EPA) annual dose limit to any member of the general public and is a fraction of a percent of the typical dose received from natural and other sources of man-made radiation.

CONCLUSIONS

The 2022 REMP for MPS resulted in the collection and analysis of 705 environmental samples and measurements. The data obtained were used to determine the impact of Millstone's operation on the environment and on the general public.

An evaluation of direct radiation measurements, environmental sample analyses, and dose calculations indicates all applicable federal criteria were met with margin. Furthermore, radiation levels and the consequential dose from station operation were small in comparison to those attributed to naturally occurring and man-made background radiation.

Based on this information, there is no significant radiological impact on the environment or on the general public due to Millstone's operation. The 2022 REMP samples results are consistent with previous years with no trends evident.

1. INTRODUCTION

This section provides an overview of the MPS REMP. It also includes background information to allow a reader to have an informed understanding of radiation and nuclear power operation.

1.1 Overview

The 2022 REMP performed by Dominion Energy Nuclear Connecticut (DENC) for MPS is discussed in this report. Since the operation of a nuclear power station results in the release of small amounts of radioactivity and low levels of radiation, the Nuclear Regulatory Commission (NRC) requires by regulations and technical specifications that a program be established to monitor radiation and radioactivity in the environment (References 1, 6, 9, 10, & 11). This report published annually per Millstone's Technical Specifications (section 5.7.2 for MPS1, section 6.9.1.6a for MPS2 and Section 6.9.1.3 for MPS3), summarizes the results of measurements of radiation and radioactivity in the environment in the vicinity of the MPS and at distant locations during the period January 1, 2022, to December 31, 2022.

The REMP consists of taking radiation measurements and collecting samples from the environment, analyzing them for radioactivity content, and interpreting the results. With emphasis on the critical radiation exposure pathways to humans, samples from the aquatic, atmospheric, and terrestrial environments are collected. These samples include, but are not limited to air, soil, well water, broadleaf vegetation, fruits, vegetables, seawater, bottom sediment, aquatic flora, fish, oysters, clams, and lobsters.

Thermoluminescent dosimeters (TLDs) are placed in the environment to measure gamma radiation levels. The TLDs are processed, and the environmental samples are analyzed to measure the very low levels of radiation and radioactivity present in the environment as a result of MPS operation and other natural and man-made sources. These results are reviewed by Millstone's radiological staff and have been reported semiannually or annually to the NRC and others for over 30 years.

To more fully understand how a nuclear power station impacts humans and the environment, background information on radiation and radioactivity, natural and man-made sources of radiation, reactor operations, radioactive effluent controls, and radiological impact on humans is provided. It is believed that this information will assist the reader in understanding the radiological impact on the environment and humans from the operation of Millstone.

1.2 Radiation and Radioactivity

All matter is made of atoms. Nuclear radiation is energy or particles that are given off from atoms in an excited state (e.g., unstable, radioactive atoms).

Radioactive material exists naturally and has always been a part of our environment. The earth's crust, for example, contains radioactive uranium, radium, thorium, and potassium. Some radioactivity is a result of fallout from nuclear weapons testing. Examples of radioactive fallout that could be present in environmental samples are cesium-137 and strontium-90. Some examples of radioactive materials released from a nuclear power station are hydrogen-3 (tritium), cesium-137, iodine-131, strontium-90, and cobalt-60.

Radiation is measured in units of mrem, much like temperature is measured in degrees. A mrem is a measure of the biological effect of the energy deposited in tissue. The letter ‘m’ is for ‘milli’, or one-thousandth of a ‘rem’. The word ‘rem’ is an acronym for roentgen equivalent man. One rem is equal to a ‘rad’ multiplied by factors to account for type of radiation and distribution within the body. The word ‘rad’ is an acronym for radiation absorbed dose. One rad is equal to the absorption of 100 ergs of energy per gram of tissue. The natural and man-made radiation dose received in one year by the average American is 300 to 600 mrem (References 2, 3, 4 & 5). The per capita dose has increased since the early 1980’s because of the increased usage of medical procedures involving exposure to radiation (Reference 3).

Radioactivity is measured in Curies. Levels of radioactivity commonly seen in the environment are typically a small fraction of a Curie, therefore radioactivity in the environment is typically measured in picocuries. One picocurie (pCi) is one-trillionth of a Curie and is equal to 0.037 disintegrations per second (2.22 disintegrations per minute).

1.3 Sources of Radiation

As mentioned previously, naturally occurring radioactivity has always been a part of our environment. Table 1.3-1 shows the sources and doses of radiation from natural and man- made sources.

Table 1.3-1

Radiation Sources and Corresponding Approximate Doses(1)

NATURAL		MAN-MADE	
Source	Radiation Dose (mrem/year)	Source	Radiation Dose (mrem/year)
Internal, inhalation(2)	228	Medical(3)	300
External, space	33	Consumer(4)	12.3
Internal, ingestion	29	Industrial, security, educational, research	0.3
External, terrestrial	21	Occupational	0.5
		Weapons Fallout	< 1
		Nuclear Power Stations	< 1
Approximate Total	311	Approximate Total	314

(1) information from References 3 and 4
(2) from radon and thoron
(3) includes computerized tomography (147 mrem), nuclear medicine (77 mrem), interventional fluoroscopy (43 mrem) and conventional radiography and fluoroscopy (33 mrem)
(4) primarily from cigarette smoking (4.6 mrem), commercial air travel (3.4 mrem), building materials (3.5 mrem) and mining and agriculture (0.8 mrem)

Cosmic radiation (external, space) from the sun and outer space penetrates the earth's atmosphere and continuously bombards us with rays and charged particles. Some of this cosmic radiation interacts with gases and particles in the atmosphere, making them radioactive. These radioactive byproducts from cosmic ray bombardment are referred to as cosmogenic radionuclides. Isotopes such as beryllium-7 and carbon-14 are formed in this way. Exposure to cosmic and cosmogenic sources of radioactivity results in about 33 mrem of radiation dose per year.

Additionally, natural radioactivity is in our body and in the food, we eat (about 29 mrem/year), the ground we walk on (about 21 mrem/year) and the air we breathe (about 228 mrem/year). Most of a person's annual dose results from exposure to radon and thoron in the air we breathe. These gases and their radioactive decay products arise from the decay of naturally occurring uranium, thorium and radium in the soil and building products such as brick, stone, and concrete. Radon and thoron levels vary greatly with location, primarily due to changes in the concentration of uranium and thorium in the soil. Residents at some locations in Colorado, New York, Pennsylvania, New Jersey, and even Connecticut have a higher annual dose because of higher levels of radon/thoron gases in these areas. In total, these various sources of naturally occurring radiation and radioactivity contribute to a total dose of about 311 mrem per year.

In addition to natural radiation, we are normally exposed to radiation from a number of man-made sources. The single largest doses from man-made sources result from therapeutic and diagnostic applications of x-rays and radiopharmaceuticals. The annual dose to an individual in the United States from medical and dental exposure is approximately 300 mrem. Consumer products/uses, such as cigarettes, building materials and commercial air travel contribute about 13 mrem/year. Much smaller doses result from weapons fallout (less than 1 mrem/year) and nuclear power stations (less than 1 mrem/year). Typically, the average person in the United States receives approximately 314 mrem per year from man-made sources.

1.4 Nuclear Reactor Operations

MPS generates about 2100 megawatts of electricity at full power, which provides approximately one-third of the power consumed in the State of Connecticut. MPS2 and MPS3 are pressurized water reactors (MPS1, which is permanently shut down, was a boiling water reactor). The nuclear station is located on an approximate 500-acre site about three miles (five kilometers) west of New London, Connecticut. Commercial operation of MPS2 began in December 1975 and MPS3 in May 1986.

MPS was operational during most of 2022, except for MPS2 forced outage to repair a RBCCW leak in January and for the MPS3 refueling outage in April. For 2022, the annual capacity factor for MPS2 was 98.17% and for MPS3 was 84.61%.

Nuclear-generated electricity is produced by many of the same techniques used for conventional oil and coal-generated electricity. Both systems use heat to boil water to produce steam. The steam turns a turbine, which turns a generator, producing electricity. In both cases, the steam passes through a condenser where it changes back into water and re-circulates back through the system (see Figure 1.4-1). The cooling water source for MPS is the Niantic Bay.

The key difference between nuclear power and conventional power is the source of heat used to boil the water. Conventional stations burn fossil fuels in a boiler, while nuclear stations use uranium fission in a nuclear reactor.

Inside the reactor, a nuclear reaction called fission takes place. Particles, called neutrons, strike the nucleus of a uranium-235 atom, causing it to split into fragments called radioactive fission products. The splitting of the atoms releases both heat and more neutrons. The newly released neutrons then collide with and split other uranium atoms, thus making more heat and releasing even more neutrons, and on and on until the uranium fuel is depleted or spent. This process is called a chain reaction. When this chain reaction is self-sustaining, the reactor is called “critical.”

The operation of a nuclear reactor results in the release of small amounts of radioactivity and low levels of radiation. The radioactivity originates from two major sources, radioactive fission products and radioactive activation products. Radioactive fission products, as illustrated in Figure 1.4-1, originate from the fissioning of the nuclear fuel. These fission products get into the reactor coolant from their release by minute amounts of uranium on the outside surfaces of the fuel cladding, by diffusion through the fuel pellets and cladding and, on occasion, through defects or failures in the fuel cladding. These fission products circulate along with the reactor coolant water and will deposit on the internal surfaces of pipes and equipment. The radioactive fission products on the pipes and equipment emit radiation. Examples of some fission products are krypton-85 (Kr-85), strontium-90 (Sr-90), iodine-131 (I-131), xenon-133 (Xe-133), and cesium-137 (Cs-137).

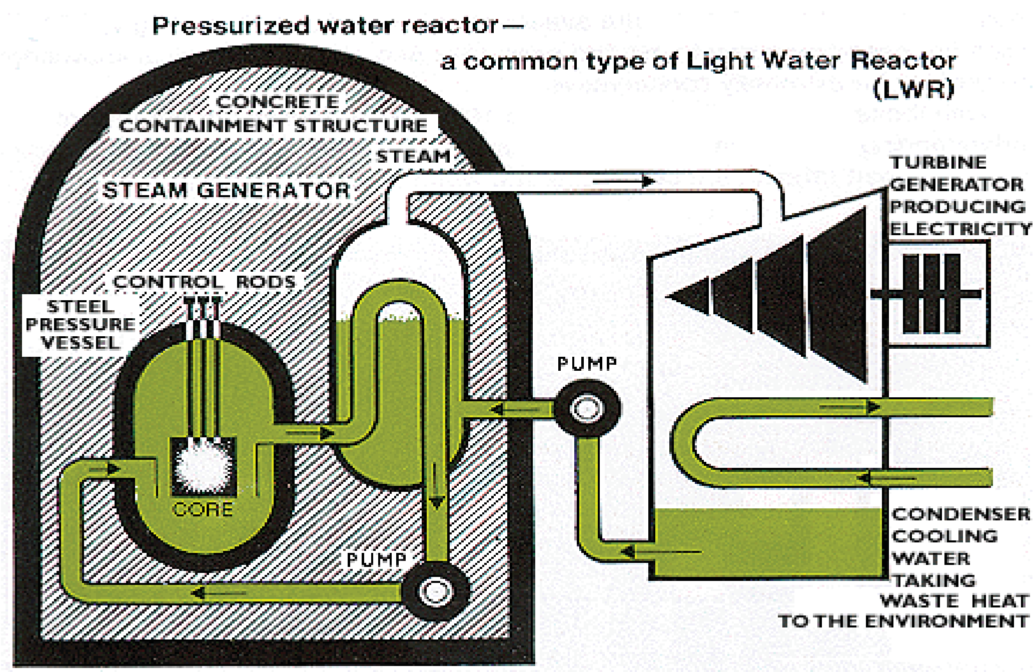


Figure 1.4-1: SIMPLIFIED DIAGRAM OF A PRESSURIZED WATER REACTOR

Nuclear Fission: fission is the splitting of atoms (e.g., uranium-235) by a neutron to release heat and more neutrons, creating a chain reaction. Radiation and fission products are by-products of the process as illustrated in Figure 1.4-2.

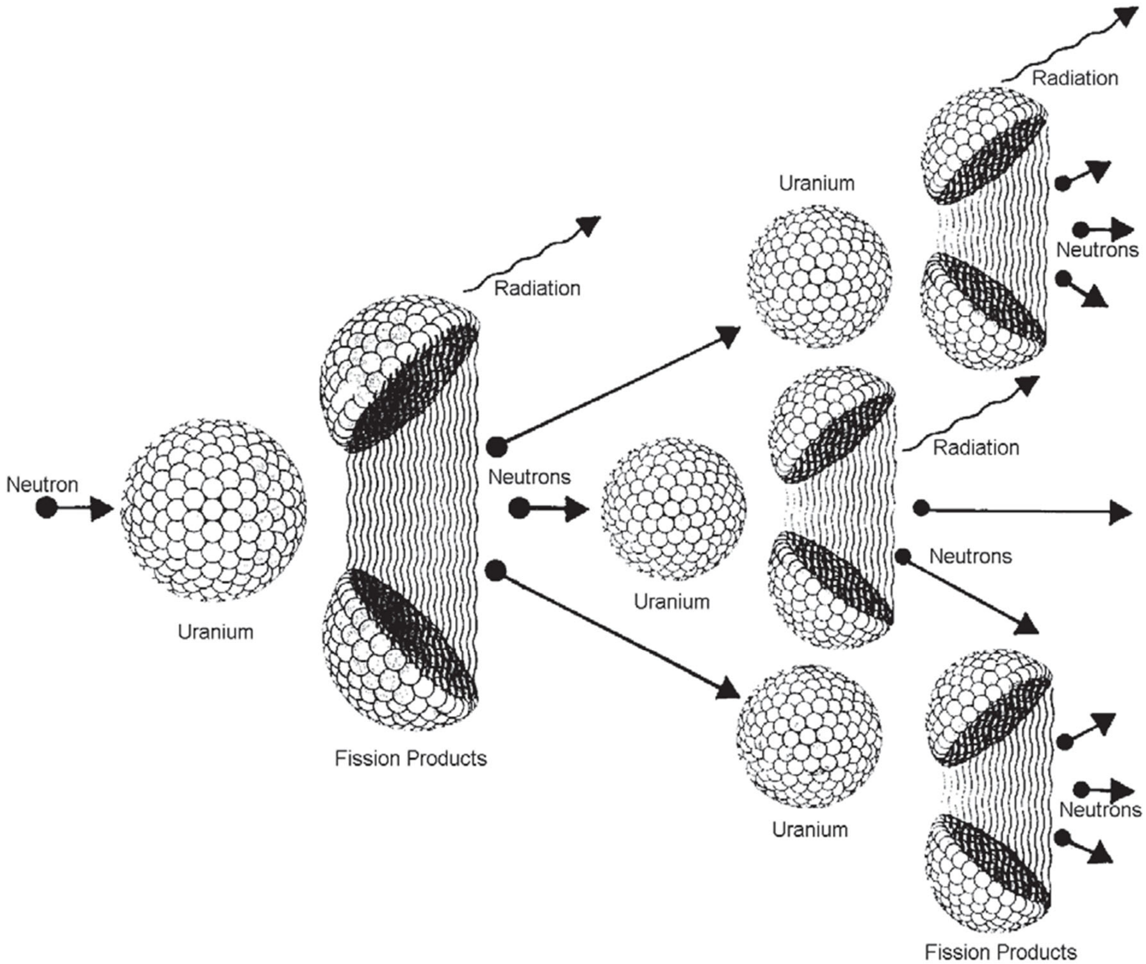


Figure 1.4-2: Radioactive Fission Product Formation

Radioactive activation products (Figure 1.4-3), on the other hand, originate from two sources. The first is by neutron bombardment of the hydrogen, oxygen and other gas (helium, argon, nitrogen) molecules in the reactor cooling water. The second is a result of the fact that the internals of any piping system or component are subject to minute yet constant corrosion from the reactor cooling water. These minute metallic particles (for example: nickel, iron, cobalt, or magnesium) are transported through the reactor core into the fuel region, where neutrons may react with the nuclei of these particles, producing radioactive products. Therefore, activation products are nothing more than ordinary naturally- occurring atoms that are made unstable or radioactive by neutron bombardment. These activation products circulate along with the reactor coolant water and will deposit on the internal surfaces of pipes and equipment. The radioactive activation products on the pipes and equipment emit radiation. Examples of some activation products are manganese-54 (Mn-54), iron-59 (Fe-59), cobalt-60 (Co-60), and zinc-65 (Zn-65).

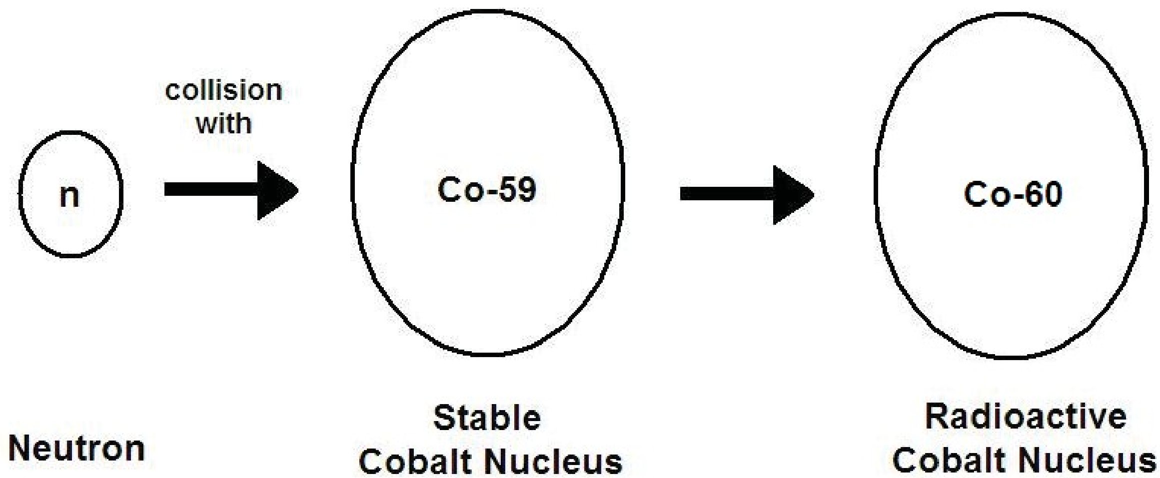


Figure 1.4-3: Radioactive Activation Product Formation

At MPS there are five independent protective barriers that confine these radioactive materials. These five barriers are:

- fuel pellets;
- fuel cladding;
- reactor vessel and associated piping and equipment;
- primary containment; and
- secondary containment (enclosure building).

The ceramic uranium fuel pellets provide the first barrier. Most of the radioactive fission products are either physically trapped or chemically bound between the uranium atoms, where they will remain. However, a few fission products that are volatile or gaseous may diffuse through the fuel pellets into small gaps between the pellets and the fuel cladding.

The second barrier, the fuel cladding, consists of zirconium alloy tubes that confine the fuel pellets. The small gaps between the fuel and the cladding contain the noble gases and volatile iodines that are types of radioactive fission products. This radioactivity can diffuse to a small extent through the fuel cladding into the reactor coolant water. Radioactivity can also escape into coolant water through cladding defects and failures.

The third barrier consists of the reactor pressure vessel, steel piping and equipment that confine the reactor cooling water. The reactor pressure vessel, which holds the reactor fuel, is typically a steel tank 40 feet high by 14 feet in diameter with walls about five to nine inches thick. These vessels and associated piping provide containment for radioactivity in the primary coolant and the reactor core. However, during the course of operations and maintenance, small amounts of radioactive fission and activation products can escape through valve leaks or upon breaching of the primary coolant system for maintenance.

The fourth barrier is the primary containment. It is a cylindrical enclosure with approximately five-foot thick steel reinforced concrete walls lined by steel on the inside. During operation the containment is closed but small amounts of radioactivity may be released from primary containment by venting during operation to maintain proper containment pressure. During maintenance and refueling outages containment is open and small amounts of radioactivity is released during this time when the fuel has been moved out of the reactor cavity in containment.

The fifth barrier is the secondary containment or enclosure building. The enclosure building is a steel building that surrounds the primary containment. This barrier is an additional safety feature at Millstone's reactor units to contain radioactivity that may escape from the primary containment. This enclosure building is equipped with a filtered ventilation system that is used when needed to reduce the radioactivity that escapes from the primary containment.

The five barriers confine most of the radioactive fission and activation products. However, small amounts of radioactivity do escape via mechanical failures and maintenance on valves, piping, and equipment associated with the reactor cooling water system. The small amounts of radioactive liquids and gases that do escape the various containment systems are further controlled by the liquid purification and ventilation filtration systems. The control of radioactive effluents at MPS will be discussed in more detail in the next section.

1.5 Radioactive Effluent Control

The small amounts of radioactive liquids and gases that might escape the first two barriers are processed in the liquid and gaseous waste treatment systems, then monitored for radioactivity, and released only if the radioactivity levels are below the federal release limits.

Radioactivity released from the liquid effluent system to the environment is limited, controlled and monitored by a variety of systems and procedures which include:

- reactor water cleanup system;
- liquid radioactive waste treatment system;
- sampling and analysis of the liquid radioactive waste tanks; and
- liquid waste effluent discharge radioactivity monitor.

The purpose of the reactor water cleanup system is to continuously purify the reactor cooling water by removing radioactive atoms and non-radioactive impurities that may become activated by neutron bombardment. A slip stream of the reactor coolant water is diverted from the primary coolant system and is directed through ion exchange resins where radioactive elements, dissolved and suspended in the water, are removed through chemical processes. The net effect is a substantial reduction of the radioactive material that is present in the primary coolant water and consequently the amount of radioactive material that might escape from the system.

Reactor cooling water that might escape the primary cooling system and other radioactive water sources are collected in floor and equipment drains. These drains direct this radioactive liquid waste to large holdup tanks. The liquid waste collected in the tanks is purified again using the liquid radioactive waste treatment system, which consists of a filter and ion exchange resins.

Processing of liquid radioactive waste results in large reductions of radioactivity in liquids discharged into Niantic Bay. Wastes processed through liquid radioactive waste treatment can be purified and, in some cases, re-used in station systems.

Prior to release, the radioactivity in any liquid radioactive waste tank is sampled and analyzed to determine if the level of radioactivity is below the release limits and to quantify the total amount of radioactive liquid effluent that will be released. If the levels are below the federal release limits, the tank is drained to the liquid effluent discharge header.

This liquid waste effluent discharge line is provided with a shielded radioactivity monitor. This detector is connected to a radiation level meter and a recorder in the Control Room. The radiation alarm is set so that the detector will alarm before radioactivity levels exceed the release limits. In addition to the alarm function, the radiation monitor also signals both discharge valves to close thus terminating the discharge release to the environment. Gamma spectroscopy analysis, tritium analysis and the effluent radiation monitors prevent any liquid radioactivity from being released in excess of release rate and total activity limits. An audible alarm notifies the Control Room operator that this has occurred.

Some liquid waste sources, which have a low potential for containing radioactivity, and/or may contain very low levels of contamination, may be discharged directly to the environment. One such source of liquid is the turbine building sump. However, periodic representative samples are collected for analysis of radioactivity content to track the amounts of radioactivity being discharged.

The preceding discussion illustrates that many controls exist to reduce the radioactive liquid effluents released to the environment to as far below the release limits as is reasonably achievable.

Radioactive releases from the radioactive gaseous effluent system to the environment are limited, controlled, and monitored by a variety of systems and procedures which include:

- containment building ventilation system;
- containment building radioactivity monitors;
- sampling and analysis of containment building vent and purge effluents;
- process gas treatment system;
- auxiliary building (and engineered safeguards and fuel building for MPS3) ventilation system;
- MPS stack and units' vent effluent radioactivity monitors;
- sampling and analysis of MPS stack and units' vent effluents;
- process radiation monitors; and
- steam jet air ejector (SJAE) monitor.

The primary sources of gaseous radioactive waste are degassing of the primary coolant, gaseous liquid drains, and gaseous vents. Additional sources of gaseous waste activity include ventilation air released from the auxiliary building and purging and venting of the containment building. The radiation level meter and recorders for the effluent radioactivity monitors are located in the Control Room. The station process computer aids in tracking the monitor readings. To supplement the information continuously provided by the detector, air samples are taken periodically from the units' containments, MPS stack and units' vents. These samples are analyzed to quantify the total amount of radioactive gases, radioactive iodine, radioactive particulate, and tritium released in gaseous effluents.

Gases from the primary coolant are held up in waste gas decay tanks for decay at MPS2. Gaseous waste at MPS3 is purified through a process gas system, consisting of high-efficiency particulate air filters and charcoal absorber beds. Gases from periodic venting of the MPS2 containment are released through a similar process system (Enclosure Building Filtration System) while gases from the MPS3 containment vacuum pumps are released without treatment. If necessary, MPS3 containment air can be filtered by an internal particulate and charcoal treatment system. Containment purges (purge is the forced ventilation process while containment vents are pressure releases) for MPS2 are filtered by high-efficiency particulate filters while at MPS3 these are not normally filtered. If necessary, particulate and charcoal filters can be used for these purges.

Normally, for MPS2, the air released from the unit vent is from the ventilation of the auxiliary (which includes the fuel pool), service and enclosure buildings. For MPS2, fuel pool and enclosure building ventilation can be redirected to the MPS Site Stack. Normally, for MPS3, the air released from the unit vent is from the ventilation of the auxiliary, fuel, service, waste disposal and enclosure buildings. For MPS3, enclosure building ventilation can be redirected to the MPS Site Stack.

Therefore, for both liquid and gaseous releases, radioactive effluent control systems exist to collect and purify the radioactive effluents in order to reduce releases to the environment to as low as is reasonably achievable. The effluents are always monitored, sampled and analyzed to make sure that radioactivity levels are below the release limits. If the release limits are being approached, isolation valves are closed to stop the release and ensure that federal regulatory limits are always met.

1.6 Radiological Impact on Humans

The final step in the effluent control process is the determination of the radiological dose impact to humans and comparison with the federal dose limits to the public. As mentioned previously, the purpose of continuous radiation monitoring and periodic sampling and analysis is to measure the quantities of radioactivity being released to determine compliance with the radioactivity release limits. This is the first stage for assessing releases to the environment.

The second stage is calculation of the dose impact to the general public from MPS's radioactive effluents. The purpose of this calculation is to periodically assess the dose to the general public resulting from radioactive effluents to ensure that the dose is being maintained as far below the federal dose limit as is reasonably achievable. This is the second stage for assessing releases to the environment.

The types and quantities of radioactive liquid and gaseous effluents released from MPS during each year are reported to the NRC annually in the Radiological Effluent Release Report (RERR). Similar to this report, the RERR is submitted annually to the NRC. The liquid and gaseous effluents were well below the federal release limits and were a small percentage of the MPS REMODCM effluent control limits.

The measurements of the physical and chemical nature of the effluents are used to determine how the radionuclides will interact with the environment and how they can result in radiation exposure to humans. The environmental interaction mechanisms depend upon factors such as the hydrological (water) and meteorological (atmospheric) characteristics in the area. Information on the water flow, wind speed, wind direction, and atmospheric mixing characteristics are used to estimate how radioactivity will distribute and disperse in the ocean and the atmosphere.

