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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2  
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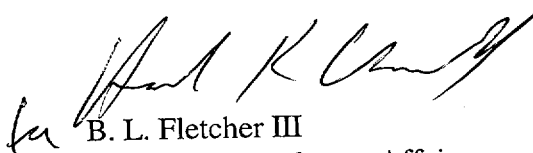
2000 RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

Ladies and Gentlemen:

In accordance with H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 Technical Specification, Section 5.6.2, "Annual Radiological Environmental Operating Report," Carolina Power & Light (CP&L) Company is transmitting the 2000 Radiological Environmental Operating Report. This report is for the period of January 1, 2000, through December 31, 2000.

If you have any questions concerning this report, please contact Mr. H. K. Chernoff.

Sincerely,

  
B. L. Fletcher III  
Manager - Regulatory Affairs

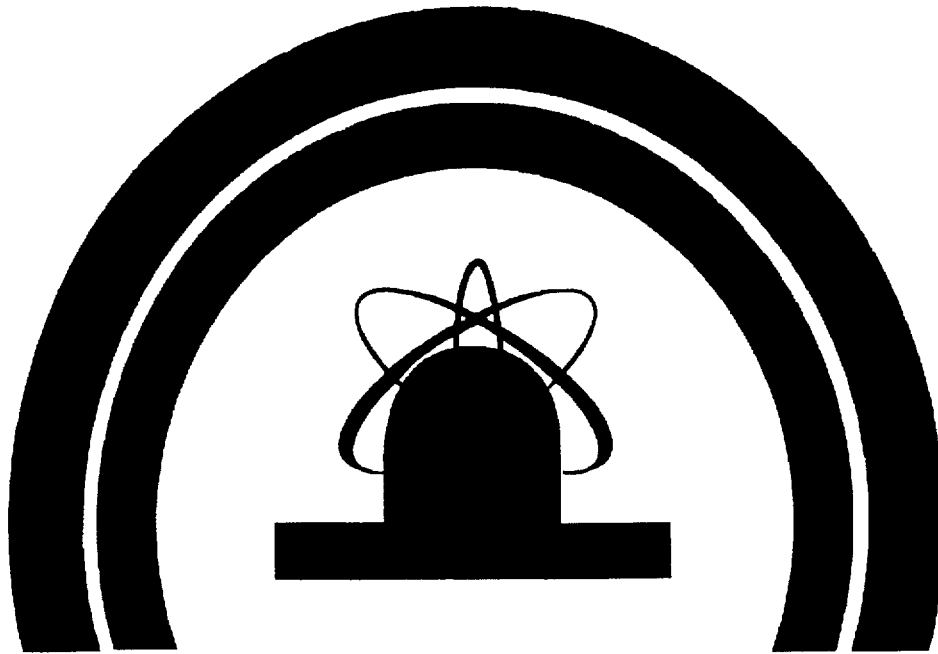
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Attachment: Radiological Environmental Operating Report 2000

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**RADIOLOGICAL  
ENVIRONMENTAL OPERATING  
REPORT  
2000**



**ROBINSON NUCLEAR PLANT  
CAROLINA POWER & LIGHT**

**RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT**

**FOR THE**

**H. B. ROBINSON STEAM ELECTRIC GENERATING PLANT, UNIT NO. 2**

**FACILITY OPERATING LICENSE NO. DPR-23**

**DOCKET NO. 50-261**

**JANUARY 1 THROUGH DECEMBER 31, 2000**

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# EXECUTIVE SUMMARY

The Robinson Nuclear Plant (RNP) is operated by Carolina Power & Light (CP&L) Company under a license granted for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 by the Nuclear Regulatory Commission (NRC). Provisions of the Nuclear Regulatory Commission's Regulatory Guide 4.8, HBRSEP, Unit No. 2 Technical Specifications, and the HBRSEP, Unit No. 2 Off-Site Dose Calculation Manual establish the requirements of the Radiological Environmental Monitoring Program. This report provides the results of the Radiological Environmental Monitoring program from January 1, 2000, through December 31, 2000.

The Radiological Environmental Monitoring program was established in 1973. Radiation and radioactivity in various environmental media have been monitored for more than 27 years. Monitoring is also provided for control locations which would not be impacted by operations of the RNP. Using these control locations and data collected prior to operation allows comparison of data collected at locations near RNP which could potentially be impacted by its operations. Radiation levels show no measurable change from pre-operational radiation levels.

Monitoring results for environmental media are summarized as follows:

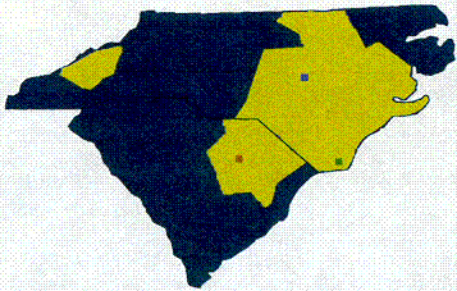
- Air-monitoring results are similar or less than the concentrations of radioactivity from pre-operational monitoring. These observations are also consistent with past operational data.
- Milk monitoring has not been conducted due to the unavailability of milk samples in the area since July 17, 1998 when the dairy ceased operations. Broadleaf sampling is conducted, since no milk animals are located within five miles of the plant in any sector. Milk sampling will resume if a new sample location is identified.
- Terrestrial vegetation includes broadleaf vegetation and food crops. Results indicate detectable concentrations of Cs-137 in both the indicator and control locations for broadleaf vegetation. No other gamma activity was detected in any samples, except for K-40, which is naturally occurring. Sampling of miscellaneous food products (non-leafy) in the vicinity of the site is conducted when leafy vegetables are not being grown.
- Aquatic organism monitoring includes fish and aquatic vegetation. Results indicate detectable concentrations of Cs-137 and K-40 in both indicator and control locations for fish, while aquatic vegetation results indicate less than the lower limit of detection, except for the Auburndale Plantation, which shows the presence of I-131. This is not attributed to plant operation.
- Surface water results indicate that the surface water from Lake Robinson shows the presence of tritium, which is attributed to plant operation.

- Drinking water results indicate less than the Lower Limit of Detection.
- External radiation dose showed no measurable change from pre-operational data.
- Sediment monitoring includes both shoreline and bottom sediment. During 2000, no gamma activity associated with plant operations was detected in any shoreline sediment sample. Bottom sediment results indicated the presence of Cs-137 and Co-60. No other gamma activity was detected in any sediment sample.

The continued operation of RNP has not significantly contributed radiation or the presence of radioactivity in the environmental media monitored. The measured concentrations of radioactivity and radiation are well within applicable regulatory limits.



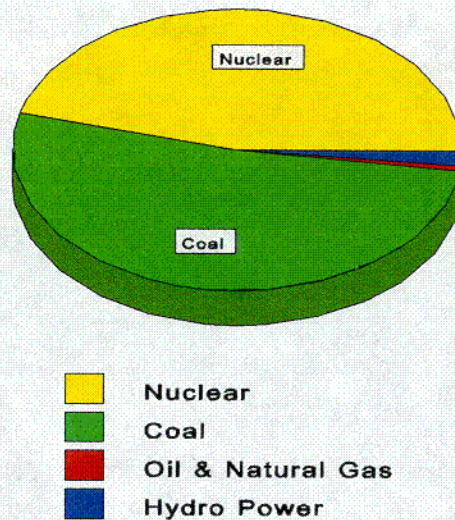
# INTRODUCTION TO NUCLEAR OPERATIONS



Carolina Power & Light (CP&L) Company operates an integrated electrical system serving more than one million customers in North Carolina and South Carolina. A system map is provided (Figure 1) that illustrates the area served and the location of the nuclear generating units including the Harris (Blue), Brunswick (Green), and Robinson (Brown) Nuclear Plants. The service area is more than 30,000 square miles and has a population of more than 4,200,000 people.

