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April 30, 1996
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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Dear Sir:

Subject: Oyster Creek Nuclear Generating Station
Docket No. 50-219
1995 Radiological Environmental Monitoring REMP Report

Enclosed is a copy of the Oyster Creek REMP report for 1995. This submittal is made in accordance with Technical Specification 6.9.1.e.

If you should have any questions or require further information, please contact Ms. Brenda DeMerchant, Regulatory Affairs Engineer, at 609-971-4642.

Very truly yours,

Michael B Roche

Michael B. Roche
Vice President & Director
Oyster Creek

MBR/BDeM/gl

Enclosure

cc: Administrator, Region I
NRC Project Manager
NRC Resident Inspector
Chief, New Jersey Bureau of Nuclear Engineering

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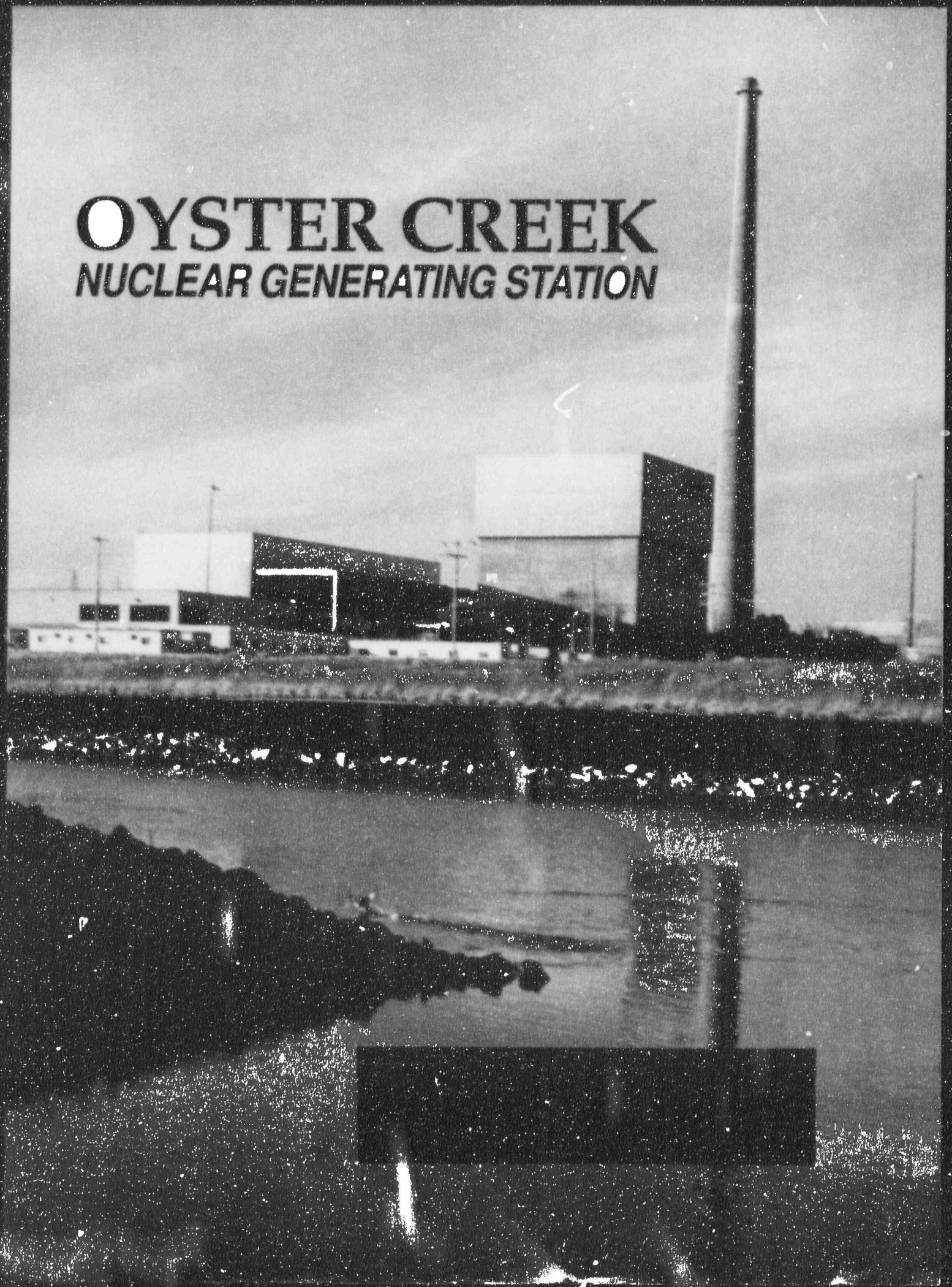
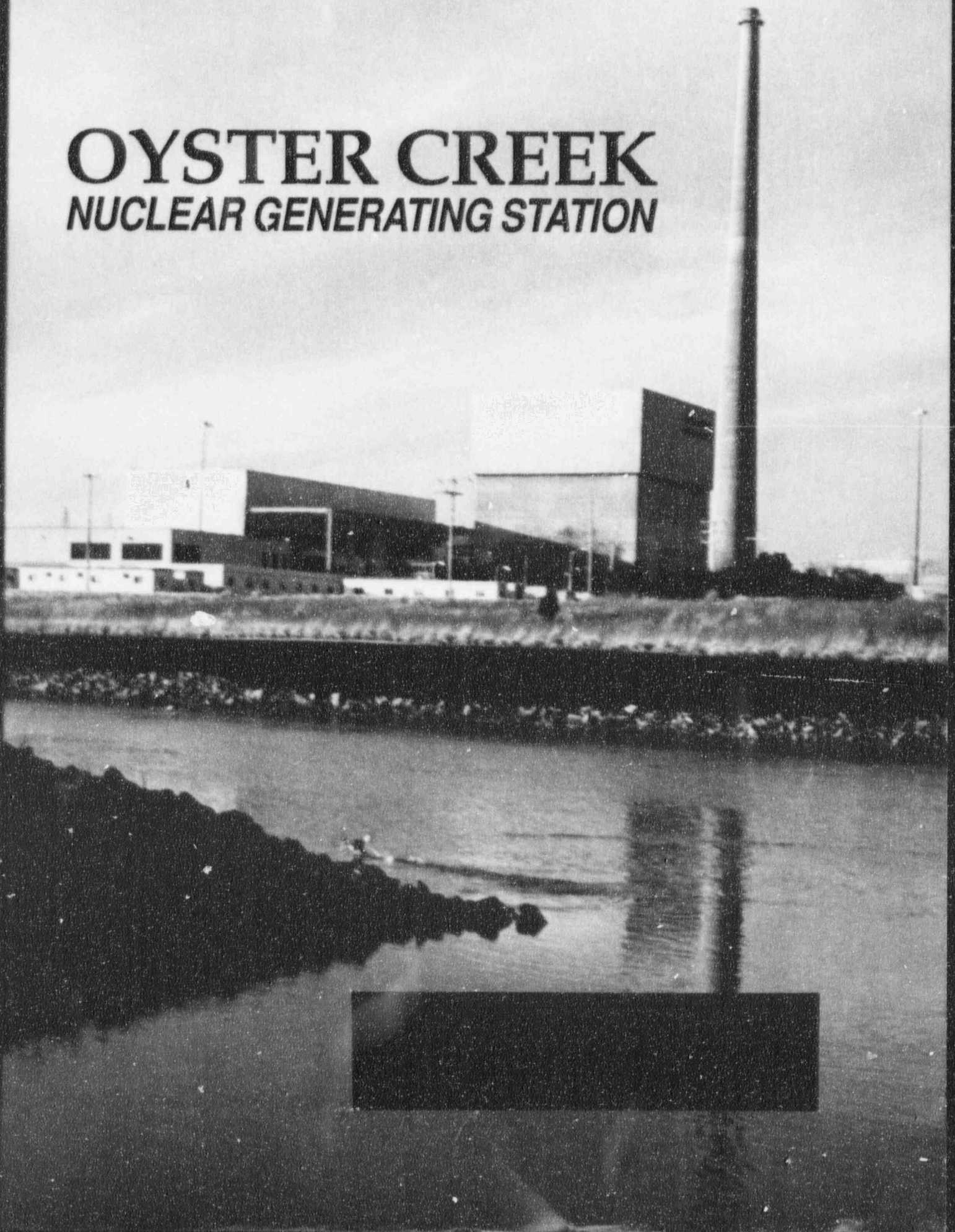
OYSTER CREEK
NUCLEAR GENERATING STATION



OYSTER CREEK
NUCLEAR GENERATING STATION



OYSTER CREEK NUCLEAR GENERATING STATION
Forked River, New Jersey

The 650 MW plant is a single-unit, five-loop General Electric Boiling Water Reactor (BWR). The site, about 800 acres, is in Lacey and Ocean Townships of Ocean County. Located approximately nine miles south of Toms River, it is about 50 miles east of Philadelphia, and 60 miles south of Newark.

Construction began in December 1963. The station began commercial operation on December 23, 1969, and at that time was the largest nuclear facility in the United States solely financed by a private company.

The Reactor Building, Turbine Building and Ventilation Stack are the most prominent structures at the site. The Reactor Building stands approximately 150 feet high with 42 feet extending below grade. The Reactor Building serves as a secondary containment and houses the primary containment (drywell), the reactor vessel and its auxiliary systems which comprise the Nuclear Steam Supply System. The drywell, which houses the reactor vessel, is constructed of high-density reinforced concrete with an inner steel liner measuring 120 feet high and 70 feet in diameter.

The reactor vessel is 63 feet high and 18 feet in diameter. The 652-ton reactor contains 560 fuel assemblies, each with 62 fuel rods that are 12 feet long, and 137 control rods. The reactor operates at a nominal pressure of 1,020 pounds per square inch and an average temperature of 540 degrees Fahrenheit.

The Turbine Building houses the turbine-generator, control room, main condensers, power conversion equipment and auxiliary systems. The turbine-generator consists of one high-pressure turbine, three low-pressure turbines, a generator and an exciter. The turbines and generator turn at 1,800 revolutions per minute to generate three-phase, 60-cycle electricity at 24,000 volts. The electricity generated is provided to the grid by two transformers which boost the voltage to 230,000 volts.

Steam is supplied to the high pressure turbine from the reactor. After being used to drive the turbines and generator, the steam is condensed in the main condensers and returned to the reactor vessel in the form of water through the condensate and feedwater pumps.

The main condensers consist of three horizontal, single pass, divided water boxes containing 44,000 tubes having a total length of about 1,875,000 feet. Cooling water is provided from Barnegat Bay, through the South Branch of the Forked River and passes through the condensers and discharges into Oyster Creek for return to Barnegat Bay. The water is pumped by four 1,000-horsepower pumps, each of which moves about 115,000 gallons per minute through the 6-foot-diameter pipes that feed the condensers.

The ventilation stack is 368 feet high with 26 feet extending below grade. The stack provides ventilation for the Reactor Building, Turbine Building and Radwaste Facilities.

Oyster Creek is owned by Jersey Central Power & Light (JCP&L) Company and operated by GPU Nuclear (GPUN) Corporation. JCP&L and GPUN are units of the GPU System.

1995

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

PREPARED BY

OYSTER CREEK ENVIRONMENTAL AFFAIRS

GPU NUCLEAR CORPORATION

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SUMMARY AND CONCLUSIONS

The radiological environmental monitoring performed during 1995 by the GPU Nuclear Environmental Affairs Department at the Oyster Creek Nuclear Generating Station (OCNGS) is discussed in this report. The operation of a nuclear power plant results in the release of small amounts of radioactive materials to the environment. A radiological environmental monitoring program (REMP) has been established to monitor radiation and radioactive materials in the environment around the OCNGS. The program evaluates the relationship between amounts of radioactive material released in effluents to the environment and resultant radiation doses to individuals. Summaries and interpretations of the data were published semiannually from 1969-1985 and annually since 1986 (Ref. 19 through 27). Additional information concerning releases of radioactive materials to the environment is contained in the Semi-Annual and Annual Effluent Release Reports submitted to the United States Nuclear Regulatory Commission (USNRC).

During 1995, as in previous years, the radioactive effluents associated with the OCNGS were a small fraction of the applicable federal regulatory limits and did not have significant or measurable effects on the quality of the environment. Calculated maximum hypothetical radiation doses to the public attributable to 1995 operations at the OCNGS ranged from 0.000026 percent to a maximum of only 0.13 percent of the applicable regulatory limits. Furthermore, they were significantly less than doses received from other man-made sources and natural background sources of radiation.

Radioactive materials considered in this report are normally present in the environment, either naturally or as a result of non-OCNGS activities such as prior atmospheric nuclear weapons testing, medical industry activities, and the 1986 Chernobyl accident. Consequently, measurements made in the vicinity of

the site were compared to background measurements to determine any impact of OCNGS operations. Samples of air, well water, surface water, clams, sediment, fish, crabs, and vegetables were collected. Samples were analyzed for radioactivity including tritium (H-3), gross beta, and gamma-emitting radionuclides. External penetrating radiation dose measurements also were made using thermoluminescent dosimeters (TLDs) in the vicinity of the OCNGS.

The results of these radiological measurements were used to assess the environmental impact of OCNGS operations, to demonstrate compliance with the Technical Specifications (Ref. 1), the Offsite Dose Calculation Manual Specifications (Ref. 2), applicable federal regulations, and to verify the adequacy of containment and radioactive effluent control systems. The data collected by the REMP also provide a historical record of the levels of radionuclides and radiation attributable to natural causes, worldwide fallout from prior nuclear weapons tests and the Chernobyl accident, as well as OCNGS operations.

Radiological impacts in terms of radiation dose as a result of OCNGS operations were calculated and also are discussed. The results provided in this report are summarized in the following highlights:

- During 1995, 1157 samples were taken from the aquatic, atmospheric, and terrestrial environments around OCNGS. A total of 1218 analyses were performed on these samples. Three hundred nineteen (319) direct radiation dose measurements using TLDs also were made. Forty-two (42) groundwater samples, taken primarily from local municipal water supplies, were collected and fifty-four (54) analyses were performed on these samples.

- In addition to natural radioactivity, trace levels of cesium-137 (Cs-137) were detected in various media and were attributed to fallout from prior nuclear weapons testing and the Chernobyl nuclear accident.

- Minute levels of cobalt-60 (Co-60) were detected in sediment samples as a result of past OCNGS operations. As a result of the termination of routine liquid radioactive discharges in 1989 and the natural radioactive decay process, the concentration of cobalt-60 in sediments has dropped to barely detectable levels.

- The amount of radioactivity released in effluents from the OCNGS during 1995 was the smallest in the history of station operation. The predominant radionuclide in gaseous effluents was Xe-135 and in liquid effluents was Cs-137. Estimated radiation doses to the public, attributable to 1995 effluents, ranged from 0.000026 percent to a maximum of only 0.13 percent of applicable regulatory limits.

- During 1995, the maximum total body dose potentially received by an individual from liquid and airborne effluents was estimated to be about 0.0043 millirems. The total body dose to the surrounding population from liquid and airborne effluents was calculated to be 0.049 person-rem. This is approximately 20.2 million times lower than the dose that the total population in the OCNGS area receives from natural background sources.

INTRODUCTION

Characteristics of Radiation

Instability within the nucleus of radioactive atoms results in the release of energy in the form of radiation. Radiation is classified according to its nature - particulate and electromagnetic. Particulate radiation consists of energetic subatomic particles such as electrons (beta particles), protons, neutrons, and alpha particles. Because of its limited ability to penetrate the human body, particulate radiation in the environment contributes primarily to internal radiation exposure resulting from inhalation and ingestion of radioactivity.

Electromagnetic radiation in the form of x-rays and gamma rays has characteristics similar to visible light but is more energetic and, hence, more penetrating. Although x-rays and gamma rays are penetrating and can pass through varying thicknesses of materials, once they are absorbed they produce energetic electrons which release their energy in a manner that is identical to beta particles. The principal concern for gamma radiation from radionuclides in the environment is their contribution to external radiation exposure.

The rate with which atoms undergo disintegration (radioactive decay) varies among radioactive elements, but is uniquely constant for each specific radionuclide. The term "half-life" defines the time it takes for half of any amount of an element to decay and can vary from a fraction of a second for some radionuclides to millions of years for others. In fact, the natural background radiation to which all mankind has been exposed is largely due to the radionuclides of uranium (U), thorium (Th), and potassium (K). These radioactive elements

were formed with the creation of the universe and, owing to their long half-lives, will continue to be present for millions of years to come. For example, potassium-40 (K-40) has a half-life of 1.3 billion years and exists naturally within our bodies. As a result, approximately 4000 atoms of potassium emit radiation internally within each of us every second of our life.

In assessing the impact of radioactivity on the environment, it is important to know the quantity of radioactivity released and the resultant radiation doses. The common unit of radioactivity is the curie (Ci). It represents the radioactivity in one gram (g) of natural radium (Ra) which is also equal to a decay rate of 37 billion radiation emissions every second. Because the level of radioactive material in the environment is extremely small, it is more convenient to work with portions or fractions of a curie. Subunits like picocurie (pCi), (one trillionth of a curie), are frequently used to express the radioactivity present in environmental and biological samples.

The biological effects of a specific dose of radiation are the same whether the radiation source is external or internal to the body. The important factor is how much radiation energy or dose was deposited. The unit of radiation dose is the Roentgen Equivalent Man (rem), which also incorporates the variable effectiveness of different forms of radiation to produce biological change. For environmental radiation exposures, it is convenient to use the smaller unit of millirem (mRem) to express dose (1000 mRem equals 1 rem). When radiation exposure occurs over periods of time, it is appropriate to refer to the dose rate. Dose rates, therefore, define the total dose for a fixed interval of time, and for environmental exposures, are usually measured with reference to one year of time (mRem per year).

Sources of Radiation

Life on earth has evolved amid the constant exposure to natural radiation. In fact, the single major source of radiation to which the general population is exposed comes from natural sources. Although everyone on the planet is exposed to natural radiation, some people receive more than others. Radiation exposure from natural background has three components (i.e., cosmic, terrestrial, and internal) and varies with altitude and geographic location, as well as with living habits.

For example, cosmic radiation originating from deep interstellar space and the sun increases with altitude, because there is less air to act as a shield. Similarly, terrestrial radiation resulting from the presence of naturally occurring radionuclides in the soil varies and may be significantly higher in some areas of the country than in others. Even the use of particular building materials for houses, cooking with gas, and home insulation affect exposure to natural radiation.

The presence of radioactivity in the human body results from the inhalation and ingestion of air, food, and water containing naturally occurring radionuclides. For example, drinking water contains trace amounts of uranium and radium, and milk contains radioactive potassium. Table 1 summarizes the common sources of radiation and their average annual doses.

TABLE 1
(Adapted from Ref. 4)

Sources and Doses of Radiation*

Natural (82%)		**Man-made** (18%)	
Source	Radiation Dose (mRem/year)	Source	Radiation Dose (mRem/year)
Radon	200 (55%)	Medical X-ray	39 (11%)
Cosmic rays	27 (8%)	Nuclear Medicine	14 (4%)
Terrestrial	28 (8%)	Consumer products	10 (3%)
Internal	40 (11%)	Other (Releases from nat. gas, phosphate mining, burning of coal, weapons fallout, & nuclear fuel cycle)	<1 (<1%)
APPROXIMATE TOTAL	295	APPROXIMATE TOTAL	64

*Percentage contribution of the total dose is shown in parentheses.

The average person in the United States receives about 300 mRem/yr (0.3 rem/yr) from natural background radiation sources. This estimate was recently revised from (approximately) 100 to 300 mRem because of the inclusion of radon gas which has always been present but has not been previously included in the calculations. In some regions of the country, the amount of natural radiation is significantly higher. Residents of Colorado, for example, receive an additional 60 mRem/yr due to the increase in cosmic and terrestrial radiation levels. In fact, for every 100 feet above sea level, a person will receive an additional 1 mRem/yr from cosmic radiation. In several regions of the world, high concentrations of uranium and radium deposits result in doses of several thousand mRem/yr to their residents (Ref. 4).

Recently, public attention has focused on radon (Rn), a naturally occurring radioactive gas produced from uranium and radium decay. These elements are widely distributed in trace amounts in the earth's crust. Unusually high concentrations have been found in certain parts of eastern Pennsylvania and northern New Jersey. Radon levels in some homes in these areas are hundreds of times greater than levels found elsewhere in the United States. However, additional surveys are needed to determine the full extent of the problem nationwide. Radon is the largest component of natural background radiation and may be responsible for a substantial number of lung cancer deaths annually. The National Council on Radiation Protection and Measurements (NCRP) estimates that the average individual in the United States receives an annual dose of about 2,400 mRem to the lung from natural radon gas (Ref. 4). This lung dose is considered to be equivalent to a whole body dose of 200 millirems. The NCRP has recommended actions to control indoor radon sources and reduce exposures.

When radioactive substances are inhaled or swallowed, they are distributed within the body in a non-uniform fashion. For example, radioactive iodine selectively concentrates in the thyroid gland, radioactive cesium is distributed throughout the body water and muscles, and radioactive strontium concentrates in the bones. The total dose to organs by a given radionuclide also is influenced by the quantity and the duration of time that the radionuclide remains in the body, including its physical, biological, and chemical characteristics. Depending on their rate of radioactive decay and biological elimination from the body, some radionuclides stay in the body for very short times while others remain for years.

In addition to natural radiation, we are exposed to radiation from a number of man-made sources. The single largest of

these sources comes from diagnostic medical x-rays, and nuclear medical procedures. Some 180 million Americans receive medical x-rays each year. The annual dose to an individual from such radiation averages about 53 millirems. Much smaller doses come from nuclear weapons fallout and consumer products such as televisions, smoke detectors, and fertilizers. Production of commercial nuclear power and its associated fuel cycle contributes less than 1 mRem to the annual dose of about 300 mRem for the average individual living in the United States.

Fallout commonly refers to the radioactive debris that settles to the surface of the earth following the detonation of nuclear weapons. It is dispersed throughout the environment either by dry deposition or washed down to the earth's surface by precipitation. There are approximately 200 radionuclides produced in the nuclear weapon detonation process; a number of these are detected in fallout. The radionuclides found in fallout which produce most of the fallout radiation exposures to humans are iodine-131 (I-131), strontium-89 (Sr-89), strontium-90 (Sr-90), and cesium-137 (Cs-137). There has been no atmospheric nuclear weapon testing since 1980 and many of the radionuclides, still present in our environment, have decayed significantly. Consequently, doses to the public from fallout have been decreasing.

As a result of the nuclear accident at Chernobyl, USSR, on April 26, 1986, radioactive material was dispersed throughout the global environment and detected in various media such as air, milk, and soil. Cesium-134, cesium-137, iodine-131, and other radionuclides were detected at the OCNGS in significant amounts following the accident. These radionuclides continue to decay toward a stable state in the environment.

Nuclear Reactor Operations

Common to the commercial production of electricity is the consumption of fuel which produces heat to make steam which turns the turbine-generator which generates electricity. Unlike the burning of coal, oil, or gas in fossil-fuel powered plants to generate heat, the fuel of most nuclear reactors is comprised of the element uranium in the form of uranium oxide. The fuel produces power by the process called fission. In fission, the uranium atom absorbs a neutron (an atomic particle found in nature and also produced by the fissioning of uranium in the reactor) and splits to produce smaller atoms termed fission products, along with heat, radiation, and free neutrons. The free neutrons travel through the reactor and are similarly absorbed by the uranium, permitting the fission process to continue. As this process continues, more fission products, radiation, heat, and neutrons are produced and a sustained reaction occurs. The heat produced is transferred via reactor coolant (water) from the fuel to produce steam which drives a turbine-generator to produce electricity. The fission products are mostly radioactive; that is, they are unstable atoms which emit radiation as they decay to stable atoms. Neutrons which are not absorbed by the uranium fuel may be absorbed by stable atoms in the materials which make up the components and structures of the reactor. In such cases, stable atoms often become radioactive. This process is called activation and the radioactive atoms which result are called activation products.

The OCNGS reactor is a Boiling Water Reactor (BWR). The nuclear fuel is designed to be contained within sealed fuel rods arranged in arrays called bundles which are located within a massive steel reactor vessel. As depicted in Figure 1, cooling water boils within the reactor vessel producing steam which drives the turbine. After the energy is

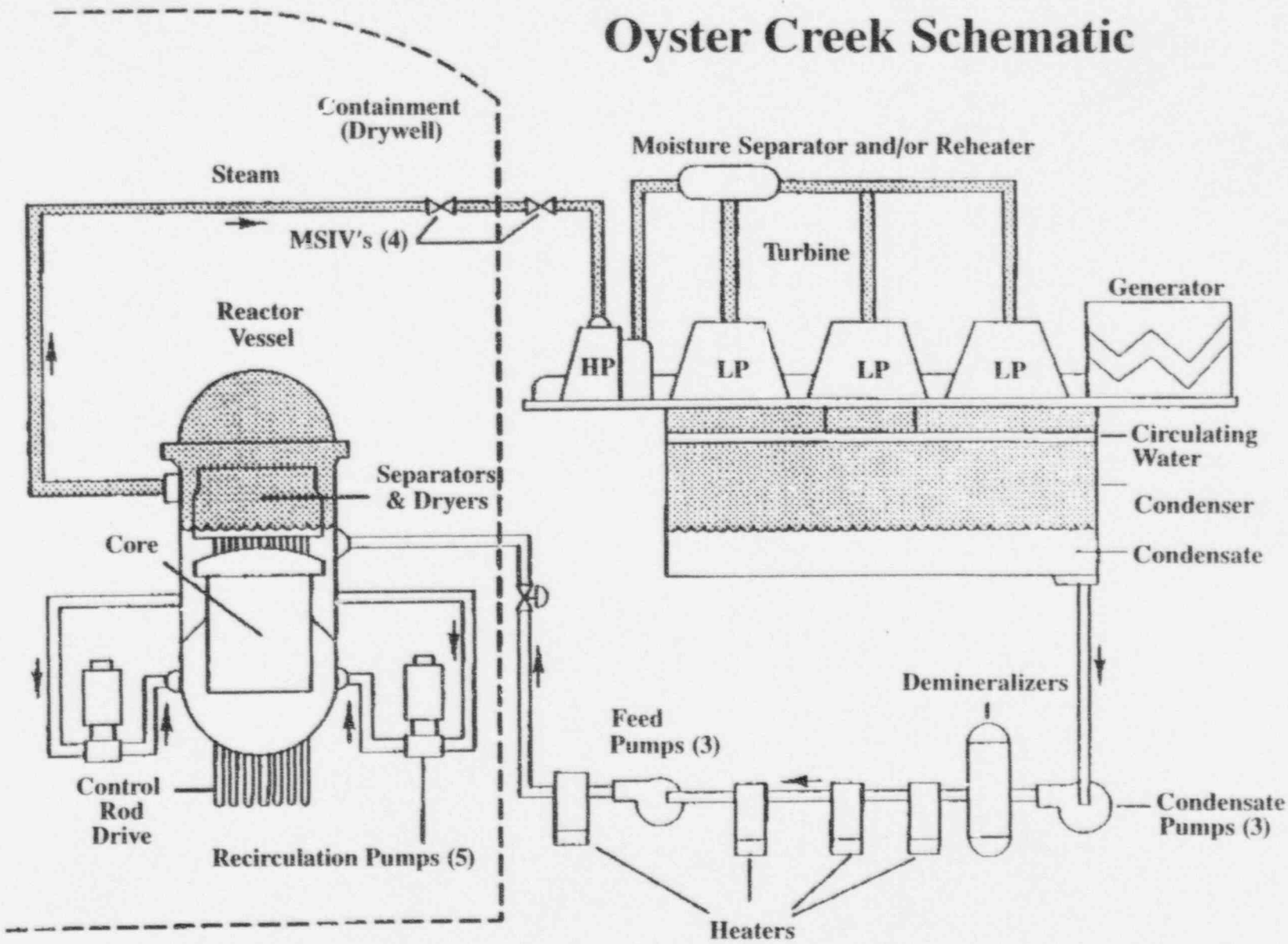

Oyster Creek Schematic
Containment
(Drywell)
Steam
MSIV's (4)
Moisture Separator and/or Reheater
Turbine
Generator
Reactor
Vessel
HP
LP
LP
LP
Circulating
Water
Separators
& Dryers
Condenser
Core
Condensate
Demineralizers
Feed
Pumps (3)
Control
Rod
Drive
Condensate
Pumps (3)
Recirculation Pumps (5)
Heaters

Figure 1

extracted from the steam in the turbine, it is cooled and condensed back into water in the main condensers. This condensate is then pumped back into the reactor vessel and the cycle repeats.