The most important type of information that is used to evaluate the radiological impact on humans is data on the use of the environment. Information on fish and shellfish consumption, boating usage, beach usage, locations of cows and goats, locations of residences, locations of gardens, and other usage information are utilized to estimate the amount of radiation and radioactivity received by the general public.

The radiation exposure pathway to humans is the path radioactivity takes from its release point at MPS to its effect on man. The movement of radioactivity through the environment and its transport to humans is portrayed in Figure 1.6-1.

EXAMPLES OF Millstone's RADIATION EXPOSURE PATHWAYS

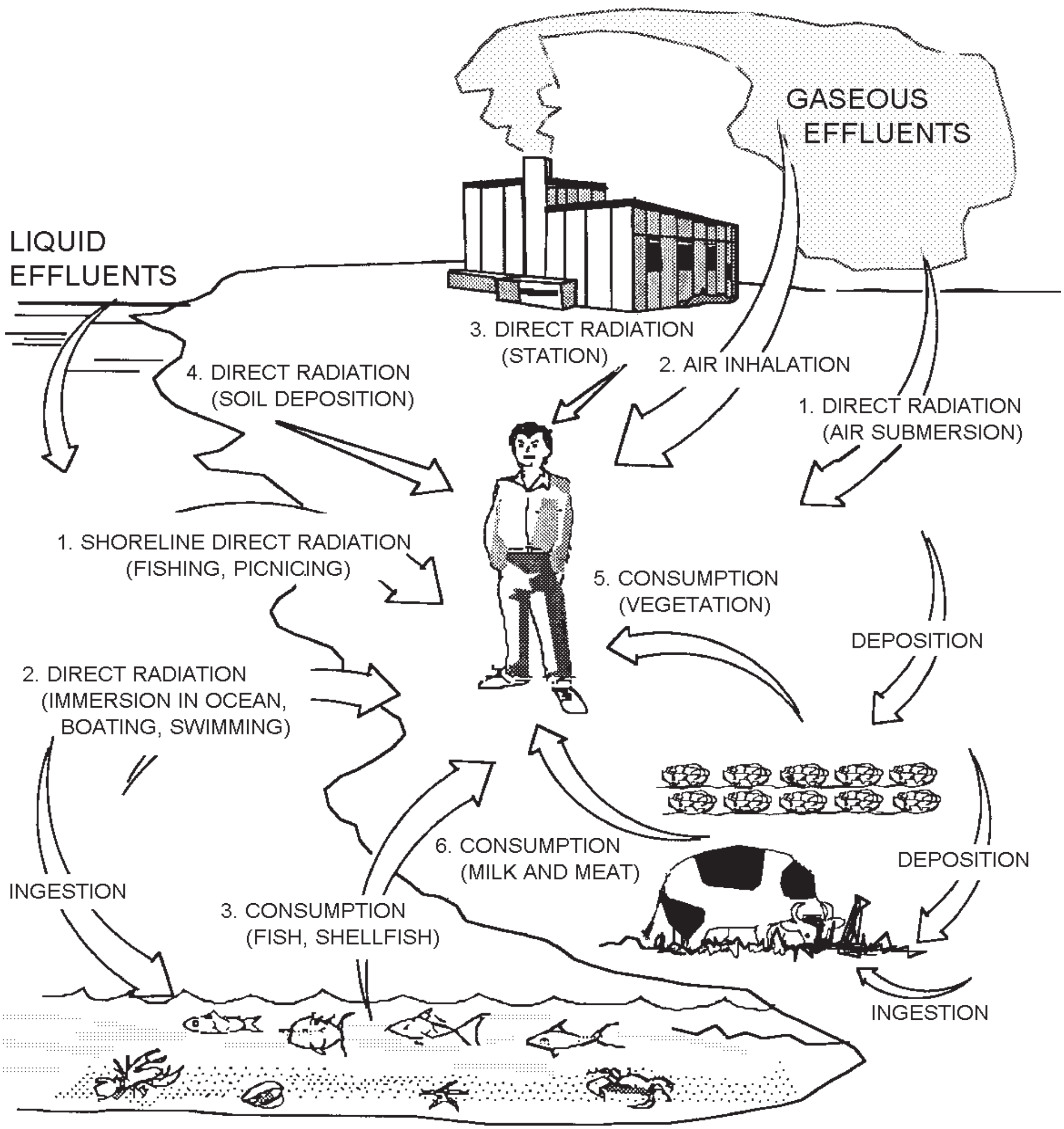


Figure 1.6-1: Radiation Exposure Pathways

There are four pathways in which liquid effluents affect humans:

- external radiation from liquid effluents that deposits and accumulates on the shoreline;
- external radiation during boating from radioactivity in ocean water;
- external radiation from immersion in ocean water containing radioactivity; and
- internal radiation from consumption of fish and shellfish containing radioactivity absorbed from the liquid effluents.

There are six major pathways in which gaseous effluents affect humans:

- external radiation from immersion in an airborne plume of radioactivity;
- external radiation from shine from an overhead, airborne plume of radioactivity;
- internal radiation from inhalation of airborne radioactivity;
- external radiation from deposition of radioactive effluents on the ground;
- internal radiation from consumption of vegetation containing radioactivity deposited on the vegetation from airborne deposition and absorbed from the soil due to ground deposition of radioactive effluents; and
- internal radiation from consumption of milk and meat containing radioactivity deposited on forage that is eaten by cattle and other livestock.

Drinking water is not a pathway of exposure for radioactivity released in liquid or gaseous effluents from Millstone. All liquid effluents are released to either Long Island Sound or Niantic Bay. Both are saltwater bodies which are not used as sources of drinking water. The closest reservoir is Lake Konomoc, 6.5 miles from Millstone. Radioactivity deposited in the reservoir from MPS gaseous effluents would not yield a significant dose to the public compared to doses from the six major pathways listed.

Ambient (direct) radiation emitted from sources of radioactivity at MPS comes from low- level radioactive waste being processed and stored at the site prior to shipping and disposal. Also, the operation of the Independent Spent Fuel Storage Installation (ISFSI) which began in 2005 results in a small amount of direct radiation at the site boundary.

The radiological dose impact on humans is based both on effluent analyses and modeling and on direct measurements of radiation and radioactivity in the environment. However, the operation of MPS results in releases of only small amounts of radioactivity, and, as a result of dilution in the atmosphere and ocean, even the most sensitive radioactivity measurement and analysis techniques cannot usually detect these tiny amounts of radioactivity above that which is naturally present in the environment. Therefore, radiation doses are calculated using radioactive effluent release data and computerized dose calculations that are based on conservative NRC-recommended models that tend to result in over-estimates of the resulting dose. These computerized dose calculations are performed by DENC personnel. These computer codes use the guidelines and methodology set forth by the NRC in Regulatory Guide 1.109 (Reference 7). The dose calculations are specified in the Millstone's REMODCM (Reference 8), which has been reviewed by the NRC.

It should be emphasized that the conservative assumptions made in the computer code calculations; the maximum hypothetical dose to an individual is considerably higher than the dose that would actually be received by a real individual.

After dose calculations are performed, the results are compared to the dose limits for the public as specified in NRC's technical specifications for MPS (References 9-11).

The technical specifications limits for the dose to a member of the general public from radioactive material in liquid effluents released to unrestricted areas are:

- less than or equal to 3 mrem per year to the total body; and,
- less than or equal to 10 mrem per year to any organ.

The technical specifications limits for dose due to release of radioactivity in gaseous effluents is restricted to:

- less than or equal to 10 mrad per year for gamma radiation from noble gases;
- less than or equal to 20 mrad per year for beta radiation from noble gases; and
- less than or equal to 15 mrem per year to any organ from iodine-131, iodine-133, tritium, and all particulate radionuclides with half-lives greater than 8 days.

The Technical Specifications limits for total dose from all three MPS units due to release of radioactivity in gaseous and liquid effluents and direct radiation is restricted to:

- less than or equal to 25 mrem per year to the total body;
- less than or equal to 75 mrem per year to the thyroid; and
- less than or equal to 25 mrem per year to any other organ.

2. PROGRAM DESCRIPTION

2.1 Sampling Schedule and Locations

The sample locations, types, and frequency of analysis are given in Tables 2.1-1 and 2.1-2 and are shown in Figures 2.1-1 and 2.1-2. The program as described in Table 2.1-1 lists the required samples collected as specified in the REMODCM, as well as any other extra samples collected under the program.

Table 2.1-1 Environmental Monitoring Program Sampling Types and Locations

No.-Type*	Location Name	Distance, Direction From Release Point**	Sample Media
1-I	Onsite – NAP Parking Lot N	0.6 Mi, NNW	TLD, Air Particulate, Iodine, Vegetation
2-I	Onsite - Weather Shack	0.3 Mi, S	TLD, Air Particulate, Iodine
3-I	Onsite - Bird Sanctuary	0.3 Mi, NE	TLD, Air Particulate, Iodine, Soil
4-I	Onsite - Albacore Drive	1.0 Mi, N	TLD, Air Particulate, Iodine, Soil
5-I	Onsite – Quarry East	0.1 Mi, SSE	TLD
6-I	Onsite - Quarry Discharge	0.3 Mi, SSE	TLD
7-I	Onsite – Env. Lab Dock	0.3 Mi, SE	TLD
8-I	Onsite – Env. Lab	0.3 Mi, SE	TLD
9-I	Onsite - Bay Point Beach	0.4 Mi, W	TLD
10-I	Goshen Fire Dept.	1.2 Mi, E	TLD, Air Particulate, Iodine, Vegetation
11-I	Great Neck Country Club	1.6 Mi, ENE	TLD, Air Particulate, Iodine
13-C	Mystic, CT	11.5 Mi, ENE	TLD
14-C	Ledyard, CT	12.0 Mi, NE	TLD, Soil
15-C	Norwich, CT	14.0 Mi, N	TLD, Air Particulate, Iodine
16-C	Old Lyme, CT – Halls Rd.	8.8 Mi, W	TLD
17-I	Site Boundary	0.5 Mi, NE	Vegetation
25-I	Fruits & Vegetables	< 10 Miles	Vegetation
26-C	Fruits & Vegetables	> 10 Miles	Vegetation
27-I	East Lyme Police Dept.	1.7 Mi, WNW	TLD, Air Particulate, Iodine
28-I	Two Tree Island [1]	0.8 Mi, SSE	Fish [I]
29-I	West Jordan Cove [1]	≤ 0.5 Mi, ENE to ESE	Clams, Fucus, Fish [I]
31-I	Niantic Shoals	1.8 Mi, NW	Bottom Sediment, Clams
32-I	Vicinity of Discharge [1,2]		Bottom Sediment, Fish [I], Seawater, Aquatic Flora
33-I	Seaside Point	1.8 Mi, ESE	Bottom Sediment
34-I	Thames River Yacht Club	4.0 Mi, ENE	Bottom Sediment
35-I	Niantic Bay	≤0.5 Mi, SSW to W	Lobster, Fish1, Aquatic Flora
36-C	Black Point	2.7 Mi, WSW	Aquatic Flora
37-C	Giant's Neck	3.5 Mi, WSW	Bottom Sediment, Seawater
41-I	Waterford - Myrock Avenue	3.2 Mi, ENE	TLD
42-I	East Lyme - Billow Road	2.4 Mi, WSW	TLD
43-I	East Lyme–Old Black Point	2.6 Mi, SW	TLD
44-I	Onsite – Schoolhouse	0.1 Mi, NNE	TLD
45-I	Onsite - Access Road #1	0.5 Mi, NNW	TLD
46-I	Old Lyme - Hillcrest Ave.	4.6 Mi, WSW	TLD
47-I	East Lyme - W. Main St.	4.5 Mi, W	TLD
48-I	East Lyme – Corey & Roxbury	3.4 Mi, WNW	TLD
49-I	East Lyme - Society Rd.	3.6 Mi, NW	TLD
50-I	East Lyme – Manwaring Rd & Terrace Ave	2.1 Mi, W	TLD
51-I	East Lyme - Smith Ave.	1.5 Mi, NW	TLD
52-I	Waterford - River Rd.	1.1 Mi, NNW	TLD
53-I	Waterford - Gardiners Wood Rd	1.4 Mi, NNE	TLD
55-I	Waterford - Magonk Point	1.8 Mi, ESE	TLD
56-I	New London – Ocean & Mott Ave.	3.7 Mi, E	TLD

1. Fish required to be sampled from one of three other locations (#28, #29 or #32).
2. Vicinity of discharge includes the Quarry and shoreline area from Fox Island to western point of Red Barn recreation Area and Offshore out to 500 feet.

Footnotes:
*I = Indicator; C = Control, X - Extra - sample not required by the REMODCM
** = The release points are the Millstone Stack for terrestrial location and the end of the quarry for aquatic location.

Table 2.1-1 Environmental Monitoring Program Sampling Types and Locations (Continues)

No.-Type[1]	Location Name	Distance, Direction From Release Point[2]	Sample Media
57-I	New London - Ocean Ave.	3.6 Mi, ENE	TLD
59-I	Waterford -Miner Ave.	3.4 Mi, NNE	TLD
60-I	Waterford-Parkway South&Cross	4.0 Mi, N	TLD
61-I	Waterford–Oil Mill&Boston Post	4.3 Mi, NNW	TLD
62-I	East Lyme - Columbus Ave.	1.9 Mi, WNW	TLD
63-I	Waterford - Gardiners Wood & Jordon Cove	0.8 Mi, NE	TLD
64-I	Waterford - Shore Rd.	1.1 Mi, ENE	TLD
65-I	Waterford – Boston Post Rd.	3.2 Mi, NE	TLD
66-X	NAP Parking Lot - Fit Center	0.4 Mi, NW	TLD
71-I	1-MW-XFMR-03	Onsite	Well Water
72-I	MW-GPI-1	Onsite	Well Water
73-X	Site Switchyard Fence	0.3 Mi, N	TLD
74-X	Ball Field Foul Pole	0.6 Mi, N	TLD
75-X	Waterford – Windward Way & Shotgun	0.5 Mi, NE	TLD
76-X	ISFSI-1	Up-gradient of ISFSI	Well Water
77-X	ISFSI-2	Down-gradient of ISFSI	Well Water
78-X	ISFSI-3	Down-gradient of ISFSI	Well Water
79-I	M3-MW-1	Onsite	Well Water
81-I	S2-MW-1	Onsite	Well Water
82-I	MW-6B	Onsite	Well Water
83-I	S3-MW-2	Onsite	Well Water
89-C	Aquatic background	>4 miles of discharge	Lobster

1. Fish required to be sampled from one of three other locations (#28, #29 or #32).
2. Vicinity of discharge includes the Quarry and shoreline area from Fox Island to western point of Red Barn recreation Area and Offshore out to 500 feet.

Footnotes:
*I = Indicator; C = Control, X - Extra - sample not required by the REMODCM
** = The release points are the Millstone Stack for terrestrial location and the end of the quarry for aquatic location.

Table 2.1-2 Required Sampling Frequency & Type of Analysis

	Exposure Pathway and/or Sample	No. of Locations	Sampling & Collection Frequency	Type and Frequency of Analysis
1.	Gamma Dose - Environmental TLD	39[1]	Quarterly	Gamma Dose - Quarterly
2.	Airborne Particulate	8	Continuous sampler - filter change every two weeks	Gross Beta – Every two weeks Gamma Spectrum - Quarterly on composite (by location), and on individual sample if gross beta is greater than 10 times the mean of the weekly control station's gross beta results
3.	Airborne Iodine	8	Continuous sampler – canister change every two weeks	I-131 – Every two weeks
4.	Vegetation	5	One sample near middle and one near end of growing season	Gamma Isotopic on each sample
5.	Milk - Refer to Table 2.1-2.1 below			
6.	Sea Water	2	Continuous sampler with a monthly collection at indicator location. Quarterly at control location - Composite of 6 weekly grab samples.	Gamma Isotopic and Tritium on each sample.
7.	Well Water	6	Semiannual	Gamma Isotopic and Tritium on each sample
8.	Bottom Sediment	5	Semiannual	Gamma Isotopic on each sample
9.	Soil	3	Annually	Gamma Isotopic on each sample
10.	Fin Fish (edible portion)	2	Semiannual	Gamma Isotopic on each sample
11.	Aquatic flora (fucus)	4	Quarterly	Gamma isotopic on each sample
13.	Clams (edible portion)	2	Semiannual	Gamma Isotopic on each sample
14.	Lobster (edible portion)	2	Semiannual	Gamma Isotopic on each sample

Footnotes
1. Two or more TLDs or TLD with two or more elements per location.

- Oysters were previously Sample#12, REMODCM revision 27.

Table 2.1-2.1 Milk Sampling Requirements

Number of Locations and Sampling Criteria	Sampling & Collection Frequency	Type and Frequency of Analysis
If milk location(s) are available, obtain samples from milking animals from up to three locations within 3 miles (5 km) distance having the highest dose potential. If there are none, then one sample from milking animals in each of three areas between 3 to 5 miles (5 to 8 km) distant where doses are calculated to greater than 1 mrem per year. One sample from milking animals at a control location 9 to 18 miles (15 to 30 km) distant and in the least prevalent wind direction.	Semimonthly when animals are on pasture; Monthly, for non---pasture producers.	Gamma Isotopic and I-131 analysis on each sample
If milk location(s) are not available, obtain samples of three different kinds of broad leaf vegetation grown nearest each of two different offsite locations of highest predicted annual average ground level D/Q	Monthly, if available, or at harvest. (a)	Gamma Isotopic and I-131 analysis on each sample

Footnotes
(a) Harvest consists of one sample near the middle and one sample near the end of the growing season.

Figure 2.1-1. "Inner TLD, Air, Grass, Soil, and Aquatic Locations"

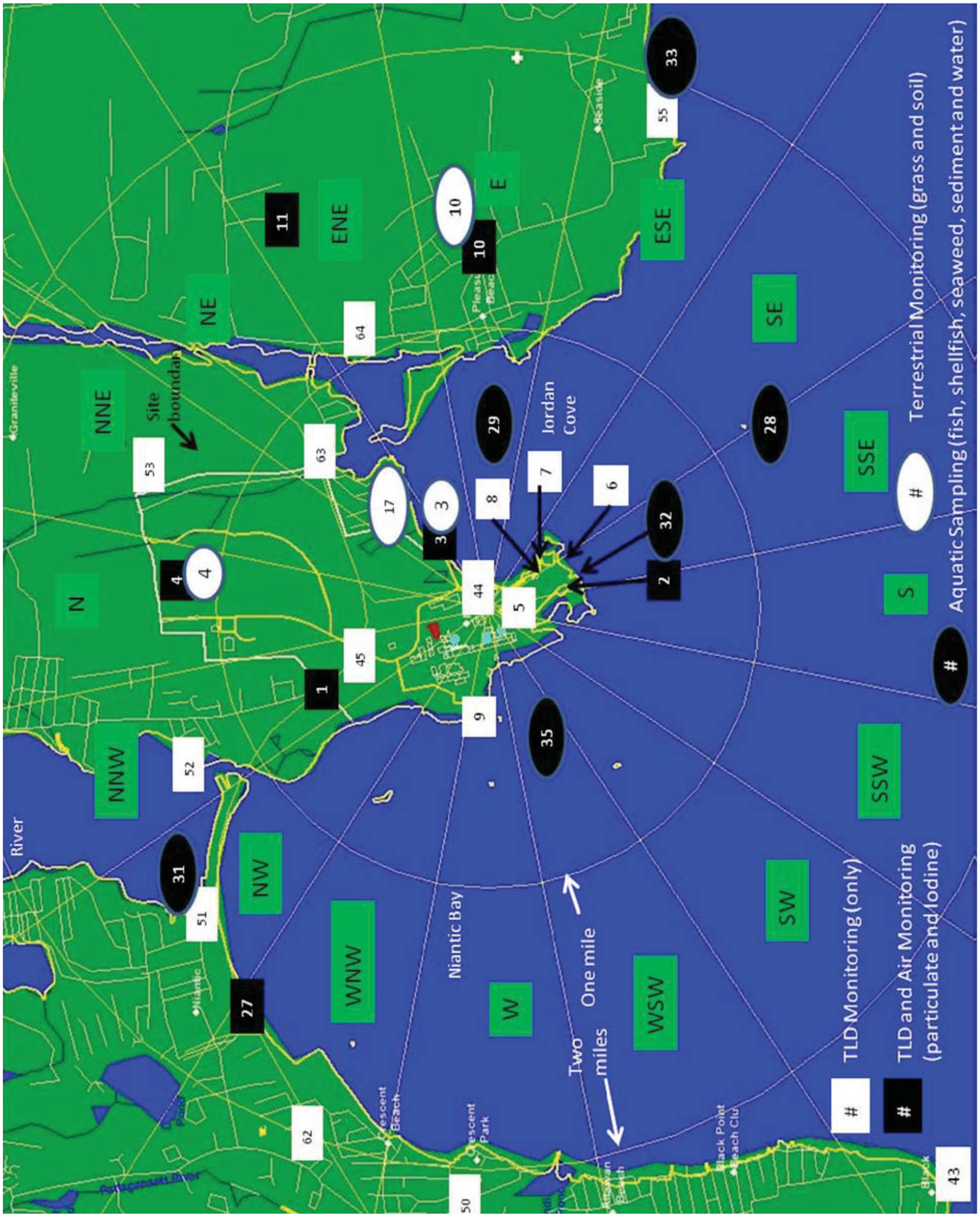
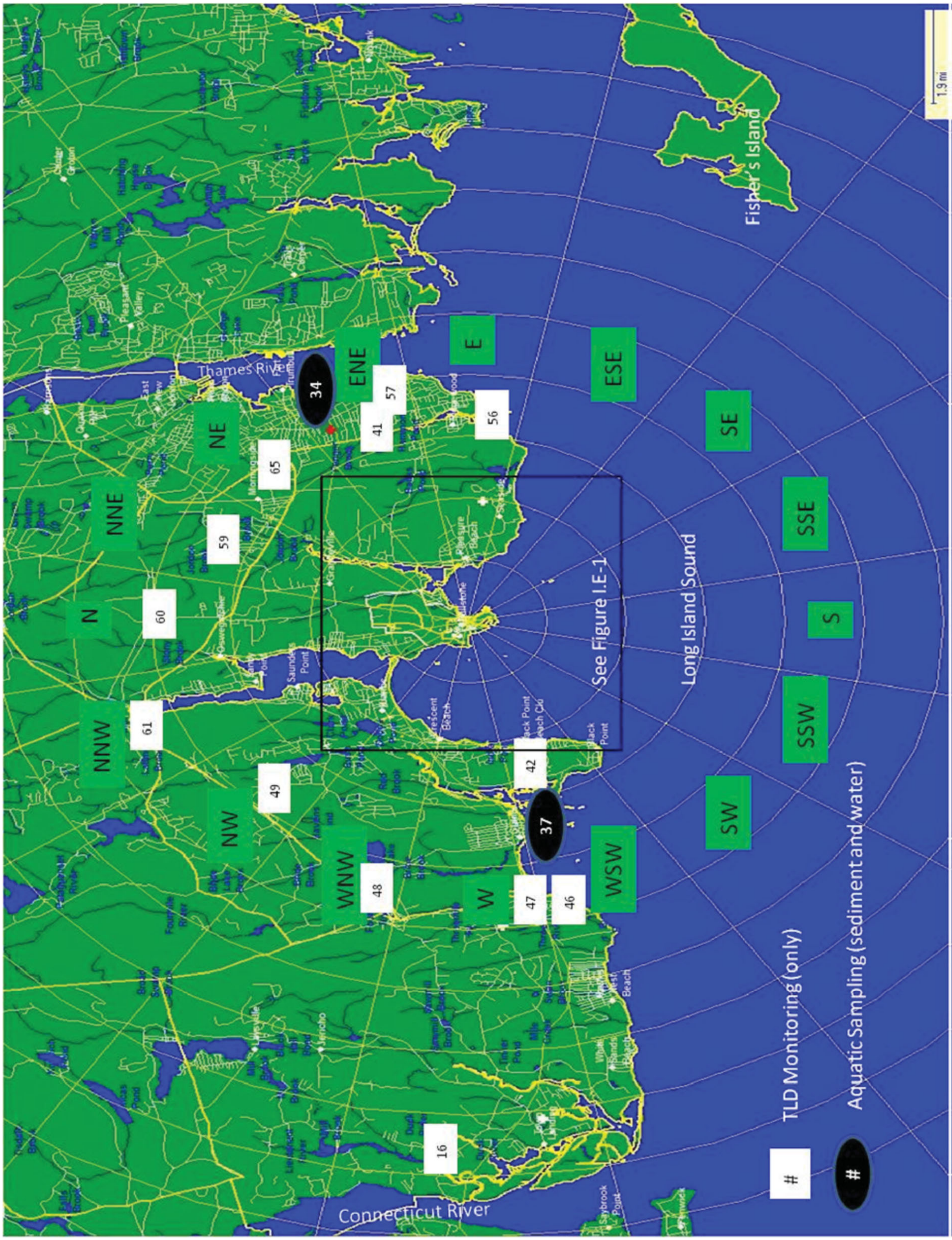


Figure 2.1-2. "Outer TLD and Aquatic Locations"



2.2 Samples Collected During Report Period

The following table summarizes the number of samples of each type collected and analyzed during 2022:

Table 2.2-1 REMP Samples Collected in 2022

Sample Type	Number of Technical Specification Required Samples	Number of Technical Specification Required Samples Analyzed	Number of Extra Samples Analyzed
Gamma Exposure (Environmental TLD)	156	156	16
Air Particulates	208	208	0
Air Iodine	208	208	0
Soil	3	3	0
Milk	12	0	0
Well Water	12	12	24
Vegetation	10	10	6
Sea Water	16	16	0
Bottom Sediment	10	10	0
Aquatic Flora	16	16	4
Fish	4	4	0
Oysters	0	0	4
Clams	4	4	0
Lobster	4	4	0
Total All Types	651	651	54

2.3 Required Samples Not Collected During the Report Period

During 2022 all required samples were obtained except for Milk.
The 2022 Land Use Census did not locate any milk farms producers within ten miles of Millstone Power Station. As a substitute for milk samples, strontium analysis of air samples and gamma analysis of broad leaf vegetation were performed. This fulfills the requirements for Milk sampling as listed in Table 2.1-2.1 of this report, “Milk Sampling Requirements”

3. RADIOCHEMICAL RESULTS

3.1 Summary Table

In accordance with the REMODCM, Section I.F.1, a summary table of the radiochemical results has been prepared and is presented on the following pages. The mean and range recorded are based only upon detectable measurements.

A more detailed analysis of the data is given in Section 4.0 where a discussion of the variations in the data explains many aspects that are not evident in the Summary Table because of the basic limitation of data summaries. The data summaries include the extra (“X”) samples collected throughout the year. These samples are taken to enhance the monitoring program or replace samples from required locations when they are not available.