**Figure 1: CP&L Service Area**

The energy sources (Figure 2) for electrical generation include coal, fuel oil, natural gas, hydro-power, and nuclear fuel. No one energy source is best. Each fuel source has merits and disadvantages. Fossil fuels pose issues associated with clean air including emissions of sulfur dioxide and oxides of nitrogen. Both natural gas and hydro-power are in limited supply. Nuclear energy is a vital component in a diversified energy mix. In 2000 nuclear energy supplied 45.7% of CP&L's total electrical generation. This nuclear component was generated from four units including the Robinson Nuclear Plant. The remaining energy sources were primarily from coal-fired generation, and a very small contribution from oil, natural gas and hydro-power.



**Figure 2: 2000 Energy Sources**

## BENEFITS OF NUCLEAR POWER

Nuclear energy is a viable, clean, safe, and readily available source of energy. The operation of RNP results in a very small impact on the environment. Nuclear generation serves a vital role in the operation of the Carolina Power & Light system as well as in the nation's electrical needs. Nuclear energy currently supplies approximately twenty percent of the nation's electrical generation. It is an important source of electrical energy now and is meeting the growing electrical needs for the future. Nuclear energy has the following advantages over other fuel sources:



- The fuel is uranium, which is relatively inexpensive when compared with the fuels of coal, natural gas, and fuel oil.
- Emissions from nuclear stations do not include sulfur dioxide, oxides of nitrogen, or carbon dioxide. Sulfur dioxide is well known as a significant contributor to acid rain leading to acidification of streams and lakes. Oxides of nitrogen play a key role in the formation of ozone, which is a significant pollutant in urbanized air quality. Finally carbon dioxide is a significant greenhouse gas.
- Nuclear energy is safe. Nuclear power in the United States has an excellent safety record, starting with the first commercial nuclear plant in 1957.

To better understand this source of energy, a basic understanding of radiation, its effects, risk assessment, and reactor operation follow.

## RADIATION AND RADIOACTIVITY

### The Atom

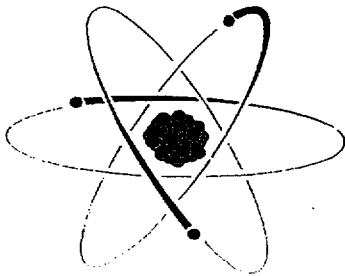


Figure 3: The Atom

All matter consists of **atoms**. An atom is the smallest units into which an element can be divided and still retain its identity as that element. An atom is made up of a number of different particles. These particles are **protons, neutrons, and electrons**. Each proton is positively charged (+). Each neutron has no charge. The electron is negatively charged (-). The heavier particles including protons and neutrons are found in the center of the atom in a very small cluster referred to as the **nucleus**. (The term nuclear refers to this nucleus.) Nearly all the mass of the atom is found in the nucleus. Electrons orbit the nucleus. Since the

atom is electrically neutral (no charge) the number of protons and electrons in the atom are equal (see Figure 3 a conceptional drawing of an atom). The electrons (red) are shown in orbit around the nucleus. The protons (green), and the neutrons (black) are shown in the nucleus at the center of the atom.

### Elements, Isotopes, and Radionuclides

Simple substances that cannot be decomposed in any chemical reaction are known as **elements**. Hydrogen, oxygen, iron, chlorine, and uranium are examples of elements. The atoms of such elements differ in the number of protons (also know as the atomic number) in their nucleus. For example the number of protons in each example above is 1 for hydrogen, 8 for oxygen, 26 for iron, 17 for chlorine, and 92 for uranium. The number of neutrons in the nucleus may vary in atoms of the same element. Atoms that contain the same number of protons but a different number of neutrons are referred to as **isotopes** of that element. An example is the element hydrogen, which has three isotopes--one with no neutrons, a second with one neutron, and the

third with two neutrons. Isotopes can be unstable (also referred to as **radioactive**), which means they will readily transform to another isotope and are called **radionuclides**. Of more than one thousand known isotopes less than twenty-five percent are considered stable. It is important to remember that a significant number of radioactive isotopes occur naturally.

When referring to isotopes of an element, it is common to refer to the element by the symbol for its name (or the name) followed by the total number of protons and neutrons, for example H-3 or hydrogen-3 describing an atom with one proton and two neutrons.

## **Radiation**

**Radiation** is defined as the conveyance of energy through space. This conveyance may occur in the form of particles, waves, or photons. Some common forms of radiation are sunlight, microwaves, or radio waves. These are all examples of non-ionizing radiation. **Ionizing radiation** differs in its interaction with matter because its energy is capable of removing an electron from the outer part of an atom resulting in the remaining atom being positively charged and a free electron. There are two types of ionizing radiation--particulate radiation and electromagnetic radiation. **Particulate radiation** is energetic particles which will travel in a straight line if unhindered. Three types of particulate radiation are of interest in nuclear energy, those being beta particles which are high-energy electrons (not part of an atom), neutrons, and alpha particles which consist of two protons and two neutrons. **Electromagnetic Radiation** is high-energy waves (or photons) which have no apparent mass (not a particle). There are two types of electromagnetic radiation of interest which are gamma rays and X-rays. **Gamma rays** have their origin in the nucleus of the atom. **X-rays** have their origin in the stored energy of the electrons orbiting the nucleus. There are many important differences in the behavior of these types of radiation which will be discussed in the later sections.

## **Radioactivity**

Radionuclides are atoms that are unstable and will eventually reach a stable state through a process known as radioactive decay. This process results in the emission of energy or energetic particles from the nucleus of the unstable atom. The process may occur in a single step or may be composed of a series of steps to various radioisotopes. When this process proceeds through a series of steps it is called a **radioactive decay series**.

There are at least three natural radioactive-decay series which are the thorium, neptunium, and the uranium series. These radioactive decay series as well as naturally occurring K (potassium)-40, C (carbon)-14, H (hydrogen)-3 are significant contributors to background radiation levels, which are addressed in greater detail later.

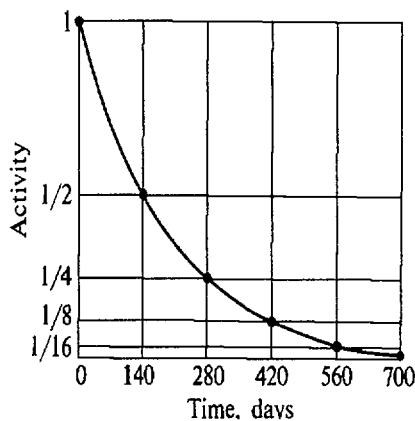


Figure 4: Radioactive Decay

The rate at which atoms undergo radioactive decay varies greatly. A common expression of the tendency for radioactive decay is the half-life associated with a particular isotope. The half-life is the amount of time required for one-half of the number of atoms for an isotope to experience radioactive decay. The longer the half-life the less likely an atom will experience radioactive decay in a fixed time interval. Half-lives vary from extremely small fractions of a second (billionths) to millions of years.

Figure 4 illustrates an isotope with a 140-day half-life. Note that the activity decreases by half in 140-days, and then by half again the next 140 days and thereafter.