Several hundred radionuclides of some 40 different elements are created in a nuclear reactor during the process of generating electricity. Because of reactor engineering designs, the short half-lives of many radionuclides, and their chemical and physical properties, nearly all radioactivity is contained.

The OCNGS reactor has six independent barriers that confine radioactive materials produced in the reactor as it heats the water. Under normal operating conditions, essentially all radioactivity is contained within the first two barriers.

The ceramic uranium fuel pellets provide the first barrier. Most of the fission products are either trapped or chemically bound in the fuel where they remain. However, a few fission products which are volatile or gaseous at normal operating temperatures may not be contained in the fuel.

The second barrier consists of zirconium (Zr) alloy tubes (termed "fuel cladding") that resist corrosion and degradation due to high temperatures. The fuel pellets are contained within these tubes. There is a small gap between the fuel and the cladding, in which the noble gases and other volatile radionuclides collect and are contained.

The primary coolant water is the third barrier. Many of the fission products, including radioactive iodine, strontium, and cesium are soluble and are retained in water in an ionic (electrically charged) form. These materials can be removed in the reactor coolant purification system. However, krypton (Kr) and xenon (Xe) do not readily dissolve in the coolant,

particularly at high temperatures. Krypton and xenon collect as a gas above the condensate when the steam is condensed.

The fourth barrier consists of the reactor pressure vessel, turbine, condenser, and associated piping of the coolant system. The reactor pressure vessel is a 63-foot high tank with steel walls approximately eight inches thick. It encases the reactor core. The remainder of the coolant system, including the turbine and condenser and associated piping, provides containment for radioactivity in the primary coolant.

The drywell provides the fifth barrier. It is a steel-lined vessel surrounded by concrete walls approximately 4 1/2 to 7 1/4 feet thick that enclose the reactor pressure vessel and recirculating pumps and piping.

The reactor building provides the sixth barrier. It is a reinforced concrete and steel superstructure with walls approximately 5 feet thick that enclose the drywell and other plant components. The Reactor Building is always maintained at a negative pressure to prevent out-leakage.

Sources of Liquid and Airborne Effluents

Although the previously described barriers contain radioactivity with high efficiency, small amounts of radioactive fission products are nevertheless able to diffuse or migrate through minor flaws in the fuel cladding and into the reactor coolant. Trace quantities of reactor system component and structural surfaces which have been activated, also get into the reactor coolant water. Many of the soluble fission and activation products such as iodines, strontiums, cobalts, and cesiums are removed by demineralizers in the purification system of the reactor coolant. The physical and

chemical properties of noble gas fission products in the primary coolant prevent their removal by the demineralizers.

Because the reactor system has many valves and fittings, an absolute seal cannot be achieved. Minute drainage of radioactive liquids from valves, piping, and/or equipment associated with the coolant system may occur in the Reactor, and/or Turbine Buildings. Noble gases, produced during the fission process, are collected as gaseous waste which is processed in the multistage systems in the Augmented Off-Gas Building, while the remaining radioactive liquids are collected in floor and equipment drains and sumps and are pumped to and processed in the Radwaste Building.

Reactor off-gas, consisting primarily of hydrogen and radioactive non-condensable gases, is withdrawn from the reactor primary system by steam jet air ejectors. These air ejectors drive the process stream through a 60 minute holdup pipe at approximately 110 cubic feet per minute and then into the Augmented Off-Gas (AOG) System. The holdup pipe allows radionuclides with short half-lives to decay. The Augmented Off-Gas System is a gaseous processing system which provides hydrogen conversion to water via a catalytic recombiner, removes the water (vapor) from the process stream, holds up the process stream to allow further decay of short-lived nuclides, and filters the off-gas using charcoal beds and High Efficiency Particulate (HEPA) filters prior to discharge to the base of the stack. Once the process stream enters the stack, it is diluted by building ventilation, which averages approximately 200,000 cubic feet per minute, is monitored and sampled, and then is discharged out the top of the 368-foot stack.

The liquid waste processing system receives water contaminated with radioactivity and processes it by filtration,

demineralization, and distillation. Purified radwaste water is routinely recycled to the plant. Occasionally, it may be necessary to discharge this purified water, under the guidelines of applicable permits, to the environment. Contaminants removed during the purification process are stored in the radwaste building and are eventually disposed of via the radioactive solids disposal systems. Before purified water is discharged to the environment, it is first sampled, analyzed, assigned a release rate, and then released to the discharge canal which has a flow rate of 460,000 to 960,000 gallons per minute.

DESCRIPTION OF THE OCNGS SITE

General Information

The Oyster Creek Nuclear Generating Station is located in Lacey Township of Ocean County, New Jersey, about 60 miles south of Newark, 9 miles south of Toms River, and 35 miles north of Atlantic City. It lies approximately 2 miles inland from Barnegat Bay. The site, covering 1416 acres, is situated partly in Lacey Township and, to a lesser extent, in Ocean Township. The Garden State Parkway bounds the site on the west. Access is provided by U. S. Route 9, passing through the site and separating a 661-acre eastern portion from the balance of the property west of the highway. The station is about 1/4 mile west of the highway and 1-1/4 miles east of the Parkway. The site property extends about 3-1/2 miles inland from the bay; the maximum width in the north-south direction is almost 1 mile. The site location is part of the New Jersey shore area with its relatively flat topography and extensive freshwater and saltwater marshlands. The south branch of Forked River runs across the northern side of the site, and Oyster Creek partly borders the southern side.

It is estimated that approximately 3.3 million people reside within a 50 mile radius of the OCNGS (Ref. 3). The nearest population center is Ocean Township which lies less than two miles south-southeast of the site. Based on 1994 population estimates, 5908 people reside in Ocean Township. Two miles to the north of the OCNGS, 23,897 people reside in Lacey Township (estimated 1994 population). Dover Township, situated 9.5 miles to the north, is the nearest major population center with a population of 81,550 (estimated 1994 population). The region adjacent to Barnegat Bay is one of the State's most rapidly developing areas. In addition to the resident population, a sizeable seasonal influx of people occurs during the summer. This influx occurs almost exclusively along the waterfront.

Climatological Summary

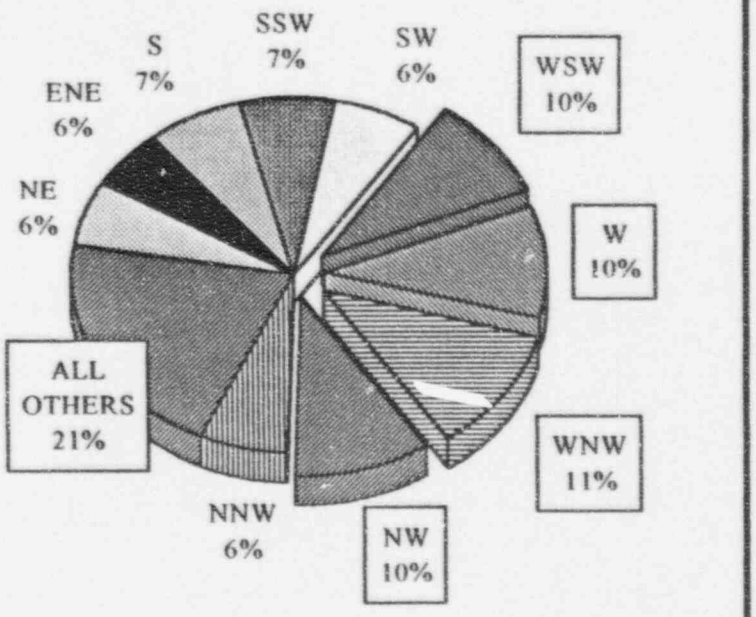
Meteorological data during 1995 were obtained from an on-site weather station. These data are subject to extensive quality assurance techniques and categorized for further analyses, including historical comparisons to both on-site and off-site sources.

The region is usually marked by contrasting weather patterns. During the summer months, winds are predominantly from the south and southwest directions. This ushers in warm and humid weather conditions. Precipitation is generally of short duration but high intensity (showers and/or thundershowers). During the fall, winter, and early spring, winds are generally from the west and northwest. Air masses during this time originate from the upper midwestern United States and Canada. They are characterized by generally cold and dry conditions.

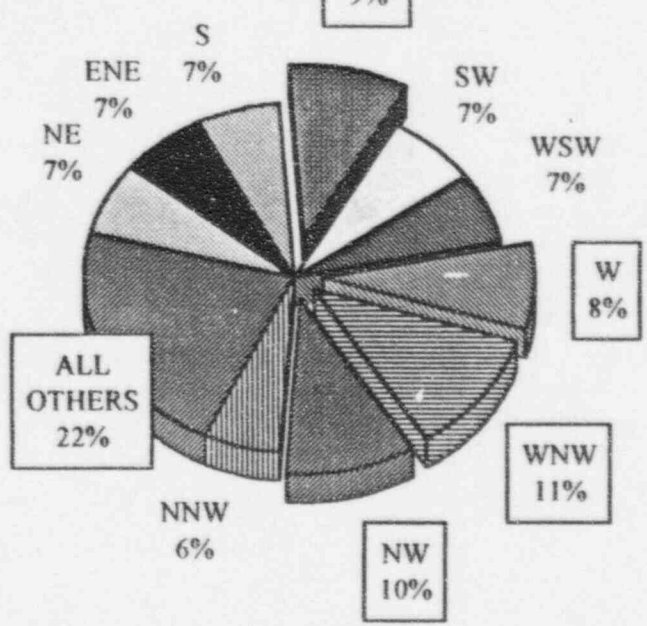
Wind direction frequencies were normal during the year. The four highest frequency of occurrence sectors for the year were winds from the west-southwest, west, west-northwest, and northwest (Figure 2). These wind directions reflect normal climatological conditions found at this latitude and area of the country. Seasonal winds were evident as well, including the sea breeze circulation (Ref. 3) during the late spring thrcugh early autumn season.

The annual average temperature for the year was 53.04 degrees Fahrenheit. The historical average annual temperature for a year is 53 degrees. For the most part, monthly average temperatures were close to normal (Figure 3). Significant below normal temperatures were the case during February, November, and December. A marked January thaw was evident in 1995 as the monthly average temperature for Oyster Creek was 38 degrees F (normal is 34 degrees F).

WIND DIRECTION FREQUENCY OF OCCURRENCE - 1995
OYSTER CREEK NUCLEAR GENERATING STATION
WIND DIRECTION "FROM" EACH COMPASS SECTOR
VALUES IN PERCENT OF HOURLY OCCURRENCE



33-FOOT WIND DIRECTION



380-FOOT WIND DIRECTION

NOTE: THE FOUR (4) HIGHEST FREQUENCY OF OCCURRENCE SECTORS ARE HIGHLIGHTED

FIGURE 2

MONTHLY MEAN AMBIENT TEMPERATURE
OYSTER CREEK NUCLEAR GENERATING STATION
DURING 1995 COMPARED WITH HISTORICAL (1946-1981)
ATLANTIC CITY NATIONAL WEATHER SERVICE AVERAGE TEMPERATURE DATA
DEGREES FAHRENHEIT

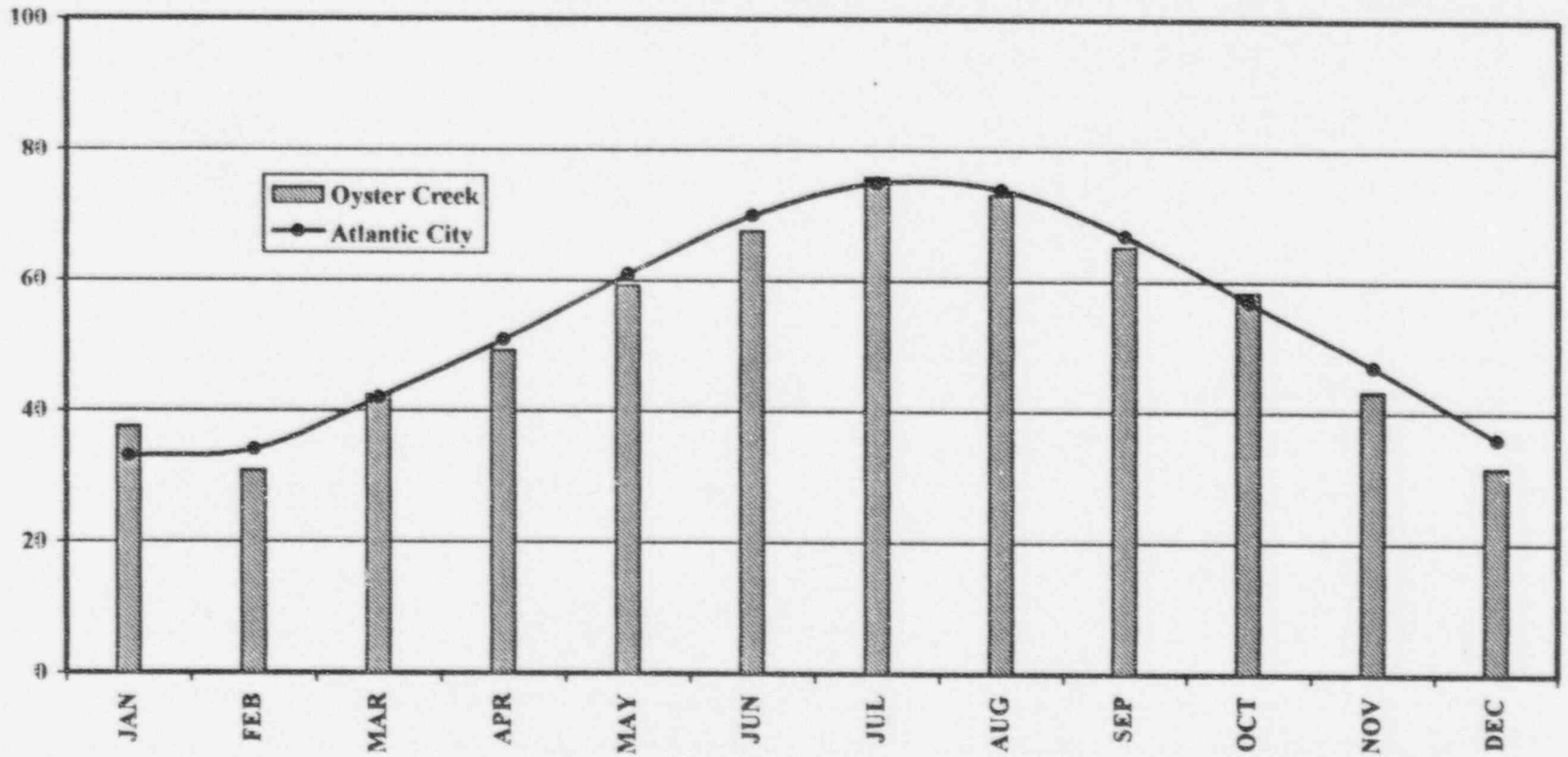


FIGURE 3

Precipitation during the year was quite sparse. The annual precipitation for 1995 was only 25.44 inches, which was approximately 16 inches below the Atlantic City National Weather Service historical average (1946 - 1981) of 41.50 inches. Conditions in the entire northeast United States were so dry that drought emergencies were declared in a large number of areas in Pennsylvania, New York, and northern New Jersey. Monthly precipitation totals did not exceed the historical average in 9 of the 12 months during the reporting period (Figure 4). The only three exceptions were during September, October, and November. During these three months, the area experienced close to 14 inches of rain, helping to relieve drought conditions. During 1995, there were five precipitation events in which more than 1 inch of liquid equivalent precipitation fell. One storm in November produced over two inches of rain. Snowfall amounts were minimal. In fact, the only measurable snow during the year was in late December when several inches of snow and sleet accumulated. Precipitation during the year was from three sources. One source of precipitation was from large extratropical storms, including the storm which occurred in November. Another source of precipitation occurred during the passage of warm fronts, most frequent during the spring and fall. A third source of precipitation, was from convective activity due to summer heat and humidity build-up. Little precipitation was received from convective activity during 1995. This heating leads to late day showers and/or thundershowers synonymous with the previously-described air mass that originates in the southeast United States and is a common feature in the northeast during the summer period. This type of precipitation occurs over short distances and time frames. Convection of any type can produce cloudbursts and associated flash flooding. Violent weather such as tornadoes and hail are associated with convective activity.

MONTHLY PRECIPITATION
OYSTER CREEK NUCLEAR GENERATING STATION
DURING 1995 COMPARED WITH HISTORICAL (1946-1981)
ATLANTIC CITY NATIONAL WEATHER SERVICE AVERAGE PRECIPITATION DATA
RAINFALL IN INCHES

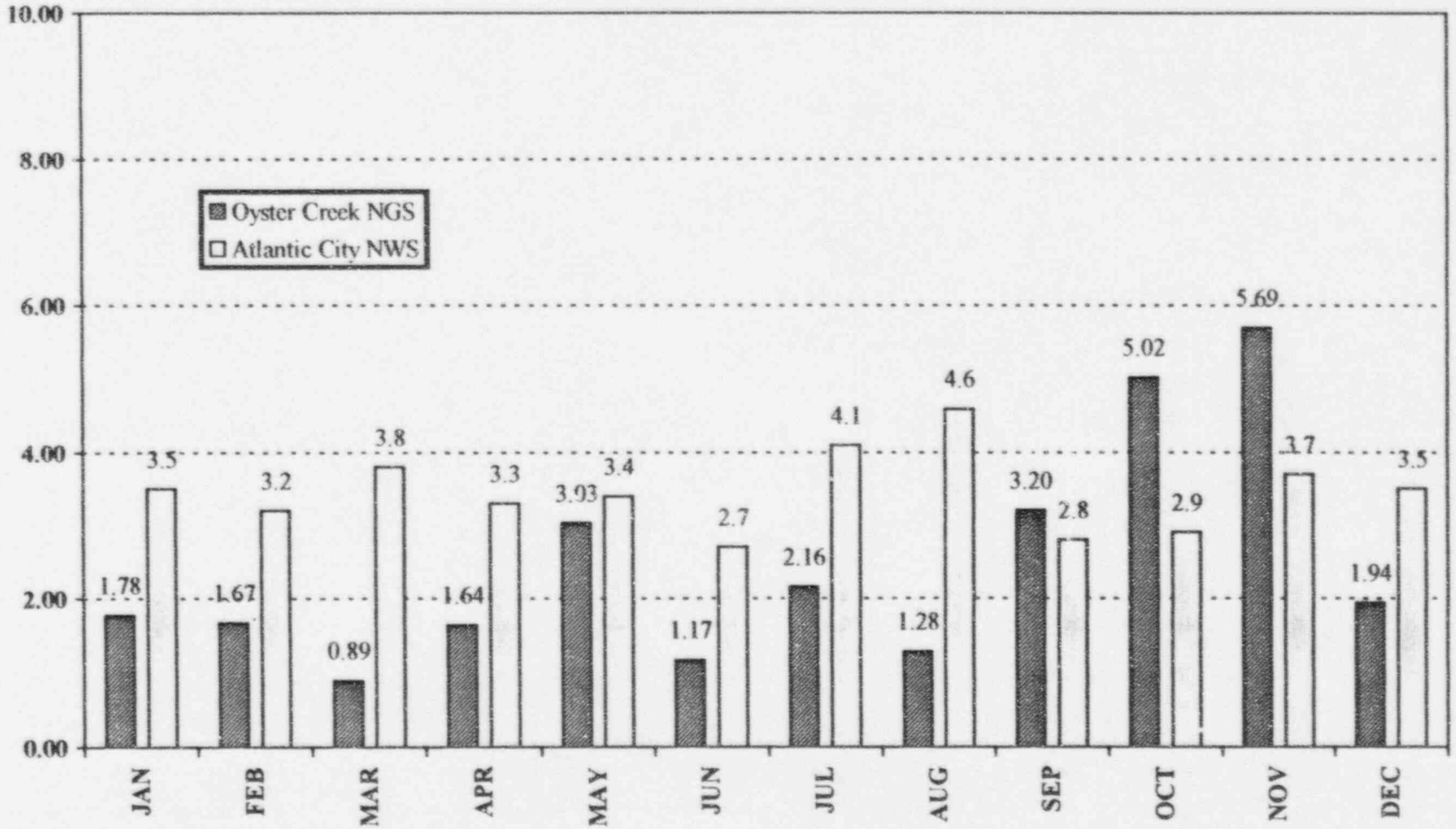


FIGURE 4

There were no major hurricane events in the region during the calendar year although on several occasions, precipitation in the fall was a result of extratropical cyclones that contained moisture from tropical (hurricane) systems. This year's hurricane season was quite active in the United States with over 15 hurricanes/tropical storms.

For additional site specific meteorological data, refer to the OCNGS Annual Radioactive Effluent Release Report for 1995 (Ref. 28).

EFFLUENTS

Historical Background

Almost from the outset of the discovery of x-rays in 1895 by Wilhelm Roentgen, the potential hazard of ionizing radiation was recognized and efforts were made to establish radiation protection standards. The International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP) were established in 1928 and 1929, respectively. These organizations have the longest continuous experience in the review of radiation health effects and with making recommendations on guidelines for radiological protection and radiation exposure limits. In 1955, the United Nations created a Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) to summarize reports received on radiation levels and the effects on man and his environment. The National Academy of Sciences (NAS) formed a committee in 1956 to review the biological effects of atomic radiation (BEAR). A series of reports have been issued by this and succeeding NAS committees on the biological effects of ionizing radiation (BEIR), the most recent during 1990 (known as BEIR V). The Federal Radiation Council (FRC) was formed in 1959 to provide a federal policy on human radiation exposures. These federal policies are approved by the President of the United States.

These committees and commissions of nationally and internationally recognized scientific experts have been dedicated to the understanding of the health effects of radiation by investigating all sources of relevant knowledge and scientific data and by providing guidance for radiological protection. Their members are selected from universities, scientific research centers, and other national and international research organizations. The committee reports contain scientific data obtained from physical, biological,

and epidemiological studies on radiation health effects and serve as scientific references for information presented in this report.

Since its inception, the USNRC has depended upon the recommendations of the ICRP, the NCRP, and the FRC (incorporated in the United States Environmental Protection Agency (USEPA) in 1970) for basic radiation protection standards and guidance in establishing regulations for the nuclear industry (Ref. 6 through 9).

Effluent Release Limits

As part of routine plant operations, limited quantities of radioactivity are released to the environment in liquid and airborne effluents. An effluent control program is implemented to ensure radioactivity released to the environment is minimal and does not exceed release limits. Radioactive effluent releases at Oyster Creek are under the regulatory jurisdiction of the USNRC. Regulations through the years have changed and reflect operating experience and advances in reactor technology. Federal regulations as defined by Title 10 of the Code of Federal Regulations, Part 20 (10 CFR 20) establish limits on the concentrations of radioactive effluents released to the environment. Federal effluent limits are set at low levels to protect the health and safety of the public. GPU Nuclear conducts operations in a manner that holds radioactive effluents to small percentages of the federal limits.

A recommendation of the ICRP, NCRP, and FRC is that radiation exposures should be maintained at levels which are "as low as reasonably achievable" (ALARA) and commensurate with the societal benefit derived from the activities resulting in such exposures. For this reason, dose limit guidelines were

established by the USNRC for releases of radioactive effluents from nuclear power plants. These guidelines were then used as the basis for the development of the Offsite Dose Calculation Manual (ODCM) and Technical Specifications. In keeping with the ALARA principle, the OCNGS operates in a manner that results in radioactive releases that are a small fraction of these limits.

Applicable OCNGS Offsite Dose Calculation Manual Limits are as follows:

- ODCM Specification 4.6.1.1.3.A
  Radioactivity Concentration in Liquid Effluent

  The concentration of radioactive material, other than noble gases, in liquid effluent in the discharge canal at the U.S. Route 9 bridge shall not exceed the concentrations specified in 10CFR Part 20, Appendix B, Table II, Column 2.

- ODCM Specification 4.6.1.1.3.B
  Radioactivity Concentration in Liquid Effluent

  The concentration of noble gases dissolved or entrained in liquid effluent in the discharge canal at the U.S. Route 9 bridge shall not exceed 2.0 E-4 uCi/ml.

- ODCM Specification 4.6.1.1.4.A
  Limit on Dose Due to Liquid Effluent

  The dose to a MEMBER OF THE PUBLIC due to radioactive material in liquid effluent in the UNRESTRICTED AREA shall not exceed:

1.5 mRem to the Total Body during any calendar quarter

5.0 mRem to any body organ during any calendar quarter

3.0 mRem to the Total Body during any calendar year
or
10.0 mRem to any body organ during any calendar year

- ODCM Specification 4.6.1.1.5.A
  Dose Rate Due to Gaseous Effluent

  The dose equivalent rate in the UNRESTRICTED AREA due to radioactive noble gas in gaseous effluent shall not exceed 500 mRem/year to the total body or 3000 mRem/year to the skin.

- ODCM Specification 4.6.1.1.5.B
  Dose Rate Due to Gaseous Effluent

  The dose equivalent rate in the UNRESTRICTED AREA due to tritium (H-3), I-131, I-133, and to radioactive material in particulate form having half-lives of 8 days or more in gaseous effluents shall not exceed 1500 mRem/year to any body organ when the dose rate due to H-3, Sr-89, Sr-90, and alpha-emitting radionuclides is averaged over no more than 3 months and the dose rate due to other radionuclides is averaged no more than 31 days.

- ODCM Specification 4.6.1.1.6.C
  Air Dose Due to Noble Gas in Gaseous Effluent

  The air dose in the UNRESTRICTED AREA due to noble gas released in gaseous effluent shall not exceed:

5 mRad/calendar quarter due to gamma radiation

10 mRad/calendar quarter due to beta radiation

10 mRad/calendar year due to gamma radiation

20 mRad/calendar year due to beta radiation

- ODCM Specification 4.6.1.1.7.A
  Dose Due to Radioiodine and Particulates in Gaseous Effluent

  The dose to a MEMBER OF THE PUBLIC from I-131, I-133, and from radioiodines in particulate form having half-lives of 8 days or more in gaseous effluent, in the UNRESTRICTED AREA shall not exceed 7.5 mRem to any body organ per calendar quarter or 15 mRem to any body organ per calendar year.

- ODCM Specification 4.6.1.1.8.A
  Annual Total Dose Due to Radioactive Effluent

The annual dose to a MEMBER OF THE PUBLIC due to radioactive material in effluent from the OCNGS in the UNRESTRICTED AREA shall not exceed 75 mRem to his/her thyroid or 25 mRem to his/her total body or to any other organ.

Effluent Control Program

Effluent control includes plant components such as the ventilation system and filters, off-gas holdup components, demineralizers, and an evaporator system. In addition to minimizing the release of radioactivity, the effluent control program includes all aspects of effluent and environmental

monitoring. This includes the operation and data analysis associated with a complex radiation monitoring system, environmental sampling and monitoring, and a comprehensive quality assurance program. Over the years, the program has evolved in response to changing regulatory requirements and plant conditions. For example, additional instruments and samplers have been installed to ensure that measurements of effluents remain onscale in the event of any accidental release of radioactivity.

Effluent Instrumentation: Liquid and airborne effluent measuring instrumentation is designed to monitor the presence and the amount of radioactivity in effluents. Many of these instruments provide continuous surveillance of radioactivity releases. Calibrations of effluent instruments are performed using reference standards certified by the United States National Institute of Standards and Technology (NIST). Instrument alarm setpoints are pre-set to ensure that effluent release limits will not be exceeded. If radiation monitor alarm setpoints are reached, releases are immediately terminated. Where continuous surveillance is not practicable or possible, contingencies are specified in the Offsite Dose Calculation Manual and/or the Technical Specifications.

Effluent Sampling and Analysis: In addition to continuous radiation monitoring instruments, samples of effluents are taken and subjected to laboratory analysis to identify the specific radionuclide quantities being released. A sample must be representative of the effluent from which it is taken. Sampling and analysis provide a sensitive and precise method of determining effluent composition. Samples are analyzed using state-of-the-art laboratory counting equipment. Radiation instrument readings and sample results are compared to ensure correct correlation.

Effluent Data

As part of routine plant operations, limited quantities of radioactivity are released to the environment in effluents. The amounts of radioactivity released vary and are dependent upon operating conditions, power levels, fuel conditions, efficiency of liquid and gas processing systems, and proper functioning of plant equipment. The largest variations occur in the airborne effluents of fission and activation gases, which are proportional to the integrity of the fuel cladding and the operation of the OCNGS augmented off gas system. In general, effluents have been decreasing with time due to improved fuel integrity and increased efficiency of processing systems.