Furthermore, in accordance with the REMODCM, Section I.E.3, an inter-laboratory comparison was performed by Teledyne Brown Engineering Environmental Services (TBE-ES) as part of their quality assurance program for environmental monitoring in order to demonstrate that the results are reasonably valid (Appendix B). Quality Control of radioanalyses involves TBE-ES internal process control program and independent third party programs administered by Analytics and Environmental Resource Associates (ERA) and Department of Energy’s (DOE) Mixed Analyte Performance Evaluation Program (MAPEP).

The Teledyne inter-laboratory comparison report concluded that 142 out of 150 quality assurance analyses performed met the specified acceptance criteria. Six analyses did not meet the specified acceptance criteria addressed in Teledyne Non-Conformance Reports (NCRs), listed in Appendix B. A review of the Teledyne NCRs was performed and none of the six analysis failures were found to adversely affect any of Millstone samples results and data accuracy.

RADIOLOCIAL ENVIRONMENT MONITORING PROGRAM SUMMARY
MILLSTONE POWER STATION
Dockets 50-245, 50-336 & 50-423 2022

Medium or Pathw ay Sampled (Units)	Analysis Type	Total Number	LLD*	Indicator Locations Number Mean (Range)	Location w ith Highest Mean Location Number	Distance Direction	Number Mean (Range)	Control Locations Number Mean (Range)
Direct Radiation *TLD (uR/hr)*	**Gamma Dose**	172	NA	156 7.9 (4.7-11.9)	8	0.3 Mi. SE	4 11.4 (11.0-11.6)	16 7.8 (5.7-9.9)
Air Iodine *(pCi/m³)*	**I-131**	208	0.07	182 <LLD	NA	NA	<LLD	26 <LLD
Air Particulate *(pCi/m³)*	**GR-B**	208	0.01	182 0.0145 (0.0072-0.0240)	11	1.6 Mi. ENE	26 0.0148 (0.0082-0.0240)	26 0.0146 (0.0088-0.02190)
	SR-89	32	0.1	28 <LLD	NA	NA	<LLD	4 <LLD
	SR-90	32	0.01	28 <LLD	NA	NA	<LLD	4 <LLD
	GAMMA	32						
	BE-7		NA	28 0.0991 (0.0683-0.1283)	10	1.2 Mi. E	4 0.1076 (0.0876-0.1283)	4 0.1072 (0.0887-0.1251)
	Other Gammas		Note 2	<LLD	NA	NA	<LLD	<LLD
Soil *(pCi/g dry)*	**GAMMA**	3						
	K-40		NA	2 12.17 (12.09-12.25)	14	12.0 Mi. NE	1 15.05 (15.05)	1 15.05 (15.05)
	CS-137		0.18	2 0.422 (0.267-0.578)	4	1.0 Mi. N	1 0.578 (0.578)	1 <LLD
	Other Gammas		Note 3	<LLD	NA	NA	<LLD	<LLD
Cow Milk *(pCi/l)*	**SR-89**		10					
	SR-90		2					
	GAMMA							
	K-40		NA		Milk w as not available for collection in 2022, as a substitute, Strontium Analysis of Air Particulate filters w as performed			
	Other Gammas		Note 4					

RADIOLOCIAL ENVIRONMENT MONITORING PROGRAM SUMMARY
MILLSTONE POWER STATION
Dockets 50-245, 50-336 & 50-423 2022

Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD*	Indicator Locations Number Mean (Range)	Location with Highest Mean Location Number	Location with Highest Mean Distance Direction	Location with Highest Mean Number Mean (Range)	Control Locations Number Mean (Range)
Goat Milk *(pCi/l)*	**SR-89**		10					
	SR-90		2					
	GAMMA				Milk was not available for collection in 2022, as a substitute,			
	K-40		NA		Strontium Analysis of Air Particulate filters was performed			
	Other Gammas		Note 4					
Well Water *(pCi/l)*	**H-3**	36	2000	36 <LLD	NA	NA	<LLD	NA
	GAMMA	36						
	K-40		NA	36 <LLD	NA	NA	<LLD	NA
	Other Gammas		Note 5	<LLD	NA	NA	<LLD	NA
Fruits & Vegetables *(pCi/g wet)*	**GAMMA**	8						
	K-40		NA	4 1.575 (0.765-2.744)	26	Beyond 10 miles	4 1.821 (1.060-3.217)	4 1.821 (1.060-3.217)
	Other Gammas		Note 6	<LLD	NA	NA	<LLD	<LLD
Broad Leaf Vegetation *(pCi/g wet)*	**GAMMA**	8						
	BE-7		NA	5/6 1.174 (0.440-2.323)	17	0.5 Mi. NE	1/2 1.589 (<LLD-1.589)	1/2 1.178 (<LLD-1.178)
	K-40		NA	6 3.185 (2.231-4.403)	1	0.6 Mi NNW	2 3.57 (3.522-3.617)	2 3.124 (1.847-4.400)
	Other Gammas		Note 6	<LLD	NA	NA	<LLD	<LLD

RADIOLOCIAL ENVIRONMENT MONITORING PROGRAM SUMMARY
MILLSTONE POWER STATION
Dockets 50-245, 50-336 & 50-423 2022

Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD*	Indicator Locations Number Mean (Range)	Location with Highest Mean: Location Number	Distance Direction	Number Mean (Range)	Control Locations Number Mean (Range)
Sea Water *(pCi/l)*	**H-3**	16	3000	10/12 823 (222-2750)	32	< 0.1 Mi	10/12 823 (222-2750)	<LLD
	GAMMA	16						
	K-40		NA	12 265 (188-319)	32	< 0.1 Mi	12 265 (188-319)	4 195 (171-223)
	Other Gammas		Note 5	<LLD	NA	NA	<LLD	<LLD
Bottom Sediment *(pCi/g dry)*	**GAMMA**	10						
	K-40		NA	8 15.073 (10.45-18.57)	33	1.8 Mi. ESE	2 18.05 (17.52-18.57)	2 15.27 (14.90-15.63)
	Ac-228			3/8 0.811 (0.322-1.295)	32	< 0.1 Mi	1/2 1.295 (<LLD-1.295)	1/2 0.336 (<LLD-0.336)
	Other Gammas		Note 3	<LLD	NA	NA	<LLD	<LLD
Aquatic Flora *(pCi/g wet)*	**GAMMA**	20						
	BE-7		NA	1/16 0.4099 (<LLD-0.4099)	35	0.3 Mi. WNW	1/6 0.4099 (<LLD-0.4099)	1/4 0.2986 (<LLD-0.2986)
	K-40		NA	16 7.0128 (5.6630-8.7020)	32	< 0.1 Mi	6 7.521 (5.8410-8.7020)	4 5.8745 (2.7750-8.6460)
	I-131		0.06	4/16 0.0584 (0.0421-0.0787)	32	< 0.1 Mi	2/6 0.07 (0.0614-0.0787)	4 <LLD
	Other Gammas		Note 6	<LLD	NA	NA	<LLD	<LLD

RADIOLOCIAL ENVIRONMENT MONITORING PROGRAM SUMMARY
MILLSTONE POWER STATION
Dockets 50-245, 50-336 & 50-423 2022

Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD*	Indicator Locations Number Mean (Range)	Location with Highest Mean Location Number	Distance Direction	Number Mean (Range)	Control Locations Number Mean (Range)
Fish - Other	**GAMMA**	4						
(pCi/g wet)	K-40		NA	4 3.365 (2.786-3.857)	28	0.8 Mi. SSE	1 3.857 (3.857)	NA
	Other Gammas		Note 8	<LLD	NA	NA	<LLD	NA
Oysters	**GAMMA**	4						
(pCi/g wet)	K-40		NA	2 1.898 (1.760-2.036)	31	1.8 Mi. NW	2 1.898 (1.760-2.036)	2 1.622 (1.120-2.123)
	Other Gammas		Note 8	<LLD	NA	NA	<LLD	<LLD
Clams	**GAMMA**	4						
(pCi/g wet)	K-40		NA	3/4 2.534 (2.162-2.735)	31	1.8 Mi. NW	2 2.720 (2.705-2.735)	NA
	Other Gammas		Note 8	<LLD	NA	NA	<LLD	NA
Lobster	**GAMMA**	4						
(pCi/g wet)	K-40		NA	2 3.156 (3.027-3.284)	35	0.3 Mi. WNW	2 3.156 (3.027-3.284)	2 2.076 (1.843-2.308)
	Other Gammas		Note 8	<LLD	NA	NA	<LLD	<LLD

NOTES FOR SUMMARY TABLE

1 - (*) The required LLD is the smallest concentration of radioactivity that will be detected with 95% confidence that the activity is real. See detailed discussion below.
2 - LLDs for air particulate gamma are 0.05 pCi/M3 for Cs-134 and 0.06 pCi/M3 for Cs-137.
3 - LLD for soil and sediment gamma is 0.15 pCi/g for Cs-134.
4 - LLDs for milk gamma are 1 pCi/l for I-131, 15 pCi/l for Cs-134, 18 pCi/l for Cs-137, 70 pCi/l for Ba-140 and 25 pCi/l for La-140.
5 - LLDs for water gamma are 15 pCi/l for Mn-54, Co-58, Co-60, Nb-95, I-131, Cs-134 and La-140; 30 pCi/l for Fe-59, Zn-65 and Zr-95; 18 pCi/l for Cs-137 and 60 pCi/l for Ba-140.
6 - LLDs for fruits & vegetables, broadleaf vegetation and aquatic flora for gamma are 0.06 pCi/M3 for I-131, 0.06 pCi/M3 for Cs-134 and 0.08 pCi/M3 for Cs-137.
7 - LLDs for other gamma are 0.06 pCi/g for Cs-134 and I-131.
8 - LLDs for fish and shellfish for gammas are 0.13 pCi/g for Mn-54, Co-58, Co-60 and Cs-134; 0.26 pCi/g for Fe-59 and Zn-65; 0.15 pCi/g for Cs-137; and 0.93 pCi/g for I-131.

Discussion of LLD

The LLD at a confidence level of 95% is the smallest concentration of radioactive material in a sample that will be detected with a 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ S_b}{E * V * 2.22 * Y * \exp(-\lambda \Delta t)}$$

LLD	is the lower limit of detection as defined above (as pCi per unit mass or volume)
S_b	is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute)
E	is the counting efficiency (as counts per transformation)
V	is the sample size (in units of mass or volume)
2.22	is the number of transformations per minute per picoCurie
Y	is the fractional radiochemical yield (when applicable)
λ	is the radioactive decay constant for the particular radionuclide
Δt	is the elapsed time between sample collection (or end of the sample collection period) and time of counting

The LLD is defined as “a priori” (before the fact) limit representing the capability of a measurement system and not an “a posteriori” (after the fact) limit for a particular measurement.

Analyses were performed in such a manner that the stated LLDs were achieved under routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may have rendered these a priori LLDs unachievable. In such cases, the contributing factors are identified and described in this report. As shown in the equation above, for composite samples taken over a period of time, the LLD is decayed to the end of the sample period.

3.2 Data Tables

The data reported in this section are results of analyses on all samples. All gamma exposure rates (Table 1) and air beta results (Table 2) are positive because of natural radioactivity. For all other results positive results are shown as bolded type. Results are considered positive when the measured value exceeds 1.5 times the listed 2σ error (i.e., the measured value exceeds 3σ). The reported error is two times the standard deviation (2σ) of the net activity. Unless otherwise noted, the overall error (counting, sample size, chemistry, errors, etc.) is estimated to be 2 to 5 times that listed. Because of counting statistics, negative values, zeros and numbers below the Minimum Detectable Level (MDL) are statistically valid pieces of data. For the purposes of this report, in order to indicate any background biases, all the valid data are presented. This practice was recommended by Health and Safety Laboratory (HASL) ("Reporting of Analytical Results from HASL," letter by Leo B. Higginbotham), NUREG 0475 and NUREG/CR-4007 (Sept. 1984).

Data are given according to sample type as indicated below.

1. Gamma Exposure Rate
2. Air Particulates, Gross Beta Radioactivity
3. Air Particulates, Airborne I-131
4. Air Particulates, Gamma Spectra
5. Soil
6. Milk
7. Well Water
8. Fruits & Vegetables
9. Broad Leaf Vegetation
10. Seawater
11. Bottom Sediment
12. Aquatic Flora (Fucus)
13. Fin Fish
14. Oysters
15. Clams
16. Lobster

TABLE 1
QUARTERLY
GAMMA EXPOSURE RATE
(uR/hr)*

LOCATIONS

PERIOD	1		2		3		4		5		6		7		8		9		10		11	
		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)
1Q	7.8	0.4	9.8	0.3	7.3	0.2	8.0	0.3	9.3	0.4	8.8	0.3	5.2	0.2	11.5	0.4	10.8	0.3	9.8	0.3	7.3	0.3
2Q	7.8	0.2	9.9	0.2	7.2	0.2	7.9	0.2	9.8	0.3	8.4	0.2	4.7	0.2	11.0	0.5	11.1	0.3	9.7	0.4	7.1	0.3
3Q	8.7	0.2	10.1	0.4	7.2	0.3	8.3	0.2	10.3	0.3	8.7	0.2	5.0	0.2	11.6	0.3	11.9	0.4	10.7	0.2	7.8	0.2
4Q	8.0	0.5	10.0	0.6	7.0	0.4	8.2	0.5	9.6	0.6	8.9	0.6	5.0	0.3	11.5	0.6	11.0	0.5	10.4	0.6	7.5	0.4

PERIOD	13C		14C		15C		16C		27		41		42		43		44		45		46	
		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)
1Q	8.9	0.5	8.2	0.5	7.4	0.3	6.0	0.2	7.5	0.4	6.9	0.2	7.2	0.3	7.7	0.2	7.8	0.3	6.9	0.3	8.1	0.4
2Q	8.6	0.3	8.3	0.3	7.2	0.3	5.7	0.1	7.6	0.2	6.7	0.2	7.4	0.4	6.9	0.2	7.8	0.2	6.9	0.2	8.3	0.3
3Q	9.1	0.2	9.9	0.3	8.2	0.3	6.0	0.4	8.0	0.3	7.4	0.3	8.2	0.2	7.3	0.4	8.2	0.3	7.9	0.3	8.5	0.4
4Q	8.9	0.5	9.3	0.4	7.5	0.4	6.2	0.4	7.7	0.4	6.9	0.4	7.5	0.4	7.3	0.4	7.9	0.4	7.5	0.4	8.3	0.4

PERIOD	47		48		49		50		51		52		53		55		56		57		59	
		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)
1Q	7.8	0.2	9.0	0.4	7.9	0.3	7.6	0.2	6.6	0.3	7.2	0.3	7.1	0.2	7.6	0.3	6.9	0.4	6.7	0.3	7.6	0.2
2Q	7.6	0.3	8.8	0.2	7.5	0.2	7.5	0.2	6.8	0.3	7.0	0.2	7.1	0.2	7.1	0.3	7.0	0.2	6.8	0.3	7.8	0.2
3Q	7.8	0.3	9.3	0.2	7.8	0.3	7.9	0.4	7.2	0.2	7.6	0.2	7.4	0.2	7.9	0.2	7.5	0.3	7.3	0.2	8.4	0.2
4Q	8.0	0.4	9.3	0.5	8.3	0.5	7.9	0.5	6.9	0.4	7.3	0.4	7.7	0.4	7.3	0.4	7.8	0.4	7.0	0.4	7.8	0.4

PERIOD	60		61		62		63		64		65		66		73		74		75	
		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)
1Q	6.2	0.2	6.1	0.2	9.0	0.3	8.2	0.3	7.3	0.4	7.8	0.2	7.4	0.3	7.6	0.3	7.4	0.3	6.7	0.3
2Q	6.0	0.1	6.2	0.1	9.3	0.3	8.3	0.3	7.2	0.2	7.7	0.3	7.1	0.2	7.7	0.2	7.7	0.2	6.2	0.2
3Q	6.9	0.3	6.6	0.3	9.3	0.2	8.9	0.2	8.6	0.2	8.5	0.2	7.7	0.3	8.1	0.4	7.6	0.2	7.1	0.3
4Q	6.7	0.3	6.2	0.3	9.3	0.4	9.1	0.4	7.3	0.4	7.9	0.4	7.3	0.4	7.9	0.4	8.0	0.4	6.8	0.4

* READINGS ARE THE AVERAGE OF MULTI $CaSo_4$(Tm) PHOSPHOR ELEMENTS WITHIN ONE PANASONIC TLD BADGE
ERRORS ARE TWO SIGMA AND INCLUDE COUNTING, TRANSIT, READER AND FADE UNCERTAINTIES
C= Control location, Background location

TABLE 2
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(pCi/m^3)

LOCATIONS

PERIOD ENDING	1	(+/-)	2	(+/-)	3	(+/-)	4	(+/-)	10	(+/-)	11	(+/-)	27	(+/-)	15C	(+/-)
01/18/22	0.023	0.002	0.024	0.003	0.022	0.002	0.022	0.002	0.023	0.003	0.024	0.002	0.023	0.002	0.021	0.002
02/01/22	0.018	0.002	0.017	0.002	0.019	0.002	0.017	0.002	0.017	0.002	0.017	0.002	0.020	0.002	0.019	0.002
02/14/22	0.015	0.002	0.015	0.002	0.016	0.002	0.014	0.002	0.015	0.002	0.016	0.002	0.012	0.002	0.013	0.002
03/01/22	0.012	0.002	0.011	0.002	0.013	0.002	0.014	0.002	0.014	0.002	0.014	0.002	0.014	0.002	0.015	0.002
03/15/22	0.016	0.002	0.017	0.002	0.017	0.002	0.016	0.002	0.016	0.002	0.014	0.002	0.016	0.002	0.016	0.002
03/29/22	0.011	0.002	0.011	0.002	0.011	0.002	0.012	0.002	0.013	0.002	0.012	0.002	0.012	0.002	0.012	0.002
04/12/22	0.010	0.002	0.011	0.002	0.012	0.002	0.012	0.002	0.010	0.002	0.011	0.002	0.010	0.002	0.010	0.002
04/26/22	0.013	0.002	0.013	0.002	0.012	0.002	0.013	0.002	0.014	0.002	0.014	0.002	0.013	0.002	0.014	0.002
05/10/22	0.013	0.002	0.014	0.002	0.012	0.002	0.011	0.002	0.013	0.002	0.012	0.002	0.014	0.002	0.013	0.002
05/23/22	0.008	0.002	0.008	0.002	0.008	0.002	0.009	0.002	0.010	0.002	0.009	0.002	0.009	0.002	0.010	0.002
06/07/22	0.009	0.002	0.010	0.002	0.009	0.002	0.010	0.002	0.009	0.002	0.010	0.002	0.008	0.001	0.012	0.002
06/21/22	0.009	0.002	0.009	0.002	0.007	0.001	0.009	0.002	0.008	0.002	0.008	0.002	0.007	0.001	0.009	0.002
07/05/22	0.013	0.002	0.011	0.002	0.011	0.002	0.011	0.002	0.011	0.002	0.011	0.002	0.012	0.002	0.012	0.002
07/19/22	0.012	0.002	0.013	0.002	0.012	0.002	0.014	0.002	0.014	0.002	0.013	0.002	0.013	0.002	0.013	0.002
08/03/22	0.017	0.002	0.018	0.002	0.017	0.002	0.018	0.002	0.017	0.002	0.017	0.002	0.019	0.002	0.017	0.002
08/16/22	0.014	0.002	0.013	0.002	0.015	0.002	0.016	0.002	0.014	0.002	0.015	0.002	0.013	0.002	0.015	0.002
08/30/22	0.020	0.002	0.020	0.002	0.020	0.002	0.019	0.002	0.022	0.002	0.021	0.002	0.017	0.002	0.018	0.002
09/13/22	0.013	0.002	0.012	0.002	0.014	0.002	0.012	0.002	0.013	0.002	0.014	0.002	0.013	0.002	0.014	0.002
09/26/22	0.018	0.002	0.014	0.002	0.016	0.002	0.016	0.002	0.018	0.002	0.018	0.002	0.017	0.002	0.015	0.002
10/11/22	0.015	0.002	0.014	0.002	0.015	0.002	0.013	0.002	0.013	0.002	0.013	0.002	0.012	0.002	0.013	0.002
10/25/22	0.021	0.002	0.021	0.002	0.019	0.002	0.022	0.002	0.024	0.003	0.021	0.002	0.020	0.002	0.022	0.002
11/08/22	0.014	0.002	0.011	0.002	0.012	0.002	0.014	0.002	0.013	0.002	0.014	0.002	0.015	0.002	0.012	0.002
11/22/22	0.014	0.002	0.015	0.002	0.013	0.002	0.013	0.002	0.013	0.002	0.012	0.002	0.010	0.002	0.014	0.002
12/06/22	0.022	0.002	0.021	0.002	0.020	0.002	0.020	0.002	0.019	0.002	0.021	0.002	0.020	0.002	0.021	0.002
12/20/22	0.011	0.002	0.014	0.002	0.013	0.002	0.014	0.002	0.013	0.002	0.012	0.002	0.012	0.002	0.011	0.002
01/03/23	0.017	0.002	0.017	0.002	0.018	0.002	0.020	0.002	0.017	0.002	0.019	0.002	0.020	0.002	0.020	0.002

C= Control location, Background location

TABLE 3
AIRBORNE IODINE
(pCi/m^3)

LOCATIONS

PERIOD ENDING	1		2		3		4		10		11		27		15C	
		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)
01/18/22	0.001	0.009	0.001	0.011	0.001	0.010	0.001	0.010	0.003	0.012	0.003	0.011	0.003	0.011	0.003	0.011
02/01/22	0.000	0.015	0.000	0.016	0.000	0.016	0.000	0.015	-0.006	0.011	-0.006	0.011	-0.006	0.011	-0.006	0.011
02/14/22	0.002	0.015	0.002	0.017	0.002	0.016	0.002	0.016	0.013	0.015	0.012	0.014	0.005	0.006	0.013	0.015
03/01/22	-0.003	0.016	-0.003	0.018	-0.003	0.016	-0.003	0.016	0.000	0.012	0.000	0.011	0.000	0.010	0.000	0.012
03/15/22	0.012	0.018	0.011	0.016	0.012	0.018	0.012	0.018	-0.007	0.013	-0.006	0.012	-0.006	0.012	-0.007	0.013
03/29/22	0.003	0.010	0.003	0.012	0.003	0.010	0.003	0.010	0.002	0.012	0.002	0.011	0.002	0.011	0.002	0.012
04/12/22	-0.006	0.009	-0.007	0.010	-0.006	0.009	-0.006	0.009	0.003	0.009	0.003	0.009	0.002	0.007	0.003	0.009
04/26/22	0.002	0.007	0.006	0.018	0.005	0.017	0.005	0.017	-0.007	0.016	-0.007	0.015	-0.007	0.014	-0.007	0.015
05/10/22	0.002	0.011	0.002	0.012	0.002	0.011	0.002	0.011	-0.004	0.011	-0.004	0.011	-0.003	0.010	-0.004	0.011
05/23/22	0.004	0.016	0.004	0.018	0.004	0.018	0.004	0.017	-0.003	0.017	-0.003	0.017	-0.003	0.014	-0.003	0.016
06/07/22	-0.001	0.023	-0.001	0.025	-0.001	0.023	-0.001	0.024	-0.009	0.023	-0.009	0.023	-0.003	0.008	-0.008	0.022
06/21/22	-0.001	0.018	-0.001	0.020	-0.001	0.017	-0.001	0.018	0.011	0.019	0.012	0.020	0.009	0.016	0.011	0.019
07/05/22	0.014	0.017	0.017	0.019	0.013	0.015	0.014	0.016	0.006	0.016	0.007	0.018	0.002	0.006	0.006	0.016
07/19/22	-0.005	0.015	-0.005	0.017	-0.004	0.014	-0.005	0.015	0.002	0.011	0.002	0.012	0.002	0.012	0.002	0.011
08/03/22	-0.010	0.018	-0.011	0.020	-0.009	0.017	-0.010	0.018	-0.007	0.013	-0.007	0.015	-0.007	0.014	-0.007	0.014
08/16/22	-0.005	0.019	-0.006	0.021	-0.005	0.018	-0.005	0.019	-0.010	0.024	-0.011	0.027	-0.011	0.026	-0.010	0.025
08/30/22	0.000	0.039	0.000	0.018	0.000	0.036	0.000	0.038	0.000	0.035	-0.018	0.031	-0.018	0.030	-0.017	0.028
09/13/22	0.005	0.017	0.006	0.018	0.005	0.015	0.005	0.016	-0.005	0.015	-0.005	0.017	-0.005	0.017	-0.005	0.015
09/26/22	0.021	0.025	0.022	0.026	0.020	0.023	0.020	0.023	-0.010	0.023	-0.011	0.024	-0.011	0.023	-0.010	0.022
10/11/22	-0.007	0.015	-0.004	0.007	-0.007	0.014	-0.007	0.014	-0.007	0.014	0.007	0.017	0.006	0.016	0.006	0.015
10/25/22	-0.002	0.018	-0.003	0.018	-0.002	0.016	-0.002	0.016	0.004	0.018	0.004	0.017	0.004	0.016	0.004	0.015
11/08/22	0.007	0.014	0.007	0.013	0.006	0.012	0.006	0.012	0.000	0.013	0.000	0.014	0.000	0.013	0.000	0.012
11/22/22	0.002	0.018	0.002	0.017	0.002	0.015	0.002	0.016	0.001	0.024	0.001	0.025	0.001	0.026	0.001	0.022
12/06/22	0.002	0.018	0.002	0.017	0.001	0.016	0.001	0.016	-0.003	0.017	-0.003	0.018	-0.003	0.018	-0.003	0.016
12/20/22	-0.014	0.026	-0.012	0.023	-0.012	0.023	-0.012	0.023	0.001	0.020	0.002	0.020	0.001	0.020	0.001	0.012
01/03/23	-0.003	0.015	-0.002	0.013	-0.002	0.013	-0.002	0.013	-0.009	0.012	-0.010	0.012	-0.009	0.012	-0.004	0.005

C= Control location, Background location

TABLE 4
AIR PARTICULATES
(pCi/m^3)

GAMMA SPECTRA - QTR 1 (01/4/22 - 03/29/22)

LOCATION	Sr-89	(+/-)	Sr-90	(+/-)	Be-7	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Co-60	(+/-)	Zn-65	(+/-)
1	0.0109	0.0177	0.0019	0.0034	**0.0860**	**0.0266**	0.0013	0.0014	-0.0011	0.0020	0.0008	0.0015	-0.0008	0.0030
2	0.0101	0.0158	0.0000	0.0031	**0.0985**	**0.0296**	0.0001	0.0013	-0.0008	0.0019	-0.0004	0.0011	0.0011	0.0021
3	0.0063	0.0180	0.0021	0.0032	**0.1178**	**0.0321**	-0.0007	0.0015	-0.0006	0.0019	0.0006	0.0014	0.0046	0.0034
4	-0.0002	0.0169	0.0028	0.0033	**0.0907**	**0.0291**	-0.0008	0.0011	0.0001	0.0014	0.0005	0.0012	-0.0010	0.0024
10	0.0084	0.0204	0.0011	0.0027	**0.1048**	**0.0360**	-0.0003	0.0015	-0.0023	0.0022	-0.0002	0.0012	-0.0014	0.0039
11	0.0051	0.0165	0.0007	0.0030	**0.1095**	**0.0244**	0.0001	0.0008	0.0003	0.0013	0.0008	0.0006	0.0003	0.0021
27	0.0112	0.0175	-0.0008	0.0020	**0.1172**	**0.0323**	0.0007	0.0009	0.0003	0.0016	0.0000	0.0009	0.0008	0.0022
15C	0.0019	0.0137	0.0004	0.0030	**0.1022**	**0.0335**	-0.0001	0.0013	0.0005	0.0021	-0.0013	0.0013	0.0006	0.0025

LOCATION	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)
1	0.0017	0.0024	-0.0031	0.0042	0.0003	0.0034	0.0010	0.0122	-0.0003	0.0014	0.0002	0.0011	-0.0675	0.1214
2	0.0011	0.0015	0.0029	0.0029	-0.0007	0.0026	0.0083	0.0096	-0.0001	0.0013	-0.0003	0.0010	-0.0035	0.0972
3	0.0009	0.0024	0.0000	0.0045	0.0010	0.0032	0.0011	0.0117	-0.0004	0.0014	0.0008	0.0011	0.1473	0.1430
4	-0.0004	0.0018	0.0007	0.0033	-0.0016	0.0025	0.0041	0.0077	-0.0001	0.0011	0.0000	0.0008	0.0759	0.1091
10	0.0020	0.0029	0.0012	0.0047	0.0000	0.0039	-0.0078	0.0135	-0.0013	0.0015	-0.0002	0.0014	-0.0432	0.1563
11	-0.0005	0.0013	-0.0001	0.0024	-0.0002	0.0017	0.0006	0.0069	-0.0005	0.0007	-0.0006	0.0007	0.0383	0.0756
27	-0.0002	0.0018	-0.0002	0.0033	-0.0003	0.0023	0.0023	0.0084	-0.0008	0.0012	0.0002	0.0008	0.0474	0.0822
15C	0.0007	0.0023	-0.0018	0.0044	0.0015	0.0036	-0.0076	0.0103	0.0010	0.0017	0.0002	0.0012	0.1810	0.1255

LOCATION	Ce-141	(+/-)	Ce-144	(+/-)
1	0.0053	0.0041	-0.0010	0.0053
2	0.0057	0.0042	-0.0012	0.0050
3	0.0030	0.0047	-0.0022	0.0057
4	-0.0010	0.0029	0.0026	0.0034
10	0.0008	0.0057	0.0001	0.0074
11	-0.0002	0.0028	0.0043	0.0031
27	-0.0008	0.0035	-0.0020	0.0045
15C	-0.0019	0.0044	-0.0063	0.0061

C= Control location, Background location
Results in bold type are positive.