## RADIATION INTERACTION WITH MATTER

### Ionization

As alpha, beta, gamma, and X-ray radiation interact with matter they impart part or all of their energy to the matter in a single interaction. It may require many interactions to absorb the energy of a single particle or photon of radiation. One of the most common ways energy is dissipated is ionization. As we discussed earlier this results in the creation of a positively charged atom and a free electron (see Figure 5). The positively charged atom and the free electron are referred to as a charged pair. The creation of the charged pair is one of the primary contributions to damage of biological systems.

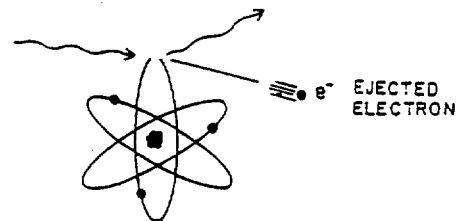


Figure 5: Ionization

### Radiation Ranges

Each type of radiation we have discussed interacts with the matter they travel through differently (Figure 6) because of the different characteristics of each radiation.

Alpha particles are composed of two protons and two neutrons. This is the heaviest particulate radiation with a positive charge of two (two protons). The alpha particle is the slowest of the

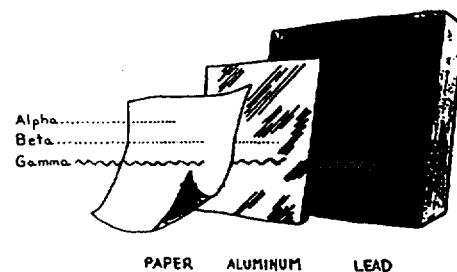


Figure 6: Radiation Ranges & Shielding

types of radiation we will review, with a speed of no more than 20,000 miles per second. As a result of these characteristics the alpha travels only a few centimeters (or inches) in air and is readily stopped by a sheet of paper. The alpha leaves its energy in a short distance characterized by a great many ionizations.

Beta particles are basically a very high-energy electron. Beta particles have a negative charge. It is a very light particle, with a mass of about one two-thousandth of a proton (or about one eight-thousandth of an alpha particle). Beta particles are very fast, approaching the speed of light. Due to their speed and lower charge, the beta particles travel several meters (or yards) in air and are readily stopped by a small piece of metal or other dense material. The beta particle leaves its energy in many ionizations but with the ionizations distributed along a much longer path of travel.

Gamma rays are photons (or energy waves, not a charged particle). Like light (also a photon) it travels at a speed of approximately 186,000 miles per second. The gamma ray travels much larger distances without interacting. When the gamma ray interacts with matter it creates very high-energy electrons similar to beta particles which in turn create ionizations as their energy is dissipated. Due to these differences the gamma ray travels much greater distances before its energy is dissipated. To dissipate the energy of a gamma ray several inches of lead are required.

## RADIATION QUALITIES AND UNITS OF MEASURE

There are numerous qualities and units used to describe radiation and radioactivity and their effects. Those used in this report relate to activity, absorbed dose, and dose equivalent. It is also common to express numbers in scientific notation or use prefixes with the number denoting the number of zeros (0) before or after the decimal. A few examples are provided below.

Prefix	Number Represented	Number in Scientific Notation
pico	.000000000001	$1 \times 10^{-12}$
nano	.000000001	$1 \times 10^{-9}$
micro	.000001	$1 \times 10^{-6}$
milli	.001	$1 \times 10^{-3}$
centi	.01	$1 \times 10^{-2}$
kilo	1,000.	$1 \times 10^3$
mega	1,000,000.	$1 \times 10^6$

**Activity** is the number of radioactive transformations (decays, disintegrations) that occur in a fixed time interval. The unit used to express activity is the **curie**. The curie is defined as 37,000,000,000 disintegrations per second; (also expressed as  $3.7 \times 10^{10} \text{ s}^{-1}$ ). A curie is a unit of

activity, not an amount of material or the number of atoms. The amount of material or number of atoms necessary to produce a curie of activity vary over a very wide range. Atoms with very long half-lives would require many more atoms to produce a curie of activity versus atoms with short half-lives.

**Absorbed dose** describes the energy absorbed per unit of mass of tissue. The unit used to express absorbed dose is the **rad** (radiation absorbed dose). One rad is an absorbed radiation dose of 100 ergs (a measure of a very small amount of energy) per gram. The rad can be used with all types of radiation including X-rays, gamma-rays, and particulate radiation. The absorbed dose can be measured with various radiation-detection instruments which allow the assessment of damage to biological systems subjected to radiation and radioactive materials.

**Dose equivalent** is an expression of the biological effect of the radiation on tissue. The unit used to express absorbed dose equivalent is the **rem** (radiation equivalent man). Dose equivalent is obtained by multiplying the absorbed dose (expressed in rad) by a **quality factor** (QF) for the type of radiation being considered.

$$\text{Dose equivalent} = \text{absorbed dose} \times \text{quality factor}$$

Some types of radiation create more biological damage due to the extent of ionization in small areas. From our discussion of alpha particles, the intense ionizations caused by the alpha particle results in a much higher Quality Factor for this radiation. This relationship for quality factors and different types of radiation we have presented in Table 1.

**Table 1**  
**Quality Factors for Various Types of Radiation**

<u>Radiation</u>	<u>Quality Factor</u>
Gamma-rays	1
X-rays	1
Beta Particles	1
Alpha Particles	20

## SOURCES OF RADIATION

### Background Radiation

Radiation occurs naturally and is an everyday fact of our existence. Mankind has always lived with radiation and radioactive materials and will continue to in the future. The radiation that occurs naturally is referred to as **background radiation**. Mankind experiences two types of radiation dose: first is radiation that originates outside the body and is called **external radiation**, and the second is radiation that originates inside the body and is called **internal radiation**. External radiation comes from the earth, the atmosphere, and every structure (buildings) around



us as well as a source referred to as **cosmic radiation** which is generated in the stars throughout the galaxy including our own sun (see Figure 7).

Cosmic radiation is composed of gamma-rays (some of very high energy) and many different types of energetic particulate radiation. Some of the particulate forms of radiation include neutrons, alpha particles, and heavy particles (including nuclei). High-energy cosmic radiation has the capability to interact with other atoms on earth and generate new isotopes. As we have already discussed, some of these may be radioactive. Common examples of radionuclides formed from cosmic radiation are carbon-14 and tritium (H-3). The atmosphere around the earth serves as an effective shield causing much of the energy of cosmic radiation to be dissipated prior to reaching the surface of the earth. However, each of us may receive a dose equivalent, due to external cosmic radiation, of 20 to 50 mrem (0.020 to 0.050 rem) annually. The actual dose is influenced by the elevation which we live. Higher elevations provide less shielding and therefore the doses are higher. A single plane flight can also contribute to our dose from cosmic radiation. The average passenger could expect to receive a dose of 2.8 mrem (0.0028 rem) per flight.

Another important contributor to external absorbed dose is **terrestrial radiation** (Figure 7). This is the radiation from the earth itself and the air around each of us. The sources of terrestrial radiation include the thorium, neptunium, and the uranium decay series as well as potassium-40. The absorbed dose varies from about 15 to 140 mrem (0.015 to 0.140 rem) annually. However, there are a very few areas that these terrestrial absorbed doses exceed 800 mrem each year.

One of the most important sources of dose is that contributed by internal radiation. These radionuclides are part of our body, the air we have breathed, or the food we have consumed. One of the most significant contributors is **radon** (Figure 7). Radon is a radioactive gas that is part of the uranium decay series. Radon's concentration varies greatly based upon the geology of each community, but is found in soils and rock everywhere. If it is allowed to concentrate in a building, the dose from radon can be increased significantly. Normally radon does not pose a significant health threat. Since radon is an alpha particle emitter, inhaling radon gas makes the lung our greatest concern (i.e., the alpha does not travel far but has a high quality factor for the affected tissue) The health effect of breathing radon is an increased risk of lung cancer.