The amount of radioactivity released in effluents from the OCNGS during 1995 was the smallest in the history of station operation. The predominant radionuclide in gaseous effluents was Xe-135 and in liquid effluents was Cs-137. The amount of radioactivity released is summarized and reported annually to the USNRC (Ref. 28). Estimated radiation doses to the public, attributable to these effluents, were a small fraction of the applicable regulatory limits (Tables 6 and 7). A summary of the OCNGS liquid and airborne effluents for 1995 is provided in Table 2. Radioactive constituents of these effluents are discussed in the following sections.

Noble Gases: The predominant radionuclides released in airborne effluents are the noble gases krypton (Kr) and xenon (Xe). Small amounts of noble gases can also be released in liquid effluents. The total amounts of krypton and xenon released into the atmosphere in 1995 were 40.5 curies and 38.7 curies, respectively. These noble gases were readily dispersed into the atmosphere when released and because of their short half-lives, quickly decayed into stable forms. No noble gas activity was released in liquid effluents during 1995.

TABLE 2

RADIONUCLIDE COMPOSITION OF OCNGS EFFLUENTS FOR 1995

Radionuclide	Half-Life	Liquid Effluents (Ci)	Airborne Effluents (Ci)
H-3	1.23E+01 Years	< LLD	1.18E+01
Cr-51	2.78E+01 Days	< LLD	4.28E-04
Mn-54	3.12E+02 Days	< LLD	1.61E-05
Co-58	7.14E+01 Days	< LLD	2.96E-04
Co-60	5.26E+00 Years	< LLD	7.33E-04
Kr-85m	4.50E+00 Hours	< LLD	4.72E+00
Kr-87	7.60E+01 Minutes	< LLD	2.43E+01
Kr-88	2.80E+00 Hours	< LLD	1.15E+01
Sr-89	5.05E+01 Days	< LLD	9.92E-04
Sr-90	2.88E+01 Days	< LLD	6.34E-06
I-131	8.05E+00 Days	< LLD	3.01E-03
I-133	2.09E+01 Hours	< LLD	1.94E-02
Xe-133	5.20E+00 Days	< LLD	2.20E-01
Xe-135m	1.56E+01 Minutes	< LLD	8.94E-01
Xe-135	9.10E+00 Hours	< LLD	3.75E+01
Cs-137	3.02E+01 Years	2.23E-7	1.09E-05
Ba-140	1.28E+01 Days	< LLD	3.49E-04
Alpha		< LLD	2.36E-06
NOTE: All effluents are expressed in scientific notation. No other nuclides were detected.			
NOTE: < LLD - Less than lower limit of detection.			

Iodines and Particulates: The discharge of iodines and particulates to the environment is minimized by factors such as their high chemical reactivity, solubility in water, and the high removal efficiency of airborne and liquid processing systems.

Of the gaseous radioiodines, iodine-131 is of particular interest because of its relatively long half-life of 8.05 days. Particulates of relative concern are the radiocesiums (Cs-134 and Cs-137), radiostrontiums (Sr-89 and Sr-90), and activation products, manganese-54 (Mn-54) and cobalt-60 (Co-60). The total amount of iodines and particulates released from the OCNGS in 1995 was 0.0252 curies in airborne effluents and 0.000000223 curies in liquid effluents.

Tritium: Tritium is typically the predominant radionuclide released in liquid effluents and is also released in airborne effluents. Tritium is a radioactive isotope of hydrogen. It is produced in the reactor coolant as a result of neutron interaction with the naturally-occurring deuterium (also a hydrogen isotope) present in water. No tritium was released in liquid effluents from the OCNGS in 1995. The total amount of tritium released in airborne effluents was 11.8 curies. To put this number in perspective, the world inventory of natural cosmic ray-produced tritium is 70 million curies, which corresponds to a production rate of 4 million curies per year (Ref. 10). Tritium contributions to the environment from nuclear power production are sufficiently small that they have no measurable effect on the existing global environmental concentrations.

Transuranics: Transuranics are produced by neutron capture in the fuel, and typically emit alpha and beta particles as they decay. Important transuranic isotopes produced in reactors are uranium-239 (U-239), plutonium-238 (Pu-238), plutonium-239

(Pu-239), plutonium-240 (Pu-240), plutonium-241 (Pu-241), americium-241 (Am-241), plutonium-243 (Pu-243), plus other isotopes of americium and curium. They have half-lives ranging from hundreds of days to millions of years. Greater than 99% of all transuranics are retained within the fuel. These nuclides are insoluble and non-volatile and are not readily transported to the environment. Gaseous and liquid processing systems remove greater than 90% of transuranics that may be found in the reactor coolant. Because retention and removal efficiencies are so high, transuranics are not routinely monitored.

Carbon-14: Production of carbon-14 (C-14) in reactors is small. It is produced in the reactor coolant as a result of neutron interactions with oxygen (O) and nitrogen (N). Estimates for all nuclear power production worldwide show that 235,000 curies were released from 1970 through 1990 (Ref. 11). Carbon-14 also is produced naturally by the interactions of cosmic radiation with oxygen and nitrogen in the upper atmosphere. The worldwide inventory of natural C-14 is estimated at 241 million curies (Ref. 11). Since the inventory of natural carbon-14 is so large, releases from nuclear power plants do not result in a measurable change in the background concentration of carbon-14. Consequently, carbon-14 is not routinely monitored in plant effluents.

RADIOLOGICAL ENVIRONMENTAL MONITORING

GPUN conducts a comprehensive radiological environmental monitoring program (REMP) at Oyster Creek to monitor radiation and radioactive materials in the environment. The information obtained from the REMP is then used to determine the effect of OCNGS operations, if any, on the environment and the public.

The USNRC has established regulatory guides which contain acceptable monitoring practices (Ref. 12). The OCNGS REMP was designed on the basis of these regulatory guides along with the USNRC Radiological Assessment Branch Technical Position on Environmental Monitoring (Ref. 13). Regarding the OCNGS REMP, all of these guidelines have been met and in most cases have been exceeded.

The objectives of the REMP are:

- to assess dose impacts to the public from OCNGS operations
- to verify in-plant controls for the containment of radioactive materials
- to determine buildup of long-lived radionuclides in the environment and changes in background radiation levels
- to provide reassurance to the public that the program is capable of adequately assessing impacts and identifying noteworthy changes in the radiological status of the environment
- to fulfill the requirements of the OCNGS Offsite Dose Calculation Manual (ODCM) and Technical Specifications

Environmental Exposure Pathways to Humans from Airborne and Liquid Effluents

As previously discussed in the "Effluents" section, small amounts of radioactive materials are released to the environment as a result of operating a nuclear generating station. Once released, these materials move through the environment in a variety of ways and may eventually reach humans via breathing, drinking, eating, and direct exposure. These routes of exposure are referred to as environmental exposure pathways. Figure 17 illustrates the important exposure routes.

As can be seen from this figure, these exposure pathways are both numerous and varied. While some pathways are relatively simple, such as inhalation of airborne radioactive materials, others may be complex. For example, radioactive airborne particulates may deposit onto forage which when eaten by cows may be transferred into milk, which is subsequently consumed by man. This route of exposure is known as the air-grass-cow-milk-human pathway.

Although radionuclides can reach humans by a number of pathways, some are more important than others. The critical pathway for a given radionuclide is the one that produces the greatest dose to a population, or to a specific segment of the population. This segment of the population is known as the critical group, and may be defined by age, diet, or other cultural factors. The dose may be delivered to the whole body or confined to a specific organ; the organ receiving the greatest fraction of the dose is known as the critical organ. This information was used to develop the OCNGS REMP.

Sampling

The OCNGS radiological environmental monitoring program consists of two phases -- the preoperational and the operational. Data gathered in the preoperational phase are used as a basis for evaluating radiation levels and radioactivity in the vicinity of the plant after the plant becomes operational. The operational phase began in 1969 when the OCNGS attained initial criticality.

The program consists of taking radiation measurements and collecting samples from the environment, analyzing them for radioactivity content, and interpreting the results. Emphasis is on the critical exposure pathways to humans with samples taken from the aquatic, atmospheric, and terrestrial environments. Tnese samples include air, well water, surface water, clams, sediment, fish, crabs, and vegetables. Thermoluminescent dosimeters (TLDs) are placed in the environment to measure gamma radiation levels. The Offsite Dose Calculation Manual Specifications (ODCM), along with recommendations from the OCNGS staff, specify the sample types to be collected and analyses to be performed.

Sampling locations were established by considering meteorology, population distribution, hydrology, and land use characteristics of the local area. The sampling locations are divided into two classes, indicator and background. Indicator locations are those which are expected to show effects from OCNGS operations, if any exist. These locations were primarily selected on the basis of where the highest predicted environmental concentrations would occur. While the indicator locations are typically within a few miles of the plant, the background stations are generally at distances greater than 10 miles from the OCNGS. Therefore, background samples are collected at locations which are expected to be unaffected by station operations. They provide a basis for evaluating

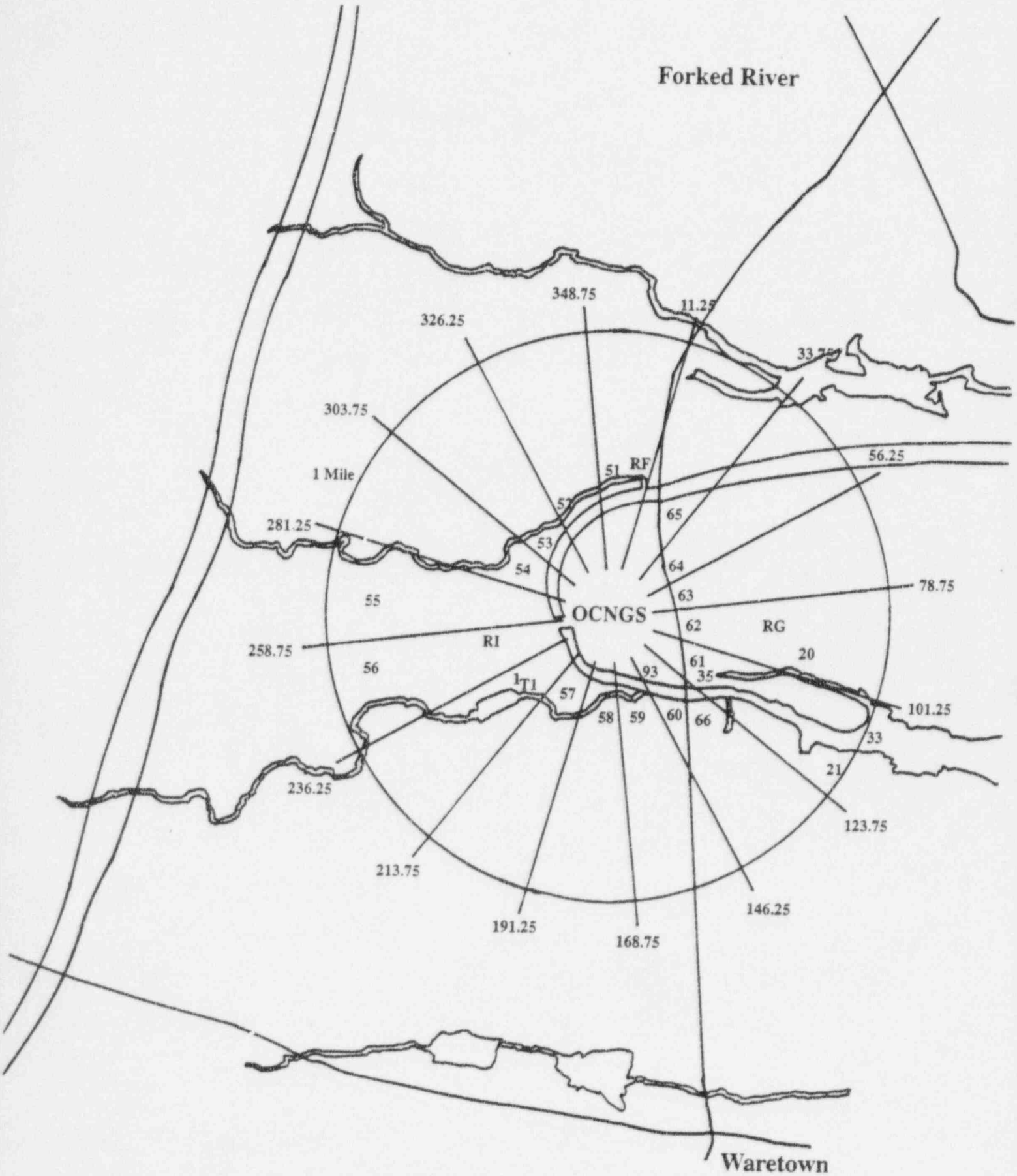
fluctuations at indicator locations relative to natural background radioactivity and fallout from prior nuclear weapon tests. Figures 5, 6, and 7 show the current sampling locations around the OCNGS. Table A-1 in Appendix A describes the sampling locations by distance and azimuth (compass direction) from the OCNGS, along with type(s) of samples collected at each sampling location.

Analysis

In addition to specifying the minimum media to be collected and the minimum number of sampling locations, the Offsite Dose Calculation Manual (ODCM) Specifications include the frequency of sample collection and the types and frequency of analyses to be performed. Also specified are analytical sensitivities (detection limits) and reporting levels. Table A-2 in Appendix A provides a synopsis of the sample types, number of sampling locations, collection frequencies, number of samples collected, types and frequencies of analyses, and number of samples analyzed. Table A-3 in Appendix A lists samples which were not collected or analyzed per the requirements of the ODCM Specifications. Sample analyses which did not meet the required analytical sensitivities are presented in Appendix B. Changes in sample collection and analysis are described in Appendix C.

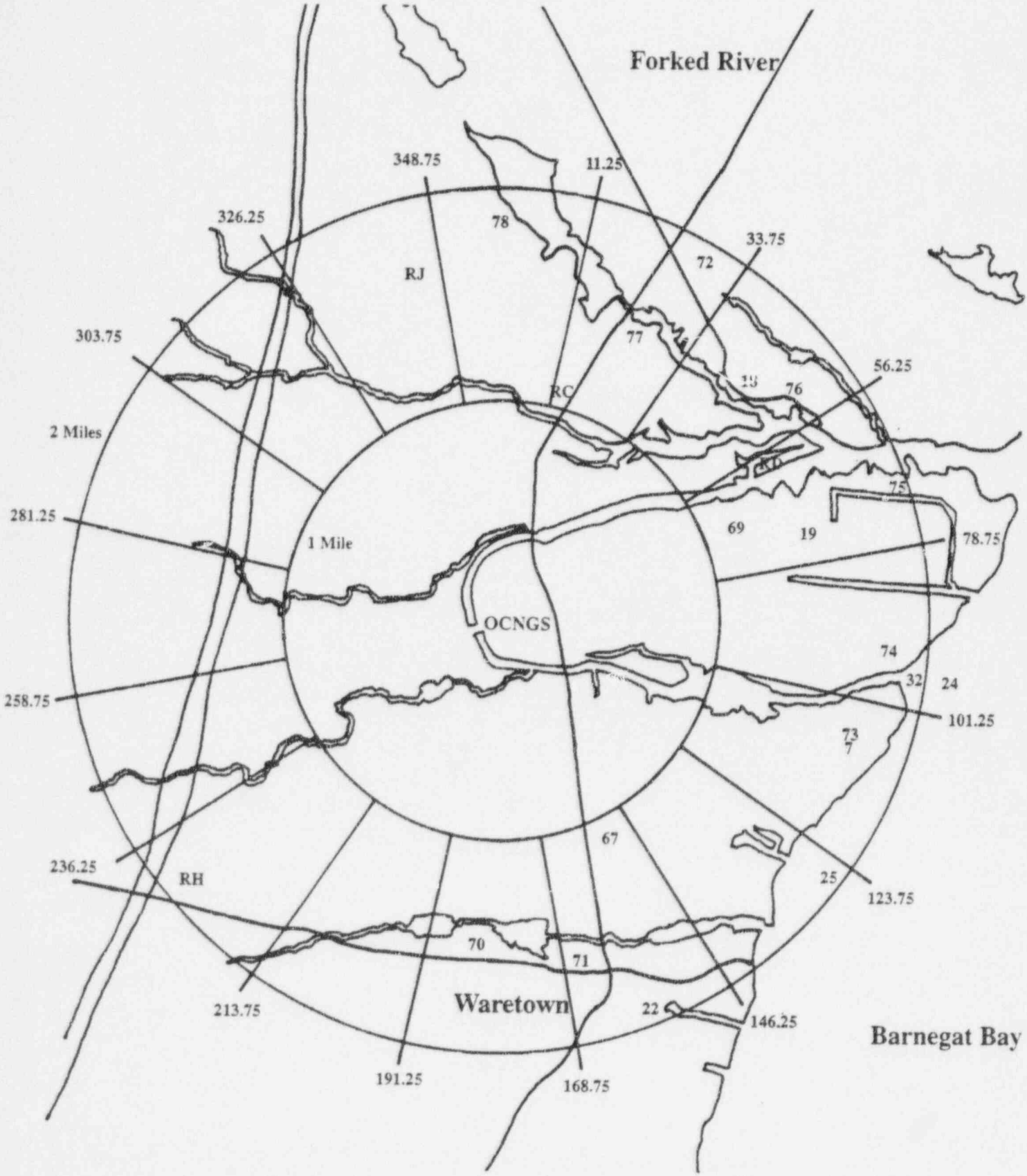
The analytical results are routinely reviewed by GPUN scientists to assure that established sensitivities have been achieved and that the proper analyses have been performed. All analytical results are subjected to an automated review process which ensures that ODCM-required lower limits of detection are met and that reporting levels are not exceeded. Investigations are conducted when action levels or reporting levels are reached or when anomalous values are discovered. The action levels were established by GPUN and are typically 10 percent of the reporting levels specified in the ODCM

Figure 5



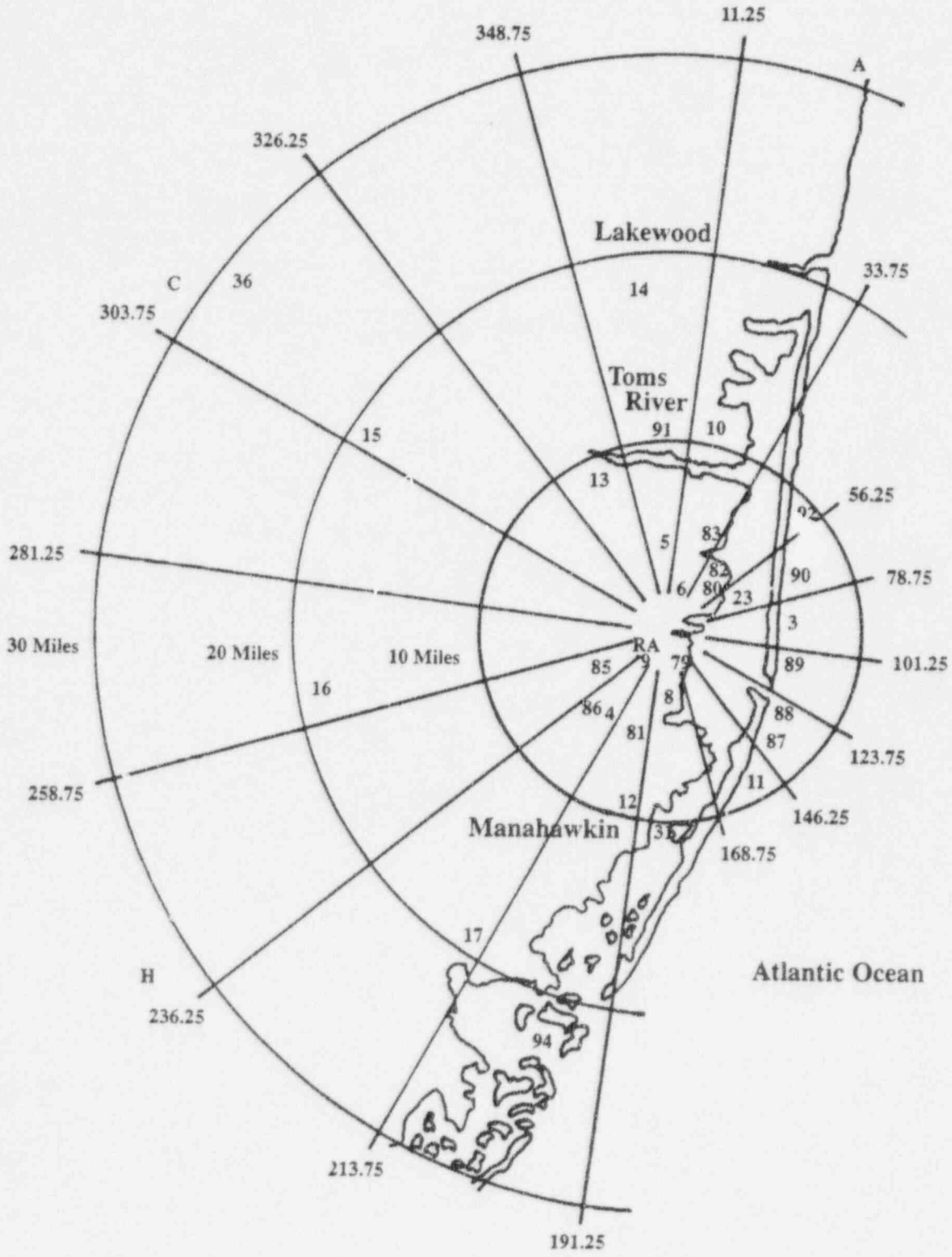
Oyster Creek Nuclear Generating Station (OCNGS)
Location of Radiological Environmental Monitoring Program
(REMP) Stations within 1 mile of the site

Figure 6



Oyster Creek Nuclear Generating Station (OCNGS)
Location of Radiological Environmental Monitoring Program (REMP)
Stations greater than 1 mile and within 2 miles of the site

Figure 7



Oyster Creek Nuclear Generating Station (OCNGS)
Location of Radiological Environmental Monitoring Program (REMP)
Stations Greater than 2 miles from the Site

Specifications. These levels are purposely set low so that corrective action can be initiated before a reporting level is reached.

Table 3, beginning on page 44, provides a summary of radionuclide concentrations detected in the primary environmental samples for 1995. The data are summarized in a format that closely resembles the suggested format presented in the USNRC Branch Technical Position (Ref. 13). Quality Assurance (QA) sample results on split and/or duplicate samples were used to verify the primary sample results. To eliminate a bias in the results, the QA results were excluded from Table 3 and the main text of this report.

Measurement of low radionuclide concentrations in environmental media requires special analysis techniques. Analytical laboratories use state-of-the-art laboratory equipment designed to detect beta and gamma radiation. This equipment must meet the required analytical sensitivities. Examples of the specialized laboratory equipment used are germanium detectors with multichannel analyzers for determining specific gamma emitting radionuclides, liquid scintillation detectors for detecting tritium, low level proportional counters for detecting gross beta radioactivity, and coincidence counters for low level I-131 detection. Computer hardware and software used in conjunction with the counting equipment perform calculations and provide data management. Analysis methods are described in Appendix I.

Quality Assurance Program

A Quality Assurance (QA) program is conducted in accordance with guidelines provided in Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs" (Ref. 16) and

as required by the ODCM Specifications (Ref. 2) and Technical Specifications (Ref. 1). The QA program is documented by GPUN written policies, procedures, and records. These documents encompass all aspects of the REMP including sample collection, equipment calibration, laboratory analysis, and data review.

The QA program is designed to identify possible deficiencies so that immediate corrective action can be taken if warranted. It also provides a measure of confidence in the results of the monitoring program in order to assure the regulatory agencies and the public that the results are valid. The Quality Assurance program for the measurement of radioactivity in environmental samples is implemented by:

- auditing all REMP-related activities including analytical laboratories
- requiring analytical laboratories to participate in the USEPA Cross-Check Program
- requiring analytical laboratories to split samples for separate analysis (recounts are performed when samples are not able to be split)
- splitting samples, having the samples analyzed by independent laboratories, and then comparing the results for agreement
- reviewing QA results of the analytical laboratories including spike and blank sample results and duplicate analysis results

The Quality Assurance program and the results of the USEPA Cross-Check Program are outlined in Appendices D and E, respectively.

The TLD readers are calibrated monthly against standard TLDs to within five percent of the standard TLD values. Also, each group of TLD's processed by a reader contains control TLDs that are used to correct for minor variations in the reader. The accuracy and variability of the results for the control TLDs are examined for each group of TLDs to assure the reader is functioning properly.

Other cross-checks, calibrations, and certifications are in place to assure the accuracy of the TLD program:

- Semiannually, randomly selected TLDs are sent to an independent laboratory where they are irradiated to set doses not known to GPUN. The GPUN dosimetry laboratory processes the TLDs and the results are compared against established limits

- Every two years, each TLD is checked for response within 10 percent of a known value

- Every two years, GPUN's dosimetry program is examined and recertified by the NIST (formally NBS) National Voluntary Laboratory Accreditation Program (NVLAP)

- Ten OCNGS REMP TLD stations have colocated quality control badges which are processed by an independent laboratory (Teledyne Brown Engineering). The results are compared against GPU Nuclear Panasonic TLD results

The environmental dosimeters were tested and qualified to the American National Standard Institute's (ANSI) Publication N545-1975 and the USNRC Regulatory Guide 4.13 (Ref. 14 and 15).

In addition to the OCNGS REMP, the Nuclear Regulatory Commission (NRC) and the New Jersey Department of Environmental Protection (NJDEP) also maintain surveillance programs in the OCNGS area. These programs provide independent assessments of radioactive releases and the radiological impact on the surrounding environment. The results from these programs have been consistent with the results from the OCNGS REMP.

TABLE 3
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
OYSTER CREEK NUCLEAR GENERATING STATION
JANUARY, 1995 THROUGH DECEMBER, 1995

THE FOLLOWING PAGES ARE A SUMMARY OF REMP DATA FOR THE SCHEDULED COLLECTION PERIOD JANUARY, 1995 THROUGH DECEMBER, 1995. DATA* ARE SUMMARIZED ON AN ANNUAL BASIS, WHERE:

SAMPLE TYPE -> Media being analyzed.

ANALYSIS -> Type of analysis being performed on the particular media.

OF ANALYSES PERFORMED -> The total number of analyses performed for a particular sample type.

LLD -> The mean lower limit of detection. Please note that this value is based on samples whose results showed no detectable activity.

INDICATOR STATIONS -> The mean, minimum and maximum based on detectable activities of all indicator stations.

HIGHEST ANNUAL MEAN -> The mean, minimum and maximum based on detectable activities of the station with the highest annual mean.

Station -> The station designation with the highest annual mean.

BACKGROUND STATIONS -> The mean, minimum and maximum based on detectable activities of all background stations.

(N/TOT) -> The fraction of detectable activities/Total number of analyses performed.

BACKGROUND STATIONS AT OCNGS

STATION(S):	A, C, H, 14	31, 94	1	36
SAMPLE TYPE(S):	AIR PARTICULATE AIR IODINE	SEDIMENT CLAMS SURFACE WATER FISH** BLUE CRAB**	WELL WATER	VEGETABLES

* An asterisk (*) indicates no data.