TABLE 4
AIR PARTICULATES
(pCi/m^3)

GAMMA SPECTRA - QTR 2 (03/29/22 - 07/05/22)

LOCATION	Sr-89	(+/-)	Sr-90	(+/-)	Be-7	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Co-60	(+/-)	Zn-65	(+/-)
1	0.0155	0.0172	0.0011	0.0031	**0.0802**	**0.0278**	-0.0008	0.0013	-0.0029	0.0020	0.0003	0.0013	0.0014	0.0031
2	0.0044	0.0140	-0.0004	0.0037	**0.1217**	**0.0231**	0.0004	0.0010	0.0002	0.0014	0.0002	0.0011	0.0004	0.0026
3	-0.0014	0.0122	0.0019	0.0033	**0.1222**	**0.0275**	-0.0008	0.0012	-0.0005	0.0018	0.0001	0.0011	0.0024	0.0033
4	0.0009	0.0138	0.0004	0.0042	**0.1146**	**0.0308**	0.0005	0.0014	-0.0009	0.0019	0.0001	0.0015	0.0014	0.0027
10	-0.0074	0.0152	0.0017	0.0033	**0.1283**	**0.0284**	0.0012	0.0010	-0.0006	0.0012	-0.0002	0.0007	0.0005	0.0027
11	0.0095	0.0165	-0.0028	0.0026	**0.0968**	**0.0236**	-0.0001	0.0007	0.0002	0.0010	-0.0005	0.0006	0.0008	0.0018
27	0.0024	0.0118	0.0002	0.0025	**0.0888**	**0.0225**	-0.0004	0.0006	-0.0005	0.0007	-0.0004	0.0006	-0.0003	0.0021
15C	0.0049	0.0155	0.0022	0.0035	**0.1251**	**0.0238**	0.0001	0.0007	-0.0002	0.0009	-0.0001	0.0007	-0.0014	0.0023

LOCATION	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)
1	-0.0012	0.0022	0.0024	0.0037	0.0016	0.0031	0.0057	0.0107	-0.0008	0.0015	-0.0009	0.0011	0.0158	0.0769
2	-0.0001	0.0015	0.0004	0.0030	-0.0013	0.0023	-0.0021	0.0070	-0.0002	0.0012	0.0001	0.0009	0.0112	0.0597
3	0.0004	0.0019	-0.0013	0.0033	-0.0014	0.0023	-0.0071	0.0116	0.0001	0.0012	-0.0002	0.0012	0.0275	0.0698
4	-0.0014	0.0019	0.0027	0.0040	-0.0004	0.0026	0.0052	0.0131	0.0001	0.0013	0.0005	0.0011	-0.0245	0.0915
10	-0.0010	0.0014	0.0010	0.0026	0.0001	0.0019	0.0032	0.0071	-0.0007	0.0009	-0.0008	0.0012	0.0308	0.0580
11	-0.0003	0.0010	0.0004	0.0020	-0.0002	0.0016	0.0023	0.0061	0.0001	0.0008	0.0001	0.0005	-0.0471	0.0412
27	-0.0005	0.0011	0.0008	0.0013	0.0007	0.0010	0.0014	0.0050	0.0006	0.0007	0.0003	0.0005	-0.0067	0.0377
15C	0.0003	0.0010	0.0006	0.0015	0.0006	0.0015	-0.0023	0.0060	0.0004	0.0008	0.0004	0.0006	0.0047	0.0505

LOCATION	Ce-141	(+/-)	Ce-144	(+/-)
1	-0.0013	0.0043	0.0059	0.0062
2	0.0000	0.0031	-0.0020	0.0045
3	0.0000	0.0035	-0.0009	0.0049
4	-0.0026	0.0040	-0.0033	0.0058
10	-0.0018	0.0028	0.0006	0.0039
11	0.0005	0.0021	-0.0007	0.0034
27	0.0007	0.0020	0.0010	0.0025
15C	-0.0006	0.0022	0.0006	0.0034

C= Control location, Background location
Results in bold type are positive.

TABLE 4
AIR PARTICULATES
(pCi/m^3)

GAMMA SPECTRA - QTR 3 (07/05/22 - 09/26/22)

LOCATION	Sr-89	(+/-)	Sr-90	(+/-)	Be-7	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Co-60	(+/-)	Zn-65	(+/-)
1	0.0190	0.0160	0.0034	0.0036	**0.1107**	**0.0280**	-0.0006	0.0011	-0.0019	0.0018	0.0011	0.0010	0.0001	0.0026
2	0.0129	0.0142	0.0008	0.0023	**0.1100**	**0.0397**	0.0002	0.0012	-0.0012	0.0020	0.0005	0.0014	0.0015	0.0033
3	0.0256	0.0186	0.0012	0.0030	**0.0925**	**0.0300**	0.0005	0.0010	0.0001	0.0015	0.0004	0.0008	0.0031	0.0027
4	0.0068	0.0127	0.0013	0.0029	**0.1225**	**0.0288**	-0.0005	0.0012	-0.0006	0.0017	0.0002	0.0009	-0.0018	0.0021
10	0.0086	0.0169	-0.0010	0.0026	**0.1098**	**0.0264**	-0.0014	0.0011	-0.0016	0.0017	0.0000	0.0007	-0.0002	0.0029
11	0.0209	0.0174	-0.0005	0.0027	**0.0886**	**0.0295**	0.0008	0.0014	-0.0005	0.0021	0.0007	0.0009	0.0018	0.0031
27	0.0044	0.0139	0.0015	0.0031	**0.1036**	**0.0276**	0.0001	0.0012	-0.0004	0.0014	0.0012	0.0012	0.0003	0.0027
15C	0.0178	0.0164	0.0011	0.0029	**0.1129**	**0.0357**	0.0006	0.0014	-0.0005	0.0020	0.0003	0.0015	0.0020	0.0031

LOCATION	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)
1	0.0003	0.0020	-0.0020	0.0036	-0.0014	0.0024	0.0027	0.0097	-0.0006	0.0012	0.0001	0.0009	-0.0178	0.1049
2	0.0003	0.0022	-0.0029	0.0038	0.0012	0.0032	-0.0055	0.0104	-0.0002	0.0015	0.0006	0.0011	0.0978	0.1300
3	-0.0006	0.0016	0.0004	0.0029	-0.0005	0.0024	0.0037	0.0078	-0.0001	0.0010	-0.0003	0.0009	0.0603	0.0985
4	-0.0015	0.0018	0.0018	0.0034	-0.0020	0.0026	-0.0019	0.0091	-0.0011	0.0011	0.0007	0.0010	-0.0475	0.1124
10	0.0002	0.0018	-0.0006	0.0029	0.0018	0.0026	-0.0025	0.0081	0.0005	0.0013	0.0000	0.0010	0.0849	0.0957
11	-0.0001	0.0017	0.0010	0.0035	0.0009	0.0030	-0.0054	0.0104	-0.0005	0.0013	0.0001	0.0010	-0.0568	0.1321
27	0.0021	0.0018	-0.0017	0.0036	0.0003	0.0022	0.0002	0.0086	0.0003	0.0010	0.0005	0.0010	-0.0048	0.1025
15C	0.0001	0.0023	0.0027	0.0046	0.0005	0.0032	-0.0027	0.0117	0.0001	0.0012	0.0013	0.0011	-0.0011	0.1497

LOCATION	Ce-141	(+/-)	Ce-144	(+/-)
1	-0.0025	0.0040	-0.0003	0.0048
2	0.0011	0.0043	0.0003	0.0051
3	-0.0004	0.0034	-0.0025	0.0042
4	0.0025	0.0037	0.0016	0.0043
10	0.0007	0.0038	0.0019	0.0049
11	-0.0039	0.0044	-0.0009	0.0046
27	0.0005	0.0032	-0.0001	0.0044
15C	0.0037	0.0048	-0.0017	0.0057

C= Control location, Background location
Results in bold type are positive.

TABLE 4
AIR PARTICULATES
(pCi/m^3)

GAMMA SPECTRA - QTR 4 (09/26/22 - 01/03/23)

LOCATION	Sr-89	(+/-)	Sr-90	(+/-)	Be-7	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Co-60	(+/-)	Zn-65	(+/-)
1	0.0155	0.0137	-0.0008	0.0024	**0.0683**	**0.0178**	0.0005	0.0010	-0.0009	0.0013	-0.0001	0.0009	0.0011	0.0021
2	0.0112	0.0115	0.0008	0.0020	**0.0840**	**0.0237**	0.0002	0.0012	0.0012	0.0014	-0.0004	0.0007	0.0024	0.0024
3	0.0083	0.0112	0.0015	0.0026	**0.0781**	**0.0219**	0.0001	0.0012	-0.0010	0.0017	-0.0004	0.0010	0.0004	0.0031
4	0.0008	0.0113	0.0022	0.0028	**0.0856**	**0.0219**	-0.0001	0.0010	0.0000	0.0013	0.0000	0.0007	0.0002	0.0019
10	0.0095	0.0126	0.0026	0.0031	**0.0876**	**0.0264**	0.0004	0.0014	0.0003	0.0021	-0.0008	0.0011	0.0023	0.0031
11	-0.0055	0.0078	0.0028	0.0028	**0.0761**	**0.0227**	0.0004	0.0010	0.0008	0.0014	0.0009	0.0014	-0.0024	0.0026
27	0.0009	0.0126	0.0004	0.0028	**0.0805**	**0.0190**	-0.0002	0.0009	-0.0006	0.0013	-0.0005	0.0007	0.0014	0.0025
15C	0.0026	0.0082	0.0001	0.0017	**0.0887**	**0.0192**	0.0001	0.0012	-0.0008	0.0016	0.0008	0.0010	0.0003	0.0026

LOCATION	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)
1	-0.0012	0.0014	0.0007	0.0024	-0.0002	0.0019	-0.0086	0.0079	-0.0002	0.0010	-0.0001	0.0008	0.0442	0.0497
2	0.0004	0.0013	0.0000	0.0024	0.0003	0.0019	0.0003	0.0095	0.0002	0.0009	0.0006	0.0010	0.0562	0.0563
3	-0.0008	0.0017	0.0001	0.0029	-0.0065	0.0032	-0.0052	0.0105	0.0007	0.0012	-0.0010	0.0011	0.0258	0.0805
4	-0.0002	0.0013	-0.0010	0.0024	-0.0008	0.0019	0.0006	0.0073	-0.0002	0.0009	-0.0001	0.0007	-0.0542	0.0542
10	-0.0005	0.0023	0.0020	0.0036	0.0003	0.0031	0.0103	0.0117	-0.0004	0.0014	0.0007	0.0010	-0.0023	0.0884
11	0.0006	0.0014	-0.0016	0.0024	-0.0006	0.0016	-0.0014	0.0085	-0.0005	0.0008	-0.0005	0.0009	-0.0103	0.0591
27	0.0000	0.0009	-0.0002	0.0022	-0.0006	0.0017	-0.0002	0.0064	0.0006	0.0009	0.0002	0.0007	-0.0019	0.0435
15C	0.0015	0.0017	-0.0005	0.0034	-0.0043	0.0031	0.0021	0.0117	0.0005	0.0010	0.0003	0.0010	0.0160	0.0674

LOCATION	Ce-141	(+/-)	Ce-144	(+/-)
1	0.0001	0.0029	-0.0034	0.0038
2	0.0000	0.0027	0.0000	0.0039
3	0.0007	0.0037	-0.0049	0.0057
4	-0.0009	0.0025	-0.0019	0.0031
10	-0.0015	0.0040	-0.0002	0.0059
11	-0.0001	0.0026	0.0025	0.0040
27	0.0005	0.0023	0.0009	0.0034
15C	-0.0029	0.0039	0.0020	0.0056

C= Control location, Background location
Results in bold type are positive.

TABLE 5
SOIL
(pCi/g dry wt.)

LOCATIONS

LOCATION	COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
3	05/03/22	-0.013	0.276	**12.090**	**1.659**	0.201	0.266	0.020	0.039	0.025	0.034	0.080	0.082
4	05/03/22	0.484	0.298	**12.250**	**1.265**	0.011	0.271	0.005	0.035	-0.031	0.025	0.034	0.063
14C	05/03/22	0.152	0.344	**15.050**	**1.601**	0.002	0.342	-0.015	0.047	-0.034	0.046	-0.027	0.086

LOCATION	COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)
3	05/03/22	-0.025	0.038	-0.135	0.118	-0.009	0.040	0.006	0.068	-0.008	0.035	-0.023	0.313
4	05/03/22	0.000	0.024	-0.094	0.067	0.007	0.033	-0.032	0.055	0.025	0.031	0.291	0.274
14C	05/03/22	-0.002	0.042	0.009	0.102	-0.058	0.050	-0.028	0.074	0.025	0.040	-0.132	0.326

LOCATION	COLLECTION DATE	Sb-125	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ce-141	(+/-)	Ce-144	(+/-)	Ac-228	(+/-)
3	05/03/22	0.054	0.087	0.044	0.044	**0.267**	**0.075**	-0.037	0.044	-0.187	0.171	0.748	0.224
4	05/03/22	-0.048	0.084	0.065	0.039	**0.578**	**0.107**	-0.014	0.041	0.124	0.168	0.846	0.240
14C	05/03/22	0.029	0.128	0.031	0.053	0.086	0.062	-0.042	0.058	0.167	0.251	0.868	0.273

C= Control location, Background location
Results in bold type are positive.

TABLE 6
MILK
(pCi/l)

LOCATION	COLLECTION DATE	I-131 (+/-)	Sr-89 (+/-)	Sr-90 (+/-)	K-40 (+/-)	Cs-134 (+/-)	Cs-137 (+/-)	Ba-140 (+/-)	La-140 (+/-)
22 Cow									
23 Goat									

Milk was not available for collection in 2022.
Strontium analysis of air samples was performed as a substitute (Table 4)

TABLE 7
WELL WATER
(pCi/l)

LOCATION	COLLECTION DATE	H-3	(+/-)	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)	Co-60	(+/-)
71	03/25/22	196	574	-18.6	27.2	12.4	35.6	-17.2	32.4	-0.77	2.64	0.31	3.32	-1.08	4.99	2.58	2.52
	05/31/22	-89	605	23.4	34.4	-43.5	55.2	20.0	37.4	-0.13	3.68	-0.64	3.72	3.32	8.10	1.81	3.96
	09/01/22	146	597	2.12	28.3	18.7	47.8	-1.26	32.0	-2.44	2.98	-1.78	3.95	-5.42	7.59	-2.13	3.93
	11/29/22	-190	605	9.85	38.6	-34.2	56.8	-23.6	33.6	0.72	3.95	-0.94	4.46	4.81	9.68	-1.54	3.20
72	03/11/22	13	553	3.37	29.6	22.6	61.0	-4.77	35.3	2.31	3.92	0.42	3.85	2.28	8.59	0.02	4.28
	05/31/22	191	623	3.79	32.4	24.9	60.7	4.91	32.9	-1.17	3.56	-0.62	4.29	6.46	7.80	3.71	3.46
	09/01/22	0	585	-5.76	25.6	36.3	51.6	5.19	30.3	-1.27	2.86	-0.75	3.08	-2.52	6.71	2.11	3.26
	11/28/22	233	631	26.4	32.4	51.7	52.5	8.78	36.3	-1.85	4.06	-2.44	4.10	-3.48	7.01	0.74	3.61
76	02/10/22	170	627	-11.2	37.8	3.81	68.3	4.86	39.7	1.88	4.41	-2.61	4.61	6.63	7.95	-0.04	4.04
	05/18/22	-140	606	-15.6	33.0	-37.3	66.9	8.10	37.8	-0.27	4.37	-0.80	3.67	-12.2	9.53	0.07	4.98
	09/14/22	-178	590	2.91	33.7	11.2	63.6	-24.8	37.0	-1.39	4.13	0.12	4.34	5.48	7.57	-1.87	4.13
	11/15/22	120	591	-18.1	41.7	-49.2	69.4	-9.00	43.4	-5.25	4.94	1.66	4.70	2.76	8.71	-1.75	4.27
77	02/10/22	-70	608	-4.69	44.9	16.5	75.9	28.8	49.9	1.06	4.81	-3.04	4.47	0.88	10.1	3.87	4.40
	05/17/22	-197	602	-36.8	52.9	-9.73	64.5	-19.9	56.0	-3.37	6.47	-1.36	5.71	-1.32	9.16	2.65	5.57
	09/14/22	-261	585	-23.5	34.9	13.5	78.0	-12.6	39.5	0.49	5.58	-5.94	5.72	1.68	9.72	3.41	5.68
	11/15/22	532	621	20.4	56.3	52.3	90.4	6.77	51.2	-6.10	6.37	-3.32	6.51	5.49	11.4	-0.49	5.14
78	02/10/22	-121	584	-1.18	41.8	19.7	65.4	-4.74	42.0	-1.58	4.83	-0.03	4.50	2.91	7.36	0.58	5.25
	05/17/22	-444	584	-14.2	32.2	-31.0	44.9	-2.34	32.7	-0.07	4.20	-2.41	3.14	0.92	7.80	2.92	4.85
	09/14/22	133	612	-9.32	32.6	23.6	66.2	24.4	35.5	-0.70	3.00	0.08	3.86	-0.49	7.38	2.94	5.33
	11/15/22	209	598	-8.70	31.2	17.2	60.4	32.2	35.9	2.06	4.09	-2.62	3.70	-3.57	9.89	3.02	4.28
79	03/11/22	57	555	0.31	33.6	24.5	56.2	14.6	38.1	-0.78	3.90	0.49	3.87	-3.27	7.11	3.71	3.28
	05/27/22	19	612	-0.25	31.4	55.2	70.7	-0.63	39.1	-0.61	3.79	-1.84	3.73	-0.77	7.78	-1.61	4.15
	09/01/22	427	618	11.8	25.8	39.7	61.8	-21.5	30.3	0.44	2.98	1.68	3.27	-1.40	5.93	1.08	3.02
	11/29/22	347	640	22.3	43.0	19.5	56.8	-42.3	49.2	-2.83	4.08	0.32	4.26	5.69	8.45	-1.88	4.51
81	03/25/22	646	606	1.11	45.6	3.83	71.3	-16.4	50.6	-3.93	4.71	-5.64	4.92	2.09	9.60	4.09	5.30
	05/24/22	-178	599	-4.32	22.2	-24.6	31.1	-0.05	28.3	2.99	2.43	-0.92	2.55	1.31	6.05	1.06	2.38
	09/01/22	25	588	-31.8	32.4	16.7	51.5	-19.7	35.2	-0.79	3.79	-0.30	3.91	3.70	7.09	0.66	4.52
	11/29/22	360	642	17.6	29.6	0.45	63.1	6.38	30.5	-2.90	4.09	0.31	3.46	0.18	8.99	0.32	3.87
82	01/21/22	302	537	5.45	42.3	28.7	63.3	19.2	51.3	-4.57	5.02	-5.87	4.89	-6.74	8.87	4.74	4.91
	05/24/22	13	612	10.9	27.6	-24.4	33.7	11.7	33.7	-1.57	2.31	0.90	2.70	-2.80	6.28	3.30	2.61
	07/28/22	197	623	20.5	30.7	-17.8	42.9	0.75	35.3	0.17	3.37	-1.10	3.69	7.50	6.61	-0.20	3.14
	10/31/22	714	634	10.3	31.8	10.2	43.0	11.8	40.0	-2.15	3.56	-2.95	4.07	-0.29	7.42	-0.03	3.72
83	03/25/22	70	565	-22.5	35.2	-27.8	51.0	15.6	34.4	1.09	4.36	2.19	3.61	0.70	5.96	0.69	3.37
	05/24/22	-318	588	2.52	24.9	16.4	36.6	17.3	31.7	-0.99	2.37	0.42	2.77	3.66	5.90	0.00	2.53
	09/01/22	64	591	5.73	37.7	76.8	52.8	-22.9	36.2	-1.15	3.63	-0.29	4.01	2.23	9.04	3.13	4.10
	11/30/22	-120	609	9.56	42.0	63.8	78.3	7.91	46.1	1.92	5.21	-0.48	3.89	-4.26	8.03	0.77	4.80

TABLE 7
WELL WATER
(pCi/l)

LOCATION	COLLECTION DATE	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)	I-131	(+/-)	Cs-134	(+/-)
71	03/25/22	-0.06	4.88	-0.75	3.76	2.80	4.45	-0.88	3.09	3.27	28.5	-5.24	8.78	2.04	4.99	1.53	2.78
	05/31/22	2.90	8.55	2.83	4.32	2.32	5.93	-3.63	3.93	-20.8	34.2	-2.34	10.6	0.21	6.90	0.58	3.96
	09/01/22	-20.0	12.4	-0.85	4.30	0.86	5.53	3.34	4.25	-20.2	35.4	-4.60	10.6	-3.02	7.89	0.44	4.02
	11/29/22	8.71	10.4	1.84	5.58	-0.84	7.43	0.39	4.74	28.5	45.8	2.42	13.0	0.84	7.27	-2.53	4.70
72	03/11/22	-19.0	10.1	-0.60	3.78	3.81	6.45	-2.57	3.97	-17.5	28.8	-6.18	9.71	3.69	8.24	-0.67	3.75
	05/31/22	-6.41	7.95	-1.86	3.97	4.27	6.15	1.32	3.95	9.54	32.4	-2.93	10.2	-4.03	6.14	-1.30	4.40
	09/01/22	-6.64	7.34	2.42	2.96	1.23	5.45	-0.78	3.28	-1.11	26.0	-2.49	8.55	2.42	7.24	-2.31	3.50
	11/28/22	-23.2	11.4	3.62	3.50	-0.23	8.02	-1.99	4.31	-14.1	34.8	-0.01	10.5	-6.57	7.27	-3.08	4.10
76	02/10/22	-29.3	13.1	2.46	5.29	1.85	8.39	0.14	4.89	-11.0	42.3	-3.93	14.7	-4.79	7.35	1.22	4.77
	05/18/22	0.36	10.3	-3.08	5.51	2.66	7.77	-3.35	4.46	24.1	38.4	-4.70	12.3	1.26	4.46	0.16	4.57
	09/14/22	10.9	10.8	2.76	4.42	3.49	6.84	-1.35	4.40	-1.86	34.9	1.16	12.3	-3.18	4.74	-1.53	4.51
	11/15/22	7.28	10.7	3.42	5.71	1.02	7.89	-0.53	5.00	11.3	41.2	10.4	14.8	-5.34	6.55	-2.86	5.50
77	02/10/22	0.42	13.0	-1.15	5.58	7.64	9.09	1.31	5.82	-40.3	46.3	8.00	14.8	-8.93	7.89	-1.28	5.71
	05/17/22	12.7	14.3	14.5	8.15	-2.97	9.75	2.35	5.80	-23.4	53.2	16.5	19.0	-6.77	7.48	3.58	6.27
	09/14/22	-2.45	16.5	-7.61	6.03	1.62	8.83	2.94	4.91	-0.33	42.7	0.32	14.6	1.69	5.11	0.52	5.86
	11/15/22	13.0	17.6	11.2	7.63	-3.25	9.63	-1.09	5.74	26.0	56.2	5.38	18.4	1.03	8.37	-1.20	6.52
78	02/10/22	-16.3	11.1	0.44	5.28	-5.11	6.00	-6.25	4.65	-16.3	39.6	0.91	13.6	2.50	6.22	-0.23	4.66
	05/17/22	-15.6	11.0	-1.37	4.26	-1.05	5.70	-3.50	4.30	21.7	38.8	-1.47	11.1	-2.30	4.24	3.27	4.49
	09/14/22	-23.1	12.4	-3.06	4.52	-6.65	6.66	-0.18	3.65	-3.58	39.7	-3.25	9.27	-3.91	4.55	-1.31	4.60
	11/15/22	-3.66	10.6	1.59	3.86	-6.89	7.75	1.75	3.96	-6.61	35.9	0.67	10.0	-0.82	4.85	1.85	3.79
79	03/11/22	-3.94	7.58	5.24	3.81	0.91	6.06	1.95	4.07	1.89	30.6	-4.26	9.55	-10.0	9.27	1.79	3.82
	05/27/22	-3.99	7.41	1.55	3.86	0.26	6.22	-3.12	4.05	5.49	32.5	5.25	10.4	-1.19	7.38	2.38	3.95
	09/01/22	-7.37	8.35	-2.02	3.10	-0.33	5.48	-1.97	3.36	-5.15	26.4	0.68	9.11	0.47	6.94	-0.55	3.70
	11/29/22	7.89	12.1	7.95	4.79	4.80	7.39	0.76	4.84	27.1	40.8	-3.47	13.0	9.90	7.94	1.85	4.68
81	03/25/22	0.75	9.63	0.97	6.68	-2.08	9.06	0.35	5.58	-23.4	40.7	-2.53	16.0	3.99	8.61	-1.93	5.48
	05/24/22	-4.74	5.86	1.54	2.86	0.23	4.04	-0.79	2.77	5.90	22.0	4.52	6.86	-2.67	7.47	0.79	2.62
	09/01/22	2.79	7.13	-0.77	4.54	-4.65	5.90	2.30	4.49	-13.3	32.0	-0.63	10.3	-0.55	8.77	0.11	3.60
	11/29/22	-10.7	11.4	1.11	4.15	-6.22	7.86	-0.23	4.45	39.7	36.5	3.40	11.0	0.48	5.85	0.13	4.02
82	01/21/22	18.2	12.7	20.9	7.23	-1.25	8.67	-4.08	5.13	-4.52	40.3	1.50	15.1	2.21	8.44	-3.43	5.34
	05/24/22	2.80	5.63	3.26	3.40	-1.83	4.73	1.38	3.41	-20.7	24.1	8.49	7.59	-2.22	7.68	-1.00	3.08
	07/28/22	-1.74	7.26	7.62	4.45	0.67	6.08	-0.78	3.57	11.1	26.6	-2.56	10.3	4.56	8.22	-1.34	3.64
	10/31/22	0.52	8.45	13.7	4.71	2.50	6.17	-6.32	3.96	17.1	30.2	11.3	10.6	2.43	8.64	0.34	4.04
83	03/25/22	-2.10	11.0	5.65	4.79	1.02	6.54	3.07	4.35	-3.13	35.7	-3.94	11.1	0.63	6.58	-1.00	3.68
	05/24/22	-3.16	5.59	-0.21	2.91	-1.24	5.23	-2.15	3.35	0.15	23.0	3.53	7.46	-5.47	7.12	-0.51	2.87
	09/01/22	-15.8	10.5	0.68	3.99	-1.27	7.08	-2.43	4.68	12.4	31.0	5.91	10.2	-5.31	8.29	-3.80	4.17
	11/30/22	-4.64	11.4	5.34	5.33	-0.77	9.68	-0.67	5.31	-16.6	43.9	0.30	15.2	-5.14	6.82	-0.50	5.06