## Source of Radiation Dose

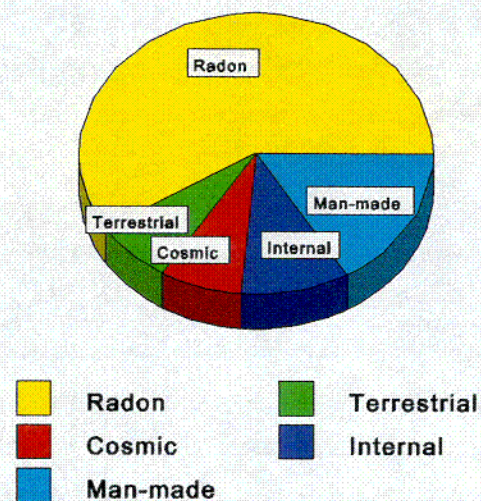


Figure 7: Radiation Sources (BIER V)



# Man-made Radiation

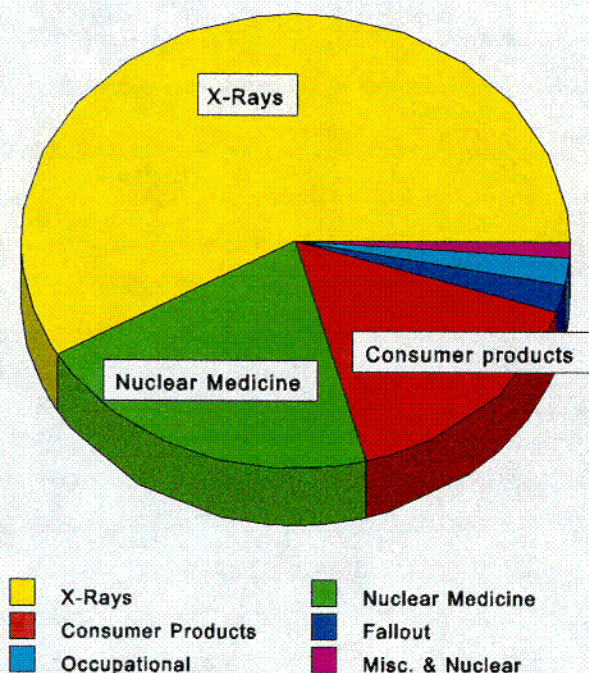


Figure 8: Man-Made Radiation Sources (BIER V)

**Man-made radiation** is important to completing our understanding of sources of radiation (see Figure 8). An important aspect in discussing man-made radiation is the benefit man derives from the use of these. Medical uses of radiation are the major contributor, including diagnostic X-ray, and nuclear medical treatment. Consumer products such as televisions, display screens, smoke detectors, and many other devices are the next most important class of man-made radiation. Fallout from prior weapons testing is now a small contributor to total radiation dose. Occupational exposure is also a factor from the medical, manufacturing, and nuclear industries. Finally, contributions from nuclear plant operations represent less than 1% of the man-

made radiation for the average member of the general public. The data presented in Figure 8 illustrates the importance of the different sources of man-made radiation for the average member of the public.

## HEALTH EFFECTS OF RADIATION

The effects of ionizing radiation have been of concern to the scientific community for several decades. The oldest body established to study biological effects of radiation dates from at least 1928 with the establishment of the International Commission on Radiological Protection. Much of our knowledge is based upon very high doses associated with animal experiments, accidents handling radioactive materials, and war time nuclear weapons use. It has been a classical problem of how to relate doses at these levels to much lower medical use (although some treatments are designed to deliver high dose) and occupational radiation levels. Environmental levels of radiation represent even greater challenges because of the extremely low doses compared with medical and occupational levels. Experiments with animals represent additional challenges because they may not accurately represent human biological responses to radiation.

Biological effects of radiation are classified as **somatic** and **genetic** (or hereditary). Somatic effects are observed in the individual receiving the radiation dose. Genetic effects are observed in the decedents of the individual receiving the radiation dose.



Somatic effects can be classified as **acute** or **chronic**. Acute effects occur within a short time (days) after the dose is received. Generally, acute effects require very high doses. Blood changes have been observed in the range of 25 to 50 rem (or 50,000 mrem). Other acute effects can be expected at even higher doses. Our knowledge of this level of dose are the survivors of nuclear weapons, accidents, and planned nuclear medical treatments. These dose levels are more than 500 times normal environmental background radiation. For this reason, these effects are not important to a discussion of environmental radiation.

Chronic effects are generally used to refer to effects that are observed over a long period of time, and these have also been referred to as **delayed effects**. The effects are also generally associated with radiation dose received over a long period known as **chronic exposure**. However, it is not necessary for the exposure to occur over a long period. The most significant chronic effect is cancer. There are numerous forms of cancer. The rate of cancer in individuals at low doses (at occupational or environmental levels) has not been observed directly. "Cancers induced by radiation are indistinguishable from those occurring naturally; hence their existence can be inferred only on the basis of statistical excess above the natural incidence." The current practice is to use observations at a much higher dose to establish the rate of cancers at that dose and then assume that the rate of cancers must be proportional to the lower dose. This has created a scientific disagreement because some scientists believe this method over-estimates the cancer risk from low doses of radiation. However, this appears to be a conservative assumption. Some risk exists, but it is believed to be a small risk of cancer at occupational levels. The Committee of the Biological Effect of Ionizing Radiation further states "It is by no means clear whether dose rates of gamma or X-rays of about 100 mrad per year are in any way detrimental to exposed people...". Environmental radiation levels are in the range of 100 mrad per year or less as we have discussed.

Genetic radiation effects occur when radiation changes the genetic material in cells. As we have discussed, the process of ionization removes electrons from the atom. These electrons are sometimes necessary in the creation of chemical bonds. If the bonds are part of the genetic material of the cell, it could result in changed genetic material (mutations). Radiation is just one of several agents that contribute to genetic change. Chemicals, including those that occur naturally, are a significant contributor to genetic mutations. Background radiation levels only provide a minor contribution to total mutations. To double the general mutation (from all sources) rate would require a dose of 50 to 250 rem (or 50,000 to 250,000 mrem). This is approximately 500 to 2,500 times the normal environmental background of about 100 mrem.

## **GENERAL HEALTH RISK**

Every human activity has risk associated with it. The air we breathe, the food we eat, where we live or work all have different risks. Many times our perception of these risks is quite different than the real risk of an activity. There was widespread fear and misunderstanding regarding the fire and safety hazard from electricity early this century. Now electricity is accepted as part of our daily existence. Radiation is unique in that it cannot be seen, felt, smelled, or detected by any of the human senses. It is detected by instruments or laboratory analysis specially designed

to detect radiation. Thus it is understandable to be wary of something we cannot readily sense and may not have a personal knowledge about. There are other similar hazards we tend to accept such as microwave radiation, carbon monoxide in the operation of some furnaces, and our vehicles due to our familiarity with these.

A common way of expressing risk is a reduction of life expectancy from a particular activity. Below is Table 2 presenting common activities and the associated reduction in life expectancy.