** Station 94 only.

TABLE 3
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
OYSTER CREEK NUCLEAR GENERATING STATION
JANUARY, 1995 THROUGH DECEMBER, 1995
ANNUAL SUMMARY

SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
AIR PARTICULATE (pCi/m3)	Gross Beta		336	No LLD Reported	7.30E-03	1.48E-02	2.40E-02	(234/234)	9.00E-03	1.57E-02	2.10E-02 Station-# 4	(26/26)	8.00E-03	1.54E-02	2.20E-02	(102/102)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Ba-140	52	5.12E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Be-7	52	No LLD Reported	4.55E-02	6.42E-02	7.65E-02	(36/36)	6.65E-02	7.00E-02	7.45E-02 Station-# 1	(4/4)	4.70E-02	6.15E-02	6.80E-02	(16/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Co-58	52	8.15E-04	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Co-60	52	8.87E-04	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Cs-134	52	6.67E-04	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Cs-137	52	7.23E-04	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Fe-59	52	1.81E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	I-131	52	2.12E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	K-40	52	1.25E-02	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	La-140	52	2.28E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Mn-54	52	7.35E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Nb-95	52	1.06E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Ra-226	52	1.17E-02	1.00E-02	1.00E-02	1.00E-02	(1/36)	1.00E-02	1.00E-02	1.00E-02 Station-# 66	(1/4)	1.10E-02	1.10E-02	1.10E-02	(1/16)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station #	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Th-232	52	3.04E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Zn-65	52	1.90E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR PARTICULATE (pCi/m3)	Gamma Scan	Zr-95	52	1.40E-03	<LLD	<LLD	<LLD	(0/36)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
AIR IODINE (pCi/m3)	Iodine-131		670	1.72E-02	<LLD	<LLD	<LLD	(0/466)	<LLD	<LLD	<LLD	(0/52)	<LLD	<LLD	<LLD	(0/204)
SURFACE WATER (pCi/L)	Gamma Scan	Ba-140	48	1.03E+01	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Be-7	48	1.81E+01	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Co-58	48	2.15E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Co-60	48	2.50E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)

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ANNUAL SUMMARY

SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
SURFACE WATER (pCi/L)	Gamma Scan	Cs-134	48	2.01E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Cs-137	48	2.21E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Fe-59	48	5.04E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	I-131	48	3.79E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	K-40	48	No LLD Reported	1.80E+02	2.56E+02	3.50E+02	(32/32)	2.50E+02	2.65E+02	2.90E+02 Station-# 24	(4/4)	2.40E+02	2.77E+02	3.60E+02	(16/16)
SURFACE WATER (pCi/L)	Gamma Scan	La-140	48	4.15E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Mn-54	48	2.14E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Nb-95	48	2.51E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Ra-226	48	5.13E+01	8.00E+01	8.00E+01	8.00E+01	(1/32)	8.00E+01	8.00E+01	8.00E+01 Station-# 32	(1/4)	7.20E+01	7.20E+01	7.20E+01	(1/16)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station #	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
SURFACE WATER (pCi/L)	Gamma Scan	Th-232	48	8.71E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Zn-65	48	5.00E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
SURFACE WATER (pCi/L)	Gamma Scan	Zr-95	48	3.96E+00	<LLD	<LLD	<LLD	(0/32)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/16)
WELL WATER (pCi/L)	Tritium		12	1.55E+02	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Ba-140	12	8.00E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Be-7	12	1.39E+01	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Co-58	12	1.78E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Co-60	12	1.88E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Cs-134	12	1.57E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
WELL WATER (pCi/L)	Gamma Scan	Cs-137	12	1.73E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Fe-59	12	3.58E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	I-131	12	2.76E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	K-40	12	2.37E+01	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	La-140	12	3.27E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Mn-54	12	1.59E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Nb-95	12	1.95E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Ra-226	12	4.33E+01	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Th-232	12	6.50E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
WELL WATER (pCi/L)	Gamma Scan	Zn-65	12	3.58E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
WELL WATER (pCi/L)	Gamma Scan	Zr-95	12	2.99E+00	<LLD	<LLD	<LLD	(0/8)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)
CABBAGE (pCi/kg(WET))	Gamma Scan	Ba-140	6	5.17E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Be-7	6	1.00E+02	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Co-58	6	1.17E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Co-60	6	1.62E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Cs-134	6	1.25E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Cs-137	6	1.28E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Fe-59	6	3.13E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
CABBAGE (pCi/kg(WET))	Gamma Scan	I-131	6	1.45E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	K-40	6	No LLD Reported	2.10E+03	2.60E+03	3.00E+03	(4/4)	2.70E+03	2.85E+03	3.00E+03 Station-# 66	(2/2)	2.30E+03	2.80E+03	3.30E+03	(2/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	La-140	6	1.87E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Mn-54	6	1.42E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Nb-95	6	1.57E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Ra-226	6	2.47E+02	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Th-232	6	5.83E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Zn-65	6	3.50E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)
CABBAGE (pCi/kg(WET))	Gamma Scan	Zr-95	6	2.30E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/2)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
COLLARD (pCi/kg(WET))	Gamma Scan	Ba-140	15	4.13E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Be-7	15	1.03E+02	7.90E+01	1.23E+02	1.80E+02	(5/10)	9.70E+01	1.39E+02	1.80E+02 Station-# 66	(2/5)	4.40E+02	4.40E+02	4.40E+02	(1/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Co-58	15	1.12E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Co-60	15	1.36E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Cs-134	15	1.03E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Cs-137	15	1.16E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Fe-59	15	2.67E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	I-131	15	1.31E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	K-40	15	No LLD Reported	2.30E+03	3.22E+03	3.90E+03	(10/10)	2.60E+03	3.36E+03	3.90E+03 Station-# 66	(5/5)	3.20E+03	4.00E+03	5.70E+03	(5/5)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station #	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
COLLARD (pCi/kg(WET))	Gamma Scan	La-140	15	1.59E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Mn-54	15	1.23E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Nb-95	15	1.23E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Ra-226	15	2.21E+02	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Th-232	15	4.80E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Zn-65	15	3.72E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
COLLARD (pCi/kg(WET))	Gamma Scan	Zr-95	15	1.98E+01	<LLD	<LLD	<LLD	(0/10)	<LLD	<LLD	<LLD	(0/5)	<LLD	<LLD	<LLD	(0/5)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Ba-140	9	6.11E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Be-7	9	1.04E+02	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Co-58	9	1.32E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Co-60	9	1.59E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Cs-134	9	1.21E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Cs-137	9	1.31E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Fe-59	9	3.31E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	I-131	9	2.18E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	K-40	9	No LLD Reported	1.90E+03	2.57E+03	3.20E+03	(6/6)	1.90E+03	2.70E+03	3.20E+03 Station-# 33	(3/3)	2.40E+03	2.57E+03	2.70E+03	(3/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	La-140	9	2.17E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Mn-54	9	1.38E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Nb-95	9	1.53E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Ra-226	9	2.46E+02	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Th-232	9	7.00E+01	5.40E+01	7.70E+01	1.20E+02	(4/6)	6.60E+01	8.47E+01	1.20E+02 Station-# 93	(3/3)	4.70E+01	7.35E+01	1.00E+02	(2/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Zn-65	9	3.33E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
BLUE CRAB (pCi/kg(WET))	Gamma Scan	Zr-95	9	2.19E+01	<LLD	<LLD	<LLD	(0/6)	<LLD	<LLD	<LLD	(0/3)	<LLD	<LLD	<LLD	(0/3)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Ba-140	1	6.00E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Be-7	1	1.00E+02	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Co-58	1	1.40E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Co-60	1	1.70E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station #	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Cs-134	1	1.20E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Cs-137	1	1.40E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Fe-59	1	3.00E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	I-131	1	1.70E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	K-40	1	No LLD Reported	*	*	*	(*/*)	*	*	*	(*/*)	2.60E+03	2.60E+03	2.60E+03	(1/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	La-140	1	2.00E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Mn-54	1	1.30E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Nb-95	1	1.60E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Ra-226	1	2.00E+02	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station #	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Th-232	1	7.00E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Zn-65	1	4.00E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
AMERICAN EEL (pCi/kg(WET))	Gamma Scan	Zr-95	1	2.00E+01	*	*	*	(*/*)	*	*	*	(*/*)	<LLD	<LLD	<LLD	(0/1)
CLAMS (pCi/kg(WET))	Gamma Scan	Ba-140	20	4.10E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Be-7	20	7.15E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Co-58	20	8.50E+00	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Co-60	20	1.08E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Cs-134	20	7.65E+00	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Cs-137	20	8.65E+00	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
CLAMS (pCi/kg(WET))	Gamma Scan	Fe-59	20	2.15E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	I-131	20	1.43E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	K-40	20	No LLD Reported	1.00E+03	1.38E+03	1.70E+03	(12/12)	1.30E+03	1.45E+03	1.70E+03 Station-#	(4/4) 24	1.10E+03	1.51E+03	1.80E+03	(8/8)
CLAMS (pCi/kg(WET))	Gamma Scan	La-140	20	1.59E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Mn-54	20	8.80E+00	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Nb-95	20	1.04E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Ra-226	20	1.69E+02	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Th-232	20	3.65E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
CLAMS (pCi/kg(WET))	Gamma Scan	Zn-65	20	2.07E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
CLAMS (pCi/kg(WET))	Gamma Scan	Zr-95	20	1.52E+01	<LLD	<LLD	<LLD	(0/12)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
TAUTOG (pCi/kg(WET))	Gamma Scan	Ba-140	1	3.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Be-7	1	5.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Co-58	1	7.00E+00	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Co-60	1	9.00E+00	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Cs-134	1	6.00E+00	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Cs-137	1	8.00E+00	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Fe-59	1	1.80E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	I-131	1	1.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
TAUTOG (pCi/kg(WET))	Gamma Scan	K-40	1	No LLD Reported	4.10E+03	4.10E+03	4.10E+03	(1/1)	4.10E+03	4.10E+03	4.10E+03 Station-# 93	(1/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	La-140	1	1.20E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Mn-54	1	7.00E+00	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Nb-95	1	7.00E+00	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Ra-226	1	1.30E+02	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Th-232	1	3.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Zn-65	1	2.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
TAUTOG (pCi/kg(WET))	Gamma Scan	Zr-95	1	1.20E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Ba-140	4	6.25E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Be-7	4	8.25E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Co-58	4	1.20E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Co-60	4	1.38E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Cs-134	4	1.05E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Cs-137	4	1.38E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Fe-59	4	3.18E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	I-131	4	2.35E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	K-40	4	No LLD Reported	3.60E+03	4.53E+03	5.60E+03	(4/4)	3.60E+03	4.53E+03	5.60E+03 Station-# 93	(4/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	La-140	4	2.08E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)

TABLE 3
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
OYSTER CREEK NUCLEAR GENERATING STATION
JANUARY, 1995 THROUGH DECEMBER, 1995
ANNUAL SUMMARY

SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Mn-54	4	1.23E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Nb-95	4	1.40E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Ra-226	4	2.05E+02	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Th-232	4	5.25E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Zn-65	4	3.43E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
STRIPED BASS (pCi/kg(WET))	Gamma Scan	Zr-95	4	1.98E+01	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/4)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Ba-140	2	8.50E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Be-7	2	1.35E+02	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Co-58	2	2.00E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS MIN	MEAN	MAX	(N/TOT)	HIGHEST ANNUAL MEAN MIN	MEAN	MAX Station #	(N/TOT)	BACKGROUND STATIONS MIN	MEAN	MAX	(N/TOT)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Co-60	2	2.50E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Cs-134	2	1.65E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Cs-137	2	1.95E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Fe-59	2	5.00E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	I-131	2	3.00E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	K-40	2	No LLD Reported	3.80E+03	3.85E+03	3.90E+03	(2/2)	3.90E+03	3.90E+03	3.90E+03 Station-#	(1/1) 33	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	La-140	2	4.00E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Mn-54	2	1.95E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station #	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Nb-95	2	2.00E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Ra-226	2	3.50E+02	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Th-232	2	8.50E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Zn-65	2	6.00E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
BLOWFISH (pCi/kg(WET))	Gamma Scan	Zr-95	2	3.50E+01	<LLD	<LLD	<LLD	(0/2)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Ba-140	1	5.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Be-7	1	9.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Co-58	1	1.10E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)

TABLE 3
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
OYSTER CREEK NUCLEAR GENERATING STATION
JANUARY, 1995 THROUGH DECEMBER, 1995
ANNUAL SUMMARY

SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Co-60	1	1.70E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Cs-134	1	1.10E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Cs-137	1	1.30E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Fe-59	1	3.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	I-131	1	1.50E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	K-40	1	No LLD Reported	3.30E+03	3.30E+03	3.30E+03	(1/1)	3.30E+03	3.30E+03	3.30E+03 Station-#	(1/1) 93	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	La-140	1	1.90E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Mn-54	1	1.50E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)

TABLE 3
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OYSTER CREEK NUCLEAR GENERATING STATION
JANUARY, 1995 THROUGH DECEMBER, 1995
ANNUAL SUMMARY

SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Nb-95	1	1.50E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Ra-226	1	2.00E+02	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Th-232	1	5.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Zn-65	1	3.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
WEAKFISH (pCi/kg(WET))	Gamma Scan	Zr-95	1	2.00E+01	<LLD	<LLD	<LLD	(0/1)	<LLD	<LLD	<LLD	(0/1)	*	*	*	(*/*)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Ba-140	32	7.38E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Be-7	32	1.17E+02	1.10E+02	4.10E+02	1.60E+03	(6/24)	1.60E+03	1.60E+03	1.60E+03 Station-# 32	(1/4)	7.60E+01	1.70E+02	3.30E+02	(5/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Co-58	32	1.24E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)

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SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS				HIGHEST ANNUAL MEAN				BACKGROUND STATIONS			
					MIN	MEAN	MAX	(N/TOT)	MIN	MEAN	MAX Station-#	(N/TOT)	MIN	MEAN	MAX	(N/TOT)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Co-60	32	1.48E+01	1.40E+01	2.33E+01	4.10E+01	(4/24)	1.40E+01	2.75E+01	4.10E+01 Station-# 33	(2/4)	<LLD	<LLD	<LLD	(0/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Cs-134	32	1.12E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Cs-137	32	1.46E+01	9.40E+00	6.71E+01	1.30E+02	(14/24)	9.10E+01	1.01E+02	1.20E+02 Station-# 93	(4/4)	1.30E+01	2.18E+01	3.20E+01	(4/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Fe-59	32	3.01E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	I-131	32	2.82E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	K-40	32	No LLD Reported	9.10E+02	4.18E+03	1.40E+04	(24/24)	1.80E+03	7.45E+03	1.40E+04 Station-# 32	(4/4)	7.30E+03	1.20E+04	1.70E+04	(8/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	La-140	32	2.40E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)

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ANNUAL SUMMARY

SAMPLE TYPE	ANALYSIS	NUCLIDE	# OF ANAL. PERF.	LLD	INDICATOR STATIONS MIN	MEAN	MAX	(N/TOT)	HIGHEST ANNUAL MEAN MIN	MEAN	MAX Station-#	(N/TOT)	BACKGROUND STATIONS MIN	MEAN	MAX	(N/TOT)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Mn-54	32	1.32E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Nb-95	32	1.71E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Ra-226	32	No LLD Reported	5.10E+02	1.07E+03	1.70E+03	(24/24)	1.20E+03	1.35E+03	1.60E+03 Station-# 93	(4/4)	4.60E+02	1.13E+03	1.80E+03	(8/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Th-232	32	No LLD Reported	1.70E+02	4.14E+02	7.80E+02	(24/24)	4.10E+02	5.10E+02	6.30E+02 Station-# 93	(4/4)	2.20E+02	5.40E+02	8.90E+02	(8/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Zn-65	32	3.19E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)
AQUATIC SEDIMENT (pCi/kg(DRY))	Gamma Scan	Zr-95	32	2.41E+01	<LLD	<LLD	<LLD	(0/24)	<LLD	<LLD	<LLD	(0/4)	<LLD	<LLD	<LLD	(0/8)

DIRECT RADIATION MONITORING

Dose rates from external radiation sources were measured at a number of locations in the vicinity of the OCNGS using thermoluminescent dosimeters (TLDs). Naturally occurring sources, including radiation of cosmic origin and natural radioactive materials in the air and ground, as well as fallout from prior nuclear weapon testing, resulted in a certain amount of penetrating radiation being recorded at all monitoring locations. Indicator TLDs were placed systematically with at least one station in each of 16 cardinal compass sectors (in a ring) at a maximum distance of 1.5 miles from the OCNGS. TLDs were also placed within a five mile radius of the OCNGS, in locations where the potential for deposition of radioactivity was determined to be high, in areas of public interest, population centers, as well as in background locations which are typically greater than ten miles distant from the OCNGS and generally in an upwind direction.

Sample Collection and Analysis

A state-of-the-art thermoluminescent dosimeter is used. Thermoluminescence is a process in which ionizing radiation, upon interacting with the sensitive material of the TLD (the phosphor or 'element') causes some of the energy deposited in the phosphor to be stored in stable 'traps' in the TLD material. These TLD traps are so stable that they do not decay appreciably over the course of years. This provides an excellent method of integrating the exposure received over a period of time. The energy stored in the TLDs as a result of interactions with radiation is removed and measured by a controlled heating process in a calibrated reading system. As the TLD is heated, the phosphor releases the stored energy as light. The amount of light given off is directly proportional to the radiation dose the TLD received. The reading process 'zeros' the TLD and prepares it for reuse.

The TLDs in use for environmental monitoring at the OCNGS are capable of accurately measuring exposures between 1 mRem (well below normal environmental levels for the quarterly monitoring periods) and 1000 Rem.

During 1995, TLD's were collected quarterly from locations ranging from less than 0.2 miles to 35.1 miles from the OCNGS. Four GPUN Panasonic TLD's were exposed at each of 71 monitoring locations. Two of the 71 monitoring locations are collocated and were used as quality assurance (QA) stations, at which four additional GPUN Panasonic TLD's were exposed. In addition, Teledyne Brown Engineering TLD's were exposed at ten selected locations which have been designated as quality control stations. GPUN Panasonic TLD's provide sixteen independent detectors at each station. Teledyne Brown Engineering TLD's provide an additional four measurements.

TLD's were exposed quarterly. The scheduled exposure periods for 1995 were:

Table 4
TLD EXPOSURE PERIODS
DURING 1995

Start Date	Collection Date
19 DEC 94	06 MAR 95
06 MAR 95	12 JUN 95
12 JUN 95	05 SEP 95
05 SEP 95	27 NOV 95

All TLD dose rate data presented in this report have been normalized to eliminate differences caused by slightly differing exposure periods. All results are normalized to a standard quarter (91.3 days). TLD dose rate data are presented in Tables J-1 and J-2 in Appendix J.

Results

In 1995, the mean dose rate from indicator stations using Panasonic TLDs was 10.7 mRem/standard quarter with a range from 8.2 to 16.5 mRem/standard quarter (Table J-2). The mean background dose was 11.3 mRem/standard quarter with doses ranging from 9.5 to 13.3 mRem/standard quarter. The mean background dose exceeded the mean indicator dose suggesting OCNGS had little if any affect on off-site exposure. These results are consistent with the results of measurements from previous years (Fig. 8).

Mean dose rates were slightly higher at locations within 2 miles of the OCNGS when compared with locations greater than 2 miles away (Fig. 9). Considering that the standard deviation of the mean dose rate was as high as 4.5 mRem/standard quarter, the data indicate that there is no statistically significant relationship between dose rates and distance from the OCNGS (Fig. 9).

Regarding Teledyne Brown Engineering TLD data, the dose rate measured at indicator stations averaged 10.6 mRem/standard quarter and ranged from 8.8 to 12.1 mRem/standard quarter (Table J-1). The dose at background TLD stations averaged 12.1 mRem/standard quarter and ranged from 10.1 to 15.2 mRem/standard quarter. The mean dose rate from the background stations was higher than the mean dose rate from the indicator stations again suggesting that OCNGS operation contributed little if any to off-site exposure.

A comparison of dose per affected compass sector demonstrates that the highest dose was not measured in the sector most likely to be affected by effluents from the OCNGS (Fig. 10).

MEAN PANASONIC TLD GAMMA DOSE - 1989 THROUGH 1995
OYSTER CREEK RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
DOSE IN MILLIREM PER STANDARD QUARTER

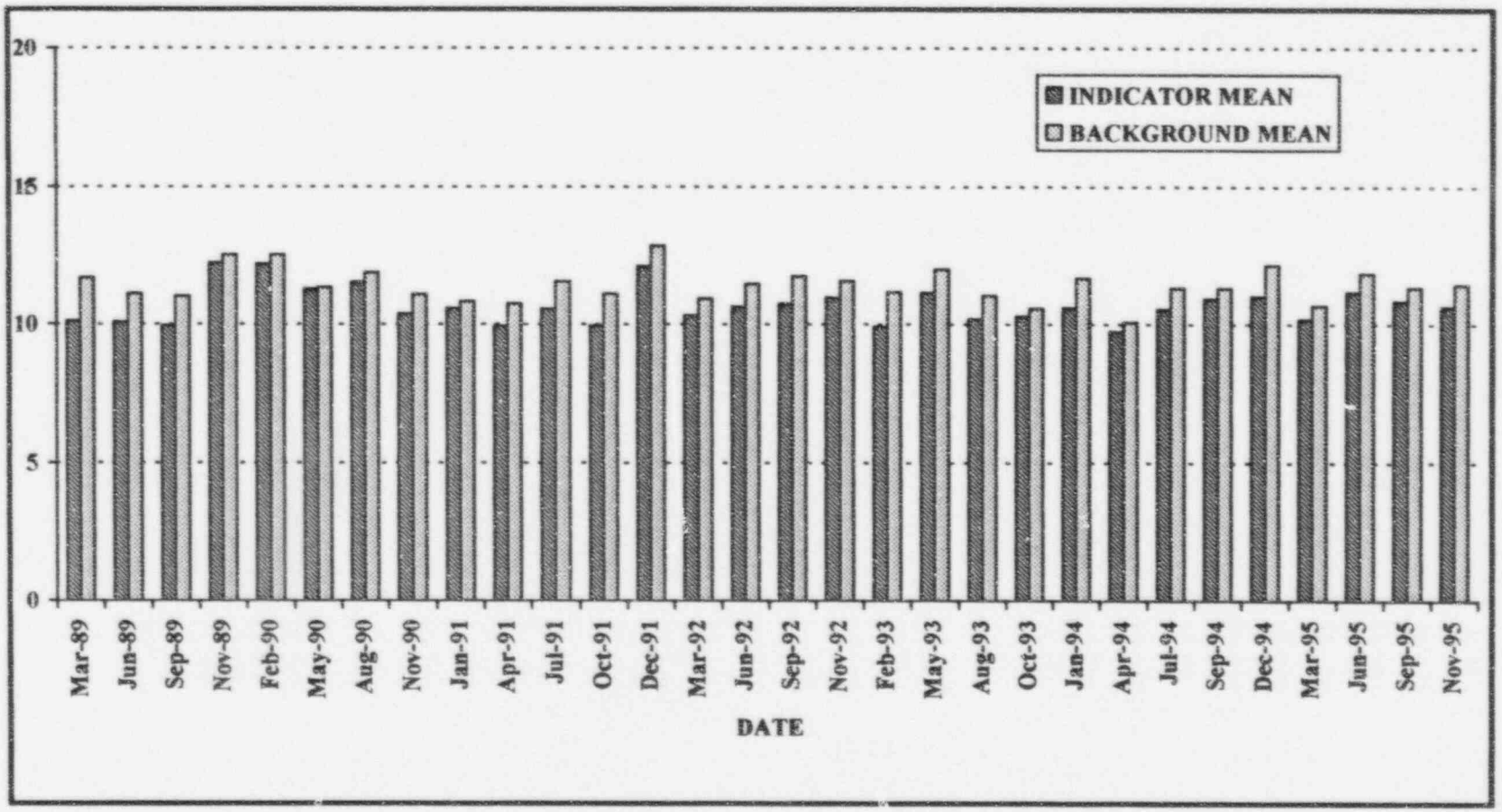


FIGURE 8

MEAN PANASONIC TLD GAMMA DOSE FOR 1995
BASED ON DISTANCE FROM OCNGS
OYSTER CREEK RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
DOSE IN MILLIREM PER STANDARD QUARTER

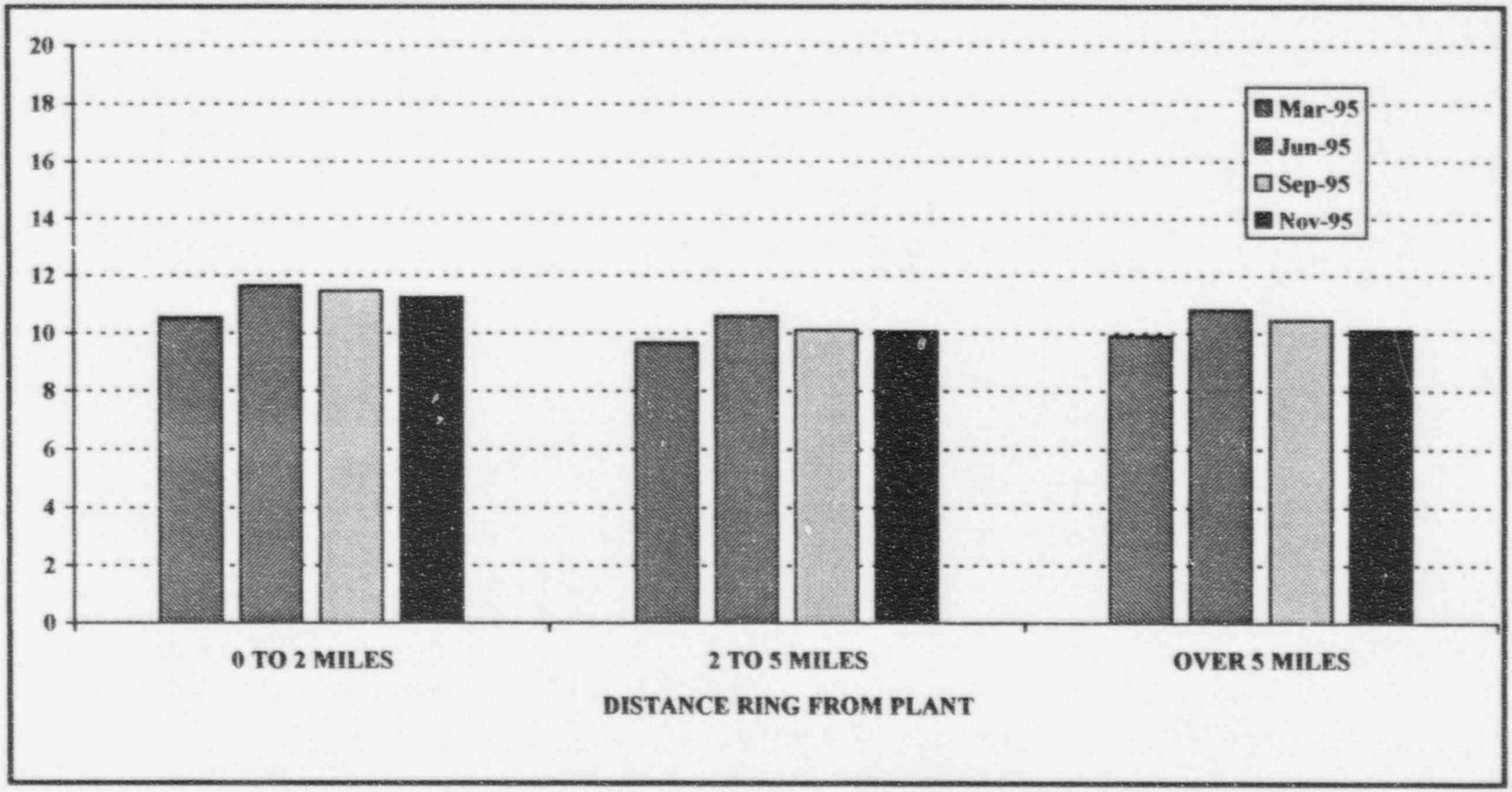


FIGURE 9

MEAN TELEDYNE AND PANASONIC TLD GAMMA DOSE FOR 1995
OYSTER CREEK RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
MEAN DOSE IN AFFECTED COMPASS SECTOR
DOSE IN MILLIREM PER STANDARD QUARTER

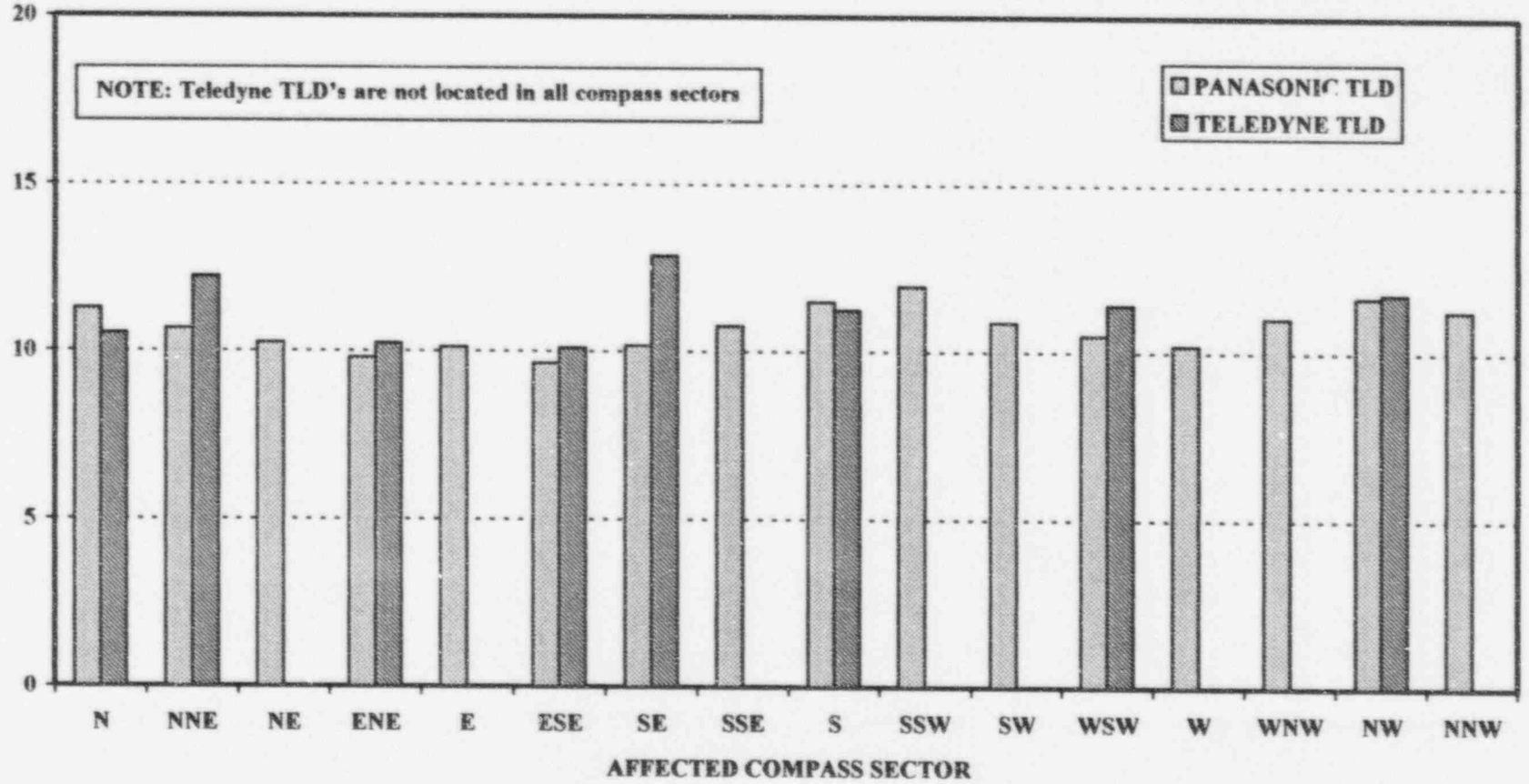


FIGURE 10

Using Panasonic TLD results, the data indicate that the south-southwest sector had the highest dose during 1995. Based upon on-site meteorology for 1995, the highest air dispersion (X/Q) factors were in the east-southeast sector and the highest dose due to OCNGS effluents should have been recorded in this sector. However, the highest dose was recorded in the south-southwest sector, which is 90 degrees opposite from the east-southeast sector. In addition, the lowest mean dose of the sixteen sectors surrounding the OCNGS was recorded in the east-southeast sector, which is further evidence that the OCNGS had little if any effect on off-site exposure.