TABLE 7
WELL WATER
(pCi/l)

LOCATION	COLLECTION DATE	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ac-228	(+/-)
71	03/25/22	-2.80	3.26	11.1	13.7	2.48	3.35	5.69	9.51
	05/31/22	0.06	4.18	-4.47	18.9	0.74	6.07	-7.96	14.4
	09/01/22	0.28	3.68	-10.7	20.2	-0.17	7.38	1.41	11.9
	11/29/22	-5.33	4.61	10.4	21.8	-1.97	5.96	1.43	17.0
72	03/11/22	2.29	3.48	-4.84	21.5	-9.85	9.59	6.34	13.4
	05/31/22	-4.91	4.71	-10.6	18.9	-0.90	5.71	2.73	12.6
	09/01/22	-1.26	3.01	-1.10	18.0	7.26	6.53	-3.28	10.5
	11/28/22	-2.43	4.01	-5.15	18.1	5.22	6.21	-2.99	16.6
76	02/10/22	-1.44	4.91	-5.02	20.0	-2.90	5.51	6.77	17.1
	05/18/22	-3.96	4.78	4.52	15.0	0.01	6.43	5.01	17.7
	09/14/22	-0.25	4.57	2.42	15.3	6.87	5.19	4.56	18.0
	11/15/22	-1.65	4.77	5.38	18.8	-0.45	5.91	3.33	18.2
77	02/10/22	-1.90	4.53	-15.6	21.7	-5.27	6.49	0.75	18.2
	05/17/22	-8.43	6.60	-12.8	22.5	2.51	7.21	-3.47	21.2
	09/14/22	2.24	5.34	-3.33	18.3	2.87	6.73	-0.70	15.8
	11/15/22	-2.00	7.47	0.22	26.5	3.09	7.78	-0.86	26.0
78	02/10/22	0.50	4.69	2.86	21.6	-1.24	7.04	-23.4	14.9
	05/17/22	-0.93	4.13	-7.22	16.6	1.30	4.87	-15.9	13.3
	09/14/22	2.05	4.42	-4.62	15.4	1.27	5.95	3.28	14.9
	11/15/22	-1.85	4.36	0.42	14.8	-0.81	4.88	-17.2	17.3
79	03/11/22	-3.47	3.65	-5.81	22.1	4.33	7.43	-1.65	12.5
	05/27/22	1.28	3.53	-0.06	17.4	0.21	6.71	-6.50	14.2
	09/01/22	1.60	3.41	-1.92	17.3	-6.36	7.26	-5.66	11.6
	11/29/22	-1.24	4.17	-1.30	20.8	0.40	6.22	-17.7	15.1
81	03/25/22	-4.50	5.45	-23.8	22.6	2.38	6.23	-4.59	21.1
	05/24/22	-2.00	2.52	-14.0	15.6	0.66	6.52	0.51	9.09
	09/01/22	-0.90	4.05	3.67	20.6	1.00	7.13	11.1	16.1
	11/29/22	-0.01	3.54	12.1	17.7	-2.71	7.30	-0.23	14.8
82	01/21/22	-4.42	5.71	-3.60	23.4	-0.99	7.37	14.8	18.8
	05/24/22	-2.82	2.76	-5.66	17.4	-2.77	5.65	2.11	9.69
	07/28/22	-1.05	3.35	-14.1	20.3	7.58	6.13	-2.14	13.2
	10/31/22	-8.73	4.11	0.25	21.1	1.87	5.61	-9.55	13.3
83	03/25/22	3.08	4.40	0.50	16.7	2.37	6.12	-5.91	14.1
	05/24/22	-2.43	2.75	6.70	19.9	4.02	6.32	3.58	8.21
	09/01/22	-0.46	3.29	-13.0	19.3	0.61	7.81	-5.73	14.3
	11/30/22	-1.92	5.04	20.8	21.8	-1.62	7.22	-13.0	18.3

TABLE 8
FRUITS & VEGETABLES
(pCi/g wet wt.)

LOCATION 25 (fruit are extra samples not required by the REMODCM)

COLLECTION DATE	Type	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)	Co-60	(+/-)
06/27/22	Lettuce	0.314	0.158	**2.744**	**0.449**	-0.105	0.128	-0.010	0.014	0.002	0.014	0.018	0.030	0.006	0.017
06/27/22	Apples	0.040	0.112	**1.199**	**0.387**	0.032	0.102	0.004	0.012	-0.006	0.012	0.004	0.024	0.003	0.013
10/04/22	Tomatoes	0.059	0.056	**1.592**	**0.236**	0.008	0.049	0.001	0.006	0.002	0.006	-0.006	0.014	-0.002	0.007
10/04/22	Pears	0.064	0.055	**0.765**	**0.211**	0.061	0.047	0.001	0.006	0.000	0.005	0.007	0.012	0.008	0.007

COLLECTION DATE	Type	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)	I-131	(+/-)
06/27/22	Lettuce	-0.015	0.033	-0.001	0.014	0.024	0.024	-0.003	0.013	0.084	0.125	0.015	0.043	-0.007	0.020
06/27/22	Apples	-0.015	0.029	-0.010	0.013	-0.012	0.021	0.002	0.012	0.042	0.109	-0.009	0.033	-0.004	0.016
10/04/22	Tomatoes	-0.017	0.017	-0.001	0.006	0.001	0.013	-0.004	0.007	-0.054	0.056	-0.002	0.016	0.000	0.007
10/04/22	Pears	-0.020	0.014	0.003	0.006	0.003	0.010	0.002	0.006	0.045	0.054	-0.003	0.016	-0.006	0.007

COLLECTION DATE	Type	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ce-141	(+/-)	Ce-144	(+/-)	Ac-228	(+/-)
06/27/22	Lettuce	0.006	0.016	-0.001	0.015	-0.006	0.064	-0.001	0.019	-0.010	0.024	0.023	0.098	-0.014	0.059
06/27/22	Apples	0.000	0.011	-0.002	0.012	0.000	0.046	0.000	0.015	-0.006	0.019	0.058	0.079	-0.032	0.042
10/04/22	Tomatoes	-0.001	0.007	0.002	0.006	0.023	0.026	0.003	0.007	-0.005	0.009	0.028	0.038	0.002	0.028
10/04/22	Pears	-0.001	0.007	0.002	0.006	-0.010	0.022	0.004	0.007	-0.003	0.008	-0.027	0.035	0.008	0.023

Results in bold type are positive.

TABLE 8
FRUITS & VEGETABLES
(pCi/g wet wt.)

LOCATION 26C (fruit are extra samples not required by the REMODCM)

COLLECTION DATE	Type	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)	Co-60	(+/-)
06/27/22	Lettuce	0.255	0.133	**3.217**	**0.483**	-0.027	0.103	-0.001	0.012	-0.004	0.013	0.008	0.028	0.006	0.016
06/27/22	Peaches	-0.065	0.114	**1.318**	**0.480**	-0.026	0.103	0.003	0.013	0.000	0.014	0.013	0.028	0.014	0.016
10/04/22	Tomatoes	-0.060	0.053	**1.690**	**0.254**	0.006	0.054	0.001	0.006	0.004	0.006	0.001	0.012	-0.001	0.008
10/04/22	Pears	0.015	0.080	**1.060**	**0.291**	-0.076	0.081	0.000	0.009	-0.009	0.010	0.012	0.024	-0.001	0.015

COLLECTION DATE	Type	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)	I-131	(+/-)
06/27/22	Lettuce	-0.015	0.033	-0.006	0.014	0.006	0.020	-0.002	0.012	-0.108	0.108	-0.020	0.041	-0.004	0.016
06/27/22	Peaches	-0.018	0.028	0.011	0.014	-0.001	0.024	-0.011	0.013	-0.013	0.115	0.004	0.033	0.008	0.016
10/04/22	Tomatoes	0.007	0.015	-0.002	0.006	0.012	0.011	0.003	0.007	0.005	0.056	0.011	0.018	0.003	0.008
10/04/22	Pears	-0.038	0.028	-0.009	0.010	-0.007	0.015	-0.002	0.010	-0.105	0.091	0.003	0.030	0.007	0.012

COLLECTION DATE	Type	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ce-141	(+/-)	Ce-144	(+/-)	Ac-228	(+/-)
06/27/22	Lettuce	-0.001	0.014	0.014	0.013	-0.035	0.053	-0.027	0.016	-0.006	0.020	0.014	0.089	-0.015	0.051
06/27/22	Peaches	0.002	0.014	0.003	0.012	-0.023	0.058	-0.003	0.018	0.010	0.017	0.005	0.068	-0.030	0.052
10/04/22	Tomatoes	0.001	0.008	-0.001	0.007	0.000	0.024	-0.004	0.007	-0.003	0.009	0.000	0.043	0.009	0.023
10/04/22	Pears	0.010	0.012	-0.001	0.011	0.006	0.040	0.004	0.016	0.006	0.013	0.022	0.053	0.008	0.039

C= Control location, Background location
Results in bold type are positive.

TABLE 9
BROADLEAF VEGETATION
(pCi/g wet wt.)

LOCATION 1

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)	Co-60	(+/-)
06/07/22	**0.520**	**0.249**	**3.522**	**0.557**	0.023	0.135	0.000	0.012	-0.001	0.014	0.009	0.029	-0.001	0.017
10/03/22	**2.323**	**0.400**	**3.617**	**0.622**	0.148	0.166	0.002	0.018	-0.018	0.020	-0.018	0.030	0.005	0.017

COLLECTION DATE	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)	I-131	(+/-)
06/07/22	-0.028	0.038	-0.002	0.014	-0.018	0.029	-0.001	0.016	-0.001	0.133	0.001	0.039	-0.004	0.021
10/03/22	-0.003	0.042	0.005	0.020	0.006	0.028	0.000	0.017	-0.005	0.191	0.033	0.054	0.020	0.022

COLLECTION DATE	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ce-141	(+/-)	Ce-144	(+/-)	Ac-228	(+/-)
06/07/22	0.014	0.017	0.003	0.014	-0.014	0.070	0.012	0.015	0.002	0.022	0.033	0.086	-0.026	0.066
10/03/22	0.012	0.019	0.011	0.020	-0.036	0.078	-0.001	0.023	-0.006	0.032	0.055	0.119	0.114	0.081

LOCATION 10

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)	Co-60	(+/-)
06/07/22	**0.440**	**0.215**	**4.403**	**0.652**	-0.179	0.133	0.013	0.016	-0.006	0.016	-0.020	0.042	-0.006	0.016
10/04/22	**1.000**	**0.266**	**2.254**	**0.448**	-0.085	0.109	0.003	0.014	0.002	0.012	0.022	0.023	-0.003	0.015

COLLECTION DATE	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)	I-131	(+/-)
06/07/22	-0.016	0.050	-0.010	0.016	0.003	0.033	0.006	0.016	0.003	0.150	0.003	0.048	-0.002	0.026
10/04/22	-0.033	0.032	0.003	0.014	-0.014	0.026	-0.005	0.010	-0.011	0.124	0.035	0.035	0.001	0.014

COLLECTION DATE	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ce-141	(+/-)	Ce-144	(+/-)	Ac-228	(+/-)
06/07/22	0.022	0.019	-0.012	0.020	-0.048	0.075	-0.004	0.022	-0.001	0.022	-0.014	0.094	0.071	0.070
10/04/22	0.014	0.016	-0.001	0.014	0.033	0.052	-0.013	0.014	-0.007	0.018	0.001	0.068	0.080	0.061

Results in bold type are positive.

TABLE 9
BROADLEAF VEGETATION
(pCi/g wet wt.)

LOCATION 17

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)	Co-60	(+/-)
06/07/22	0.277	0.155	**3.081**	**0.459**	-0.091	0.134	0.002	0.013	0.000	0.014	0.006	0.030	-0.004	0.014
10/04/22	**1.589**	**0.343**	**2.231**	**0.502**	0.106	0.131	0.010	0.017	-0.009	0.018	0.020	0.035	0.006	0.022

COLLECTION DATE	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)	I-131	(+/-)
06/07/22	-0.092	0.038	-0.006	0.015	-0.031	0.025	-0.003	0.014	-0.054	0.123	-0.008	0.039	-0.001	0.023
10/04/22	-0.034	0.048	-0.001	0.018	0.008	0.027	0.006	0.017	0.048	0.157	-0.022	0.047	-0.010	0.018

COLLECTION DATE	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ce-141	(+/-)	Ce-144	(+/-)	Ac-228	(+/-)
06/07/22	0.011	0.015	0.011	0.017	0.006	0.056	0.010	0.021	-0.004	0.022	0.057	0.070	0.056	0.056
10/04/22	0.004	0.017	-0.008	0.017	-0.023	0.059	0.022	0.023	0.000	0.023	0.039	0.105	0.058	0.078

LOCATION 26C

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)	Co-60	(+/-)
06/07/22	0.385	0.161	**4.400**	**0.519**	-0.005	0.122	-0.005	0.014	-0.002	0.014	-0.008	0.032	0.013	0.013
10/03/22	**1.178**	**0.272**	**1.847**	**0.493**	0.086	0.127	0.008	0.015	-0.001	0.015	-0.001	0.029	0.012	0.016

COLLECTION DATE	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)	I-131	(+/-)
06/07/22	-0.038	0.033	-0.018	0.014	0.008	0.026	-0.002	0.017	0.068	0.115	-0.028	0.040	0.011	0.022
10/03/22	-0.031	0.039	0.004	0.016	0.017	0.029	-0.008	0.015	0.071	0.160	0.014	0.040	-0.002	0.021

COLLECTION DATE	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ce-141	(+/-)	Ce-144	(+/-)	Ac-228	(+/-)
06/07/22	-0.009	0.016	-0.003	0.016	0.038	0.064	0.009	0.018	-0.009	0.023	0.051	0.091	0.064	0.057
10/03/22	0.025	0.019	-0.009	0.015	0.025	0.068	-0.012	0.018	0.018	0.026	-0.062	0.113	0.093	0.065

C= Control location, Background location
Results in bold type are positive.

TABLE 10
SEA WATER
(pCi/l)

LOCATION 32

COLLECTION DATE	H-3	(+/-)	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
01/25/22	**1360**	**278**	18.0	37.3	**319**	**106**	19.2	36.8	1.48	4.57	-1.61	3.72	-4.18	7.86
02/22/22	**575**	**250**	-0.33	33.3	**210**	**107**	-19.9	37.1	1.10	4.41	-4.87	4.30	-6.60	9.17
03/29/22	**391**	**119**	-30.3	31.5	**319**	**98**	8.30	37.2	-0.70	3.70	0.39	3.89	3.19	7.57
04/26/22	**2750**	**341**	-0.10	31.0	**246**	**99**	8.23	31.9	0.62	3.78	2.71	4.60	-5.20	9.64
05/31/22	**1070**	**681**	0.66	39.9	**233**	**113**	-2.38	43.6	-0.09	4.97	-2.08	4.61	-0.89	9.49
06/28/22	132	185	-21.1	30.6	**188**	**78**	2.94	25.6	-2.52	3.03	-2.66	3.32	0.06	6.73
07/26/22	**482**	**232**	7.54	21.5	**291**	**75**	-2.50	20.9	-3.50	2.74	-0.02	2.59	-0.51	5.06
08/30/22	**222**	**130**	-11.1	14.1	**283**	**57**	6.10	15.3	-0.54	1.80	0.23	1.80	1.40	3.90
09/26/22	**277**	**123**	11.4	31.2	**277**	**88**	-4.18	32.3	-1.82	3.93	-2.18	3.91	0.29	5.40
10/25/22	**581**	**141**	34.9	34.2	**259**	**96**	-18.3	37.4	1.90	4.18	-1.72	3.74	-2.29	7.61
11/29/22	278	201	18.5	33.4	**266**	**97**	-8.34	33.2	2.22	3.53	-1.43	4.39	4.33	9.05
12/27/22	**523**	**247**	-15.2	31.1	**285**	**93**	-10.3	31.8	-0.45	3.31	1.07	3.57	-1.42	6.56

COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)
01/25/22	-3.03	3.90	-2.21	9.51	-0.68	4.40	-0.04	7.23	-0.63	4.00	-11.3	38.5	-0.56	12.4
02/22/22	1.80	4.66	-5.05	9.68	1.50	4.47	-4.13	7.27	0.30	4.56	12.3	39.4	-4.25	11.6
03/29/22	2.38	4.19	-2.02	10.1	-0.45	4.03	6.97	8.04	-2.78	4.33	-15.4	41.8	-7.35	12.7
04/26/22	0.79	3.90	-6.12	9.98	-4.09	4.29	-1.17	6.79	1.37	4.55	-14.5	48.7	-0.74	12.7
05/31/22	0.73	4.85	-0.71	10.2	1.81	4.40	-9.29	10.1	-2.72	4.78	53.2	40.5	3.49	14.3
06/28/22	-2.13	3.39	-10.3	8.58	0.06	3.48	-1.84	5.86	-3.44	3.92	-6.34	30.3	1.38	9.17
07/26/22	1.26	2.98	-3.61	5.41	0.01	2.67	2.05	4.61	0.47	2.53	14.9	21.9	0.97	6.96
08/30/22	1.54	2.22	-2.25	4.37	0.43	1.88	-1.35	3.41	-0.19	1.86	-11.1	18.1	-3.47	4.27
09/26/22	-1.29	3.72	-4.50	6.93	5.45	3.65	0.49	5.28	0.93	3.55	28.9	34.5	0.56	9.90
10/25/22	2.92	4.07	-14.5	11.6	1.48	4.23	0.90	7.24	1.59	5.04	4.92	41.7	-2.99	12.7
11/29/22	4.25	5.00	-3.10	9.13	-1.23	3.81	-7.53	6.89	0.28	3.50	38.6	38.8	1.34	11.0
12/27/22	0.53	3.49	-4.44	9.33	0.58	3.90	-0.12	6.57	1.62	3.86	-7.70	30.3	-6.00	11.0

Results in bold type are positive.

TABLE 10
SEA WATER
(pCi/l)

LOCATION 32 Cont'd

COLLECTION DATE	I-131	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ac-228	(+/-)
01/25/22	0.21	4.47	4.13	4.05	0.41	4.53	-0.02	15.5	0.32	4.26	9.38	15.2
02/22/22	-0.22	4.60	-0.97	5.77	4.35	4.39	-3.75	14.7	-2.23	5.45	-2.52	18.0
03/29/22	0.82	5.05	3.97	4.41	-3.00	4.52	12.2	15.8	-2.53	5.45	-2.86	17.7
04/26/22	-0.79	4.61	-2.83	6.53	4.53	4.45	6.33	18.1	1.73	5.73	9.77	16.6
05/31/22	1.35	8.20	0.99	3.64	-2.88	5.13	-8.59	21.8	-1.84	8.62	19.9	17.4
06/28/22	-1.08	4.05	-0.92	3.35	-1.34	2.98	-3.26	12.6	2.53	3.78	-4.52	13.7
07/26/22	-0.91	2.75	0.04	2.49	2.51	2.98	-4.56	8.77	-2.16	3.04	-6.96	10.3
08/30/22	0.07	2.05	2.32	2.18	-0.68	1.79	0.72	7.51	-0.19	2.45	-0.25	8.47
09/26/22	2.59	4.81	0.09	3.81	0.01	3.47	2.67	16.7	0.41	5.05	6.33	13.7
10/25/22	5.10	5.36	-4.29	5.00	5.10	4.26	-12.3	17.8	-3.91	5.64	2.67	16.2
11/29/22	-1.56	6.93	0.80	3.54	0.42	4.29	-13.1	20.4	7.24	7.18	2.64	13.0
12/27/22	-4.35	6.70	1.64	3.32	-0.72	3.99	-6.24	15.0	1.79	5.93	-3.78	13.1

LOCATION 37C

COLLECTION DATE	H-3	(+/-)	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
03/22/22	15	108	-12.0	36.2	**223**	**107**	-39.2	43.1	-0.54	4.10	-0.51	3.75	0.14	6.77
06/21/22	14	181	3.79	29.9	**171**	**105**	-12.3	33.0	0.51	3.49	-3.60	3.44	2.07	7.20
09/13/22	6	170	-12.1	24.6	**217**	**97**	-16.4	32.2	0.16	3.63	-1.19	3.25	4.94	6.87
12/20/22	39	176	23.6	33.6	**171**	**88**	22.1	37.2	-1.59	3.41	0.29	3.59	-2.78	9.41

COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)	Sb-125	(+/-)
03/22/22	3.50	4.09	3.25	10.4	0.55	4.14	-3.67	7.22	3.52	5.23	-0.42	41.1	1.56	13.0
06/21/22	2.70	4.25	-6.08	8.91	-1.84	3.63	-2.95	5.56	-1.67	3.87	-14.6	39.9	-1.93	9.62
09/13/22	1.72	5.04	-4.12	7.37	-1.23	3.29	-4.06	5.52	-2.20	3.94	8.46	34.2	-0.14	9.79
12/20/22	-1.00	2.97	-4.23	11.4	0.02	3.94	-6.17	7.82	-2.01	4.20	-5.14	29.5	1.09	10.3

COLLECTION DATE	I-131	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ba-140	(+/-)	La-140	(+/-)	Ac-228	(+/-)
03/22/22	-3.10	5.10	0.19	5.58	0.66	3.83	4.95	17.4	-0.65	4.19	-11.5	18.3
06/21/22	4.76	4.75	1.44	4.28	-2.90	4.18	1.59	15.2	-4.87	4.83	7.94	16.9
09/13/22	-3.89	4.53	2.65	3.67	1.29	3.50	1.28	12.3	5.18	5.24	3.38	13.9
12/20/22	-3.57	6.93	-0.89	4.31	0.44	4.05	4.82	20.1	-3.44	5.73	4.85	13.7

C= Control location, Background location
Results in bold type are positive.

TABLE 11
BOTTOM SEDIMENT
(pCi/g dry wt.)

LOCATION	COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
31	03/09/22	0.049	0.157	**14.35**	**0.892**	0.011	0.156	-0.002	0.020	0.001	0.018	-0.041	0.049
31	12/13/22	0.003	0.246	**14.18**	**1.348**	-0.007	0.229	-0.003	0.032	0.020	0.028	-0.016	0.061
32	06/24/22	0.282	0.354	**13.09**	**1.671**	0.047	0.290	0.002	0.039	0.010	0.035	-0.021	0.094
32	09/28/22	-0.207	0.280	**17.79**	**1.775**	-0.026	0.308	0.011	0.040	0.008	0.033	0.066	0.075
33	06/28/22	0.228	0.238	**17.52**	**1.600**	0.042	0.238	-0.018	0.032	-0.004	0.035	-0.048	0.071
33	12/14/22	-0.177	0.262	**18.57**	**1.567**	-0.160	0.251	0.003	0.030	-0.020	0.035	-0.003	0.072
34	06/28/22	0.048	0.183	**14.63**	**1.401**	-0.048	0.180	-0.004	0.029	-0.003	0.024	-0.016	0.064
34	12/14/22	0.089	0.191	**10.45**	**1.032**	-0.244	0.193	-0.010	0.021	-0.026	0.023	-0.003	0.053
37C	03/09/22	0.123	0.143	**14.90**	**0.905**	-0.008	0.124	0.007	0.018	0.005	0.017	0.014	0.042
37C	12/13/22	-0.146	0.199	**15.63**	**1.430**	0.016	0.198	0.027	0.027	-0.002	0.027	-0.042	0.070

LOCATION	COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)
31	03/09/22	-0.001	0.018	-0.100	0.053	-0.012	0.020	-0.013	0.032	0.008	0.020	-0.069	0.162
31	12/13/22	0.008	0.025	-0.069	0.078	0.016	0.032	-0.010	0.053	0.029	0.028	-0.065	0.268
32	06/24/22	0.042	0.039	0.057	0.100	-0.019	0.048	0.029	0.070	0.008	0.038	-0.023	0.335
32	09/28/22	0.025	0.037	-0.106	0.100	-0.004	0.038	0.026	0.067	0.001	0.033	0.090	0.324
33	06/28/22	-0.011	0.032	-0.144	0.099	-0.014	0.036	-0.014	0.059	0.005	0.028	-0.219	0.268
33	12/14/22	0.026	0.041	-0.043	0.087	-0.001	0.038	-0.004	0.059	0.025	0.030	-0.253	0.307
34	06/28/22	0.012	0.033	-0.038	0.076	-0.017	0.029	-0.038	0.050	0.018	0.024	-0.014	0.220
34	12/14/22	-0.004	0.027	-0.050	0.067	-0.018	0.026	0.010	0.043	0.013	0.020	-0.166	0.221
37C	03/09/22	0.008	0.018	-0.051	0.050	0.002	0.017	0.011	0.031	-0.004	0.015	0.109	0.151
37C	12/13/22	0.028	0.030	-0.068	0.082	-0.009	0.029	-0.013	0.043	0.003	0.025	0.068	0.235

C= Control location, Background location
Results in bold type are positive.