**Table 2**  
**Reduction in Average Life Expectancy**

<u>Activity</u>	<u>Reduction in Life Expectancy</u>
Cigarette Smoking 2 Packs/Day	10 Years
Cigarette Smoking 1 Pack/Day	7 Years
Heart Disease	5.8 Years
Living in City Versus Rural	5 Years
Overweight 30 %	3.6 Years
Cancer	2.7 Years
Commercial Nuclear Power	12 Minutes

## **NUCLEAR POWER PLANT OPERATIONS**

The primary difference between a nuclear generating station and fossil generating station is the source of heat or thermal energy. The steam turbine, condenser, condensate and feed water systems are much the same. The uranium fuel within the nuclear reactor is the source of heat or energy in the nuclear generating station.

## Nuclear Fission

Certain heavy radionuclides are known to naturally undergo a special form of radioactive decay, called spontaneous fission. Spontaneous **fission** means the nuclei of these radioisotopes literally split into two or three new nuclei (also known as fission fragments) and a few free neutrons (not in a nucleus). The protons and neutrons are shared between these new nuclei. One isotope of uranium known as U-235 is known to undergo fission. The other more common isotope of uranium known as U-238 does not fission so easily.

Fission can also be stimulated by neutrons interacting with the nucleus of these atoms (see Figure 9). Simply stated a neutron reaches the nucleus and produces fission fragments, free neutrons, and heat. Fission of uranium produces more than one neutron per fission. Therefore, if there is enough uranium (especially U-235) present it is possible to produce more fissions and keep the process going or cause more and more fissions to occur. When the rate of fission initiated is self-sustaining or increasing, a **chain reaction** has been established. It is this sustained chain reaction and the energy produced that produces the heat needed to generate steam for electrical generation.

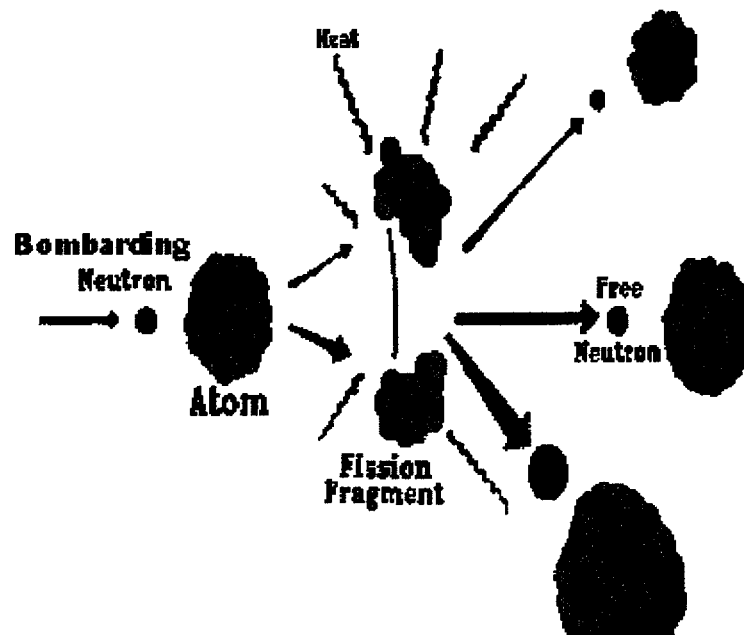


Figure 9: Nuclear Fission

## Uranium Fuel

Uranium ore is mined from the earth the same as many minerals (see Figure 10). This uranium ore is then taken to a mill to concentrate the uranium. The extraction process for uranium uses acids to dissolve the uranium and separate it from the ore. This uranium is then **converted** chemically to a gas uranium hexafluoride (in chemical notation  $\text{UF}_6$ ). While in this form it is

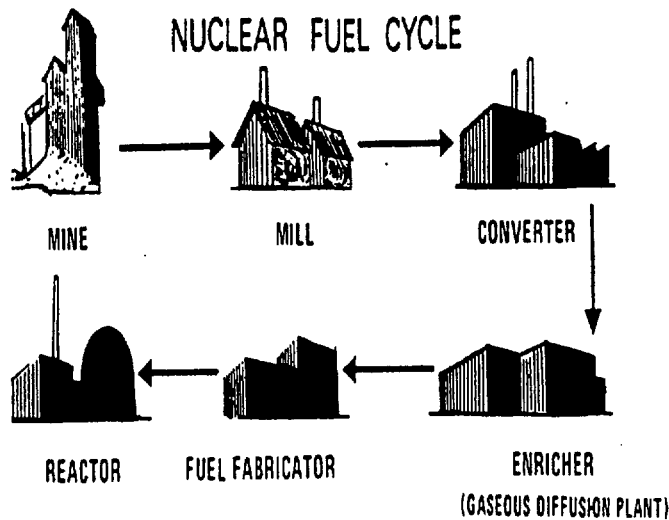


Figure 10: The Nuclear Fuel Cycle

The powder is then processed under high pressure, and temperature to create a ceramic pellet of uranium dioxide. This process is part of the **fuel fabrication**. The fuel fabricator also ensures that each fuel pellet also has the proper amount of U-235 and U-238. The additional U-235 added is referred to as the percent enrichment which for commercial reactors is about 5% of the total uranium in the fuel. These fuel pellets are placed into long tubes of zirconium alloy or **fuel rods**. These rods of uranium fuel are then placed with other such fuel rods into a **fuel assembly** (see Figure 11). This fuel assembly is the basic unit that is shipped to the nuclear power plant. It is important to note that the entire process of making nuclear fuel is carefully controlled to ensure the quality of the nuclear fuel.

possible to separate the lighter U-235 from the heavier U-238. This process of separation is called **gaseous diffusion**. The reason for separation is to allow more of the U-235 to be included in the fuels used in commercial reactors. We have already discussed that U-235 fissions more readily than U-238. This process that increases the amount of U-235 is also referred to as **enrichment**. After enrichment this gas is chemically converted to uranium dioxide (in chemical notation  $\text{UO}_2$ ). At this point the uranium dioxide is a gray powder.

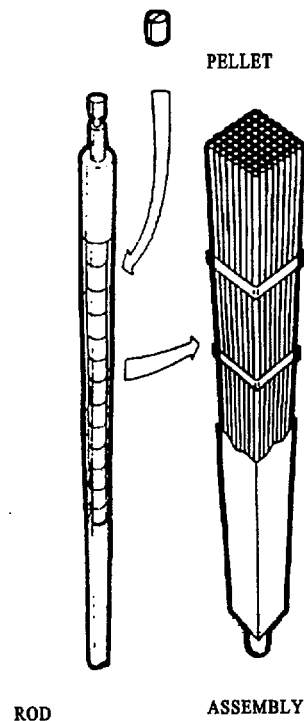


Figure 11: Fuel Pellets, Rods & Assemblies

## PLANT SYSTEMS

### System Summary

There are four (4) groupings of major plant systems which are the reactor, the turbine generator, the condensate and feed water systems, and various support systems including various emergency systems (see Figure 12). The reactor, with its nuclear fuel, is the source of heat to generate high pressure steam. The turbine is a large rotating fan-like machine that the steam causes to rotate. The turbine is connected to an electrical generator which produces a rotating magnetic field. Electricity is generated in winding of metallic conductors around this magnetic field and then transmitted to the electrical transmission system, and distributed to the customers in the service area and neighboring utilities.

After the steam has spent most of its energy in the turbine, water vapor remains and must be recovered for reuse. The water vapor is recovered as water in a condenser. The condenser is a large system of tubes that are water cooled. The water used to cool the condenser is one of the most visible features at any power plant. Either large quantities of water are used or a cooling tower is used. After the steam has been recovered as water it is returned through a system of pumps, piping, and heaters to the steam generator. The process of reusing this water and steam in a continuing cycle is referred to as the **steam cycle**.