These results also indicate good correlation between the dose as recorded by the two independent TLD networks at the ten collocated stations (Figure 10). This is further demonstrated by a statistical comparison of the data from the collocated stations of the two networks in which only 4 of 38 results fell outside the established control limit (Figure 11).

PERCENT ERROR - QUALITY CONTROL
SELECTED TLD STATIONS - PANASONIC AND TELEDYNE NETWORKS - 1995
OYSTER CREEK RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

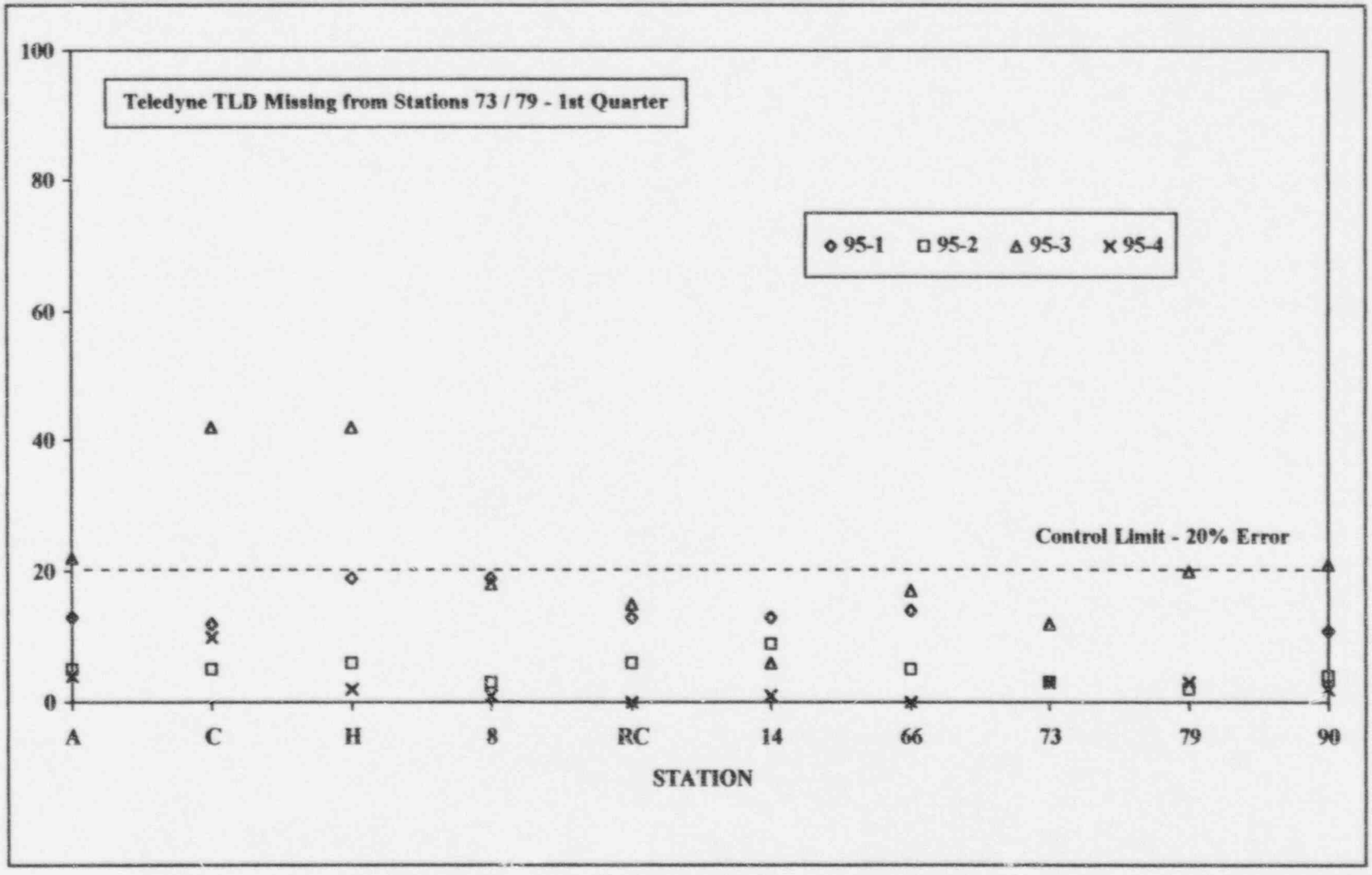


FIGURE 11

ATMOSPHERIC MONITORING

A potential exposure pathway to man is the inhalation and ingestion of airborne radioactive materials. Air was sampled by a network of thirteen continuously operating air samplers and then analyzed for radioactivity content.

Indicator air sampling stations are located in prevailing downwind directions, local population areas, and areas of public and special interest. All indicator stations are located within 6.5 miles of the OCNGS. Background air sampling stations are located greater than 17 miles from the site in Lakewood, Allenhurst, Cookstown, and Hammonton, NJ.

Sample Collection and Analysis

Mechanical air samplers are used to continuously draw a recorded volume of air first through a glass fiber (particulate) filter and then through a charcoal cartridge. A dry gas meter, which is temperature compensated, is used in line with the filters to record the volume of air sampled. Internal vacuums are also measured in order to pressure correct the indicated volume. All air samplers are maintained and calibrated by the OCNGS instrument and control department.

The particulate filters were collected every two weeks and analyzed for gross beta radioactivity. The filters were then combined quarterly by individual station locations and analyzed for gamma-emitting radionuclides.

Charcoal cartridges, used to collect gaseous radioiodines, contain activated charcoal. Charcoal cartridges were collected weekly and analyzed for iodine-131 (I-131) activity.

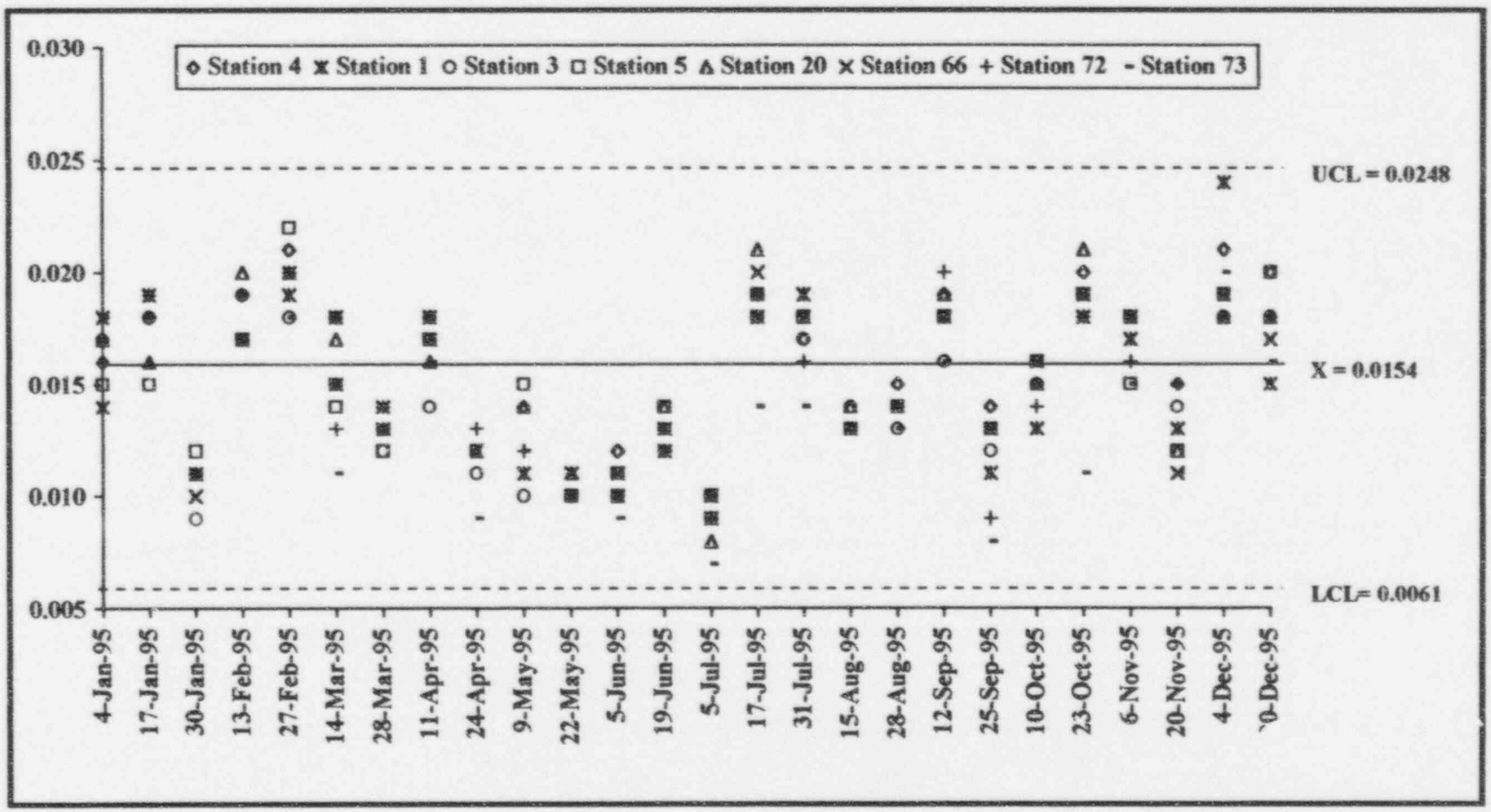
Results

The results of the atmospheric monitoring during 1995 demonstrated that, as in previous years, the radioactive airborne effluents associated with the OCNGS did not have any measurable effects on the environment.

During 1995, 336 gross beta analyses were performed on air particulate filters (Table 3). Two samples were lost due to sampler malfunction (Appendix A-3). The background mean gross beta activity (0.0154 pCi/m^3) was slightly higher than the indicator mean (0.0148 pCi/m^3) and all gross beta analysis results were within two standard deviations of the historical mean. A quality control check of indicator station results shows that all of the 208 observations were within statistical limits (Figure 12).

Comparison of the 1995 bi-weekly mean air particulate gross beta concentrations for indicator and background stations shows that indicator and background concentrations were essentially identical (Figure 13). These results are consistent with the results of gross beta analyses of air samples from previous years (Figure 14). The air particulate gross beta analysis results indicate that effluent containing gross beta radioactivity from OCNGS operation did not have any measurable impact on the local environment.

MEASUREMENT AND MOVING RANGE CHART - QUALITY CONTROL
INDICATOR STATIONS COMPARED TO BACKGROUND LIMITS
AIR PARTICULATE GROSS BETA - 1995
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
RESULTS IN PICOCURIES PER CUBIC METER



NOTE: Upper (UCL) and lower (LCL) control limits computed from the background stations (A, C, H, and 14) using 3-sigma limits

FIGURE 12

WEEKLY MEAN AIR PARTICULATE GROSS BETA CONCENTRATIONS FOR 1995
OYSTER CREEK RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
RESULTS IN PICOCURIES PER CUBIC METER

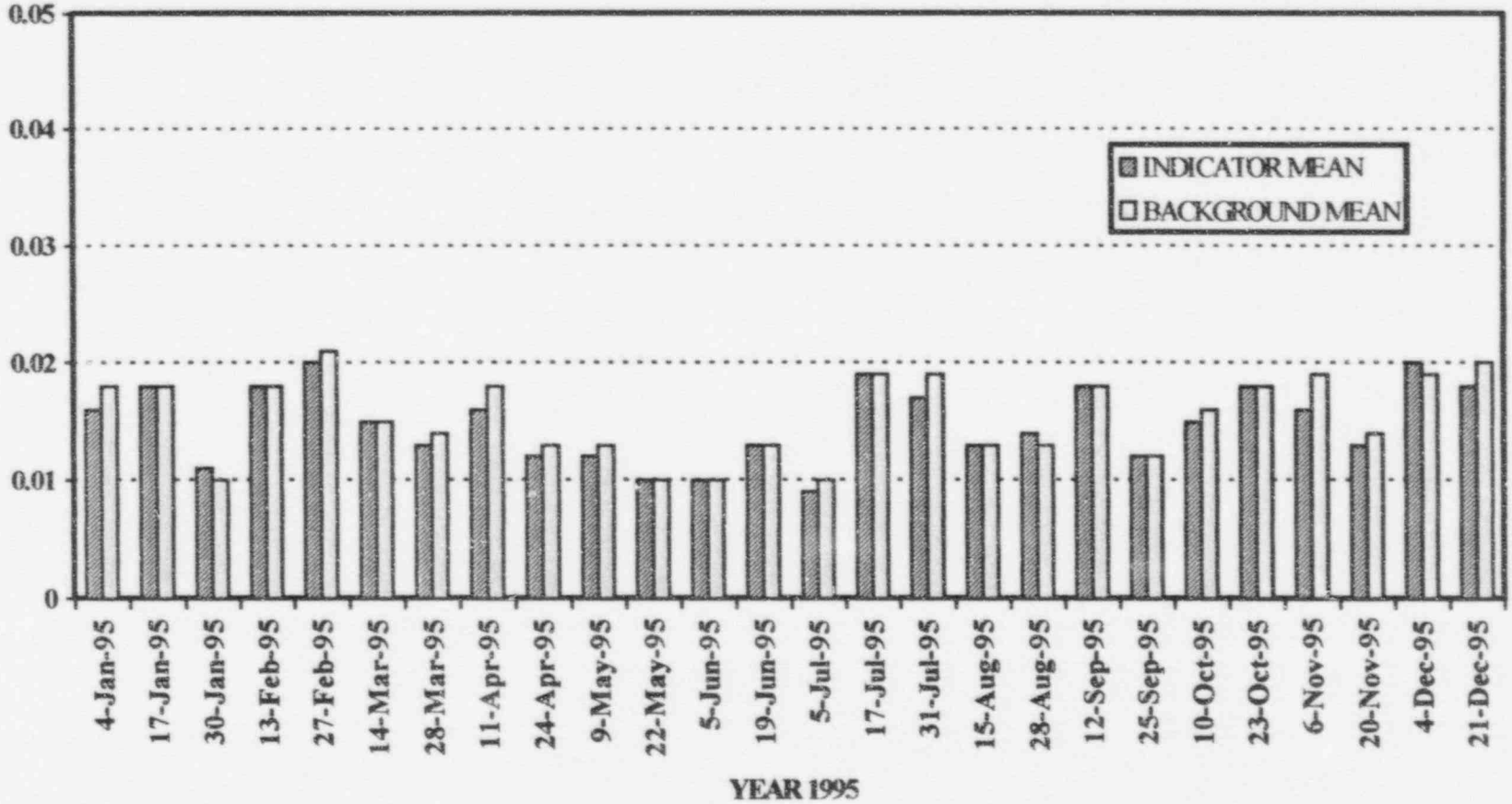


FIGURE 13

MONTHLY MEAN AIR PARTICULATE GROSS BETA CONCENTRATIONS
1986 THROUGH 1995
OYSTER CREEK RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
RESULTS IN PICOCURIES PER CUBIC METER

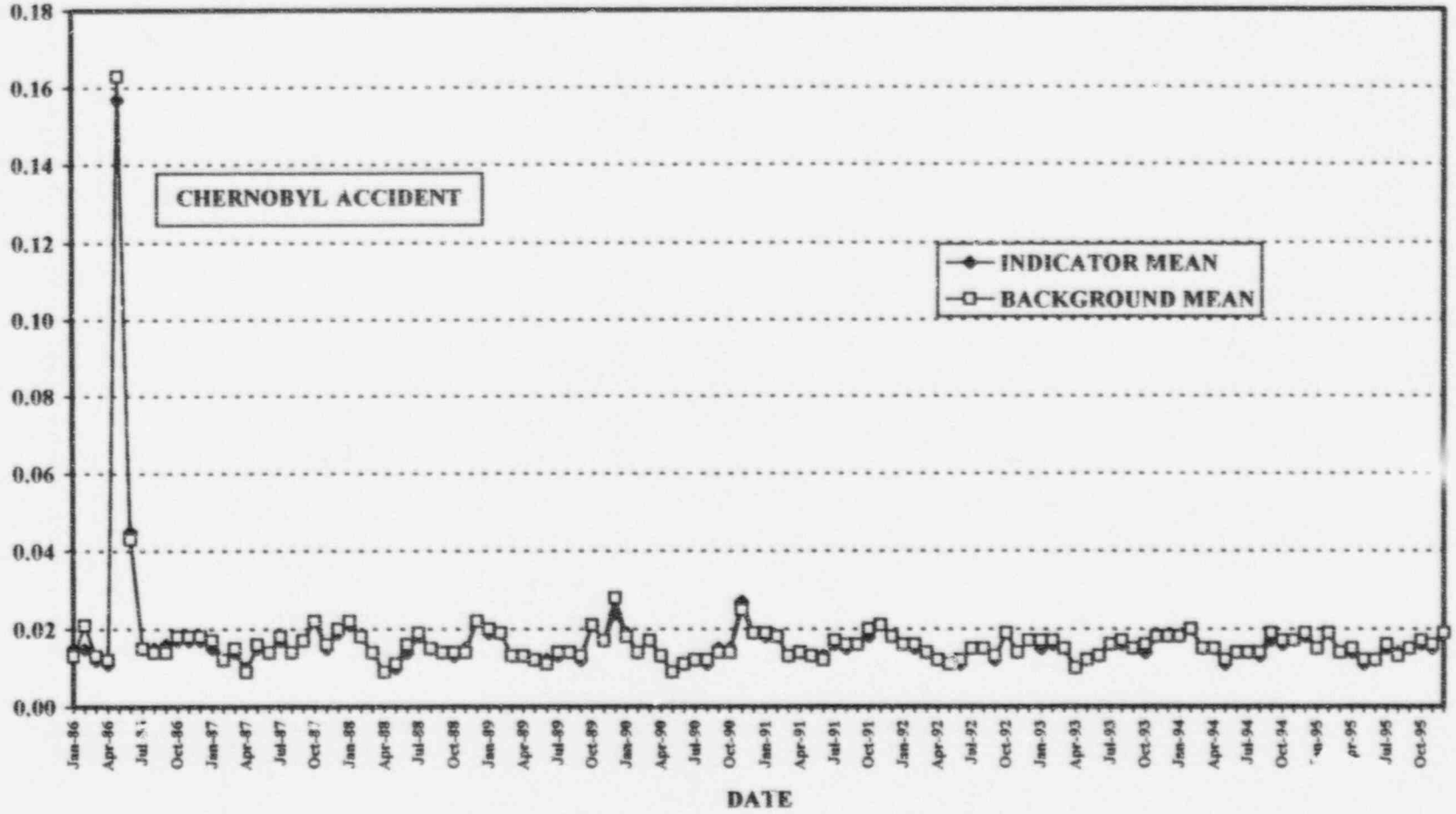


FIGURE 14

Gamma isotopic analyses were performed on 52 air particulate filter composites (Table 3). The only radionuclides identified were naturally occurring beryllium-7 and radium-226, which were seen in similar concentrations at both indicator and background stations. Because they are naturally occurring nuclides, the detected radioactive concentrations cannot be attributed to effluents from the OCNGS.

Air charcoal cartridges (670) were analyzed for iodine-131 (I-131) and no radioiodine was detected in any of the samples (Table 3). Six samples were lost due to sampler malfunction (Appendix A-3).

AQUATIC MONITORING

Brackish water from Barnegat Bay is drawn in through the south branch of Forked River, pumped into the OCNGS cooling systems, and then discharged to Barnegat Bay via Oyster Creek. Fish, clams, and crabs are harvested from the bay on a recreational and, to a limited extent, commercial basis. The ingestion pathway is addressed because of fish, clam, and crab consumption by man.

On occasion, a radioactive liquid release is discharged in accordance with the limits established in the OCNGS Offsite Dose Calculation Manual (ODCM) Specifications, Technical Specifications, and 10CFR20. Highly purified water, containing traces of radioactivity, may be discharged into Oyster Creek which has a minimum flow rate of slightly under one-half million gallons per minute. There was one radioactive liquid release (totalling 40 gallons) from the OCNGS during 1995. Samples of surface water, sediment, fish, blue crab, and hard clams were routinely collected from the OCNGS intake and discharge canals, as well as Barnegat Bay, Manahawkin Bay, and Great Bay/Little Egg Harbor in order to monitor any environmental impact that may be associated with past releases.

Sample Collection and Analysis

Surface water samples from two stations were collected monthly while an additional six stations were sampled on a quarterly basis. Sediment and clam samples were collected quarterly. Grab samples of surface water and sediment were collected from six indicator stations and two background stations. Grab samples of clams were collected from three indicator and two background stations. Three indicator stations for surface water and sediment are located in the OCNGS discharge canal - Oyster Creek. No clams are available for collection at these stations. Three additional indicator stations are located in

Barnegat Bay in close proximity to the mouth of Oyster Creek. One background station is located in Manahawkin Bay, approximately 11 miles south of the OCNGS. A second background station is located approximately 22 miles south of the OCNGS in Great Bay/Little Egg Harbor.

Blue crab and fish samples were collected quarterly (when available) from two indicator stations and one background station. Both indicator stations are located in the OCNGS discharge canal and the background station is located in Great Bay/Little Egg Harbor. Crab pots were used to catch blue crab. Traps, as well as the hook and line technique, were used to catch fish.

All samples were analyzed for gamma-emitting nuclides.

Results

Operation of the OCNGS had no detectable effect upon the local surface water which was sampled 48 times at eight different locations during 1995. Two gamma-emitting nuclides, potassium-40 (K-40), and radium-226 (Ra-226), were detected in 48 and 2 of the samples, respectively (Table 3). Both of these radionuclides are naturally occurring and commonly found in salt water at or above the observed concentrations. No other radionuclides were detected in surface water samples.

Six gamma-emitting nuclides were detected in the 32 sediment samples collected during 1995 (Table 3). Four of these radionuclides, beryllium-7 (Be-7), potassium-40, radium-226, and thorium-232 (Th-232), are naturally occurring and were detected at both background and indicator stations. Cesium-137 (Cs-137), which is a fission product, was also detected in both background and indicator samples. Cesium-137 was widely distributed and detected in considerable abundance as a result of fallout following atmospheric weapons tests and

the 1986 Chernobyl accident. Cesium-137 was also released in small quantities from the OCNGS in liquid effluents in 1995 (Table 2), as well as in past years, most recently during 1991. The mean concentration of Cs-137 (67.1 pCi/kg (dry)), observed at indicator stations, is similar to the mean concentration seen at background stations in the recent past, most notably, 1991, 1990, and 1989. Mean concentrations of cesium-137 at background stations during these years were 63.2 pCi/kg (dry), 58.8 pCi/kg (dry), and 76.1 pCi/kg (dry), respectively. The presence of this radionuclide in both background and indicator samples, and the extremely small quantities released in effluents from the OCNGS, suggest that Cs-137 activity detected in Barnegat Bay sediments originated from past nuclear weapons testing and the Chernobyl accident, not OCNGS operation.

Cobalt-60 was detected in seventeen percent of the aquatic sediment indicator station samples and none of the background station samples (Table 3). The presence of this radionuclide in Barnegat Bay sediments is of interest because it can be attributed to past OCNGS liquid releases. As documented in previous reports, OCNGS-related cobalt-60 activity has been found in sediment and clams from Barnegat Bay since at least the mid-1970's. The volume of liquid effluents has been significantly reduced since that time and this decrease in the rate of input of cobalt-60 to the environment, combined with radioactive decay of the existing inventory, has resulted in a gradual decline in the cobalt-60 concentration in sediment and clams (Figs. 15 and 16). The last detectable concentration of this radionuclide was found in clams during the third quarter of 1987 (Fig. 16).

Twenty clam samples were collected from five different locations during 1995. Gamma isotopic analyses indicated that the only gamma-emitting nuclide present was potassium-40 which is naturally occurring and commonly found in salt water (Table 3).