TABLE 11
BOTTOM SEDIMENT
(pCi/g dry wt.)

LOCATION	COLLECTION DATE	Ag-110M	(+/-)	Sb-125	(+/-)	I-131	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ac-228	(+/-)
31	03/09/22	0.001	0.018	-0.050	0.052	0.014	0.030	0.020	0.021	-0.015	0.019	**0.322**	**0.112**
31	12/13/22	-0.005	0.029	-0.001	0.070	0.022	0.043	0.047	0.037	-0.016	0.031	**0.815**	**0.175**
32	06/24/22	0.002	0.035	-0.018	0.092	-0.010	0.057	0.038	0.050	0.045	0.041	**1.295**	**0.285**
32	09/28/22	0.005	0.036	0.033	0.097	0.001	0.050	0.018	0.049	-0.010	0.037	1.113	0.268
33	06/28/22	-0.008	0.029	-0.035	0.086	-0.003	0.039	0.061	0.039	-0.012	0.034	0.359	0.145
33	12/14/22	-0.014	0.033	-0.009	0.081	0.014	0.044	-0.003	0.038	0.010	0.033	0.205	0.140
34	06/28/22	0.003	0.020	0.039	0.061	-0.020	0.027	0.026	0.035	-0.005	0.027	0.125	0.107
34	12/14/22	0.000	0.020	-0.008	0.060	0.031	0.034	0.000	0.027	-0.002	0.021	0.134	0.102
37C	03/09/22	0.002	0.017	0.023	0.040	-0.006	0.022	0.025	0.021	-0.012	0.019	**0.336**	**0.154**
37C	12/13/22	0.000	0.022	-0.041	0.057	-0.003	0.042	0.024	0.028	-0.013	0.026	0.294	0.135

C= Control location, Background location
Results in bold type are positive.

TABLE 12
AQUATIC FLORA - FUCUS
(pCi/g wet wt.)

LOCATION	COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
29	03/07/22	0.1264	0.1382	**6.5610**	**0.6501**	-0.0297	0.1315	0.0053	0.0140	-0.0097	0.0133	-0.0036	0.0304
29	05/25/22	0.1085	0.1192	**7.3820**	**0.6829**	0.0939	0.1189	-0.0009	0.0133	0.0182	0.0154	-0.0279	0.0305
29	08/18/22	0.1084	0.1555	**7.0010**	**0.7775**	-0.0302	0.1223	-0.0081	0.0180	0.0028	0.0155	-0.0180	0.0385
29	11/29/22	0.0906	0.0763	**5.9650**	**0.4383**	-0.0345	0.0713	0.0011	0.0083	0.0048	0.0089	-0.0128	0.0239
32	03/07/22	0.0985	0.0812	**7.0630**	**0.5292**	0.0406	0.0801	0.0053	0.0094	-0.0041	0.0100	0.0001	0.0211
32	03/07/22	0.0394	0.1129	**7.5660**	**0.6492**	0.0761	0.1084	0.0062	0.0148	-0.0052	0.0125	-0.0079	0.0310
32	03/22/22	0.1277	0.0861	**5.8410**	**0.5198**	-0.0341	0.0782	-0.0005	0.0106	-0.0037	0.0093	0.0265	0.0208
32	05/25/22	0.0509	0.1290	**8.3010**	**0.8227**	0.0204	0.1089	-0.0115	0.0179	0.0145	0.0145	0.0110	0.0325
32	09/28/22	0.1234	0.1117	**7.6530**	**0.7213**	0.0548	0.1019	0.0051	0.0166	0.0003	0.0154	-0.0194	0.0323
32	12/01/22	0.1508	0.1332	**8.7020**	**0.6872**	-0.0550	0.1462	0.0007	0.0165	0.0035	0.0162	-0.0117	0.0402
35	03/07/22	0.3793	0.1407	**5.6630**	**0.5388**	0.0323	0.1120	-0.0007	0.0126	-0.0074	0.0128	-0.0037	0.0296
35	03/07/22	**0.4099**	**0.1449**	**6.2830**	**0.5565**	0.0015	0.0874	0.0017	0.0105	-0.0017	0.0110	-0.0036	0.0250
35	03/22/22	0.2378	0.1130	**6.2670**	**0.6368**	0.0969	0.0987	-0.0108	0.0137	-0.0023	0.0107	-0.0419	0.0324
35	05/25/22	0.0863	0.1462	**8.0460**	**0.7659**	0.0341	0.1167	0.0023	0.0152	-0.0072	0.0153	-0.0018	0.0367
35	08/18/22	0.1011	0.1642	**6.3610**	**0.8190**	-0.0948	0.1158	0.0100	0.0180	0.0019	0.0168	-0.0068	0.0371
35	12/14/22	0.3508	0.1370	**7.5490**	**0.5494**	-0.1028	0.1183	0.0100	0.0137	0.0045	0.0137	0.0289	0.0330
36C	03/09/22	0.3665	0.1715	**6.0990**	**0.6900**	-0.0623	0.1319	-0.0148	0.0159	0.0064	0.0149	-0.0111	0.0347
36C	06/24/22	0.1260	0.0949	**2.7750**	**0.3659**	-0.0291	0.0905	0.0002	0.0094	-0.0046	0.0095	0.0018	0.0215
36C	09/28/22	**0.2986**	**0.1475**	**5.9780**	**0.5192**	0.0497	0.0934	-0.0139	0.0112	0.0018	0.0109	-0.0090	0.0240
36C	12/20/22	0.3331	0.1906	**8.6460**	**0.8962**	0.1933	0.1806	-0.0090	0.0155	-0.0107	0.0188	-0.0108	0.0371

C= Control location, Background location
Results in bold type are positive.

TABLE 12
AQUATIC FLORA - FUCUS
(pCi/g wet wt.)

LOCATION	COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)
29	03/07/22	-0.0023	0.0172	-0.0215	0.0355	0.0055	0.0155	-0.0042	0.0238	0.0059	0.0135	0.0241	0.1156
29	05/25/22	0.0032	0.0155	-0.0054	0.0419	0.0220	0.0146	0.0131	0.0246	0.0052	0.0142	-0.0385	0.1400
29	08/18/22	0.0007	0.0197	0.0008	0.0436	-0.0089	0.0197	-0.0178	0.0283	-0.0075	0.0169	0.0665	0.1586
29	11/29/22	0.0058	0.0105	-0.0478	0.0261	0.0062	0.0094	-0.0017	0.0166	-0.0027	0.0081	0.0597	0.0755
32	03/07/22	0.0001	0.0112	-0.0158	0.0213	0.0022	0.0091	0.0087	0.0169	0.0060	0.0087	0.0559	0.0808
32	03/07/22	0.0070	0.0147	-0.0142	0.0335	0.0076	0.0131	0.0026	0.0191	0.0073	0.0117	0.0200	0.1131
32	03/22/22	0.0002	0.0118	-0.0216	0.0291	-0.0032	0.0095	0.0156	0.0204	0.0019	0.0095	-0.1073	0.0945
32	05/25/22	0.0115	0.0178	-0.0561	0.0447	-0.0014	0.0157	-0.0009	0.0287	-0.0114	0.0141	-0.0858	0.1425
32	09/28/22	-0.0029	0.0162	0.0083	0.0399	-0.0025	0.0121	0.0121	0.0257	-0.0030	0.0138	-0.0210	0.1183
32	12/01/22	0.0024	0.0179	-0.0016	0.0425	0.0098	0.0169	0.0034	0.0283	-0.0049	0.0160	0.1050	0.1398
35	03/07/22	0.0062	0.0152	-0.0520	0.0333	0.0015	0.0122	-0.0110	0.0204	-0.0061	0.0121	-0.0611	0.1078
35	03/07/22	0.0057	0.0110	-0.0070	0.0300	0.0031	0.0111	-0.0040	0.0176	0.0000	0.0097	0.0516	0.0935
35	03/22/22	0.0029	0.0166	-0.0204	0.0328	0.0115	0.0121	0.0017	0.0222	-0.0004	0.0113	0.0241	0.1170
35	05/25/22	-0.0051	0.0149	-0.0120	0.0347	0.0001	0.0151	0.0036	0.0247	-0.0122	0.0146	0.0394	0.1478
35	08/18/22	-0.0191	0.0215	-0.0182	0.0502	0.0154	0.0200	-0.0128	0.0298	0.0098	0.0153	0.0552	0.1674
35	12/14/22	-0.0095	0.0142	0.0239	0.0330	-0.0021	0.0131	0.0165	0.0227	-0.0039	0.0143	-0.0145	0.1191
36C	03/09/22	0.0009	0.0150	-0.0264	0.0384	0.0042	0.0167	-0.0097	0.0267	-0.0040	0.0150	0.0835	0.1201
36C	06/24/22	-0.0014	0.0114	-0.0229	0.0232	0.0051	0.0102	0.0042	0.0158	0.0124	0.0115	0.0105	0.0894
36C	09/28/22	-0.1956	0.0165	-0.0009	0.0267	-0.0006	0.0116	0.0052	0.0188	-0.0011	0.0107	-0.0351	0.1033
36C	12/20/22	0.0098	0.0229	-0.0292	0.0466	0.0097	0.0209	0.0034	0.0363	0.0028	0.0185	-0.0631	0.1641

C= Control location, Background location
Results in bold type are positive.

TABLE 12
AQUATIC FLORA - FUCUS
(pCi/g wet wt.)

LOCATION	COLLECTION DATE	Ag-110M	(+/-)	Sb-125	(+/-)	I-131	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ac-228	(+/-)
29	03/07/22	0.0131	0.0148	-0.0164	0.0396	0.0272	0.0198	-0.0008	0.0179	-0.0015	0.0152	0.0165	0.0613
29	05/25/22	-0.0119	0.0133	-0.0085	0.0405	0.0084	0.0172	0.0001	0.0184	0.0186	0.0163	0.0532	0.0713
29	08/18/22	0.0044	0.0138	-0.0120	0.0406	0.0121	0.0181	0.0028	0.0190	-0.0076	0.0177	0.0526	0.0707
29	11/29/22	0.0017	0.0082	0.0002	0.0217	0.0054	0.0135	0.0063	0.0098	-0.0014	0.0098	0.1080	0.0460
32	03/07/22	0.0007	0.0093	0.0058	0.0254	**0.0787**	**0.0175**	0.0031	0.0087	0.0041	0.0106	0.0352	0.0402
32	03/07/22	0.0113	0.0129	-0.0052	0.0382	**0.0614**	**0.0331**	-0.0170	0.0145	-0.0048	0.0137	0.0471	0.0554
32	03/22/22	-0.0022	0.0091	-0.0007	0.0251	0.0106	0.0117	0.0015	0.0118	-0.0023	0.0106	0.0310	0.0415
32	05/25/22	0.0016	0.0147	-0.0209	0.0384	0.0061	0.0156	-0.0051	0.0202	-0.0019	0.0161	0.0654	0.0784
32	09/28/22	0.0038	0.0124	-0.0304	0.0329	0.0048	0.0158	0.0115	0.0145	-0.0060	0.0162	-0.0319	0.0583
32	12/01/22	-0.0039	0.0149	-0.0012	0.0412	0.0140	0.0305	0.0026	0.0185	-0.0022	0.0161	0.1130	0.0730
35	03/07/22	0.0068	0.0124	0.0049	0.0339	**0.0513**	**0.0214**	-0.0062	0.0143	-0.0061	0.0134	0.0963	0.0604
35	03/07/22	0.0007	0.0100	0.0000	0.0283	**0.0421**	**0.0212**	0.0055	0.0120	0.0047	0.0108	0.0523	0.0539
35	03/22/22	0.0075	0.0125	0.0180	0.0333	0.0022	0.0151	0.0023	0.0145	-0.0016	0.0137	-0.0142	0.0612
35	05/25/22	-0.0054	0.0135	-0.0129	0.0377	-0.0008	0.0175	0.0036	0.0189	0.0042	0.0172	0.0003	0.0634
35	08/18/22	-0.0104	0.0179	0.0156	0.0441	0.0172	0.0182	-0.0008	0.0191	0.0164	0.0219	0.0428	0.0886
35	12/14/22	0.0049	0.0130	0.0372	0.0378	-0.0070	0.0210	0.0171	0.0157	0.0194	0.0140	0.1275	0.0607
36C	03/09/22	-0.0085	0.0150	-0.0482	0.0422	0.0181	0.0226	0.0230	0.0179	0.0018	0.0172	0.0569	0.0707
36C	06/24/22	0.0090	0.0105	0.0146	0.0249	0.0102	0.0161	0.0045	0.0100	-0.0139	0.0110	0.0017	0.0405
36C	09/28/22	0.0031	0.0106	-0.0048	0.0298	0.0136	0.0156	-0.0055	0.0118	-0.0073	0.0123	0.0737	0.0450
36C	12/20/22	0.0096	0.0170	-0.0240	0.0470	0.0095	0.0300	0.0064	0.0201	-0.0042	0.0205	0.0816	0.0782

C= Control location, Background location
Results in bold type are positive.

TABLE 13
FISH
(pCi/g wet wt.)

LOCATION	COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
28	10/27/22	0.124	0.226	**3.857**	**0.883**	-0.049	0.257	-0.005	0.031	0.014	0.033	0.014	0.058
32	05/26/22	-0.001	0.238	**2.786**	**0.900**	-0.073	0.213	0.008	0.034	0.010	0.029	0.028	0.068
35	06/02/22	-0.090	0.210	**2.988**	**0.606**	0.109	0.212	0.011	0.023	-0.014	0.023	0.057	0.047
35	10/27/22	-0.159	0.241	**3.827**	**0.984**	0.010	0.210	-0.001	0.034	0.012	0.024	-0.012	0.073

LOCATION	COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)
28	10/27/22	-0.007	0.032	-0.021	0.065	0.014	0.030	0.034	0.055	0.031	0.032	0.128	0.283
32	05/26/22	-0.001	0.040	0.016	0.092	0.018	0.029	-0.013	0.062	-0.022	0.035	0.235	0.240
35	06/02/22	0.002	0.021	-0.032	0.051	0.025	0.022	0.006	0.041	0.011	0.023	-0.118	0.202
35	10/27/22	-0.001	0.035	-0.028	0.083	-0.004	0.028	-0.022	0.070	-0.004	0.036	-0.204	0.342

LOCATION	COLLECTION DATE	Ag-110M	(+/-)	Sb-125	(+/-)	I-131	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ac-228	(+/-)
28	10/27/22	0.019	0.027	-0.020	0.086	-0.011	0.044	-0.007	0.032	0.008	0.032	-0.093	0.100
32	05/26/22	0.026	0.031	0.005	0.094	-0.015	0.031	-0.008	0.032	-0.013	0.040	0.096	0.123
35	06/02/22	0.007	0.021	-0.017	0.058	0.013	0.053	-0.003	0.026	-0.003	0.024	0.000	0.091
35	10/27/22	-0.011	0.034	-0.030	0.080	0.016	0.043	-0.005	0.034	0.014	0.035	0.056	0.107

Results in bold type are positive.

TABLE 14
OYSTERS
(pCi/g wet wt.)

LOCATION	COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
31	06/23/22	0.087	0.232	**1.760**	**0.692**	-0.015	0.243	-0.021	0.034	-0.012	0.026	-0.025	0.046
31	11/29/22	0.006	0.218	**2.036**	**0.594**	0.076	0.212	0.000	0.025	0.009	0.025	0.002	0.048
89C	05/03/22	-0.065	0.248	**2.123**	**0.928**	0.205	0.246	-0.018	0.038	0.000	0.027	-0.019	0.067
89C	09/21/22	-0.098	0.215	**1.120**	**0.639**	-0.021	0.238	0.009	0.024	0.016	0.027	-0.060	0.054

LOCATION	COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)
31	06/23/22	0.011	0.030	-0.049	0.062	0.011	0.027	0.033	0.049	-0.010	0.022	-0.176	0.213
31	11/29/22	0.020	0.031	-0.080	0.071	-0.010	0.030	0.023	0.043	-0.023	0.027	-0.009	0.228
89C	05/03/22	0.017	0.036	-0.043	0.073	-0.023	0.037	-0.052	0.067	0.009	0.035	-0.215	0.310
89C	09/21/22	0.001	0.030	-0.001	0.067	0.020	0.029	-0.040	0.048	-0.016	0.026	-0.198	0.231

LOCATION	COLLECTION DATE	Ag-110M	(+/-)	Sb-125	(+/-)	I-131	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ac-228	(+/-)
31	06/23/22	0.006	0.024	0.009	0.066	0.000	0.048	0.009	0.022	0.016	0.028	0.004	0.121
31	11/29/22	-0.006	0.023	0.050	0.070	-0.006	0.039	0.011	0.029	0.003	0.024	0.065	0.108
89C	05/03/22	-0.010	0.033	-0.074	0.084	0.019	0.033	-0.001	0.033	0.014	0.038	0.091	0.137
89C	09/21/22	0.026	0.024	0.043	0.069	0.007	0.051	-0.001	0.028	-0.011	0.026	-0.012	0.097

C= Control location, Background location
Results in bold type are positive.

TABLE 15
CLAMS
(pCi/g wet wt.)

LOCATION	COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
29	06/24/22	0.060	0.311	1.226	0.966	0.021	0.304	0.012	0.027	-0.032	0.036	-0.047	0.065
29	10/24/22	-0.198	0.254	**2.162**	**0.752**	-0.236	0.232	-0.020	0.034	-0.017	0.030	-0.010	0.073
31	06/28/22	0.127	0.262	**2.735**	**0.787**	0.030	0.208	0.036	0.036	-0.028	0.027	0.016	0.048
31	11/07/22	-0.058	0.321	**2.705**	**0.899**	0.105	0.323	-0.022	0.042	-0.004	0.042	0.047	0.078

LOCATION	COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)
29	06/24/22	0.005	0.036	-0.094	0.093	0.020	0.040	-0.021	0.061	-0.011	0.034	-0.045	0.304
29	10/24/22	0.008	0.036	-0.033	0.074	-0.006	0.035	0.041	0.062	0.011	0.031	0.200	0.294
31	06/28/22	-0.004	0.034	-0.073	0.063	-0.011	0.030	-0.041	0.051	-0.007	0.030	0.050	0.265
31	11/07/22	-0.011	0.044	-0.127	0.127	0.014	0.043	0.007	0.068	-0.010	0.040	-0.215	0.354

LOCATION	COLLECTION DATE	Ag-110M	(+/-)	Sb-125	(+/-)	I-131	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ac-228	(+/-)
29	06/24/22	0.017	0.031	0.030	0.101	-0.003	0.053	0.018	0.037	0.010	0.032	0.070	0.148
29	10/24/22	-0.012	0.035	-0.004	0.095	0.009	0.037	-0.004	0.032	0.024	0.041	0.094	0.121
31	06/28/22	0.015	0.029	-0.036	0.075	0.008	0.029	-0.003	0.035	0.026	0.029	0.002	0.135
31	11/07/22	-0.043	0.044	0.066	0.102	-0.066	0.054	-0.040	0.048	0.048	0.041	0.100	0.171

Results in bold type are positive.

TABLE 16
LOBSTERS
(pCi/g wet wt.)

LOCATION	COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	Cr-51	(+/-)	Mn-54	(+/-)	Co-58	(+/-)	Fe-59	(+/-)
35	05/18/22	-0.035	0.311	**3.284**	**1.166**	-0.049	0.302	0.033	0.042	-0.004	0.040	0.015	0.065
35	10/27/22	0.257	0.318	**3.027**	**1.028**	-0.267	0.299	0.013	0.036	-0.003	0.038	0.000	0.075
89C	06/23/22	-0.036	0.188	**1.843**	**0.698**	-0.144	0.223	-0.001	0.027	0.014	0.027	0.020	0.059
89C	08/18/22	-0.163	0.262	**2.308**	**0.962**	-0.053	0.242	0.011	0.031	0.000	0.032	0.031	0.063

LOCATION	COLLECTION DATE	Co-60	(+/-)	Zn-65	(+/-)	Nb-95	(+/-)	Zr-95	(+/-)	Ru-103	(+/-)	Ru-106	(+/-)
35	05/18/22	0.015	0.045	0.027	0.092	0.007	0.040	0.039	0.075	0.011	0.034	-0.143	0.341
35	10/27/22	-0.018	0.039	-0.006	0.090	0.021	0.038	-0.026	0.065	-0.008	0.040	-0.017	0.326
89C	06/23/22	0.009	0.032	-0.007	0.064	-0.002	0.025	0.032	0.051	0.021	0.029	0.159	0.222
89C	08/18/22	-0.025	0.033	0.046	0.066	-0.004	0.026	0.014	0.043	0.009	0.031	0.182	0.285

LOCATION	COLLECTION DATE	Ag-110M	(+/-)	Sb-125	(+/-)	I-131	(+/-)	Cs-134	(+/-)	Cs-137	(+/-)	Ac-228	(+/-)
35	05/18/22	-0.013	0.034	-0.001	0.121	-0.029	0.047	-0.024	0.038	0.036	0.037	-0.128	0.176
35	10/27/22	-0.015	0.036	0.037	0.110	0.012	0.052	0.057	0.039	0.018	0.038	-0.056	0.157
89C	06/23/22	0.003	0.025	-0.008	0.073	0.042	0.043	0.038	0.031	-0.011	0.028	0.074	0.131
89C	08/18/22	-0.010	0.028	-0.058	0.081	-0.015	0.037	0.014	0.038	-0.008	0.035	0.173	0.117

C= Control Location, Background location
Results in bold type are positive.

4. DISCUSSION OF RESULTS

This section summarizes the results of the analyses on the REMP samples. Station related tritium (H-3) radioactivity was detected in seawater collected at the quarry discharge point. This was within the station boundary. A false-positive I-131 was identified in aquatic flora – fucus at location #32 and location #35. This was confirmed after further analysis and backup sampling, the results indicated the absence of I-131. Further details are discussed in section 4.12 of this report. The naturally occurring nuclides of Be-7, K-40, and Ac-228, were detected in some samples. Be-7 is from cosmic radiation. It was observed in air, broadleaf vegetation and in some fucus samples. K-40 and Ac-228 are two common terrestrial isotopes. K-40 was not seen in well water samples but was observed in other samples. Ac-228 was observed in four sediment samples. Cs-137 and Sr-90 from atmospheric nuclear weapons testing in the 1960's has been observed in the past. A study by the Connecticut Department of Energy and Environmental Protection in 2006 affirmed that radioactivity from nuclear weapons testing has decreased to almost non-detectable levels (Reference 19). Since 2006 detection of Cs- 137 and Sr-90 in environmental samples has been rare. Cs-137 from nuclear weapons testing was detected above MDC at two locations and at MDC (Minimum Detectable Concentration) at one location in 2022. Based on sample location, it is expected to identify the presence of Cs-137 in undisturbed soil[22]. The REMP samples obtained during 2022 indicated a slight uptick in value consistent with values from previous years. The overall trend is decreasing (Figure 4.5-1).

4.1 Gamma Exposure Rate (Table 1)

Gamma exposure rate is determined from the integrated exposure measured over a calendar quarter using TLDs. Prior to 1990, Victoreen CaF2(Mn) glass bulb dosimeters were used for these measurements. In 1990, these were replaced by Harshaw CaF2(Mn) chips. In 2000, the CaF2(Mn) TLDs, were replaced with the CaSO4(Tm) Panasonic model UD-814 AS1 TLDs. Readings are recorded as µR/hr. The unit µR stands for 'micro-roentgen' with a 'micro' being one-millionth of a roentgen. A roentgen is the quantity of radiation equal to 87.6 ergs of energy per gram of air. For gamma exposure a micro-roentgen is equivalent to a micro-rem, a measure of dose to man.

The dosimeters are strategically placed at several onsite locations, as well as at inner and outer offsite locations. Starting in 2001, the collection of TLDs was changed from monthly to quarterly and additional measurement locations were incorporated into the REMP requirements listed in the REMODCM (Reference 8). Three more locations (73-75) were added in mid-2003 to prepare for monitoring the potential effect from the ISFSI. Two dry cask containers were loaded in the first quarter of 2005, three in 2006, three in 2007, three in 2009, three in 2010, four in 2012, six in 2015, five in 2016, three in 2018, seven in 2019, six in 2021, and two in 2022.

Prior to any cask loading, the background readings average recorded from mid 2003 – 2004 were: 9.5 µR/hour at Location 73, 7.5 µR/hour at Location 74, and 6.9 µR/hour at Location 75.

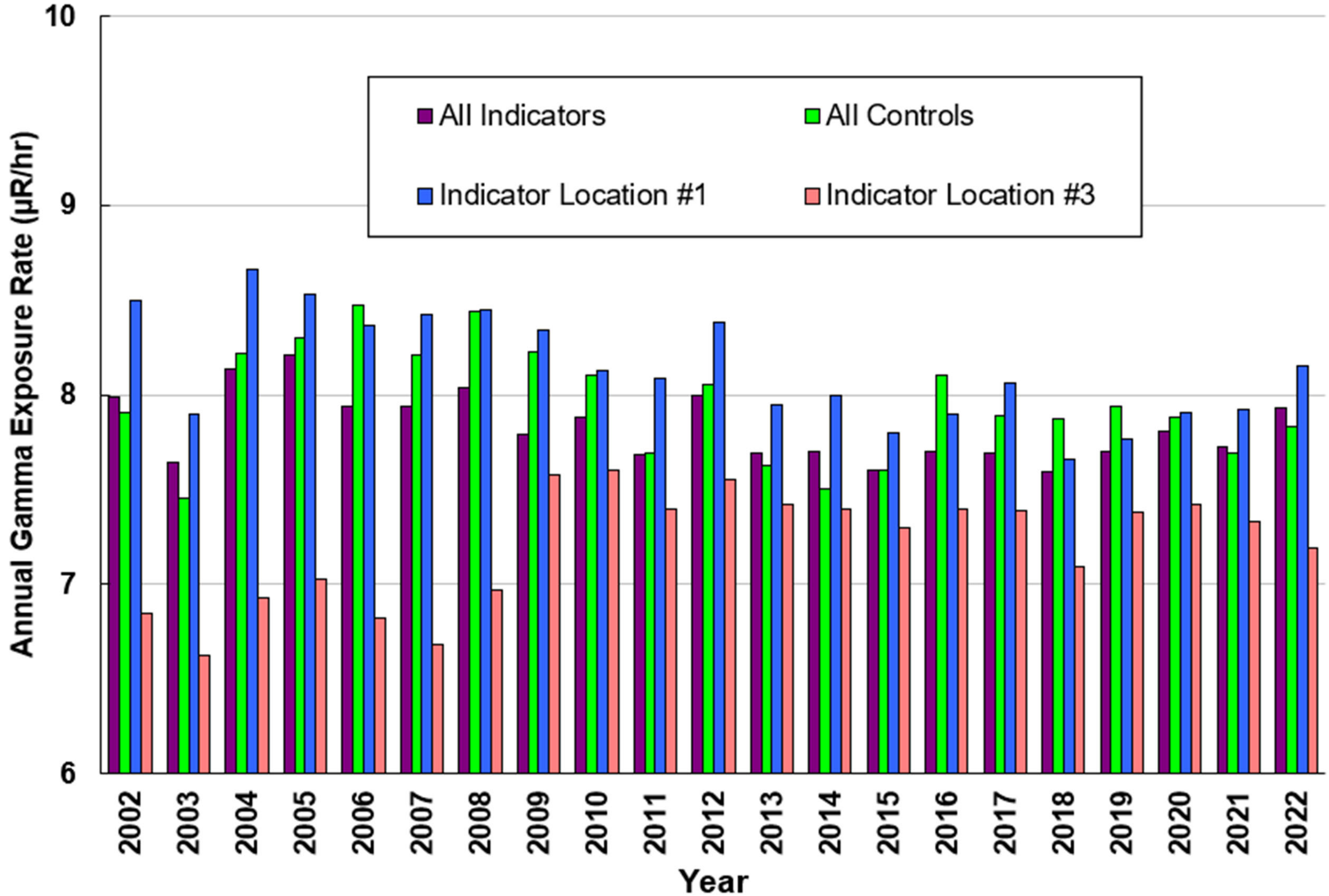
In 2022, the annual average exposure rate measurement for the ISFSI area was 7.8 µR/hour at Location 73, 7.7 µR/hour at Location 74, and 6.7 µR/hour at Location 75. The station offsite dose from ISFSI for 2022 was 0.026 mrem/year, which is below the 25 mrem/year limit per 40.190 CFR.