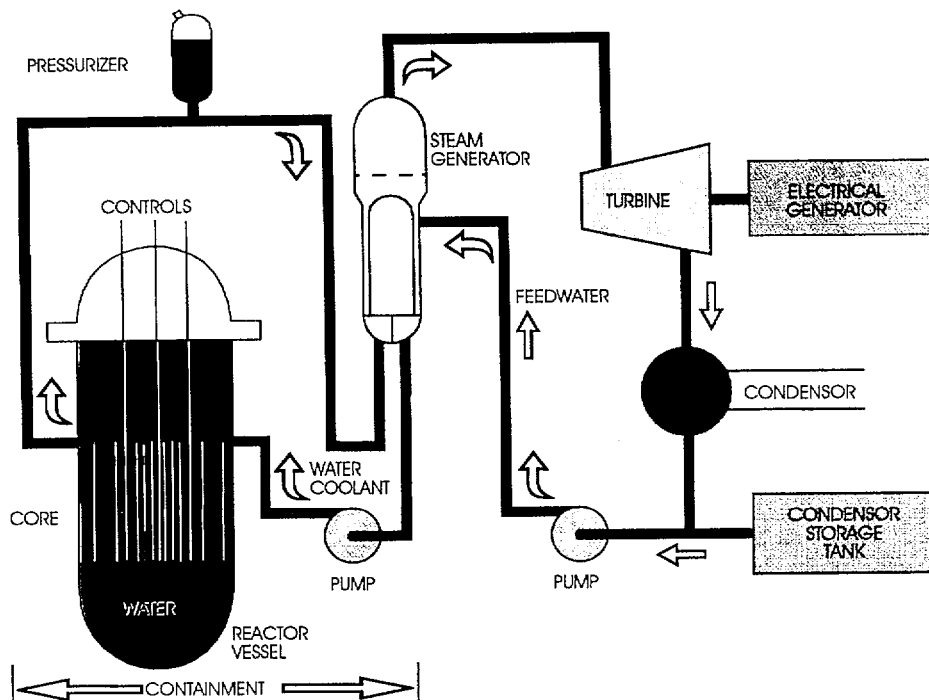


Figure 12: Major Plant Systems for The Pressurized Water Reactor

## Reactor Types and the Reactor Vessel

There are more than 100 commercial nuclear reactors being used to generate electricity in the United States today. Of these, there are two basic types of reactor in use today, the **Pressurized Water Reactor (PWR)** and the **Boiling Water Reactor (BWR)**. The basic difference is the point where steam is formed. The boiling water reactor forms steam in the reactor while the pressurized water reactor forms steam through a separate heat exchanger called a steam generator. The H. B. Robinson Steam Electric Plant, Unit No. 2 (also called Robinson Nuclear Plant) is a Pressurized Water Reactor (PWR). There are other types of reactors used for research and military purposes.

The collection of fuel assemblies is referred to as the **reactor core**. The Robinson Plant has 157 fuel assemblies in the reactor core.

The reactor core, the controls, instrumentation; as well as other components, are located in the reactor vessel (see Figure 13). The components vary greatly by reactor type. The reactor vessel is a specially designed container which supports all of the components. The reactor vessel is 9.31 inches thick of steel with a stainless steel lining.

The rate of nuclear fission is controlled by neutron absorbing materials. One of the most common materials used is an isotope of boron known as boron-10 (B-10). Also control rods are used that are made of other materials including indium and cadmium. By controlling how much of the control rods are inserted in the reactor core the rate of nuclear fission is controlled. The Robinson Plant has 20 control rods per assembly.

The boiling water reactor generates steam with a significant water fraction and this steam must have this water removed. The reactor vessel for the boiling water reactor contains a steam separator which removes most of the water fraction. After treatment by the steam separator the steam passes through a steam dryer to remove additional water. The water removed by the steam separator and dryer is returned to the water in the reactor vessel. The boiling water reactor also has a special pair of recirculating pumps that provide additional control of steam generation and reactor power.

The pressurized water reactor does not generate steam in the reactor. The reactor vessel is pressurized to prevent boiling from occurring in the reactor or the reactor vessel. Steam is generated in a heat exchanger called the steam generator. The steam and the water from which steam is generated is a separate water system from reactor water or reactor coolant. This

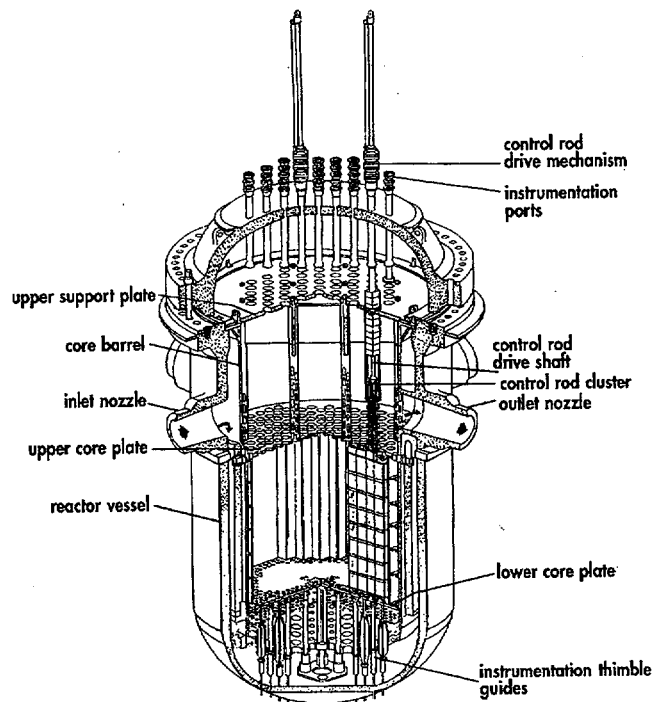


Figure 13: Reactor Vessel

separate water system is referred to as the **secondary system** while the reactor's water system is referred to as the **primary system**. In the pressurized water reactor it is this secondary water that steam is made from and recycled through the condenser and feedwater system. This water is returned to the steam generator.

The PWR steam generators serve as the point of steam production. The reactor water of the primary system is not allowed to boil or produce steam. This primary system water (or coolant) is circulated to the steam generators and back to the reactor in a continuous cycle. While in the steam generator the primary coolant (or water) transfers some of its heat or energy to the secondary coolant (water) by heating the secondary coolant and making steam with the secondary coolant. It is important to note that there is no exchange of water between the primary coolant and the secondary coolant. This process is made possible because the pressure in the primary (reactor) systems are maintained at a point which prevents boiling in the reactor.

The pressurizer is the system that supports regulation of reactor pressure. The pressurizer is a vessel partly filled with water and is in free exchange with the water in the reactor and primary systems. The pressurizer also allows for the volumetric expansion of the primary coolant (water) as the reactor starts up, while maintaining the pressure of the reactor.

## Sources of Radioactive Materials In Reactor Operation

There are two primary means that radioactive materials are produced in reactor operation which are:

- Fission produces two or more fission fragments in each fission. These fission fragments become the nuclei of new atoms as **fission products**. As we have already discussed many atoms are radioactive as is the case with these fission fragments. Examples of these isotopes are iodine-131 (I-131), strontium-90 (Sr-90), cesium-137 (Cs-137), as well as others.
- Activation of normally stable nuclei occurs in the neutron field in the reactor. This occurs because neutrons are absorbed by the nucleus of an atom, and a new isotope of that atom is created. The new isotopes may be radioactive. Examples of these isotopes include tritium (H-3) and cobalt-60 (Co-60). These radionuclei are referred to as **activation products**.