MEAN COBALT-60 CONCENTRATION IN AQUATIC SEDIMENT - 1984 THROUGH 1995
OYSTER CREEK RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
RESULTS IN PICOCURIES PER KILOGRAM (DRY)

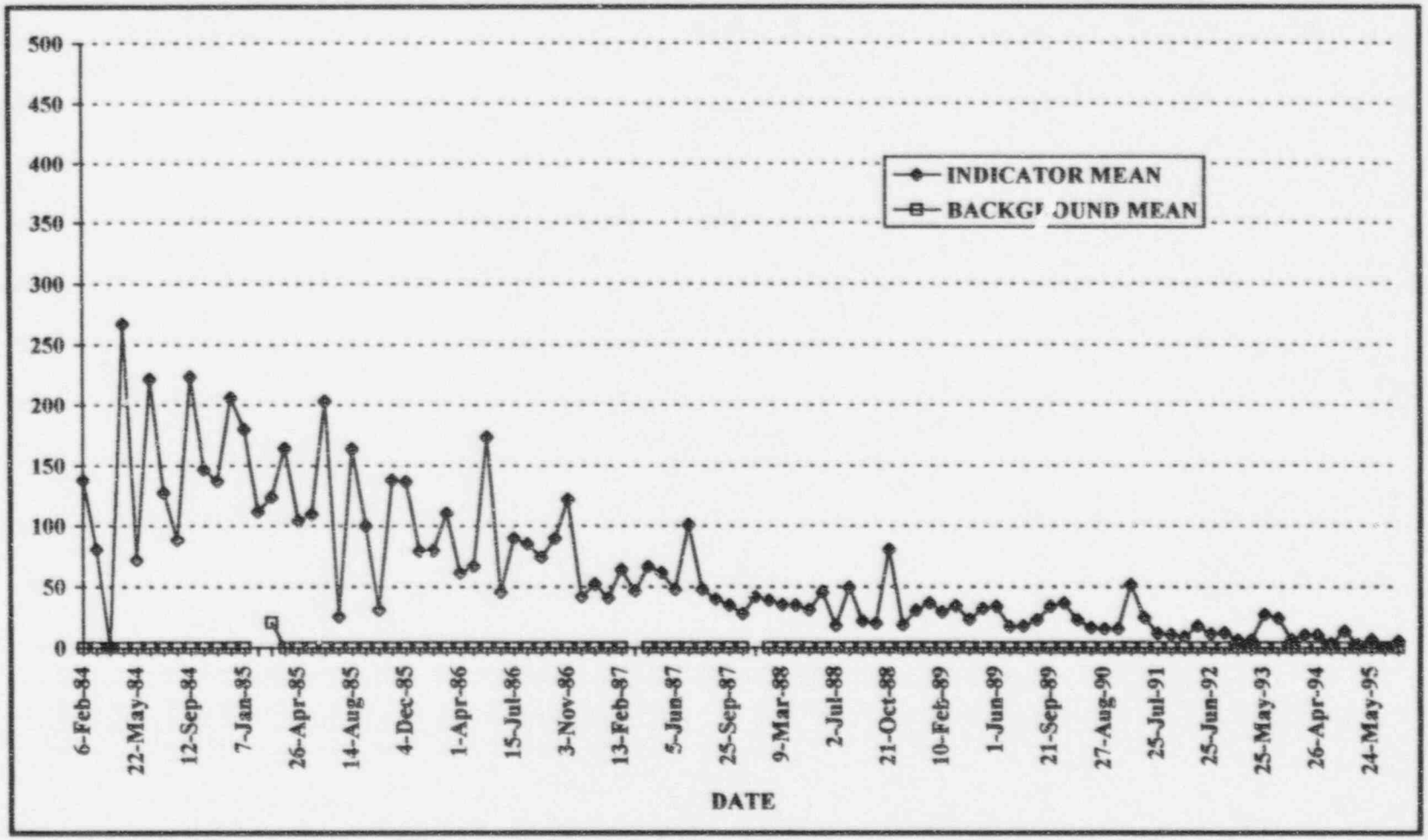


FIGURE 15

MEAN COBALT-60 CONCENTRATION IN CLAMS - 1984 THROUGH 1995
OYSTER CREEK RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
RESULTS IN PICOCURIES PER KILOGRAM (WET)

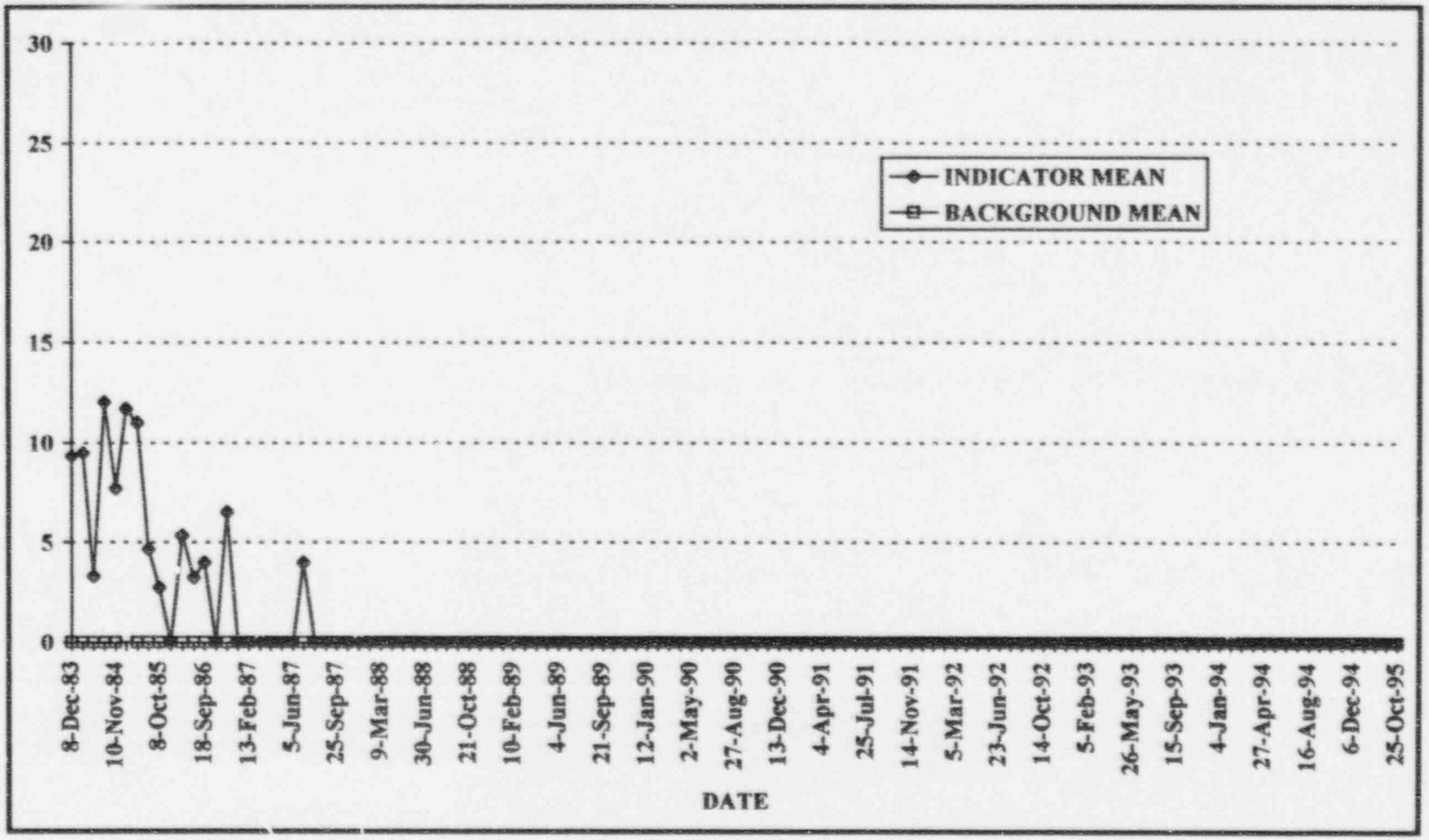


FIGURE 19

Nine blue crab samples were collected from three locations during 1995. A gamma isotopic analysis was performed on each sample and naturally occurring potassium-40 and thorium-232 were the only radionuclides identified (Table 3). The close association of this species with Barnegat Bay sediments could make it susceptible to cobalt-60 uptake. However, no detectable Co-60 activity has been observed in blue crab samples since routine collection began in 1985.

Nine fish samples, yielding five species, were collected from 3 sampling locations during 1995. The species and number of samples collected are listed below:

TABLE 5

SPECIES OF FISH CAUGHT AS PART OF THE OCNGS REMP IN 1995

Fish	Number of Samples
striped bass	4
blowfish	2
American eel	1
tautog	1
weakfish	1

Naturally occurring potassium-40 was detected in each of the 9 fish samples (Table 3). This was the only radionuclide detected.

TERRESTRIAL MONITORING

Radionuclides released to the atmosphere may be deposited on soil and vegetation and may be incorporated into milk, vegetables, and/or other food products. To assess the impact of dose to humans from the ingestion pathway, food product samples such as green leafy vegetables were collected and analyzed during 1995.

The contribution of radionuclides from the OCNGS operation was assessed by comparing the results of samples collected in prevalent downwind locations, primarily to the southeast of the site, with background samples collected from distant and generally upwind directions.

A dairy census was conducted to determine the locations of commercial dairy operations and milk producing animals in each of the 16 meteorological sectors out to a distance of five miles from the OCNGS. The census showed that there were no commercial dairy operations and no dairy animals producing milk for human consumption within a 5 mile radius of the plant (Appendix F).

Two gardens were maintained near the site boundary of the OCNGS in the two sectors with the highest potential for radioactive deposition in accordance with the ODCM Specifications (Ref 2). Both of these indicator gardens are greater than 50 square meters (500 square feet) in size and produce green leafy vegetables. A commercial farm located approximately 24 miles northwest of the site was used as a background station.

Sample Collection and Analysis

Broadleaf vegetables, specifically cabbage and collards, were collected on a monthly basis beginning in July and ending in November 1995. A gamma isotopic analysis was performed on each sample.

Results

The results of the terrestrial monitoring during 1995 demonstrated that the radioactive effluents associated with the OCNGS did not have any measurable effects on vegetation.

A gamma isotopic analysis was performed on fifteen collard samples and six cabbage samples (Table 3). Naturally occurring potassium-40 (K-40) was detected in all of the samples collected from both indicator and background stations. Another naturally occurring nuclide, beryllium-7 (Be-7), was identified in 5 of 10 collard samples collected from indicator stations and in 1 of 5 collard samples collected from background stations. No other radionuclides were detected in vegetable samples. Of the radionuclides detected, none are associated with OCNGS operation.

GROUNDWATER MONITORING

The Oyster Creek Nuclear Generating Station is located on the Atlantic Coastal Plain Physiographic Province. This Province extends southeastward from the Fall Zone, a topographic break that marks the boundary between the Atlantic Coastal Plain and the more rugged topography of the Piedmont Province. The Fall Zone is also where the crystalline and sedimentary rocks of the Piedmont and the unconsolidated coastal plain sediments meet.

At least five distinct bodies of fresh groundwater or aquifers exist in the vicinity of the OCNGS. From the surface downward, they are:

1. Unconfined, Recent and Upper Cape May Formation
2. Confined, Lower Cape May Formation
3. Confined, Cohansey Sand
4. Confined, Upper Zone in the Kirkwood Formation
5. Confined, Lower Zone in the Kirkwood Formation

The unconfined Recent and Cape May Formations are replenished directly by local precipitation. The recharge to the confined aquifers occurs primarily from direct rainfall penetration on the outcrop areas, which are generally to the west of the site at higher elevations.

Sample Collection and Analysis

As part of the routine REMP, three groundwater wells were sampled on a quarterly basis. Grab samples were obtained from two local Municipal Utility Authority wells and an on-site drinking water well. The Lacey Municipal Utility Authority combines water from three wells which are drilled to depths of 239', 248', and 267'. This sampling location is 2.2 miles

north-northeast of the OCNGS. A second sampling location is the Ocean Township Municipal Utility Authority well which is approximately 360' deep and located 1.6 miles from the OCNGS in a south-southwest direction. A third sampling location is the 380' deep well that supplies drinking water to the OCNGS. Each sample was subjected to a tritium and gamma isotopic analysis.

In addition, a well network installed around the OCNGS in 1983 to serve as an early detection and monitoring system for spills, was sampled in April and September, 1995. Grab sample methodology was used. This effort was separate from routine REMP. This network is comprised of fifteen wells which are located in the Cape May, Cohansey , and Kirkwood Aquifers. The samples were also analyzed for tritium and gamma emitting nuclides.

Results

The results of the groundwater monitoring during 1995 demonstrated that, as in previous years, the radioactive effluents associated with the OCNGS did not have any measurable effects on offsite groundwater quality.

Twelve routine REMP well water samples were collected during 1995. No radioactivity was detected in any of these samples (Table 3).

The results of the analyses of 30 samples from the onsite spill monitoring well network were similar to results seen in past years. Only the naturally occurring radionuclides tritium, potassium-40, radium-226, and thorium-232 were detected. The maximum tritium level was 220 pCi/liter, which is only slightly above detection limits and is only 1.1 percent of the EPA drinking water limit. Considering the very

large environmental inventory of tritium due to cosmic ray interactions and nuclear weapons testing, it is highly unlikely that the tritium in the OCNGS's effluents could have a measurable effect on existing environmental concentrations. These nuclides have been detected in the past in similar concentrations at both indicator and background stations and are not attributed to OCNGS effluents.

RADIOLOGICAL IMPACT OF OCNGS OPERATIONS

An assessment of potential radiological impact indicated that radiation doses to the public from 1995 operations at OCNGS were well below all applicable regulatory limits and were significantly less than doses received from common sources of radiation. The 1995 total body dose, potentially received by a hypothetical maximum exposed individual, from OCNGS airborne effluents, was conservatively calculated to be 4.3E-3 millirem total or only 4.3E-3 percent of the regulatory limit. The 1995 total body dose to the surrounding population from OCNGS airborne effluents was calculated to be 4.9E-2 person-Rem. This is approximately 20.2 million times lower than the doses to the total population within a 50-mile radius of the OCNGS resulting from natural background sources.

Determination of Radiation Doses to the Public

To the extent possible, doses to the public are based on direct measurement of dose rates from external sources and measurements of radionuclide concentrations in the environment which may contribute to an internal dose of radiation. Thermoluminescent dosimeters (TLDs) positioned in the environment around the OCNGS provide measurements to determine external radiation doses to humans. Samples of air, water, food products, etc. are used to determine internal doses.

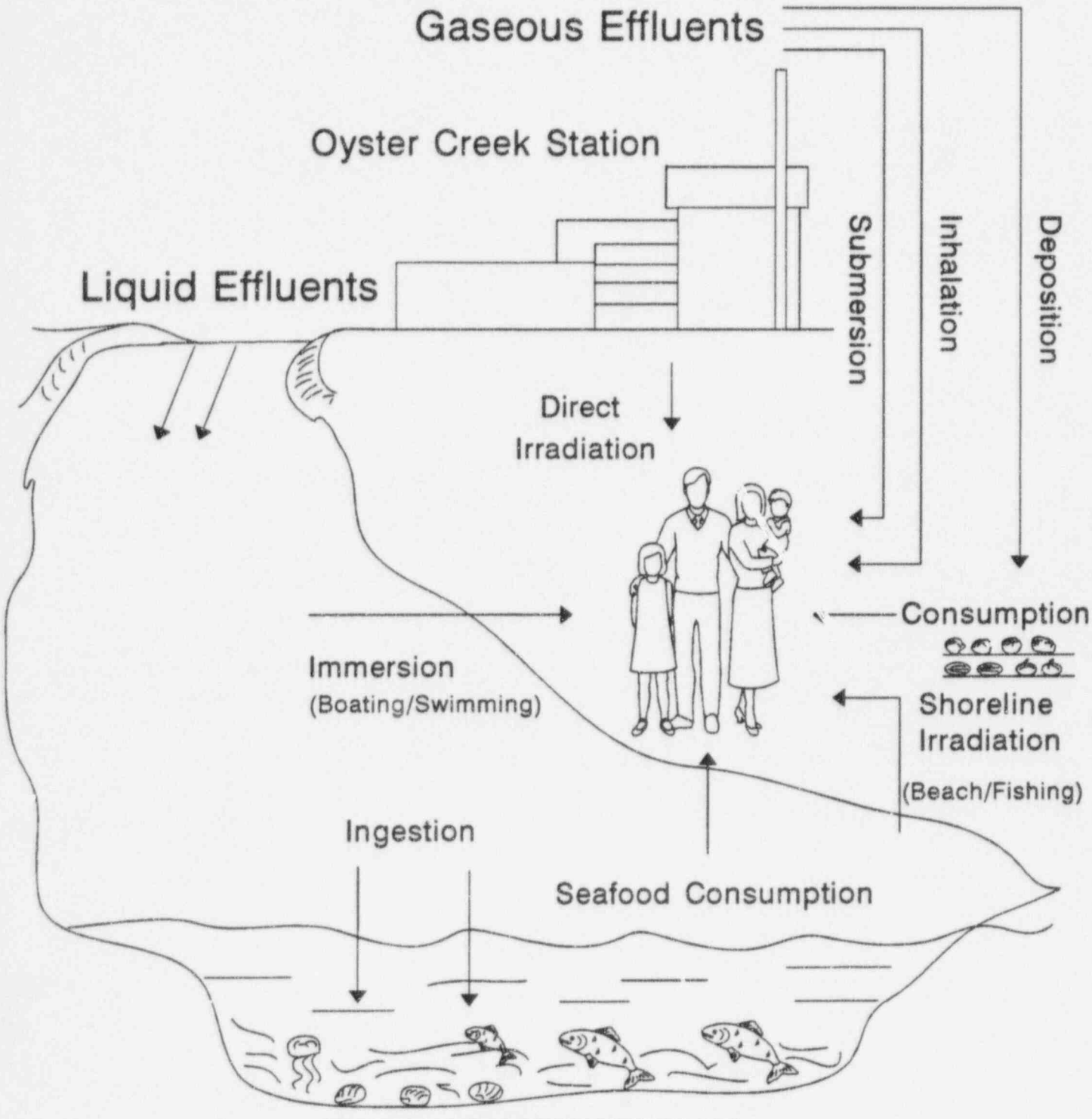
During normal plant operations the quantities of radionuclide releases are typically too small to be measured once distributed in the offsite environment. As a result, the potential offsite doses are calculated using a computerized model that predicts concentrations of radioactive materials in

the environment and subsequent radiation doses on the basis of radionuclides released to the environment. OCNGS doses were calculated using two advanced computer programs called SEEDS (Simplified Effluent Environmental Dosimetry System) and EFFECTS (Radioactive Effluent Filing, Evaluation and Comparison with Technical Specifications). These programs are based upon the OCNGS Off-Site Dose Calculation Manual (ODCM). These models incorporate the guidelines and methodologies set forth by the USNRC in Regulatory Guide 1.109 (Ref. 17). Due to the conservative assumptions that are used in the models, the calculated doses are considerably higher than the actual doses to people.

The type and amount of radioactivity released from the OCNGS is calculated using measurements from effluent radiation monitoring instruments and effluent sample analysis. Once released, the dispersion of radionuclides in the environment is readily determined by computer modelling. Airborne releases are diluted and carried away from the site by atmospheric diffusion which continuously acts to disperse radioactivity. Variables which affect atmospheric dispersion include wind speed and direction, atmospheric stability, and terrain. A meteorological monitoring station northwest of the OCNGS permanently records and telemeters all necessary meteorological data. Computer models are also used to predict the downstream dilution and travel times for liquid releases into the Barnegat Bay estuary and Atlantic Ocean.

The pathways to human exposure are also included in the model. These pathways are depicted in Figure 17. The exposure pathways considered for the discharge of the station's liquid effluent are fish and shellfish consumption and shoreline exposure. The exposure pathways considered for airborne effluents include plume exposure, inhalation, vegetable consumption (during growing season) and land deposition.

FIGURE 17
EXPOSURE PATHWAYS FOR RADIONUCLIDES POTENTIALLY RELEASED FROM THE OCNGS



PREDOMINANT RADIONUCLIDES

NOBLE GASES (Xe, Kr)
Plume Exposure

RADIOIODINES (I-131,I-133)
Inhalation and Consumption of Vegetables

ACTIVATION PRODUCTS (Co-60, Mn-54)
Shoreline Exposure and Consumption of Seafood

RADIOCESIUMS (Cs-134, Cs-137)
Shoreline Exposure and Consumption of Seafood and Vegetables

TRITIUM (H-3)
Inhalation and Cosumption of Vegetables

SEEDS employs numerous data files which describe the area around the OCNGS in terms of demography and foodstuffs production. Data files include such information as the distance from the plant stack to the site boundary in each of the sixteen compass sectors, the population groupings, gardens of more than 500 square feet, meat animals, and crop yields.

When determining the dose to humans, it is necessary to consider all pathways and all exposed tissues (summing the dose from each) to provide the total dose for each organ as well as the total body from a given radionuclide in the environment. Dose calculations involve determining the energy absorbed per unit mass in the various tissues. Thus, for radionuclides taken into the body, the metabolism of the radionuclide in the body must be known along with the physical characteristics of the nuclide such as energies, types of radiations emitted, and half-life. SEEDS and EFFECTS also contain dose conversion factors for over 75 radionuclides for each of four age groups (adult, teen, child, and infant) and eight organs (total body, thyroid, liver, skin, kidney, lung, bone, and gastro-intestinal tract).

Doses are calculated for what is termed the "maximum hypothetical individual." This individual is assumed to be affected by the combined maximum environmental concentrations wherever they occur. For liquid releases, the maximum hypothetical individual would be one who stands at the U.S. Route 9-discharge canal shoreline for 67 hours per year while eating 43 pounds of fish and shellfish. For airborne releases, the maximum hypothetical individual would live at the location of highest radionuclide concentration for inhalation and direct plume exposure while eating 1,389 pounds of vegetables per year.

This location is 522 meters to the southeast based on historical meteorological air dispersion analysis (Ref. 3). The usage factors and other assumptions used in the model result in a conservative overestimation of dose. Doses are calculated for the population within 50 miles of the OCNGS for airborne effluents and the entire population using the Barnegat Bay estuary and Atlantic Ocean for liquid effluents. Appendix G contains a more detailed discussion of the dose calculation methodology.

Results of Dose Calculations

Doses from natural background radiation provide a baseline for assessing the potential public health significance of radioactive effluents. The average person in the United States receives about 300 millirem (mRem) per year from natural background radiation sources. Natural background radiation from cosmic, terrestrial, and natural radionuclides in the human body (not including radon), averages about 100 mRem/yr. The natural background radiation from cosmic and terrestrial sources varies with geographic location, ranging from a low of about 65 mRem/yr on the Atlantic and Gulf coastal plains to as much as 350 mRem/yr on the Colorado plateau (Ref. 5). The National Council on Radiation Protection and Measurements (NCRP) now estimates that the average individual in the United States receives an annual dose of about 2,400 millirems to the lung from natural radon gas. This lung dose is considered to be equivalent to a whole body dose of 200 millirems (Ref. 4). Effluent releases from the OCNGS and other nuclear power plants contribute a very small percentage to the natural radioactivity which has always been present in the air, water, soil, and even in our bodies.

In general, the annual population doses from natural background radiation (excluding radon) are 1,000 to 1,000,000 times larger than the doses to the same population resulting from nuclear power plant operations (Ref. 18).

Results of the dose calculations are summarized in Tables 6 and 7. Table 6 compares the calculated maximum dose to an individual of the public with the OCNGS ODCM Specifications, Technical Specifications, 40CFR190, 10CFR20.1301, and 10CFR50 Appendix I dose limits. Table 7 presents the maximum total body radiation doses to the population within 50 miles of the plant from airborne releases, and to the entire population using Barnegat Bay and the Atlantic Ocean, for liquid releases.

These conservative calculations of the doses to members of the public from the OCNGS ranged from 0.000026 percent to a maximum of only 0.13 percent of the applicable regulatory limits. They are also considerably lower than the doses from natural background and fallout from prior nuclear weapon tests.

TABLE 6

CALCULATED MAXIMUM HYPOTHETICAL DOSES TO AN INDIVIDUAL FROM LIQUID AND AIRBORNE EFFLUENT RELEASES FROM THE OCNGS FOR 1995

EFFLUENT RELEASED	REGULATORY LIMITS mRem/YEAR	SOURCE	CALCULATED DOSE mRem/YEAR	PERCENT OF REGULATORY LIMIT
LIQUID	3 - TOTAL BODY	ODCM SPEC 4.6.1.1.4	6.4E-8	2.1E-6
LIQUID	10 - ANY ORGAN	ODCM SPEC 4.6.1.1.4	1.1E-7	1.1E-6
AIRBORNE (NOBLE GAS)	100 - TOTAL BODY	10CFR20.1301	4.3E-3	4.3E-3
AIRBORNE (NOBLE GAS)	3000 - SKIN	ODCM SPEC 4.6.1.1.5	8.0E-4	2.6E-5
AIRBORNE (IODINE AND PARTICULATE)	15 - ANY ORGAN	ODCM SPEC 4.6.1.1.7	2.0E-2	1.3E-1
TOTAL-LIQUID AND AIRBORNE	25 - TOTAL BODY	ODCM SPEC 4.6.1.1.8*	4.3E-3	1.72E-2
TOTAL-LIQUID AND AIRBORNE	75 - THYROID	ODCM SPEC 4.6.1.1.8*	2.0E-2	2.67E-2
TOTAL-LIQUID AND AIRBORNE	25 - ANY OTHER ORGAN	ODCM SPEC 4.6.1.1.8*	8.0E-4	3.2E-3

* 40 CFR 190

TABLE 7

CALCULATED MAXIMUM TOTAL RADIATION DOSES TO THE POPULATION FROM LIQUID AND AIRBORNE EFFLUENT RELEASES FROM THE OCNGS FOR 1995

	Calculated Population Total Body Dose Person-Rem/Year OCNGS
From Radionuclides in Liquid Releases (Barnegat Bay and Atlantic Ocean Users)	2.8E-6
From Radionuclides in Airborne Releases (Within 50-Mile Radius of OCNGS)	4.9E-2

DOSE DUE TO NATURAL BACKGROUND RADIATION

Approximately 990,000 Person-Rem Per Year

REFERENCES

(1) Jersey Central Power and Light Company. "Oyster Creek Nuclear Generating Station Operating License and Technical Specifications," Appendix A, DPR-16, April 1969.

(2) GPU Nuclear Corporation. "Oyster Creek Offsite Dose Calculation Manual," October 1983.

(3) GPU Nuclear Corporation. "Final Safety Analysis Report, Oyster Creek Nuclear Generating Station," August 1993.

(4) National Council on Radiation Protection and Measurements, Report No. 93, "Ionizing Radiation Exposure of the Population of the United States," 1987.

(5) CRC Handbook, "Radioecology: Nuclear Energy and the Environment," F. Ward Whicker and Vincent Schultz, Volume I, 1982.

(6) National Council on Radiation Protection and Measurements, Report No. 22, "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and Water for Occupational Exposure," (Published as National Bureau of Standards Handbook 69, Issued June 1959, superseding Handbook 52).

(7) International Commission on Radiological Protection, Publication 2, "Report of Committee II on Permissible Dose for Internal Radiation (1959)," with 1962 Supplement Issued in ICRP Publication 6; Publication 9, "Recommendations on Radiation Exposure," (1965); ICRP Publication 7 (1965), amplifying specific recommendations of Publication 9 concerning environmental monitoring; and ICRP Publication 26 (1977).

(8) Federal Radiation Council Report No. 1, "Background Material for the Development of Radiation Protection Standards," May 13, 1960.

(9) National Council on Radiation Protection and Measurements, Report No. 39, "Basic Radiation Protection Criteria," January 1971.

(10) National Council on Radiation Protection and Measurements, Report No. 62, "Tritium in the Environment," March 1979.

(11) National Council on Radiation Protection and Measurements, Report No. 81, "Carbon-14 in the Environment," May 1985.

(12) United States Nuclear Regulatory Commission. Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in The Environs of Nuclear Power Plants," Revision 1, April 1975.

(13) United States Nuclear Regulatory Commission Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," Revision 1, November 1979.

(14) American National Standards Institute, Inc., "Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry," ANSI N545-1975.

(15) United States Nuclear Regulatory Commission. Regulatory Guide 4.13, "Performance, Testing and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications," Revision 1, July 1977.

(16) United States Nuclear Regulatory Commission. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment", Revision 1, February 1979.

(17) 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.

(18) NUREG/CR-4068 "Summary of Historical Experience with Releases of Radioactive Materials from Commercial Nuclear Power Plants in the United States", 1985.

(19) GPU Nuclear Corporation. "1986 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station." May 1987.

(20) GPU Nuclear Corporation. "1987 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station." May 1988.

(21) GPU Nuclear Corporation. "1988 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station." May 1989.

(22) GPU Nuclear Corporation. "1989 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station." May 1990.

(23) GPU Nuclear Corporation. "1990 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station." May 1991.

(24) GPU Nuclear Corporation. "1991 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station." May 1992.

(25) GPU Nuclear Corporation. "1992 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station" May 1993.

(26) GPU Nuclear Corporation. "1993 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station" May 1994.

(27) GPU Nuclear Corporation. "1994 Radiological Environmental Monitoring Report for Oyster Creek Nuclear Generating Station" May 1995.

(28) GPU Nuclear Corporation. "1995 Annual Radioactive Effluent Release Report for Oyster Creek Nuclear Generating Station" March 1996.