Table 1 in Section 3.2 lists the exposure rate measurements for all 43 monitored locations. These measurements demonstrate the general variations in background radiation between the various onsite and offsite locations and include gamma exposure from all sources of radioactivity. For example, the Weather Shack (Location 2), Quarry East (Location 5), Environmental Laboratory (Location 8), Bay Point Beach (Location 9), Goshen Fire Dept (Location 10), and Corey Road (Location 48) experience higher exposure rates due to their proximity to granite beds and stonewalls. In addition, the Mystic (Location 13C) and Ledyard (Location 14C) control locations experience relatively higher background exposure rate than the other control locations in Norwich and Old Lyme (Locations 15C and 16C).

Figure 4.1-1 shows a historical trend of TLD exposure rate measurements, comparing an annual average of all indicator TLDs, an annual average of all control TLDs, and the annual average of the two most critical indicator locations, location 1 and 3, which are used to represent the two closest site boundary residences in the North-northwest and Northeast directions. The average indicator and control readings were both about 8.0 μR/hour.

Figure 4.1-1 also relates the difference in indicator locations 1 and 3 and the annual average of all indicator TLDs to the annual average of the control TLDs collected and measured during coincident periods throughout the year. Locations 1 and 3 are important because they are onsite and located between the plant and nearby populated areas. As discussed earlier, the exposure measurements of many indicator locations onsite (and two of the control locations) are influenced by natural background exposure differences caused by the many granite outcroppings typical of the local area. Figure 4.1-1 shows that the annual average at indicator Location 3 was lower in gamma exposure rate than the average control gamma exposure rate. These differences are the result of the differences in granite at these locations. Location 3 was moved in the second quarter 2009 to minimize the effect of tree covering for the air sampler also located at this location. The 2000 to 2009 data for Location 3 shows an increase likely attributable to 1-3 μR/hr gradients observed from the granite bedrock of the MPS Site (Reference 21). Over the last 10 years there has been no significant change in the annual gamma exposure rate (Figure 4.1-1); the small variation in the results for all indicators, location 1, and locations 3 are expected due to counting statistical variation.

Figure 4.1-1
Annual Gamma Exposure Rate - 20 Year History



4.2 Air Particulate Gross Beta Radioactivity (Table 2)

Air is continuously sampled at seven inner ring (0 to 2 miles) locations and one control location (14 miles N) by passing it through glass fiber particulate filters. These samples are collected every two weeks and analyzed for gross beta radioactivity. Results are shown on Figure 4.2-1 and Table 2. Gross beta activity remained at levels similar to that seen over the last decade. Indicators and control monitoring locations continue to show no significant variation in measured activities and are within the expected calculated uncertainty of ±0.002 pCi/m^3 (see Figure 4.2-2). This indicates that any station contribution is not measurable.

Figure 4.2-1
Air Particulate Gross Beta Activity
Monthly Average - 2022

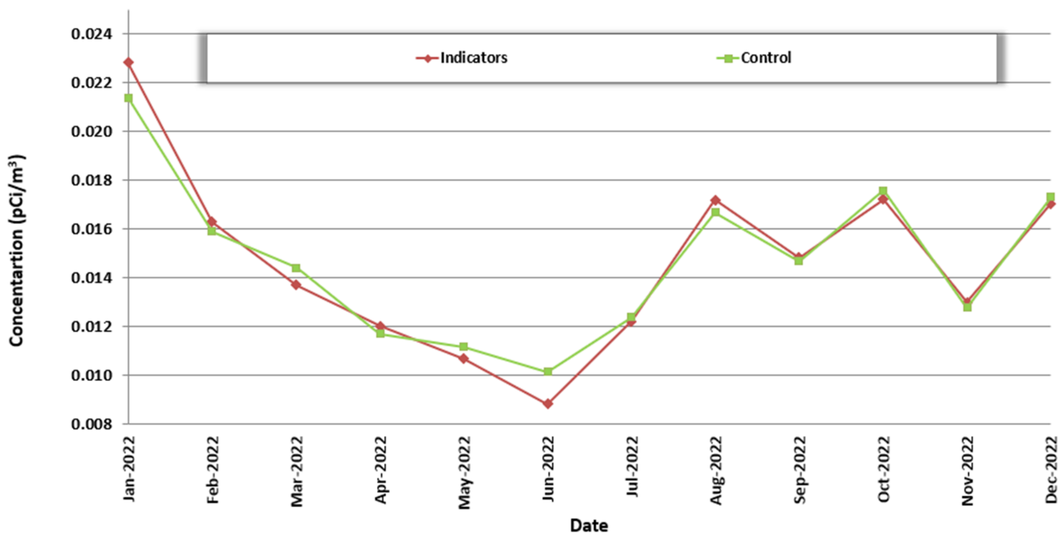
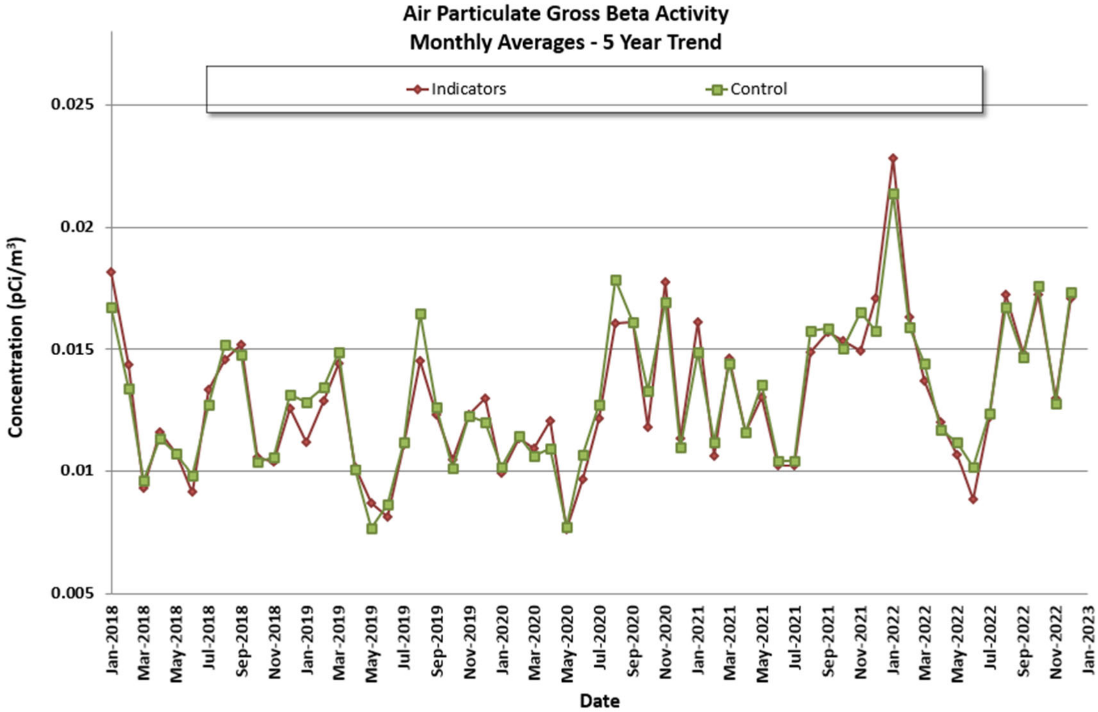


Figure 4.2-2
Air Particulate Gross Beta Activity
Monthly Averages - 5 Year Trend



4.3 Airborne Iodine (Table 3)

Charcoal cartridges are included at all the air particulate monitoring stations for the collection of atmospheric iodine. These cartridges were analyzed for I-131 every two weeks. No detectable levels of I-131 were seen in the 2022 charcoal samples.

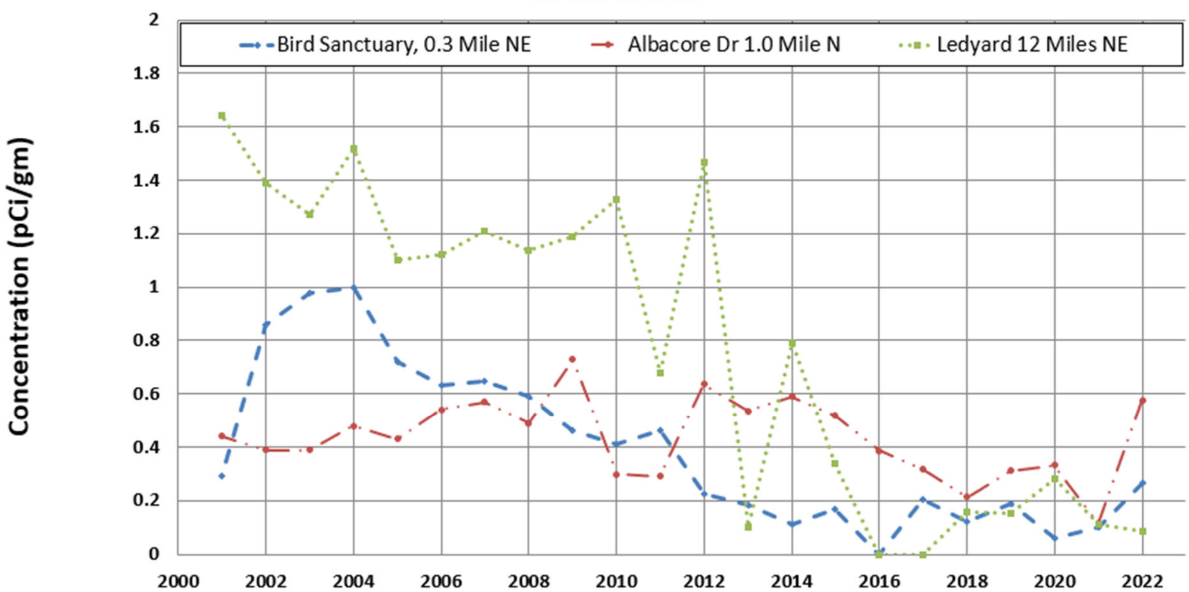
4.4 Air Particulate Gamma (Table 4)

The air particulate samples that are utilized for the gross beta analyses are composited quarterly and analyzed for gamma emitting isotopes including strontium analysis as a substitute for milk analysis. The results, as shown in Table 4, indicate the presence of naturally occurring Be-7, which is produced by cosmic radiation. No other positive results are seen. These analyses indicate that there was not any detectable station related radioactivity in the air samples.

4.5 Soil (Table 5)

This media is collected annually from one control and two indicator locations. MPS has collected and analyzed soil since 2001. Prior to 2001, soil had not been sampled for over fifteen years because station related detectable activity had not been detected. Since 2001 no station detectable activity has been seen in these samples. Naturally occurring K-40 is detected in soil. Cs-137 from nuclear weapons testing was detected slightly above MDC (Minimum Detectable Concentration) in both soil indicator samples in 2022. The control location was below MDC. The results of these samples, allows for the determination of baseline activity levels in soil. This is particularly important for Cs-137 since significant levels from past weapons testing fallout remain in the soil. Figure 4.5-1 shows the trend of Cs-137 in soil samples, the trend appears to be declining with time with an expected counting statistical variation observed over the last 15 years. Baseline levels should be useful in the future, when site characterization and decommissioning of the station become the focus during preparations for license termination.

Figure 4.5-1
Cs-137 in Soil



4.6 Milk (Table 6)

Each year the Land Use Census is used to identify locations of milk animals that should be included in the monitoring program. It is performed annually and is maintained by observations, door-to-door surveys, and consulting with local agriculture authorities. The 2022 census is listed in Appendix A. If a new dairy farm is identified close enough to MPS to be considered an indicator location, the collection of milk at that location would be added.

In 2022, the Land Use Census did not locate any location of commercial milk farms within 10 miles of Millstone Power Station. Prior to 2018, milk samples were obtained and analyzed for strontium from a farm that is no longer producing milk. A valid substitute for milk analysis is air filters strontium analysis and gamma analysis of broadleaf vegetation. This strontium analysis of air filter was determined to be more effective than milk analysis, MP-HPO-17067. The air sampling stations are located closer to the plant and in the predominant downwind direction.

4.7 Well Water (Table 7)

All REMP well samples including ISFSI well samples were less than the Lower Level of Detection Limit (LLD). Additional samples from other wells were obtained as part of the Groundwater Protection Program (GWPP). Results from the GWPP are reported in the MPS annual "Radioactive Effluent Release Report" for 2022. ISFSI well results have been documented in Table 7 as required by the Connecticut Siting Council.

4.8 Fruits and Vegetables (Table 8)

Consistent with past years, this media did not show any station effects. Naturally occurring K-40 was the only isotope detected in the samples.

4.9 Broad Leaf Vegetation (Table 9)

Consistent with past years, this media did not show any station effects. Most samples had detectable levels of cosmic produced Be-7 and naturally occurring K-40. Occasionally these samples have indicated positive levels of Cs-137 in the past. This can be attributed to fallout from weapons testing which has been widespread in terrestrial samples for many years. Cs-137 was not detected in any of the 2022 collected Broad Leaf Vegetation samples.

4.10 Seawater (Table 10)

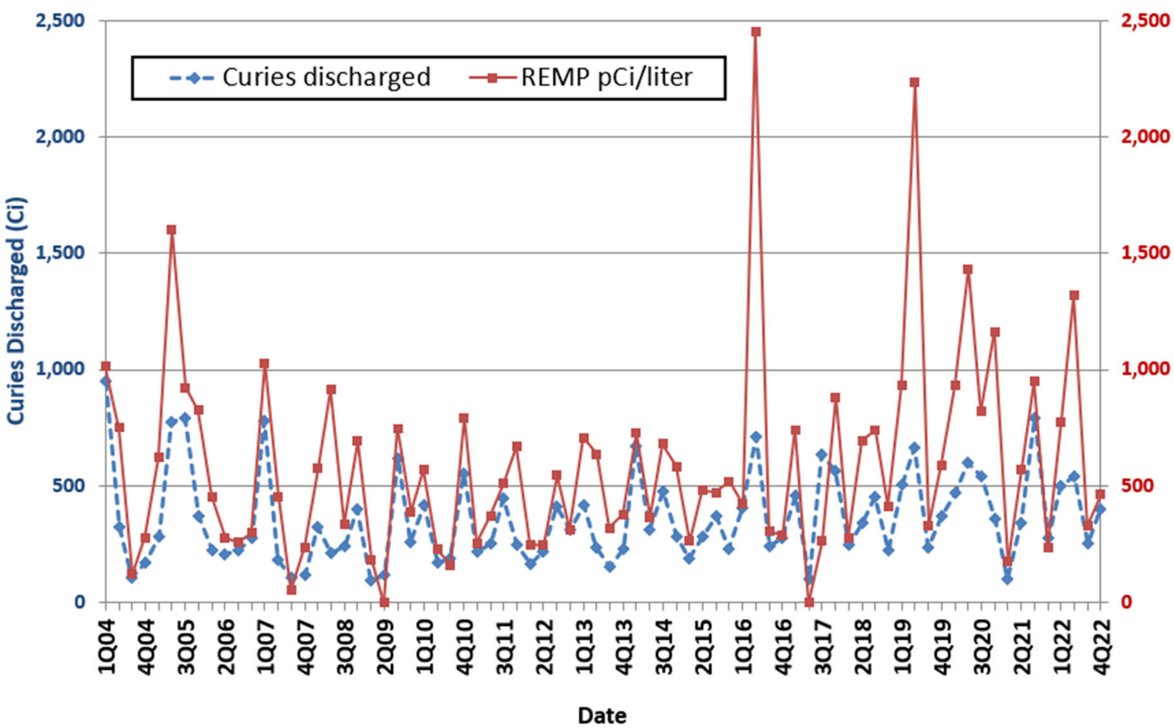
The guidance in Reference 15 specifies one sample upstream (control – beyond significant influence of the discharge) and one sample downstream (indicator – beyond but near the mixing zone) for surface water samples. Historically the downstream sample for MPS has been located in the vicinity of discharge (Location 32) which is prior to the mixing zone. This location was chosen since it was readily accessible and not affected by cold weather conditions. Operation of an automatic sampler at the indicator location is necessary for providing a representative sample. Any dose consequences can be assessed by use of the appropriate dilution factors. It is not necessary to have a continuous sampler at the control location due to the historical relative consistency noted in seawater background activity near the Millstone.

A technician collects an aliquot from the automatic sampler at Location 32 on a weekly frequency. These samples are composited for monthly analyses. For the Control Location, Giant's Neck (Location 37C), six weekly grab samples are obtained for quarterly compositing.

Naturally occurring K-40 was the only detectable gamma activity seen in these samples. Measured station related levels of H-3, beta activity, in seawater from the vicinity of discharge (Location 32) were observed in most samples. Tritium releases are typically higher near outages due to the need for increased liquid processing during these times. As mentioned above, these samples are taken directly from liquid effluent flow prior to dilution into the Long Island Sound.

Tritium builds up in the reactor coolant during each fuel cycle. It is generated during station operation from fission and neutron reactions. Figure 4.10-1 shows an eighteen-year trend of Tritium (H-3) releases in the MPS liquid effluents versus the measured environmental concentrations from the vicinity of discharge location. In 2022 MPS had one outage requiring the processing and subsequent discharge of processed refueling water. The highest quarterly average H-3 value in 2022 for seawater was 2,750 pCi/l, which is well below the drinking water limit established by the Environmental Protection Agency (EPA) of 20,000 pCi/l. The total annual exposure from the liquid discharge pathway for 2022 was 0.001 mrem/yr.

Figure 4.10-1
H-3 Curies Released versus Seawater Concentration
18 Year Trend



4.11 Bottom Sediment (Table 11)

There was no station related radioactivity detected in bottom sediment samples in 2022. Naturally occurring K-40 is seen in all samples and naturally occurring Ac-228 in some samples. Bottom sediment is not a significant dose pathway to man, especially at areas not typically used by the public.

4.12 Aquatic Flora (Table 12)

Aquatic flora is a sensitive indicator of low levels of man-made radioactivity (e.g., Mn-54, Co- 58, Co-60, Zn-65, I-131 and Ag-110m) in the environment so it was added as a required sample at four locations in revision 28 of the REMODCM. Naturally occurring Be-7 appears in some samples as well as naturally occurring K-40 in all samples.

In the first quarter of 2022, vendor sample results from location 35 and location 32 identified the presence of I-131. Follow up investigation was conducted where further analysis of the samples showed a drop in activity value and a high counting error greater than 50 percent. Location 32 sample was a split with the State of CT DEEP. The State of CT DEEP analysis of the sample did not show I-131 or any other plant related activity. A backup sample was obtained at both locations soon after the initial samples. The backup samples did not show any detectable I-131 or other plant related activity at either location.

4.13 Fish (Table 13)

The activity in fish is the same as that seen in the past. No activity was observed except for the naturally occurring K-40.

4.14 Oysters (Table 14)

All locations utilize oysters stocked in trays. Oyster sampling has occasionally presented challenges in obtaining the sample size required for analysis. In 2022 four adequately sized for analysis samples were obtained. Only naturally occurring K-40 was detected in the collected samples. No plant related radioactivity was detected in oysters in 2022.

4.15 Clams (Table 15)

In 2022, only the naturally occurring K-40 was detected in the collected samples.

4.16 Lobsters (Table 16)

In 2022, only the naturally occurring K-40 was detected in the collected samples

5. REFERENCES

1) United States of America, Code of Federal Regulations, Title 10, Part 50, Appendix A Criteria 64.
2) Donald T. Oakley, "Natural Radiation Exposure in the United States," U.S. Environmental Protection Agency, ORP/SID 72-1, June 1972.
3) National Council on Radiation Protection and Measurements, Report No. 160, "Ionizing Radiation Exposures of the Population of the United States," March 2009.
4) National Council on Radiation Protection and Measurements, Report No. 94, "Exposure of the Population of the United States and Canada from Natural Background Radiation," December 1987.
5) United States Nuclear Regulatory Commission, Regulatory Guide 8.29, "Instructions Concerning Risks from Occupational Radiation Exposure," Revision 0, July 1981.
6) United States of America, Code of Federal Regulations, Title 10, Part 20.1302.
7) United States Nuclear Regulatory Commission, 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.
8) Millstone Power Station Radiological Effluent Monitoring and Offsite Dose Calculation Manual, Revision 30, September 19, 2018
9) Millstone Power Station Unit 1 Defueled Technical Specifications, License No. DPR-21.
10) Millstone Power Station Unit 2 Technical Specifications, License No. DPR-65.
11) Millstone Power Station Unit 3 Technical Specifications, License No. NPF-49.
12) United States Nuclear Regulatory Commission, Regulatory Guide 4.1, "Program for Monitoring Radioactivity in the Environs of Nuclear Power Plants," Rev. 1, April 1975.
13) ICN/TracerLab, "Millstone Power Station Pre-Operational Environmental Radiation Survey Program, Quarterly Reports," April 1967 to June 1970.
14) International Commission of Radiological Protection, Publication No.43, "Principles of Monitoring for the Radiation Protection of the Population," May 1984.
15) United States Nuclear Regulatory Commission, NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors," April 1991.
16) United States Nuclear Regulatory Commission, Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program", Rev. 1, November 1979.
17) Reassessment of Millstone Power Station's Environmental Monitoring Data, Connecticut Department of Environmental Protection, Division of Radiation, March 2006.
18) Nuclear Regulatory Commission Regulatory Guide 4.1, Radiological Environmental Monitoring for Nuclear Power Plants, Revision 2, June 2009.
19) Division of Radiation, CT Dept. of Energy and Environmental Protection, "Reassessment of Millstone Power Station's Environmental Monitoring Data," January 2006.
20) Connecticut Sitting Council Decision and Order for ISFSI, Docket No. 265, May 27, 2004.
21) RP-16-08, "Take-Home Thermoluminescent Dosimeter Variance", June 17, 2016.
22) MP-HPO-98137, "Determination of Cs-137 In Undisturbed Soil At Locations Greater Than 10 Miles From Millstone Site", July 28, 1998.

APPENDIX A

LAND USE CENSUS FOR 2022

The annual land use census in the vicinity of MPS was conducted as required by the MPS REMODCM. Table A-1 is a list of closest residents in each of twelve over-land compass sectors around Millstone. The list of residents was determined by a survey of properties around Millstone using Google Earth and verified by a field survey. It was assumed that the closest resident was also the closest garden. No changes from the 2021 closest resident list were identified

Table A-2 is a list of milk and other foods within ten miles of Millstone. Cow and goat milk producers were identified using the State of Connecticut Agriculture Department list of licensees and using American Dairy Goat Association (ADGA). There were no animals producing milk located within ten miles of Millstone Power Station. As a substitute for milk samples, strontium analysis of air filter and gamma analysis of broadleaf vegetation are being performed on quarterly basis.

Other sources of food were obtained from the Internet at http://www.farmfresh.org by searching for businesses closest to Waterford, CT. A search using Google Earth and field surveys were used to identify additional sources, Figure A-1. No changes from the 2021 sources of food locations were identified.

The 2022 Land Use Census also evaluated aquatic sampling exposure pathways from the fish and shellfish located around MPS. Figure A-2 shows shellfish beds around MPS from the Bureau of Aquaculture of the Department of Agriculture. The saltwater fishing areas are identified in Figure A-3. No changes from the 2021 aquatic sampling exposure pathways were identified.

The dose modeling incorporates the distances listed in Tables A-1, A-2.