The potential sources of radioactive emissions from nuclear power operations involve the treatment of water from the reactor systems, the treatment of air in the buildings that house plant systems, and the condenser vacuum system. Each of these emissions is managed to reduce the emissions to levels that are considered as low as reasonably achievable. The radiological monitoring program is designed to assess the impacts of these emissions even though they are acknowledged to be small contributors to background radiation.

## Barriers to Release of Radioactive Materials

There are several barriers to release of radioactive materials. In order these are:

- the ceramic fuel pellet itself
- the zirconium cladding of the fuel rod
- the reactor vessel and its associated piping
- the containment building

The fuel, fuel rods, and the reactor vessel have already been discussed. The **containment** building is illustrated in Figure 14. The containment houses the reactor core, the reactor vessel and its associated piping, reactor coolant pumps and the pressurizer.

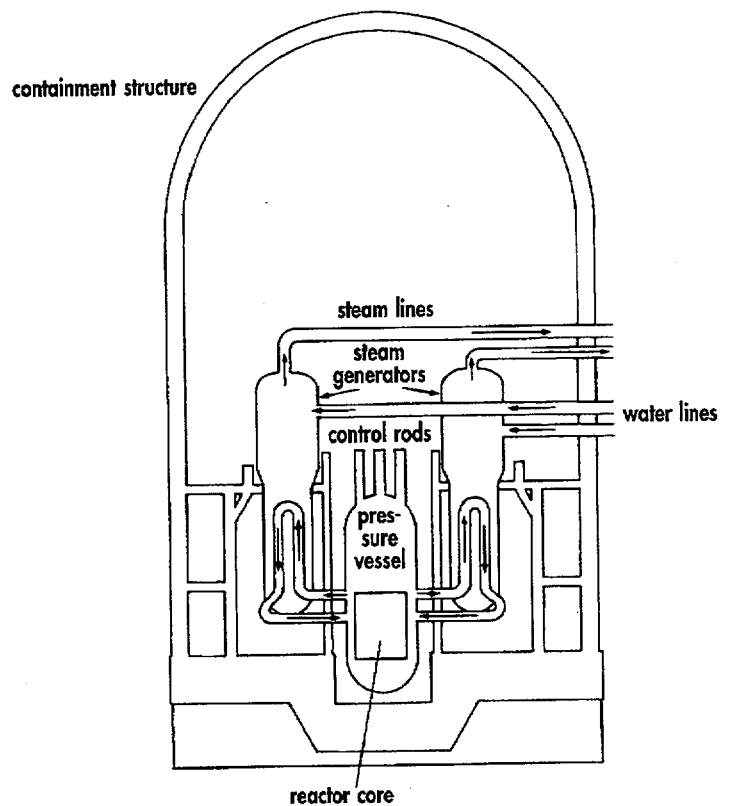


Figure 14: Primary Containment Structure

## REACTOR SAFETY

There are several points regarding nuclear safety that are important to understand, and these are:

- Commercial nuclear generating stations can not explode like a nuclear weapon. The uranium for weapons is highly enriched and must be carefully timed and configured to create an explosion. The uranium in commercial generating stations is low enrichment and can not be configured to create a nuclear explosion.
- The **reactor control system** regulates the power output of the reactor by controlling the rate of nuclear fission. This is accomplished by inserting or withdrawing control rods or by the addition of neutron absorbing materials. A special safety system is part of the reactor control system call the **reactor protection system** which will cause the control rods to be quickly inserted. This insertion causes the nuclear chain reaction to stop. There are numerous sensors that measure different plant conditions that would cause the reactor protection system to activate.
- There are several emergency systems that provide adequate cooling of the reactor in the event of a loss of coolant. Should there be breakage of piping carrying water to the



reactor, this is referred to as a Loss of Coolant. Accident systems are activated upon a drop in reactor pressure or a low level of water in the reactor. The exact activation varies by reactor type. The systems that deliver this supplemental source of water to the reactor are referred to as the **Emergency Core Cooling System**. There are even backup systems to the individual Emergency Core Cooling Systems. This practice is referred to as a defense in depth. Safety is not dependent on any one device, but is a system of several backup devices.

The Robinson Nuclear Plant is designed to be a safe means of generating electrical power. This level of safety is further enhanced through the discipline of operation provided by a well qualified and trained staff. Ongoing training is provided to the staff to ensure a high quality performance from each member of the plant staff. Although the requirements are high for the staff, reactor operators and senior reactor operators must also pass a rigorous license examination by the Nuclear Regulatory Commission on a regular basis. These examinations test knowledge of plant systems, design, procedures, problem solving, regulatory requirements, and the ability to function as a team responding to plant conditions.

# **RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM**

## **PURPOSE AND REQUIREMENTS FOR THE RADIOLOGICAL MONITORING PROGRAM**

Although the operation of a nuclear generating station results in the raising of background radiation only a small amount, it is important to measure these emissions of radioactivity and radiation to assess their impact on the surrounding populations. The purpose of the radiological monitoring program is to measure accumulation of radioactivity in the environment, to determine whether this radioactivity is the result of operations of the Robinson Plant, and to assess the potential dose to the off-site population based on the cumulative measurements of radioactivity of plant origin. Radiological environmental monitoring programs provide an additional verification of the containment and radiological controls of nuclear generating stations.

The radiological monitoring program was established in 1973 and has continued to collect samples and evaluate them for twenty-seven (27) years.

Requirements are established for the radiological monitoring program as follows:

- Off-Site Dose Calculation Manual (ODCM)
- various procedures

Additional guidance regarding the radiological monitoring program may be found in the following:

- NRC 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
- NRC Regulatory Guide 4.13 Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications Revision 1 July 1977
- NRC Regulatory Guide 4.15 Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment Revision 1 February 1979



## General Site Description

The Robinson Nuclear Plant (Unit No. 2) consists of a pressurized water reactor with a design rating of 769 MWe (Mega-watts electric). The site is shared with a pulverized coal unit (Unit No. 1), which established commercial operation in 1960. Commercial production was initiated at Robinson Nuclear Plant on March 7, 1971. The Robinson Nuclear Plant is located in Darlington County, South Carolina. The site is along state route 151 approximately five (5) miles north west of Hartsville, South Carolina and is displayed on the map of northeastern South Carolina (Figure 15). The site is also approximately twenty five (25) miles north west of Florence, South Carolina.