APPENDIX A

1995 REMP Sampling Locations and Descriptions, Synopsis of REMP, and Sampling and Analysis Exceptions

TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

Sample Medium	Station Code	Distance	Azimuth	Description
APT, AIO, TLD	1	0.2 miles	228°	SW of site, at Oyster Creek Fire Pond, Forked River, NJ
WWA	1	0.1	227	On site well at OCNGS Forked River, NJ
APT, AIO, TLD	3	6.1	94	E of site, near Coast Guard Station Island Beach State Park
APT, AIO, TLD	4	4.7	215	SW of site, where Route 554 and the Garden State Parkway meet, Barnegat, NJ
APT, AIO, TLD	5	5.2	355	N of site, Garden State Parkway Service Area, Forked River, NJ
TLD	6	2.2	14	NNE of site, Lane Place, behind St. Pius Church, Forked River, NJ
TLD	7	1.8	111	ESE of site, Bay Parkway, Sands Point Harbor, Waretown, NJ
TLD	8	2.3	180	S of site, Route 9 at the Waretown Substation, Waretown, NJ
TLD	9	2.0	230	SW of site, where Route 532 and the Garden State Parkway meet, Waretown, NJ
APT, AIO, TLD	A	31.1	25	NNE of site, JCP&L office parking lot, next to substation, Allenhurst, NJ
APT, AIO, TLD	C	35.1	309	NW of site, JCP&L office rear parking lot, Cookstown, NJ
APT, AIO, TLD	H	35 miles	248°	WSW of site, Atlantic Electric office storage yard, Hammonton, NJ

TABLE A-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

Sample Medium	Station Code	Distance	Azimuth	Description
TLD	10	10.2	21	NNE of site, Route 37 and Gilford Avenue, Toms River, NJ
TLD	11	8.3	156	SSE of site, 80th and Anchor Streets at Water Tower, Harvey Cedars, NJ
TLD	12	9.4	192	SSW of site, Atlantic Electric substation access road, Cedar Run, NJ
TLD	13	8.3	345	NNW of site, Dover Road, next to last pole traveling west, South Toms River, NJ
APT, AIO, TLD	14	18	1	N of site, Larrabee Substation on Randolph Road, Lakewood, NJ
TLD	15	19	309	NW of site, Route 539, last pole on south side across from Bomarc Site, New Egypt, NJ
TLD	16	18	271	W of site, two poles south of the intersection of Routes 563 and 72.
TLD	17	19	214	SW of site, Route 563, 2 miles north at high voltage line, New Gretna, NJ
APT, AIO, TLD	20	0.7	93	E of site, on Finninger Farm on south side of access road, Pole BT17, Forked River, NJ
TLD	22	1.6	146	SE of site, at 27 Long John Silver Way, Skipper's Cove, Pole #BT152 ON, Waretown, NJ
SWA, CLAM, AQS	23	4.0	63	ENE of site, Barnegat Bay off Stouts Creek 400 yards SE of FL"1"
SWA, CLAM, AQS	24	2.0	104	ESE of site, Barnegat Bay, 250 yards SE of FL"3"

TABLE A-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

Sample Medium	Station Code	Distance	Azimuth	Description
SWA, CLAM, AQS	25	1.8	127	SE of site, Barnegat Bay off Holiday Harbor, 700 yards SE of lagoon mouth
SWA, CLAM, AQS	31	10.5	183	S of site, Manahawkin Bay 25 yards SE of C "23" and N "24"
SWA, AQS	32	1.9	98	E of site, mouth of Oyster Creek discharge canal
SWA, AQS, FISH, CRAB	33	0.7	104	ESE of site, 1200 yards east of Route 9 Bridge in Oyster Creek Discharge Canal
VEG	35	0.4	110	ESE of site, east of Route 9 and north of the Discharge Canal, Forked River, NJ
VEG	36	24 miles	315°	NW of site, at "U-Pick" Farm, New Egypt, NJ
WWA	37	2.2	19	NNE of Site, off Boox Road at Lacey MUA Pumping Station, Forked River, NJ
WWA	38	1.6	193	SSW of Site, on Route 532, at Waretown MUA Pumping Station, Waretown, NJ
TLD	51	0.4	358	N of site, on the access road to Forked River site, Forked River, NJ
TLD	52	0.4	340	NNW of site, on the access road to Forked River site, Forked River, NJ
TLD	53	0.3	310	NW of site, at the JCP&L Visitor's Center, Forked River, NJ
TLD	54	0.3	294	WNW of site, on the access road to Forked River site, Forked River, NJ

TABLE A-1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

Sample Medium	Station Code	Distance	Azimuth	Description
TLD	55	1.5	273	W of site, next to Basin #1 on the Forked River site, Forked River, NJ
TLD	56	1.1	258	WSW of site, on the siren pole of the Building 12 parking lot, Forked River site, Forked River, NJ
TLD	57	0.2	203	SSW of site, on Southern Area Stores access road, Pole BT 375, L, Forked River, NJ
TLD	58	0.4	180	S of site, on Southern Area Stores access road, Pole JC-7-L, Forked River, NJ
TLD	59	0.3	163	SSE of site, on Southern Area Stores access road, Waretown, NJ
TLD	60	0.4	136	SE of site, on Southern Area Stores access road entrance, Waretown, NJ
TLD	61	0.3 miles	116°	ESE of site, on Route 9 south of Oyster Creek Main Entrance, Pole BT1458, Forked River, NJ
TLD	62	0.2	99	E of site, on Route 9 at access road to Main Gate, Pole BT-61, Forked River, NJ
TLD	63	0.2	70	ENE of site, on Route 9 at North Gate access road, Pole BT 14D63, Forked River, NJ
TLD	64	0.3	48	NE of site, on Route 9 north of North Gate access road on Pole JC407X, Forked River, NJ
TLD	65	0.4	22	NNE of site, on Route 9 at Intake Canal Bridge on Pole JC406L, Forked River, NJ
APT, AIO, TLD, VEG	66	0.5	127	SE of site, east of Route 9 and south of the Discharge Canal, inside fence, Waretown, NJ

TABLE A-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

Sample Medium	Station Code	Distance	Azimuth	Description
TLD	67	1.0	161	SSE of site, on Route 9 at Waretown Plaza, Waretown, NJ
TLD	69	1.3	70	ENE of site, at the intersection of Chesapeake Drive and Buena Vista Road on Pole JC1347L, Forked River, NJ
TLD	70	1.6	183	S of site, on Route 532, 3/4 mile west of Route 9, in front of Martin residence, Waretown, NJ
APT, AIO, TLD	71	1.7	165	SSE of site, on Route 532 at the Waretown Municipal Building, Waretown, NJ
APT, AIO, TLD	72	1.9	27	NNE of site, at Library, Forked River, NJ
APT, AIO, TLD	73	1.8 miles	111°	ESE of site, on Bay Parkway, Sands Point Harbor, Waretown, NJ
TLD	74	2.0	90	E of site, Orlando Drive and Penguin Court, Pole JC6472L, Forked River, NJ
TLD	75	2.0	69	ENE of site, 1225 Beach Blvd. and Maui Drive, Forked River, NJ
TLD	76	1.7	51	NE of site, on Lacey Road across from Captain's Inn Restaurant, Forked River, NJ
TLD	77	1.5	26	NNE of site, NJ State Marina parking lot, Forked River, NJ
TLD	78	1.8	2	N of site, 1514 Arient Road, Forked River, NJ
TLD	79	2.9	162	SSE of site, Hightide Drive and Bonita Drive Pole JC124 ON

TABLE A-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

Sample Medium	Station Code	Distance	Azimuth	Description
TLD	80	3.1	58	NE of site, Riviera Drive and Dewey Drive, Pole BT787, Lanoka Harbor, NJ
TLD	81	4.6	192	SSW of site, east of Route 9 at Brook and School Streets, Pole JC257BGT, Barnegat, NJ
TLD	82	4.4	38	NE of site, Bay Way and Clairmore Avenue, Pole JC1273L, Lanoka Harbor, NJ
TLD	83	5.8	29	NNE of site, Route 9 and Harbor Inn Road, Pole BT666B, Berkeley, NJ
TLD	84	4.8 miles	339°	NNW of site, on Lacey Road, 1.3 miles west of the Garden State Parkway on JCP&L siren pole, Forked River, NJ
TLD	85	3.8	254	WSW of site, on Route 532 West, just prior to landfill, Pole BT354, Waretown, NJ
TLD	86	4.8	226	SW of site, on Route 554, 1 mile west of the Garden State Parkway, Barnegat, NJ
TLD	87	7.2	143	SE of site, north of Seaview Drive on siren pole, Loveladies, NJ
TLD	88	6.6	127	SE of site, eastern end of 3rd Street, Barnegat Light, NJ
TLD	89	6.2	110	ESE of site, Job Francis residence, Island Beach State Park
TLD	90	6.6	74	ENE of site, parking lot A-5, Pole JC181, Island Beach State Park

TABLE A-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

Sample Medium	Station Code	Distance	Azimuth	Description
TLD	91	9.5	4	N of site, on Robins Parkway, near Lobster Shanty Restaurant, Toms River, NJ
TLD	92	9.2	48	NE of site, at Guard Shack/Toll Booth, Island Beach State Park
SWA, AQS	93	0.25	150	SSE of site, Oyster Creek Discharge Canal, west of the confluence of freshwater Oyster Creek
FISH, CRAB	93	0.1 to 0.3 miles	128° to 250°	SE to WSW of site, Oyster Creek Discharge Canal between pump discharge and Route 9
SWA, AQS, CLAM, FISH	94	21.8	201	SSW of site, in Great Bay, mouth of Jimmies Creek west of channel marker 1
CRAB	94	21.8	201	SSW of site, in Great Bay, adjacent to docks of Cape Horn Marina
TLD	T1	0.2	228	SW of site, at Oyster Creek Fire Pond, Forked River, NJ
TLD	RA	2.5	243	WSW of site, at Ocean County VoTech School on JCP&L siren pole, Waretown, NJ
TLD	RC	1.1	15	NNE of site, at sewage pumping station across from Oyster Bay Restaurant, Forked River, NJ
TLD	RD	1.3	43	NE of site, at Twin Rivers sewage pumping station, Forked River, NJ
TLD	RF	0.5	14	NNE of site, on access road to Forked River site, Forked River, NJ

TABLE A-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLING LOCATIONS

Sample Medium	Station Code	Distance	Azimuth	Description
TLD	RG	0.6	82	E of site, on Finninger Farm, west of dredge spoils basin, Forked River, NJ
TLD	RH	1.8	222	SW of site, at Ocean Community Cemetery off Route 532, Waretown, NJ
TLD	RI	0.5	251	WSW of site, on access road to Southern Area Stores, near building 17
TLD	RJ	1.7	343	NNW of site, in Pheasant Run development, Sheffield Drive and Derby Court, Forked River, NJ

SAMPLE MEDIUM IDENTIFICATION KEY

APT = Air Particulate	SWA = Surface Water	FISH = Fish
AIO = Air Iodine	AQS = Aquatic Sediment	CRAB = Crab
WWA = Well Water	CLAM = Clams	
VEG = Vegetables	TLD = Thermoluminescent Dosimeter	

TABLE A-2

SYNOPSIS OF THE OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
CONDUCTED BY
GPUN ENVIRONMENTAL AFFAIRS DEPARTMENT
OYSTER CREEK NUCLEAR GENERATING STATION
1995 (1)

SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS	COLLECTION FREQUENCY	NUMBER OF SAMPLES COLLECTED	TYPE OF ANALYSIS	ANALYSIS FREQUENCY	NUMBER OF SAMPLES ANALYZED (2)
Air Particulate	13	Bi-weekly	338	Gross Beta Gamma	Bi-weekly Quarterly composite	336 (3) 52
Air Iodine	13	Weekly	674	I-131	Weekly	670
Well Water	3	Quarterly	12	Gamma H-3	Quarterly Quarterly	12 12
Surface Water	8	2 locations-Monthly 8 Locations-Quarterly	48	Gamma	Monthly (2 Stations) Quarterly (8 Stations)	48
Clam	5	Quarterly	20	Gamma	Quarterly	20
Sediment	8	Quarterly	32	Gamma	Quarterly	32
Vegetables	3	Monthly	21	Gamma	Monthly	21
Fish	3	Quarterly	9	Gamma	Quarterly	9
Crab	3	Quarterly	9	Gamma	Quarterly	9
TLD-Teledyne Brown Engineering	10	Quarterly	38	Immersion Dose	Quarterly	38
TLD-Panasonic	71	Quarterly	281	Immersion Dose	Quarterly	281

(1) This table does not include Quality Assurance (QA) results.

(2) The number of samples analyzed does not include duplicate analyses, recounts, or reanalyses.

(3) See Table A-3.

TABLE A-3

1995 SAMPLING AND ANALYSIS EXCEPTIONS

During 1995, 1157 samples were collected from aquatic, atmospheric, and terrestrial environments around the OCNGS. This is far more than the minimum number of samples and analyses required by the Offsite Dose Calculation Manual (ODCM) Specifications. No sampling or analysis exception occurred in 1995 that resulted in a deviation from or violation of the requirements of the ODCM.

The air sampler at station 14 developed an internal leak in mid-August 1995 that went undiscovered for approximately 27 days. Because of the leak, an accurate accounting of the total volume sampled through the filters could not be made. During the period of sampler malfunction, two air particulate gross beta analysis results and three air iodine results were voided. The sampler was repaired immediately upon discovery of the leak. This air monitoring station is not required by the ODCM Specifications.

An intense coastal storm knocked out power to the station 3 air sampler on 11 Nov 95. Because of the remote location, power could not be restored to the station for 18 days. During this period, an air iodine sample could not be taken. This air monitoring station is not required by the ODCM Specifications.

APPENDIX B

1995 Lower Limits of Detection (LLD) Exceptions

TABLE B-1

DURING 1995, THERE WERE NO LOWER LIMIT OF DETECTION (LLD) VIOLATIONS ON ANY ANALYZED REMP SAMPLE

APPENDIX C
CHANGES TO THE 1995 REMP

TABLE C-1

CHANGES TO THE 1995 REMP

In January 1995, several changes were made to the OCNGS REMP. These changes are outlined below. In all cases where changes were made, the REMP continues to exceed the requirements of the ODCM Specifications and all other applicable regulations. Even though fewer samples were collected and fewer analyses were performed than in past years, the ability to evaluate impact of the OCNGS on the surrounding environment was not compromised.

Medium - Air Particulate

Previous Program - Air particulate filters were collected weekly and analyzed for gross beta activity.

- A gamma isotopic analysis was performed on a monthly composite of filters by station.

1995 Program - Air particulate filters were collected every two weeks and analyzed for gross beta activity.

- A gamma isotopic analysis was performed on a quarterly composite of filters by station.

Medium - Precipitation

Previous Program - Precipitation samples were collected from 13 stations every 4 weeks and composited every 12 weeks for analysis.

1995 Program - The precipitation sampling program was terminated. Rain water stations 1, 3, 4, 5, A, C, H, 14, 20, 66, 71, 72, & 73 were deleted.

TABLE C-1 (continued)
CHANGES TO THE 1995 REMP

Medium - Well Water		
Previous Program	-	Well water samples were collected every 4 weeks from five stations around the OCNGS.
1995 Program	-	Well water samples were collected quarterly from three stations. Well water stations 18, 19, 21, & 22 were deleted and stations 37 & 38 were added. See Table A-1 for a detailed description of the new stations.
Medium - Surface Water		
Previous Program	-	Surface water samples were collected every 4 weeks from eight stations. A tritium and gamma isotopic analysis was performed on each sample.
1995 Program	-	Surface water samples were collected monthly from two stations, station 33 & 94, and quarterly from the additional six stations. A gamma isotopic analysis was performed on each sample.
Medium - Clams		
Previous Program	-	Clam samples were collected every 4 weeks when available. As part of the REMP QA program, split/duplicate aliquots were sent to both the primary and the secondary labs for analysis every twelve weeks.
1995 Program	-	Clam samples were collected quarterly when available. Regarding the REMP QA program, one aliquot was collected, sent first to the primary lab for analysis and then forwarded to the secondary lab for analysis.

TABLE C-1 (continued)
CHANGES TO THE 1995 REMP

Medium - Sediment		
Previous Program	-	Sediment samples were collected every 4 weeks and composited by station every 12 weeks.
1995 Program	-	Sediment samples were collected every 12 weeks.
Medium - Soil		
Previous Program	-	Soil samples were collected from three stations every 4 weeks during the vegetable harvesting season.
1995 Program	-	Soil sampling was terminated. Soil stations 35, 36, & 66 were deleted.
Medium - Fish		
Previous Program	-	Fish samples were collected every 4 weeks when available.
1995 Program	-	Fish samples were collected quarterly when available.
Medium - Crabs		
Previous Program	-	Crab samples were collected every four weeks when available.
1995 Program	-	Crab samples were collected quarterly when available.

TABLE C-1 (continued)
CHANGES TO THE 1995 REMP

A gamma isotopic analysis, which was performed on the fourth quarter air particulate filter composites, included three additional nuclides: Ag-110m, Sb-125, and U-235. These results are seen below. (These nuclides will also be included in future gamma scans.)

Sample Type - Air Particulate
Units - pCi/m^3
Analysis - Gamma Isotopic

Nuclide - Ag-110m

Number of Analysis Performed - 13

LLD - 5.54E-4

Indicator Stations		Background Stations	
Minimum	- < LLD	Minimum	- < LLD
Mean	- < LLD	Mean	- < LLD
Maximum	- < LLD	Maximum	- < LLD
N/TOT	- (0/9)	N/TOT	- (0/4)

Nuclide - Sb-125

Number of Analysis performed - 13

LLD - 1.44E-3

Indicator Stations		Background Stations	
Minimum	- < LLD	Minimum	- < LLD
Mean	- < LLD	Mean	- < LLD
Maximum	- < LLD	Maximum	- < LLD
N/TOT	- 0/9	N/TOT	- (0/4)

Nuclide - U -235

Number of Analysis performed - 13

LLD - 2.42E-3

Indicator Stations		Background Stations	
Minimum	- < LLD	Minimum	- < LLD
Mean	- < LLD	Mean	- < LLD
Maximum	- < LLD	Maximum	- < LLD
N/TOT	- 0/9	N/TOT	- (0/4)

APPENDIX D
1995 Quality Assurance Results

The OCNGS REMP Quality Assurance (QA) Program is comprised of three phases. Phase I requires samples collected at designated stations be split and analyzed by separate (independent) laboratories. Analysis results from the quality assurance (QA) laboratory are compared to those from the primary laboratory as set forth in OC Environmental Affairs procedure 6530-ADM-4500.07. Agreement criteria are established in this procedure. If non-agreement of the data occurs, an investigation begins which may include recounting or reanalyzing the sample(s) in question.

Phase II requires laboratories analyzing REMP samples for the OCNGS to participate in a program involving analysis and reporting of single-blind radiological samples, such as the USEPA Cross-Check Program. This serves as independent verification of each laboratory's ability to correctly perform analyses on various kinds of samples containing unknown quantities of specific radionuclides. Results of this interlaboratory comparison program are presented in Appendix E.

Phase III requires that the REMP analytical laboratories perform duplicate analyses on every twentieth sample. The number of duplicate analyses performed during 1995 is outlined in Table D-1. Results of the duplicate analyses were reviewed in accordance with procedure 6530-ADM-4500.07. No non-agreements occurred during 1995 regarding duplicate analyses of OCNGS REMP samples.

Table D-2 outlines the split sample portion (Phase I) of the QA program for the media collected during 1995. Of the 16 samples that were split, only one resulted in an initial non-agreement (Table D-3). A re-analysis was performed on this sample which then resulted in an agreement. The observed difference in the initial analyses results are believed to be due to non-homogeneous distribution of Ra-226 in aquatic sediments.

TABLE D-1

1995 QA SAMPLE PROGRAM
NUMBER OF DUPLICATE ANALYSES PERFORMED

	ANALYSES			
SAMPLE MEDIUM	GROSS BETA	H-3	I-131	GAMMA ISOTOPIC
AIR PARTICULATE	18			4
AIR IODINE			42	
WELL WATER		0		0
SURFACE WATER				3
AQUATIC SEDIMENT				0
CLAMS				2*
FISH				1
CRABS				0
VEGETABLES				0

* 1 DUPLICATE ON QA SAMPLE

TABLE D-2

1995 QA SAMPLE PROGRAM

SPLIT SAMPLES

SAMPLE MEDIUM	NUMBER OF REGULAR STATIONS	COLLECTION FREQUENCY	NUMBER OF QA STATIONS	QA SAMPLE COLLECTION FREQUENCY
WELL WATER	3	QUARTERLY	1	QUARTERLY
SURFACE WATER	2	MONTHLY		MONTHLY
	6	QUARTERLY	1	QUARTERLY
SEDIMENT	8	QUARTERLY	1	QUARTERLY
CLAMS	5	QUARTERLY	1	SEMI-ANNUALLY
VEGETABLES	3	MONTHLY WHEN AVAILABLE	1	QUARTERLY WHEN AVAILABLE
TLD	71	QUARTERLY	2	QUARTERLY

TABLE D-3

RESOLUTION OF 1995 OCNGS REMP SPLIT SAMPLE ANALYTICAL NON-AGREEMENTS

SAMPLE MEDIUM	SAMPLE DATE	NUCLIDE	AGREEMENT AFTER RE-ANALYSIS	REASON FOR NON-AGREEMENT
AQUATIC SEDIMENT	3-23-95	Ra-226	YES	Re-analysis by secondary laboratory resulted in agreement. Observed differences are believed to be due to non-homogeneous distribution of Ra-226 in aquatic sediments.

APPENDIX E

1995 US EPA Cross-Check Results

TABLE E-1
OYSTER CREEK NUCLEAR GENERATING STATION
US EPA CROSS-CHECK PROGRAM 1995

COLLECTION DATE	MEDIA	NUCLIDE	EPA RESULTS (A)	GPUN-ERL RESULTS (B)*	TELEDYNE BROWN ENGINEERING RESULTS (B)**
01/13/95	Water	Sr-89	20.0 ± 8.7	(C)	19.00 ± 2.65
		Sr-90	15.0 ± 8.7	(C)	14.00 ± 0.00
01/27/95	Water	Alpha	5.0 ± 8.7	(D)	5.00 ± 1.00
		Beta	5.0 ± 8.7	(D)	6.00 ± 1.00
02/03/95	Water	I-131	100.00 ± 17.3	97.33 ± 2.52	88.33 ± 2.31
03/10/95	Water	H-3	7435.0 ± 1290.8	(E)	7066.67 ± 115.47
04/18/95	Water	Alpha	47.5 ± 20.6	31.67 ± 3.21	39.67 ± 2.52
		Beta	86.6 ± 17.3	75.00 ± 2.00	80.33 ± 2.52
		Co-60	29.0 ± 8.7	29.67 ± 0.58	31.67 ± 2.08
		Sr-89	20.0 ± 8.7	(C)	20.67 ± 1.15
		Sr-90	15.0 ± 8.7	(C)	14.67 ± 0.58
		Cs-134	20.0 ± 8.7	18.67 ± 0.58	19.67 ± 2.08
		Cs-137	11.0 ± 8.7	10.00 ± 1.00	11.67 ± 1.53
06/09/95	Water	Co-60	40.0 ± 8.7	40.33 ± 1.53	42.33 ± 2.52
		Zn-65	76.0 ± 13.9	76.00 ± 5.57	82.33 ± 3.51
		Ba-133	79.0 ± 13.9	79.67 ± 2.08	74.33 ± 2.08
		Cs-134	50.0 ± 8.7	46.00 ± 1.73	46.67 ± 2.08
		Cs-137	35.0 ± 8.7	35.00 ± 2.65	37.67 ± 1.15
07/14/95	Water	Sr-89	20.0 ± 8.7	(C)	18.33 ± 1.53
		Sr-90	8.0 ± 8.7	(C)	8.00 ± 0.00
07/21/95	Water	Alpha	27.5 ± 12.0	12.33 ± 2.08 (F)	18.33 ± 1.53
		Beta	19.4 ± 8.7	20.67 ± 3.51	19.33 ± 1.53
08/04/95	Water	H-3	4872.0 ± 844.9	4933.33 ± 57.74	4866.67 ± 152.75
08/25/95	Filter	Alpha	25.0 ± 10.9	25.00 ± 1.73	23.67 ± 1.53
		Beta	86.6 ± 17.3	76.67 ± 2.89	84.67 ± 1.53
		Sr-90	30.0 ± 8.7	(C)	25.33 ± 0.58
		Cs-137	25.0 ± 8.7	28.00 ± 0.00	27.00 ± 1.00
09/29/95	Milk	Sr-89	20.0 ± 8.7	(C)	23.33 ± 3.06
		Sr-90	15.0 ± 8.7	(C)	16.33 ± 0.58
		I-131	99.0 ± 17.3	98.33 ± 1.53	103.33 ± 5.77
		Cs-137	50.0 ± 8.7	51.33 ± 2.89	54.67 ± 2.52
		K-Nat	1654.0 ± 144.0	1733.33 ± 57.74	1683.33 ± 136.50
10/06/95	Water	I-131	148.0 ± 26.0	156.67 ± 5.77	150.00 ± 0.00
10/17/95	Water	Alpha	99.4 ± 43.1	103.33 ± 5.77	94.67 ± 6.00
		Beta	141.8 ± 36.9	120.00 ± 10.00	120.00 ± 10.00
		Co-60	49.0 ± 8.7	49.33 ± 2.08	53.33 ± 5.37
		Sr-89	20.0 ± 8.7	(C)	20.67 ± 3.00
		Sr-90	10.0 ± 8.7	(C)	9.30 ± 1.20
		Cs-134	40.0 ± 8.7	33.33 ± 0.58	34.37 ± 4.03
		Cs-137	30.0 ± 8.7	29.00 ± 1.73	35.10 ± 3.93
10/27/95	Water	Alpha	51.2 ± 22.2	32.00 ± 0.00	37.00 ± 3.00
		Beta	24.8 ± 8.7	28.67 ± 1.53	25.33 ± 1.53

TABLE E-1
OYSTER CREEK NUCLEAR GENERATING STATION
US EPA CROSS-CHECK PROGRAM 1995

COLLECTION DATE	MEDIA	NUCLIDE	EPA RESULTS (A)	GPUN-ERL RESULTS (B)*	TELEDYNE BROWN ENGINEERING RESULTS (B)**
11/03/95	Water	Co-60	60.0 ± 8.7	57.33 ± 3.79	58.00 ± 7.00
		Zn-65	125.0 ± 22.6	133.33 ± 5.77	131.33 ± 19.14
		Ba-133	99.0 ± 17.3	94.67 ± 1.53	91.33 ± 3.06
		Cs-134	40.0 ± 8.7	35.67 ± 2.31	36.33 ± 2.08
		Cs-137	49.0 ± 8.7	49.33 ± 1.53	50.33 ± 4.62

* GPUN-ERL - The Environmental Radioactivity Laboratory located in Middletown, PA.

** The Teledyne Brown Engineering Laboratory is located in Westwood, NJ

A. EPA Results - Expected Laboratory precision (control limit ± 3 sigma, n = 3). Units are pCi/L for water and milk except K-Nat. is in mg/L. Units are total pCi for air particulate filters.

B. Results - Average ± one standard deviation. Units are pCi/L for water and milk except K-Nat is in mg/L. Units are total pCi for air particulate filters.

C. No data available. Analysis not performed by laboratory.

D. The ERL results were not reported to the EPA. The sample was analyzed six times and the precision of the individual results was not acceptable. The ERL policy is to report only highly confident results and since the confidence level could not be achieved from this sample, the results were not submitted to the EPA.

E. The ERL tritium results were not reported to the EPA in time for the report. The ERL result (average 3 determinations) was 7533.33 ± 208.17 pCi/L. The value is within all limits (0.23 sigma of known). Also the precision (R.A. = 0.318) is acceptable.

F. The ERL result was below the control limit (-3.81 normalized deviation from the known). A reanalysis was performed and the result (28.33 ± 4.08 pCi/L) was within all limits.

APPENDIX F

1995 Annual Dairy Census

Annual Dairy Census - 1995

An annual dairy census was conducted to determine the number of commercial dairy operations and/or lactating dairy animals providing milk for human consumption located within a five mile radius of the OCNGS. As a result of the study, no commercial dairy operations were identified within the vicinity of the OCNGS.

Ocean County Agricultural Extension Service Agent, Ms. Debra Fiola, was contacted regarding the occurrence of dairy animals within a five mile radius of the OCNGS. Ms. Fiola indicated that no commercial dairy operations were active in the study area. The closest known dairy animals whose milk was being used for human consumption were goats owned by three families in the Whiting area which is approximately 12 miles NW of OCNGS.