Table A-1

2022 Survey

Downwind Direction	Resident/Garden[1]	
	miles	meters
N	0.95	1,529
NNE	0.53	853
NE	0.47	756
ENE	0.50	805
E	0.92	1,481
ESE	1.06	1,706
SE[2]	N/A	N/A
SSE[2]	N/A	N/A
S[2]	N/A	N/A
SSW[2]	N/A	N/A
SW	2.28	3,669
WSW	1.95	3,138
W	1.78	2,865
WNW	1.51	2,430
NW	1.35	2,173
NNW	0.51	821

Notes:

1. No gardens located closer than resident.
2. Sectors SE thru SSW are N/A because they are over water.

Table A-2
Dairy and food producers within Ten miles of Millstone - 2022

Sector	Miles	Business	Location	Comments
NW	1.95	Smith's Acres	Niantic	Fruits and vegetables
NE	1.96	Mingo Goat	Waterford	Registered ADGA member only, no goats on site.
ENE	2.8	Secchiaroli Farms	Waterford	Has pigs, fed nonlocal sources and have concrete pens
WNW	5.0	Four Mile River Farm	Old Lyme	Eggs, Meat
NW	5.2	Scott's Yankee Farmer	East Lyme	Fruits, vegetables, and cider
NNW	5.3	White Gate Farm	East Lyme	Vegetables, Herbs, Eggs, Meat, Nursery, and Flowers
ENE	6.8	Leverett Goat	Groton	Registered ADGA member only, no goats on site.
N	7.4	Hunts Brook Farm	Quaker Hill	Honey, Maple, and Vegetables
ENE	7.5	Groton Family Farm	Groton	Vegetables, Honey, Maple, and Eggs
NE	8.3	Red Fence Farm	Groton	Fruits, vegetables, cows, and pig. Cows not producing milk
N	9.2	Valchris Farm	Oakdale	Organic Fruits & Vegetables

Figure A-1
Farms and Goats Products within ten miles of Millstone

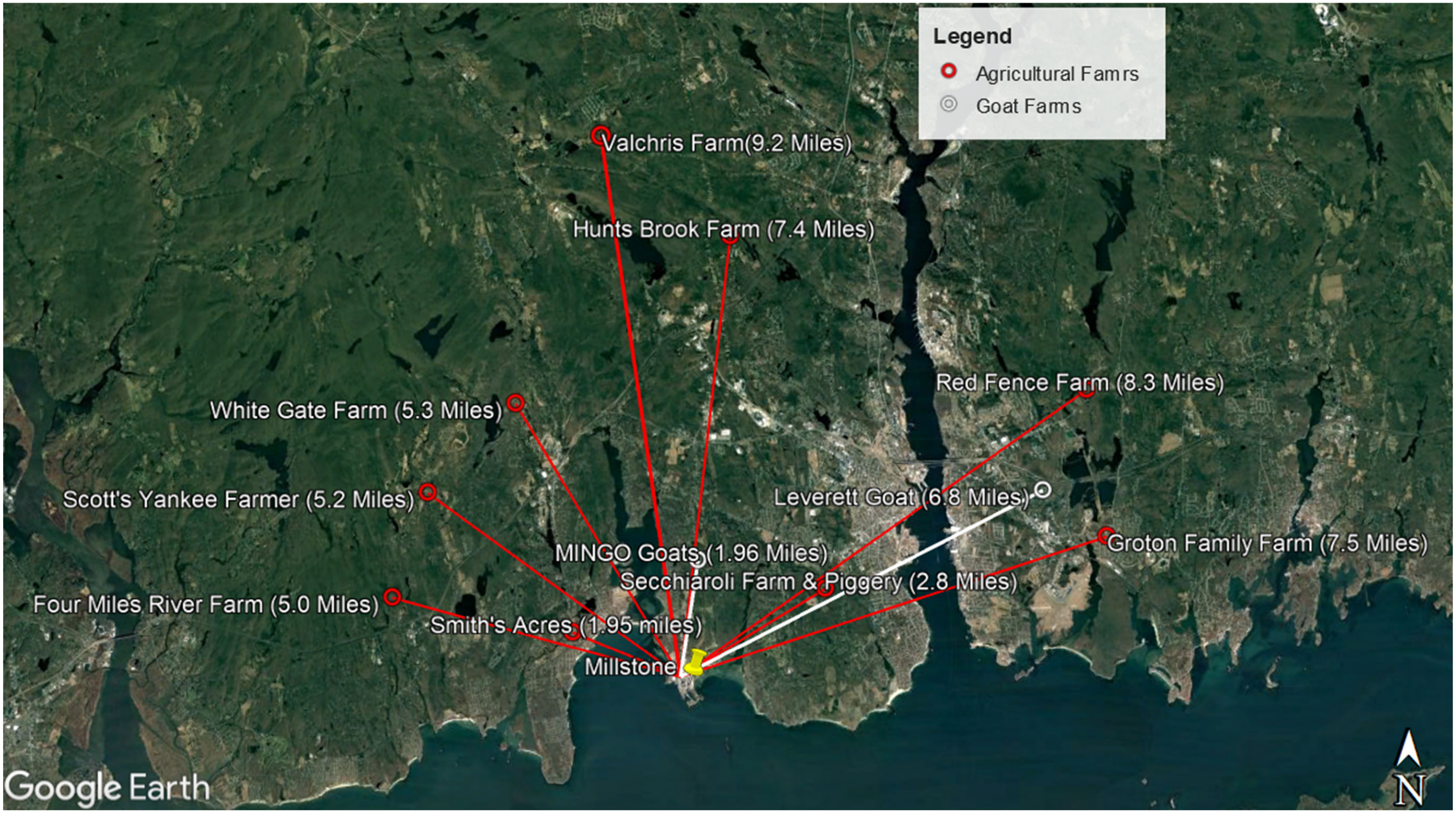


Figure A-2
Shellfish Beds in Vicinity of Millstone

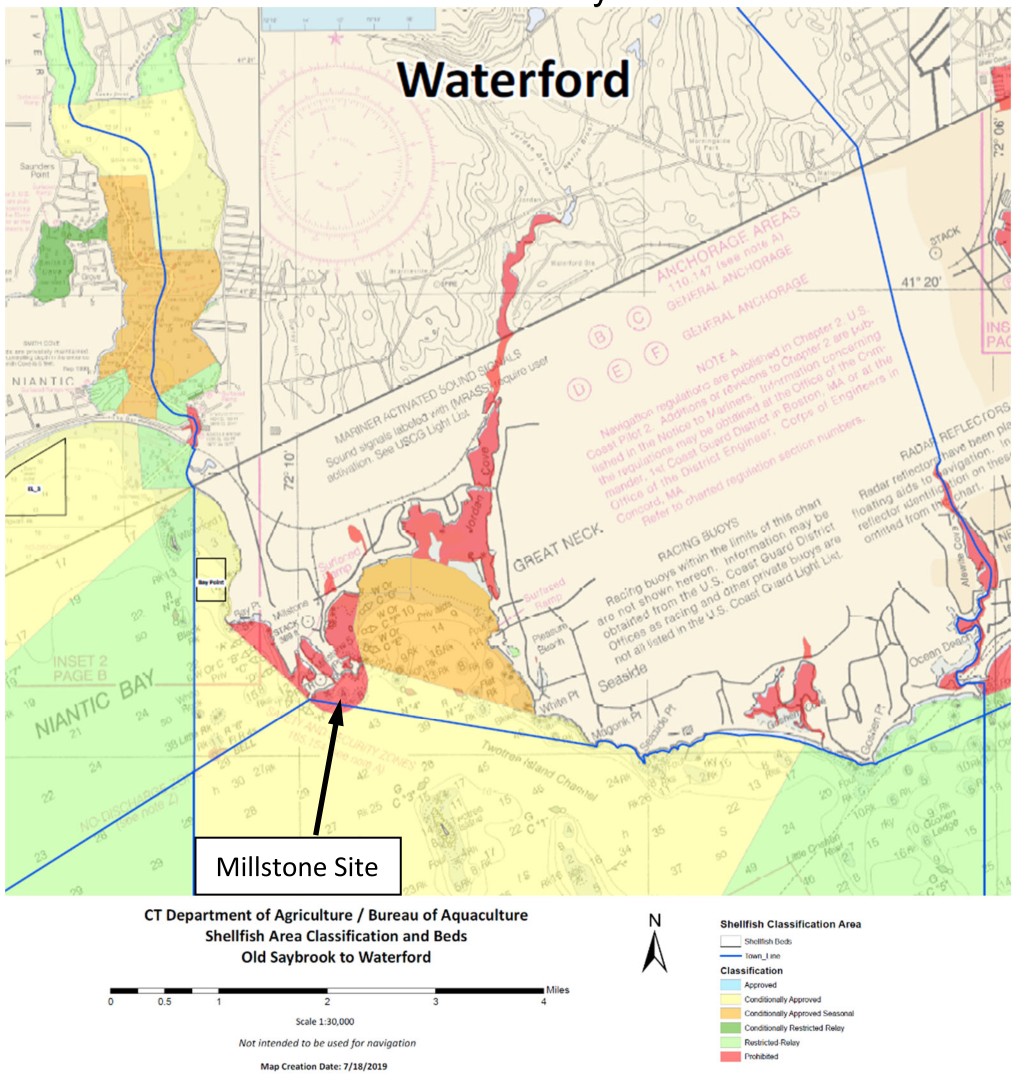
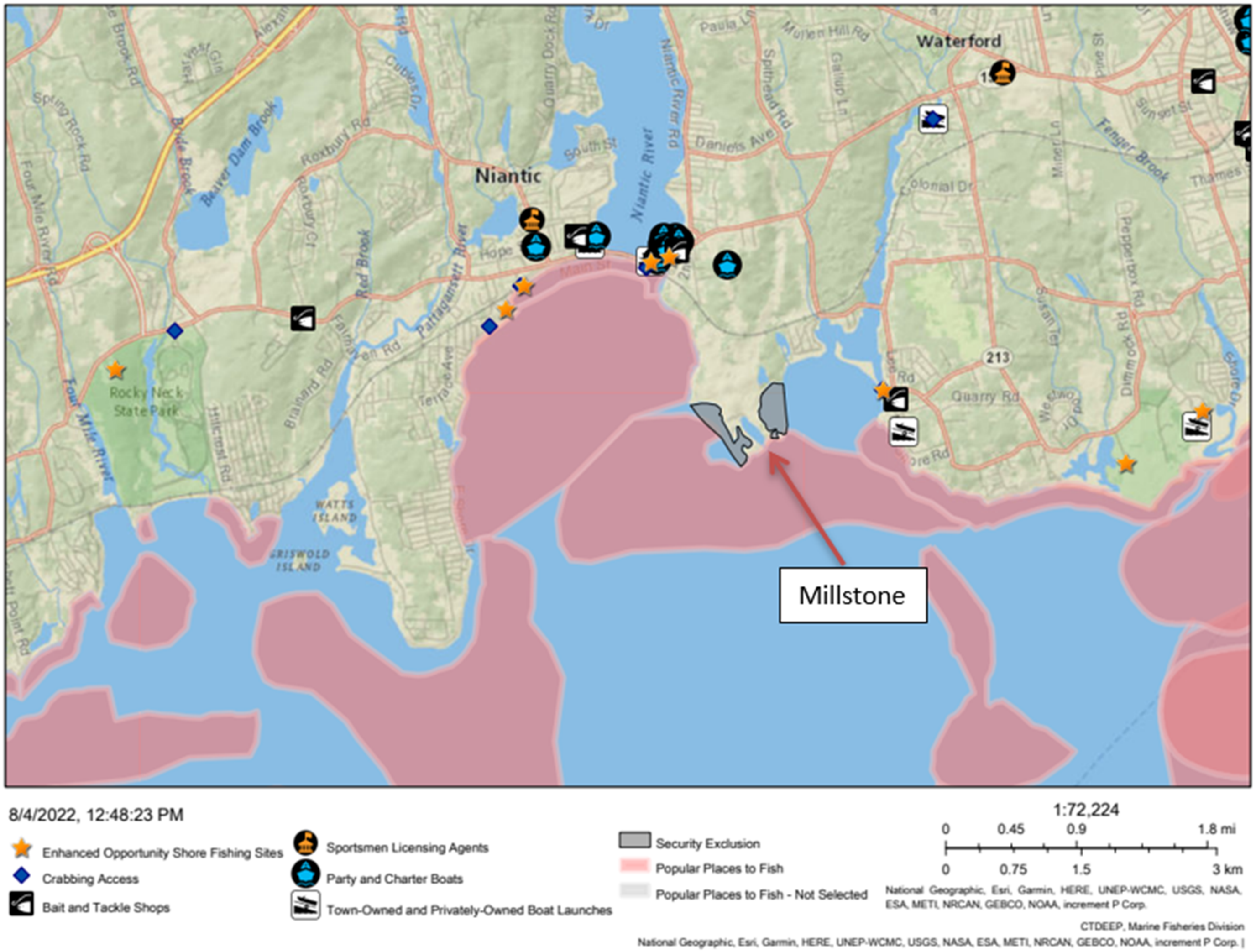


Figure A-3
Saltwater Fishing Resource Map



APPENDIX B

SUMMARY OF INTERLABORATORY COMPARISONS

Summary of Results – Inter-laboratory Comparison Program (ICP)

The TBE Laboratory analyzed Performance Evaluation (PE) samples of air particulate (AP), air iodine, milk, soil, vegetation, and water matrices for various analytes. The PE samples supplied by Analytics Inc., Environmental Resource Associates (ERA) and Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

A. Analytics Evaluation Criteria

Analytics' evaluation report provides a ratio of TBE's result and Analytics' known value. Since flag values are not assigned by Analytics, TBE evaluates the reported ratios based on internal QC requirements based on the DOE MAPEP criteria.

B. ERA Evaluation Criteria

ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the US EPA, National Environmental Laboratory Accreditation Conference (NELAC), state-specific Performance Testing (PT) program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

C. DOE Evaluation Criteria

MAPEP's evaluation report provides an acceptance range with associated flag values. MAPEP defines three levels of performance:
Acceptable (flag = "A") - result within ± 20% of the reference value
Acceptable with Warning (flag = "W") - result falls in the ± 20% to ± 30% of the reference value
Not Acceptable (flag = "N") - bias is greater than 30% of the reference value

Note: The Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP) samples are created to mimic conditions found at DOE sites which do not resemble typical environmental samples obtained at commercial nuclear power facilities.

For the TBE laboratory, 142 out of 150 analyses performed met the specified acceptance criteria. Eight analyses did not meet the specified acceptance criteria and were addressed through the TBE Corrective Action Program. NOTE: Two analyses (soil for Tc-99 and U-238) that did not meet acceptance criteria was performed for TBE information and is not on the list of required ICP analyses. A summary is found below:

1. The Analytics March 2022 AP Ce-141 result was evaluated as Not Acceptable. The reported value for Ce-141 was 60.9 pCi and the known result was 42.0 pCi/L (1.45 ratio of reported result vs. known; TBE's internal acceptance range is 0.70 - 1.30). This sample was used as the workgroup duplicate with a result of 45.7 (109% of known) and was also counted on a different detector with a result of 50.9 (121% of known). This was TBE's first failure for AP Ce-141. (NCR 22-04)

2. The MAPEP February 2022 Urine U-234 & U-238 results were evaluated as Not Acceptable. TBE's reported values of 0.142 and 0.0254 were above the known upper ranges of 0.0096 and 0.0134 respectively for U-234 and U-238. These spiked values were below TBE's typical MDC for urine client samples. The samples were re-prepped

using a larger sample aliquot and counted for 60 hours as opposed to 48 hours. The recount results were 0.00732 for U-234 and 0.0119 for U-238 (both within acceptable range). MAPEP urine samples will be flagged to use a larger sample aliquot and counting time than typical client samples. MAPEP did not include any urine cross-check samples in August. (NCR 22-05)

3. The ERA MRAD September 2022 AP Pu-238 was evaluated as Not Acceptable. The reported value was 38.8 pCi and the known result was 29.9 (acceptance range 22.6 – 36.7). The AP filter was cut in half prior to digestion (shared with Fe-55) but should have been complete digested together and aliquoted afterwards like typical client samples. This is the first failure for AP Pu-238. (NCR 22-19)

4. The ERA October 2022 water Uranium result was evaluated as Not Acceptable. The reported value was 10.54 pCi/L and the known was 8.53 (acceptance range 6.60 – 9.88) or 124% of the known (acceptable for TBE QC). The 2-sigma error was 3.2, placing the reported result well within the acceptable range. This sample was used as the workgroup duplicate with a result of 8.2 +/- 2.9 pCi/L (also within the acceptable range). All other QA was reviewed with no anomalies. (NCR 22-20)

5. The Analytics AP Co-60 result was evaluated as Not Acceptable. The reported value was 207 pCi and the known was 147 (141% of the known). TBE's internal QC acceptance is 70 - 130%. All QA was reviewed with no anomalies. This sample was used as the workgroup duplicate and counted on a different detector with a result of 167 pCi (114% of the known). This is the first failure for AP Co-60 – average result ratio compared to the known is 109%. (NCR 22-21)

6. The MAPEP August 2022 water Tc-99 result was evaluated as Not Acceptable. The reported value was 1.86 +/- 0.414 Bq/L for this "false positive" test. The evaluation of the submitted result to the 3 times the uncertainty indicated a slight positive. This sample was used as the workgroup duplicate with a result of 0.88 +/- 0.374 Bq/L. All QC was reviewed, and no anomalies found. This is the first unacceptable since the resumption of reporting water Tc-99 for the 3rd quarter of 2020. TBE to known ratios have ranged from 94-109% during this time. (NCR 22-22)

The Inter-Laboratory Comparison Program provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value (a)	Ratio of TBE to Analytics Result	Evaluation (b)
March 2022	E13706	Milk	Sr-89	pCi/L	80.3	96.8	0.83	A
			Sr-90	pCi/L	12.7	12.6	1.01	A
	E13707	Milk	Ce-141	pCi/L	62.3	65	0.96	A
			Co-58	pCi/L	158	164	0.96	A
			Co-60	pCi/L	286	302	0.95	A
			Cr-51	pCi/L	314	339	0.93	A
			Cs-134	pCi/L	155	182	0.85	A
			Cs-137	pCi/L	210	223	0.94	A
			Fe-59	pCi/L	211	185	1.14	A
			I-131	pCi/L	88.0	96.7	0.91	A
			Mn-54	pCi/L	169	164	1.03	A
			Zn-65	pCi/L	238	246	0.97	A
	E13708	Charcoal	I-131	pCi	79.9	87.1	0.92	A
	E13709	AP	Ce-141	pCi	60.9	42.0	1.45	N(1)
			Co-58	pCi	118	107	1.11	A
			Co-60	pCi	218	196	1.11	A
			Cr-51	pCi	251	221	1.14	A
			Cs-134	pCi	129	118	1.09	A
			Cs-137	pCi	156	145.0	1.07	A
			Fe-59	pCi	124	120.0	1.03	A
			Mn-54	pCi	120	107	1.12	A
			Zn-65	pCi	162	160	1.01	A
	E13710	Soil	Ce-141	pCi/g	0.123	0.103	1.19	A
			Co-58	pCi/g	0.254	0.263	0.97	A
			Co-60	pCi/g	0.493	0.483	1.02	A
			Cr-51	pCi/g	0.603	0.543	1.11	A
			Cs-134	pCi/g	0.268	0.292	0.92	A
			Cs-137	pCi/g	0.399	0.431	0.93	A
			Fe-59	pCi/g	0.320	0.296	1.08	A
			Mn-54	pCi/g	0.263	0.263	1.00	A
			Zn-65	pCi/g	0.407	0.395	1.03	A
	E13711	AP	Sr-89	pCi	83.2	97.4	0.85	A
			Sr-90	pCi	12.7	12.7	1.00	A

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on TBE internal QC limits:
A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [(a)]	Ratio of TBE to Analytics Result	Evaluation [(b)]
September 2022	E13712	Milk	Sr-89	pCi/L	71.1	89.1	0.80	A
			Sr-90	pCi/L	12.0	13.6	0.88	A
	E13713	Milk	Ce-141	pCi/L	148	161	0.92	A
			Co-58	pCi/L	178	189	0.94	A
			Co-60	pCi/L	229	260	0.88	A
			Cr-51	pCi/L	486	456	1.07	A
			Cs-134	pCi/L	220	252	0.87	A
			Cs-137	pCi/L	203	222	0.92	A
			Fe-59	pCi/L	174	173	1.01	A
			I-131	pCi/L	75.9	94.2	0.81	A
			Mn-54	pCi/L	269	282	0.95	A
			Zn-65	pCi/L	364	373	0.97	A
	E13714	Charcoal	I-131	pCi	81.4	83.6	0.97	A
	E13715	AP	Ce-141	pCi	102	91	1.12	A
			Co-58	pCi	118	107	1.11	A
			Co-60	pCi	207	147	1.41	N[(2)]
			Cr-51	pCi	310	257	1.21	W
			Cs-134	pCi	148	142	1.04	A
			Cs-137	pCi	137	125	1.10	A
			Fe-59	pCi	115	98	1.18	A
			Mn-54	pCi	168	159	1.05	A
			Zn-65	pCi	240	211	1.14	A
	E13716	Soil	Ce-141	pCi/g	0.288	0.284	1.01	A
			Co-58	pCi/g	0.320	0.334	0.96	A
			Co-60	pCi/g	0.445	0.459	0.97	A
			Cr-51	pCi/g	0.883	0.805	1.10	A
			Cs-134	pCi/g	0.410	0.446	0.92	A
			Cs-137	pCi/g	0.447	0.465	0.96	A
			Fe-59	pCi/g	0.314	0.305	1.03	A
			Mn-54	pCi/g	0.489	0.499	0.98	A
			Zn-65	pCi/g	0.666	0.660	1.01	A
	E13717	AP	Sr-89	pCi	87.5	98.3	0.89	A
			Sr-90	pCi	12.6	15.0	0.84	A

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation
(b) Analytics evaluation based on TBE internal QC limits:
A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

(1) See ***NCR 22-04***
(2) See ***NCR 22-21***

DOE's Mixed Analyte Performance Evaluation Program (MAPEP)
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value (a)	Acceptance Range	Evaluation (b)
February 2022	22-GrF46	AP	Gross Alpha	Bq/sample	0.402	1.20	0.36 - 2.04	A
			Gross Beta	Bq/sample	0.669	0.68	0.341 - 1.022	A
	22-MaS46	Soil	Ni-63	Bq/kg	645	780	546 - 1014	A
			Tc-99	Bq/kg	526	778	545 - 1011	N(3)
	22-MaSU46	Urine	Cs-134	Bq/L	1.67	1.77	1.24 - 2.30	A
			Cs-137	Bq/L	1.50	1.56	1.09 - 2.03	A
			Co-57	Bq/L	4.93	5.39	3.77 - 7.01	A
			Co-60	Bq/L	2.13	2.06	1.44 - 2.68	A
			Mn-54	Bq/L	4.83	5.08	3.56 - 6.60	A
			U-234	Bq/L	0.142	0.0074	0.0052 - 0.0096	N(4)
			U-238	Bq/L	0.0254	0.0103	0.0072 - 0.0134	N(4)
			Zn-65	Bq/L	4.71	4.48	3.14 - 5.82	A
	22-MaW46	Water	Ni-63	Bq/L	28.6	34.0	23.8 - 44.2	A
			Tc-99	Bq/L	8.59	7.90	5.5 - 10.3	A
	22-RdV46	Vegetation	Cs-134	Bq/sample	6.61	7.61	5.33 - 9.89	A
			Cs-137	Bq/sample	1.50	1.52	1.06 - 1.98	A
			Co-57	Bq/sample	5.11	5.09	3.56 - 6.62	A
			Co-60	Bq/sample	0.0162		*(1)*	A
			Mn-54	Bq/sample	2.42	2.59	1.81 - 3.37	A
			Sr-90	Bq/sample	0.684	0.789	0.552 - 1.026	A
			Zn-65	Bq/sample	1.44	1.47	1.03 - 1.91	A
August 2022	22-MaS47	Soil	Ni-63	Bq/kg	14.6		*(1)*	A
			Tc-99	Bq/kg	994	1000	700 - 1300	A
	22-MaW47	Water	Ni-63	Bq/L	24.4	32.9	23.0 - 42.8	A
			Tc-99	Bq/L	1.9		*(1)*	N(5)
	25-RdV47	Vegetation	Cs-134	Bq/sample	0.032		*(1)*	A
			Cs-137	Bq/sample	0.891	1.08	0.758 - 1.408	A
			Co-57	Bq/sample	0.006		*(1)*	A
			Co-60	Bq/sample	4.04	4.62	3.23 - 6.01	A
			Mn-54	Bq/sample	2.01	2.43	1.70 - 3.16	A
			Sr-90	Bq/sample	1.25	1.60	1.12 - 2.08	W
			Zn-65	Bq/sample	6.16	7.49	5.24 - 9.74	A

(a) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measureme made during standard preparation

(b) DOE/MAPEP evaluation:
A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

(1) False positive test
(2) Sensitivity evaluation
(3) Tc-99 soil cross-checks done for TBE information only - not required
*(4) See **NCR 22-05***
*(5) See **NCR 22-22***

ERA Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value (a)	Acceptance Limits	Evaluation (b)
March 2022	MRAD-36	Water	Am-241	pCi/L	68.3	74.6	51.2 - 95.4	A
			Fe-55	pCi/L	797	1140	670 - 1660	A
			Pu-238	pCi/L	146	147	88.4 - 190	A
			Pu-239	pCi/L	69.9	71.9	44.5 - 88.6	A
		Soil	Sr-90	pCi/kg	8050	6720	2090 - 10500	A
		AP	Fe-55	pCi/filter	148	127	46.4 - 203	A
			Pu-238	pCi/filter	29.9	29.6	22.3 - 36.4	A
			Pu-239	pCi/filter	51.6	49.7	37.2 - 60.0	A
			U-234	pCi/filter	59.9	67.3	49.9 - 78.9	A
			U-238	pCi/filter	59.0	66.7	50.4 - 79.6	A
			GR-A	pCi/filter	95.6	94.2	49.2 - 155	A
			GR-B	pCi/filter	71.2	66.8	40.5 - 101	A
April 2022	RAD-129	Water	Ba-133	pCi/L	61.7	62.9	52.3 - 69.2	A
			Cs-134	pCi/L	80.9	81.6	68.8 - 89.8	A
			Cs-137	pCi/L	37.4	36.6	32.1 - 43.3	A
			Co-60	pCi/L	103	97.4	87.7 - 109	A
			Zn-65	pCi/L	318	302	272 - 353	A
			GR-A	pCi/L	26.9	20.8	10.4 - 28.3	A
			GR-B	pCi/L	49.7	51.0	34.7 - 58.1	A
			U-Nat	pCi/L	56.3	68.9	56.3 - 75.8	A
			H-3	pCi/L	17,000	18,100	15,800 - 19,000	A
			Sr-89	pCi/L	65.3	67.9	55.3 - 76.1	A
			Sr-90	pCi/L	42.1	42.7	31.5 - 49.0	A
			I-131	pCi/L	25.7	26.2	21.8 - 30.9	A
September 2022	MRAD-37	Water	Am-241	pCi/L	111	96.2	66.0 - 123	A
			Fe-55	pCi/L	850	926	544 - 1350	A
			Pu-238	pCi/L	62.1	52.6	31.6 - 68.2	A
			Pu-239	pCi/L	139.5	117	72.5 - 144	A
		Soil	Sr-90	pCi/kg	3350	6270	1950 - 9770	A
			U-234	pCi/kg	1684	3350	1570 - 4390	A
			U-238	pCi/kg	1658	3320	1820 - 4460	N(2)
		AP	Fe-55	pCi/filter	71.9	122	44.5 - 195	A
			Pu-238	pCi/filter	38.8	29.9	22.6 - 36.7	N(1)
			Pu-239	pCi/filter	14.5	13.0	9.73 - 15.7	A
			U-234	pCi/filter	78.0	71.5	53.0 - 83.8	A
			U-238	pCi/filter	79.7	70.9	53.5 - 84.6	A
			GR-A	pCi/filter	62.8	55.5	29.0 - 91.4	A
			GR-B	pCi/filter	70.9	64.8	39.3 - 97.9	A
October 2022	RAD-131	Water	Ba-133	pCi/L	76.2	79.4	66.6 - 87.3	A
			Cs-134	pCi/L	28.0	30.5	23.9 - 33.6	A
			Cs-137	pCi/L	202	212	191 - 235	A
			Co-60	pCi/L	52.4	51.4	46.3 - 59.1	A
			Zn-65	pCi/L	216	216	194 - 253	A
			GR-A	pCi/L	19.7	16.9	8.28 - 23.7	A
			GR-B	pCi/L	49.8	53.0	36.1 - 60.0	A
			U-Nat	pCi/L	10.54	8.53	6.60 - 9.88	N(3)
			H-3	pCi/L	13,900	15,100	13,200 - 16,600	A
			Sr-89	pCi/L	59.7	64.5	52.3 - 72.5	A
			Sr-90	pCi/L	32.9	37.3	27.4 - 43.0	A
			I-131	pCi/L	26.9	24.4	20.2 - 28.9	A

(a) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(b) ERA evaluation:
A = Acceptable - Reported value falls within the Acceptance Limits
N = Not Acceptable - Reported value falls outside of the Acceptance Limits

(1) See ***NCR 22-19***
(2) U soil cross-checks done for TBE information only - not required
(3) See ***NCR 22-20***

APPENDIX C

ERRATUM

Erratum- Correction to Previously Published Annual Radiological Environmental Operating Report

In the 2022 Annual Radiological Environmental Operating Report there were no correction identified to previously published Annual Radiological Environmental Operating Reports.