APPENDIX G

Dose Calculation Methodology

To the extent possible, radiological impacts were evaluated based on the direct measurement of dose rates or of radionuclide concentrations in the environment. However, the effluents associated with 1995 OCNGS operations were too small to be measured once dispersed in the offsite environment. As a result, the potential offsite doses could only be estimated using computerized models that predict concentrations of radioactive materials in the environment and subsequent radiation doses on the basis of radionuclides released to the environment. GPUN calculates doses using two advanced class "A" dispersion models called SEEDS (Simplified Effluent Environmental Dosimetry System) and EFFECTS (Radioactive Effluent Filing Evaluation and Comparison with Technical Specifications). These models incorporate the guidelines and methodology set forth in USNRC Regulatory Guide 1.109 (Ref. 17). SEEDS uses real-time hourly meteorological information matched to the time of release to assess the dispersion of effluents in the discharge canal/estuary system and the atmosphere. Combining this assessment of dispersion and dilution with effluent data, postulated maximum hypothetical doses to the public from the OCNGS effluents are computed. The maximum individual dose is calculated as well as the dose to the total population within 50 miles of the OCNGS for gaseous effluents and the entire population downstream of the OCNGS around Barnegat Bay and the Atlantic Ocean for liquid effluents. Values of environmental parameters and radionuclide concentration factors have been chosen to provide conservative results. As a result, the doses calculated using this model are conservative estimates (i.e., overestimates) of the actual exposures.

The dose summary table, Table G-1, presents the maximum hypothetical doses to an individual, as well as the population dose, resulting from effluents from OCNGS during the 1995 reporting period.

Individual Doses From Liquid Effluents

As recommended in USNRC Regulatory Guide 1.109 (Ref. 17), dose calculations resulting from OCNGS liquid effluents are performed on four age groups and eight organs. The pathways considered are consumption of fish, consumption of shellfish, and shoreline exposure. All pathways are considered to be primary recreational activities associated with Barnegat Bay and the Atlantic Ocean in the vicinity of the OCNGS. The "receptor" would be that individual who eats fish and shellfish that reside in the OCNGS discharge canal, and stands on the shoreline influenced by the station discharge. Table G-1 presents the maximum total body dose and critical organ dose for the age group most affected.

For the 1995 reporting period, the calculated maximum hypothetical total body dose received from liquid effluents would have been 6.4E-8 mRem to a teen. This represents 2.1E-6 percent of the OCNGS ODCM specification limit. Similarly, the maximum hypothetical organ dose from liquid effluents would have been 1.1E-7 mRem to the liver of a teen. This represents 1.1E-6 percent of the OCNGS ODCM annual dose limit.

Individual Doses From Gaseous Effluents

There are seven major pathways considered in the dose calculation for gaseous effluents. These are: (1) plume exposure, (2) inhalation, (3) consumption of cow milk, (4) goat milk, (5) vegetables, (6) meat, and (7) standing on contaminated ground.

The maximum plume exposure reported in lines 3 and 4 of Table G-1 generally occurs at, or near, the site boundary. These "air doses" are not to an individual but are considered to be the maximum dose at a location. The location is not necessarily a receptor.

With respect to airborne noble gaseous releases for the 1995 reporting period, the maximum plume exposure (air dose) would have been 1.1E-3 and 3.8E-4 mRad for OCNGS gamma and beta radiation, respectively. These doses are equal to only 1.1E-2 percent and 1.9E-3 percent of the OCNGS Offsite Dose Calculation Manual (ODCM) annual dose limits, respectively.

The calculated airborne doses to the closest individual in the maximally affected sector (SE) for total body dose and skin dose was at a distance of 522 meters using the default parameters specified in the ODCM. Dose data are presented in lines 5 and 6 of Table G-1. Maximum calculated plume exposures to an individual, regardless of age, from gaseous effluents during the 1995 reporting period were 4.3E-3 mRem to the total body and 8.0E-4 mRem to the skin. These doses are equivalent to only 4.3E-3 percent and 2.6E-5 percent of the applicable annual dose limits, respectively.

The dose to the maximum exposed organ due to radioactive airborne iodine and particulates is presented in line 7, Table G-1. This does not include the total body plume exposure, which was separated out on line 5. The dose presented in this section reflects the maximum exposure to an organ for the appropriate age group. During 1995, gaseous iodines and particulates from OCNGS would have resulted in a maximum dose of 2.0E-2 mRem to the thyroid of a child. This dose is only 1.3E-1 percent of the OCNGS ODCM specified annual dose limit.

Population Doses From Liquid and Gaseous Effluents

The population doses resulting from liquid and gaseous effluents are summed over all pathways and the affected population (Table G-1, lines 8-11). Liquid population dose is based upon the population located within the region from the OCNGS outfall extending out to the Atlantic Ocean. The population dose due to gaseous effluents is based upon the 1980 population projections of the Final Safety Analysis Report (FSAR) and considers the population out to a distance of 50 miles around the OCNGS as well as the much larger total population which can be fed by food stuffs grown in the 50 mile radius. Population doses are summed over all distances and sectors to give an aggregate dose.

Total OCNGS liquid and gaseous effluents resulted in a population dose of 4.9E-2 person-rem total body for the 1995 reporting period. This is approximately 20.2 million times lower than the doses to the same population resulting from natural background sources.

TABLE G-1

SUMMARY OF MAXIMUM HYPOTHETICAL INDIVIDUAL AND POPULATION DOSES FROM LIQUID AND AIRBORNE EFFLUENT RELEASES FROM THE OCNGS FOR 1995

INDIVIDUAL DOSES[1]

Effluent Released	ODCM Specification Limit	Calculated Dose	Age Group	Dist. (m)	Sector	% Reg. Limit
LIQUID	3 mRem-Total Body	6.4E-8 mRem	Teen	Receptor 1*		2.1E-6 %
LIQUID	10 mRem-Organ	1.1E-7 mRem	Teen	Receptor 1*		1.1E-6 %
AIRBORNE	10 mRad-Gamma	1.1E-3 mRad	-	522	SE	1.1E-2 %
AIRBORNE	20 mRad-Beta	3.8E-4 mRad	-	522	SE	1.9E-3 %
AIRBORNE	100 mRem-Total Body[3]	4.3E-3 mRem	All	522	SE	4.3E-3 %
AIRBORNE	3000 mRem-Skin	8.0E-4 mRem	All	522	SE	2.6E-5 %
AIRBORNE	15 mRem-Organ	2.0E-2 mRem	Child	522	SE	1.3E-1 %

POPULATION DOSES[2]

Effluent Released		Calculated Dose (Person-Rem)
LIQUID	Total Body	2.6E-6 Rem
LIQUID	Liver	4.9E-6 Rem
GASEOUS	Total Body	4.9E-2 Rem
GASEOUS	Thyroid	1.1E-1 Rem

* Receptor 1 is the U.S. Route 9 Discharge Canal.

[1] Individual doses for the calendar year were calculated using the EFFECTS software. These calculations utilize default meteorology referenced in the OCNGS Offsite Dose Calculation Manual.

[2] Population doses were calculated using the SEEDS software.

[3] This limit is from 10CFR20.1301. The ODCM limit is 500 mRem.

APPENDIX H

1995 Groundwater Monitoring Results

TABLE H-1
OCNGS-GROUNDWATER RESULTS
ON-SITE SPILL MONITORING WELL NETWORK

APRIL 1995 RESULTS

Analysis Performed: Tritium
Gamma Isotopic

STATION	TRITIUM	GAMMA ISOTOPIC*		
	H-3	K-40	Ra-226	Th-232
WW-1	< 180 pCi/liter	< 40 pCi/liter	< 70 pCi/liter	< 10 pCi/liter
WW-2	< 170 pCi/liter	< 30 pCi/liter	< 60 pCi/liter	< 9 pCi/liter
WW-3	220+/-110 pCi/liter	< 40 pCi/liter	74+/-61 pCi/liter	< 10 pCi/liter
WW-4	< 170 pCi/liter	< 30 pCi/liter	< 50 pCi/liter	< 8 pCi/liter
WW-5	< 180 pCi/liter	< 80 pCi/liter	< 80 pCi/liter	< 20 pCi/liter
WW-6	< 180 pCi/liter	< 30 pCi/liter	< 60 pCi/liter	< 9 pCi/liter
WW-7	< 170 pCi/liter	< 50 pCi/liter	< 80 pCi/liter	< 12 pCi/liter
WW-9	< 180 pCi/liter	< 50 pCi/liter	< 70 pCi/liter	< 13 pCi/liter
WW-10	< 180 pCi/liter	< 70 pCi/liter	< 90 pCi/liter	< 18 pCi/liter
WW-12	210+/-120 pCi/liter	< 60 pCi/liter	< 100 pCi/liter	< 18 pCi/liter
WW-13	< 180 pCi/liter	< 40 pCi/liter	< 70 pCi/liter	< 10 pCi/liter
WW-14	< 180 pCi/liter	< 70 pCi/liter	< 90 pCi/liter	< 20 pCi/liter
WW-15	< 180 pCi/liter	< 80 pCi/liter	< 120 pCi/liter	< 30 pCi/liter
WW-16	< 170 pCi/liter	< 60 pCi/liter	< 80 pCi/liter	< 16 pCi/liter
WW-17	< 180 pCi/liter	< 50 pCi/liter	< 60 pCi/liter	< 11 pCi/liter

* No other gamma isotopic nuclides detected.

TABLE H-1 (continued)
OCNGS-GROUNDWATER RESULTS
ON-SITE SPILL MONITORING WELL NETWORK

SEPTEMBER 1995 RESULTS

Analysis Performed: Tritium
Gamma Isotopic

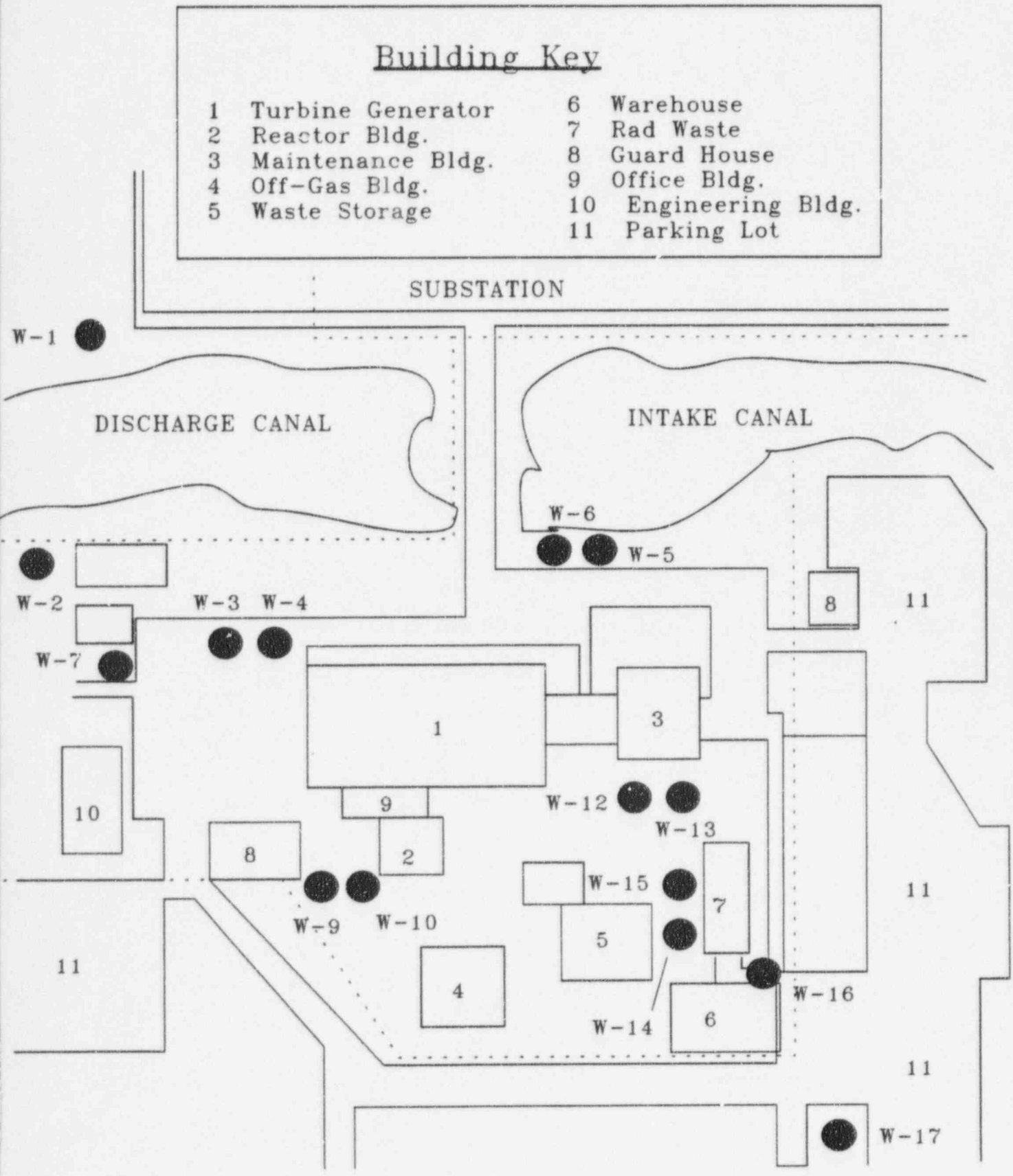
STATION	TRITIUM	GAMMA ISOTOPIC*		
	H-3	K-40	Ra-226	Th-232
WW-1	< 140 pCi/liter	< 40 pCi/liter	< 70 pCi/liter	< 10 pCi/liter
WW-2	< 140 pCi/liter	< 40 pCi/liter	< 80 pCi/liter	< 12 pCi/liter
WW-3	180 +/- 90 pCi/liter	< 90 pCi/liter	< 140 pCi/liter	< 30 pCi/liter
WW-4	< 140 pCi/liter	< 70 pCi/liter	< 100 pCi/liter	< 20 pCi/liter
WW-5	< 140 pCi/liter	< 30 pCi/liter	< 70 pCi/liter	10 +/- 8 pCi/liter
WW-6	< 140 pCi/liter	< 30 pCi/liter	< 70 pCi/liter	< 10 pCi/liter
WW-7	< 140 pCi/liter	< 40 pCi/liter	< 70 pCi/liter	< 11 pCi/liter
WW-9	< 140 pCi/liter	73 +/- 40 pCi/liter	< 60 pCi/liter	< 9 pCi/liter
WW-10	< 140 pCi/liter	< 40 pCi/liter	< 70 pCi/liter	< 11 pCi/liter
WW-12	< 140 pCi/liter	< 40 pCi/liter	64 +/- 52 pCi/liter	21 +/- 8 pCi/liter
WW-13	< 140 pCi/liter	< 40 pCi/liter	< 80 pCi/liter	< 12 pCi/liter
WW-14	< 140 pCi/liter	< 30 pCi/liter	< 60 pCi/liter	< 8 pCi/liter
WW-15	< 140 pCi/liter	< 40 pCi/liter	< 70 pCi/liter	< 12 pCi/liter
WW-16	< 140 pCi/liter	< 30 pCi/liter	< 60 pCi/liter	< 9 pCi/liter
WW-17	< 140 pCi/liter	< 40 pCi/liter	< 60 pCi/liter	< 11 pCi/liter

* No other gamma isotopic nuclides detected.

TABLE H-1 (continued)
OCNGS-GROUNDWATER RESULTS
ON-SITE SPILL MONITORING WELL NETWORK

TYPICAL ANALYTICAL SENSITIVITIES (LLD's)			
H-3	170 pCi/liter	Zr-95	8 pCi/liter
Be-7	40 pCi/liter	I-131	10 pCi/liter
K-40	70 pCi/liter	Cs-134	4 pCi/liter
Mn-54	4 pCi/liter	Cs-137	5 pCi/liter
Co-58	5 pCi/liter	Ba-140	30 pCi/liter
Fe-59	10 pCi/liter	La-140	11 pCi/liter
Co-60	6 pCi/liter	Ra-226	90 pCi/liter
Zn-65	9 pCi/liter	Th-232	18 pCi/liter
Nb-95	6 pCi/liter		

Figure H-1
Locations Of On-Site Wells



APPENDIX I
1995 REMP Sample Collection and Analysis Methods

TABLE I-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
SUMMARY OF SAMPLE COLLECTION AND ANALYSIS METHODS
1995

Analysis	Sample Medium	Sampling Method	Collection Procedure Number	Approximate Sample Size Collected	Analysis Procedure Number	Procedure Abstract
Gross Beta	Air Particulate	Two week composite of continuous air sampling through filter paper	OC-EC 6530-IMP-4522.05	1 filter (approximately 1200 cubic meters bi-weekly)	TMI-EC 6510-IMP-4592.05	Low background gas flow proportional counting
Gamma Spectroscopy	Air Particulate	Quarterly composite of each station	OC-EC 6530-IMP-4522.05	6 filters (approximately 7200 cubic meters)	TMI-EC 6510-IMP-4592.05	Gamma Isotopic analysis
Gamma Spectroscopy	Air Iodine	Weekly composite of continuous air sampling through charcoal filter	OC-EC 6530-IMP-4522.05	1 cartridge (approximately 600 cubic meters weekly)	TMI-EC 6510-IMP-4591.04	Gamma Isotopic analysis
Gamma Spectroscopy	Surface Water	Monthly grab sample at two stations and quarterly grab sample at an additional six stations	OC-EC 6530-IMP-4522.06	3.78 liters	TMI-EC 6510-IMP-4592.06 6510-OPS-4591.04 TBE-Westwood PRO-042-5	Gamma Isotopic analysis Gamma Isotopic analysis
Gamma Spectroscopy	Well Water	Quarterly grab sample	OC-EC 6530-IMP-4522.10	3.78 liters	TMI-EC 6510-IMP-4592.06 6510-OPS-4591.04 TBE-Westwood PRO-042-5	Gamma Isotopic analysis Gamma Isotopic analysis
Gamma Spectroscopy	Clams Fish Crabs	Quarterly grab sample Quarterly grab sample Quarterly grab sample	OC-EC 6530-IMP-4522.14 6530-IMP-4522.16	1 kg (if possible)	TMI-EC 6510-IMP-4592.03 6510-OPS-4591.04 TBE-Westwood PRO-042-5	Gamma Isotopic analysis Gamma Isotopic analysis
Gamma Spectroscopy	Sediment	Quarterly grab sample	OC-EC 6530-IMP-4522.03	3.78 liters	TMI-EC 6510-IMP-4592.04 6510-OPS-4591.04 TBE-Westwood PRO-042-5	Gamma Isotopic analysis Gamma Isotopic analysis

TABLE I-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
SUMMARY OF SAMPLE COLLECTION AND ANALYSIS METHODS
1995

Analysis	Sample Medium	Sampling Method	Collection Procedure Number	Approximate Sample Size Collected	Analysis Procedure Number	Procedure Abstract
Gamma Spectroscopy	Vegetables	Four week grab sample	OC-EC 6630-IMP-4522.04	1 kg or more (if possible)	TMI-EC 6510-IMP-4592.03 6510-OPS-4591.04 TBE-Westwood PRO-042-5	Gamma Isotopic analysis Gamma Isotopic analysis
Tritium	Well Water	Quarterly grab sample	OC-EC 6530-IMP-4522.10	3.78 liters	TMI-EC 6510-IMP-4592.02 6510-OPS-4591.05 TBE-Westwood PRO-052-2	Sample mixed with scintillation fluid for scintillation counting. Water converted to hydrogen, methane added for gas counting.
TLD (Panasonic)	Immersion Dose	Dosimeters exchanged quarterly	OC-EC 6530-IMP-4522.02	Four Badges	TMI-Dosimetry 9100-OPS-4243.01	Thermoluminescent dosimetry
TLD (Teledyne Brown Engineering)	Immersion Dose	Dosimeters exchanged quarterly	OC-EC 6530-IMP-4522.02	One Badge	TBE-Westwood PRO-342-17	Thermoluminescent dosimetry

APPENDIX J

1995 TLD Quarterly Data

TABLE J-1
OYSTER CREEK NUCLEAR GENERATING STATION - ENVIRONMENTAL CONTROLS
1995 QUARTERLY ENVIRONMENTAL TLD REPORT - TELEDYNE ISOTOPES
RUNNING TABLE - MILLIREM PER STANDARD QUARTER AND 2-STANDARD DEVIATIONS

Station	First Period 1995		Second Period 1995		Third Period 1995		Fourth Period 1995	
	Reading	Std. Dev	Reading	Std. Dev	Reading	Std. Dev	Reading	Std. Dev
A	12.7	1.1	11.4	0.9	13.7	0.8	11.1	0.6
C	11.3	0.9	10.5	0.5	15.2	4.7	10.1	0.4
H	11.3	0.5	10.2	0.6	14.1	5.7	10.1	0.4
8	11.8	0.9	10.6	0.5	12.1	0.9	10.5	0.5
RC	12.0	0.5	10.5	1.7	12.1	0.6	10.7	0.4
14	13.4	1.4	12.2	1.0	13.7	0.9	12.2	0.7
66	10.9	0.6	9.9	0.4	11.7	0.4	10.0	0.4
73	TLD	LOST	9.8	1.0	10.9	0.3	9.6	0.4
79	TLD	LOST	10.2	2.7	11.2	0.3	9.3	0.6
90	9.6	1.1	9.6	1.7	10.9	2.6	8.8	0.4

TABLE J-2
OYSTER CREEK NUCLEAR GENERATING STATION - ENVIRONMENTAL CONTROLS
1995 QUARTERLY ENVIRONMENTAL TLD REPORT - PANASONIC
RUNNING TABLE - MILLIREM PER STANDARD QUARTER AND 2-STANDARD DEVIATIONS

Station	First Period 1995		Second Period 1995		Third Period 1995		Fourth Period 1995	
	Reading	Std. Dev	Reading	Std. Dev	Reading	Std. Dev	Reading	Std. Dev
A	11.03	0.75	12.00	0.72	11.36	0.79	11.72	0.87
C	10.01	0.52	11.05	1.52	10.71	0.76	11.09	0.96
H	9.48	0.65	10.94	1.13	10.11	1.12	10.25	1.08
1	12.48	0.98	13.57	1.77	12.83	1.24	13.68	0.24
3	10.01	0.87	10.49	1.02	10.03	0.80	10.16	0.78
4	9.22	0.25	9.44	0.84	10.14	1.06	9.08	1.43
5	9.98	0.17	10.04	0.62	10.49	0.76	10.51	1.06
6	9.87	0.91	10.04	0.52	10.21	0.79	10.80	0.59
7	9.28	0.65	9.56	1.34	9.44	1.32	9.84	1.41
8	10.14	0.92	10.21	1.07	10.08	0.89	10.53	1.01
9	10.45	0.96	11.41	0.75	10.61	1.27	11.30	0.59
RA	9.53	1.19	9.87	0.60	9.49	0.62	10.24	1.07
RC	10.68	1.05	11.14	1.01	10.39	0.66	10.66	0.61
RD	9.75	0.64	10.46	0.71	10.20	1.19	9.74	0.76
RE	10.61	0.80	10.94	0.64	10.65	0.75	10.36	0.39
RG	8.86	0.50	9.52	0.63	9.20	0.78	9.43	1.38
RH	9.38	0.64	10.28	0.33	9.88	0.78	9.93	0.71
RI	11.44	0.27	11.70	0.61	11.39	1.50	10.86	0.59
RJ	10.12	0.86	10.56	0.94	10.10	0.92	10.02	0.93
T1	12.31	0.94	13.87	0.76	13.76	0.82	13.76	0.97
10	10.23	0.96	10.75	0.65	10.67	0.75	10.24	1.68
11	9.65	0.91	10.66	0.55	10.16	0.91	10.40	1.04
12	10.51	0.44	12.08	0.39	11.09	1.41	NO	DATA
13	8.94	0.56	9.96	0.54	9.82	0.47	9.46	0.47
14	12.24	1.04	13.32	0.52	13.05	1.45	12.64	1.55
15	10.03	0.48	11.37	0.70	10.79	0.40	10.31	1.14
16	8.98	3.07	9.91	0.46	9.82	1.23	9.92	0.67
17	9.64	1.59	8.21	4.50	10.47	0.75	9.24	3.55
20	9.97	0.70	10.20	0.49	10.54	0.55	9.66	0.78
22	9.39	0.47	9.72	0.52	9.74	1.02	10.00	0.61
51	13.27	1.14	14.01	1.33	13.60	1.44	12.69	0.43
52	14.37	0.51	15.04	1.66	14.35	1.93	14.99	1.38
53	13.86	1.03	14.12	1.00	14.31	0.66	14.02	0.99
54	10.63	0.88	11.59	0.77	11.10	1.05	11.00	1.05
55	10.22	0.39	11.22	0.99	11.11	1.00	10.69	0.93

TABLE J-2 (Continued)
OYSTER CREEK NUCLEAR GENERATING STATION - ENVIRONMENTAL CONTROLS
1995 QUARTERLY ENVIRONMENTAL TLD REPORT - PANASONIC
RUNNING TABLE - MILLIREM PER STANDARD QUARTER AND 2-STANDARD DEVIATIONS

Station	First Period 1995		Second Period 1995		Third Period 1995		Fourth Period 1995	
	Reading	Std. Dev	Reading	Std. Dev	Reading	Std. Dev	Reading	Std. Dev
56	10.67	0.47	12.06	1.20	11.93	0.42	11.34	0.46
57	13.02	1.73	15.75	2.36	16.05	2.46	15.64	2.46
58	12.87	0.68	15.07	1.10	16.47	0.31	14.65	1.21
59	12.19	1.82	13.01	0.49	14.94	1.31	13.97	1.45
60	9.65	1.56	10.96	0.32	10.61	1.46	10.39	1.14
61	9.43	0.88	10.38	0.93	10.47	0.82	9.98	0.54
62	10.42	0.82	10.85	1.22	11.13	1.01	10.86	0.99
63	10.28	0.62	11.41	0.68	11.41	0.68	TLD	LOST
64	9.71	0.80	10.90	0.60	10.95	0.79	10.15	0.38
65	9.59	0.90	10.88	0.46	10.34	0.83	10.14	0.77
66	9.46	0.33	10.19	0.48	9.89	1.30	10.13	1.14
67	9.81	0.89	11.29	0.53	10.26	0.81	10.72	1.34
69	8.94	0.92	10.40	0.62	9.40	1.05	9.75	0.47
70	8.95	0.73	10.21	0.90	9.41	0.58	9.76	0.97
71	9.43	0.87	10.27	0.66	NO	DATA	9.48	0.74
72	9.91	1.01	10.98	0.61	10.18	1.32	9.88	1.01
73	9.45	0.85	10.11	0.44	9.84	0.44	9.65	0.88
74	9.94	1.10	10.69	0.90	11.23	1.39	9.73	0.47
75	10.66	0.50	12.12	0.54	10.06	0.95	10.87	1.19
76	8.99	0.27	10.13	0.63	9.63	0.94	9.23	1.08
77	9.71	0.91	11.66	0.55	10.52	0.73	11.37	1.50
78	9.46	0.50	10.50	0.68	9.61	0.85	9.79	0.90
79	8.94	0.88	9.86	0.77	9.27	0.91	9.76	0.58
80	9.54	0.64	10.47	0.61	9.91	0.77	10.01	0.88
81	9.73	0.68	11.66	1.04	10.33	0.47	10.58	0.95
82	10.03	0.79	11.07	0.87	10.24	1.14	10.61	0.71
83	9.54	1.55	10.99	0.67	10.57	0.69	10.39	0.78
84	10.17	0.89	11.73	0.36	10.85	0.89	10.31	1.50
85	9.18	0.85	10.62	1.07	9.89	0.83	9.61	0.70
86	9.92	1.11	11.09	0.52	10.35	1.23	9.71	1.18
87	10.67	1.21	12.88	1.26	11.79	0.66	12.05	0.90
88	8.57	0.89	9.71	0.76	9.00	0.48	9.09	0.64
89	9.40	1.16	9.80	0.61	9.28	1.18	8.63	1.44
90	8.65	0.70	8.98	1.19	8.72	0.79	9.23	3.61
91	9.89	0.95	10.88	0.40	10.04	0.76	9.75	1.74
92	11.14	0.72	12.52	0.65	11.07	0.76	9.87	1.50