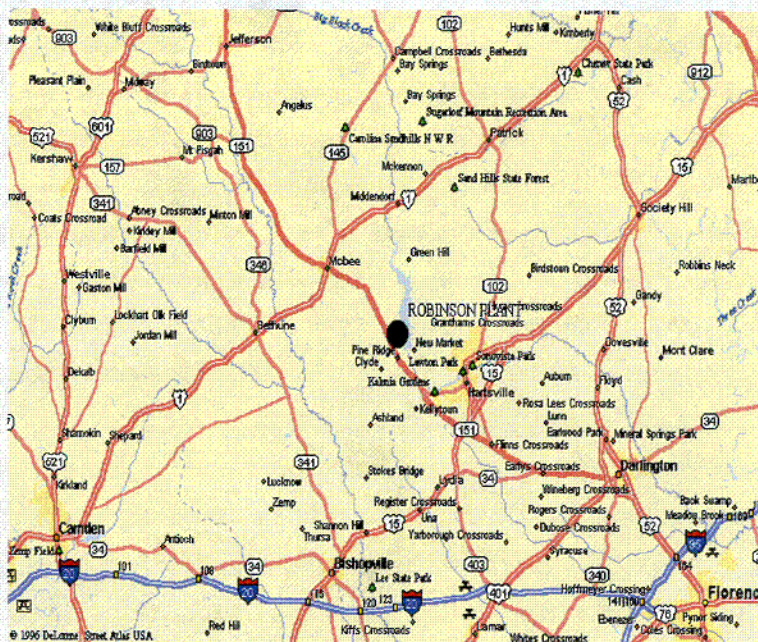


Figure 15: Location of Robinson Nuclear Plant

Lake Robinson is adjacent to the plant itself and is the source of cooling water. The lake was impounded during the construction of Robinson Unit No.1 (coal fired). The lake is fed by Black Creek and is approximately 2,250 acres in area. The plant intake is at the southern portion of the lake near the dam. The discharge is to a canal which conveys the cooling water to a point 4.2 miles north of the plant, where it returns to Lake Robinson.

The local economy supports primarily industrial and agricultural contributions. Fishing, boating, and swimming are popular activities on Lake Robinson and other nearby lakes. These activities contribute to the radiological pathways by consumption of fish, and immersion related to swimming and boating. Consumption of milk and food crops contributes to the ingestion pathway.



## **RADIOLOGICAL MONITORING PROGRAM QUALITY ASSURANCE**

A required component of the environmental radiological monitoring program is the Quality Assurance Program. The standards for the quality assurance program are established in the NRC Regulatory Guide (RG) 4.15, "Quality Assurance for Radiological Monitoring Programs. According to RG 4.15, the purpose of the quality assurance program is to "(1) to identify deficiencies in the sampling and measurement processes to those responsible for these operations so that corrective action can be taken, and (2) to obtain some measure of confidence in the results of the monitoring programs in order to assure the regulatory agencies and the public that the results are valid." This provides the opportunity to implement corrective actions that address possible deficiencies. Examples of the activities of the quality assurance program include:

- regular review of sample collection and records
- regular review of laboratory procedures and methods
- participation in an Environmental Interlaboratory Comparison Program, which provides an independent assessment of the quality of laboratory results.
- the use of known concentrations of radioactivity in test samples by the laboratory to ensure consistent quality results on an ongoing basis.

## **RADIOLOGICAL MONITORING PROGRAM GENERAL DESCRIPTION**

Although the contribution to background radiation is small, CP&L has established this program to measure the exposure pathways to man. An exposure pathway describes the source of the radiological exposure. The primary forms of potential radiological emissions from the plant are airborne and liquid discharge. The pathways monitored are external dose, ingestion of radioactive materials, and the inhalation of radioactive material. Specific methods and different environmental media are required to assess each pathway. Table 3 provides a list of the media used to assess each of these pathways.

**Table 3**  
**Media Used to Assess Exposure Pathways to Man**

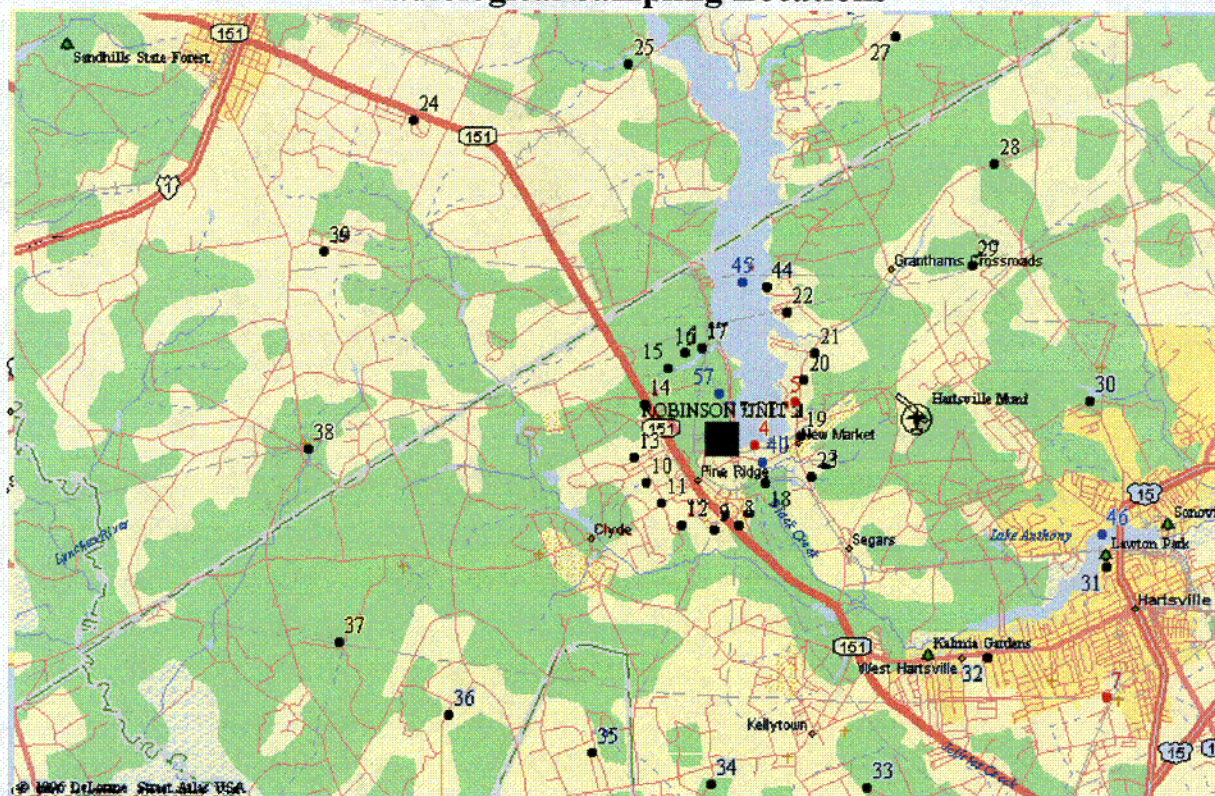
<u>Pathway of Exposure to Man</u>	<u>Media Sampled</u>
External Dose	Thermoluminescent Dosimetry(TLD) Shoreline Sediment
Ingestion	Aquatic Vegetation Broadleaf Vegetation Food Crops Fish Ground Water Surface Water
Inhalation	Air Samples (Particulate & Radioiodine)

### **Sampling Locations**

Sampling locations are chosen based upon meteorological factors, preoperational monitoring, and results of the land use surveys. A number of locations are selected as controls. Control stations are selected because they are very unlikely to be affected by operation of the plant. Sample locations may be seen in Figures 16 and 17. A description of each sample location may be found in Table 4.



## Radiological Sampling Locations



**Figure 16: Radiological Sampling Locations (Distant from Plant) (Scale 1 inch = 2 miles)**

Thermoluminescent dosimeter locations(only) are displayed in black, ingestion and waterborne pathways in blue, and inhalation or air sampling stations in red. Stations not shown include 1, 26, 41, 47 (varies), 49 (varies), 52, 54, and 58 (varies). Locations near the plant are shown on Figure 17.

Stations 1 through 7 and 55 include air sampling and thermoluminescent dosimeters.

### Sample Types

Air Cartridge & Particulate

Shoreline Sediment

Ground Water

Broadleaf Vegetation

Surface Water

Thermoluminescent Dosimeter

Fish

Food Products

Aquatic Vegetation & Bottom Sediment

### Sample Locations

1-7, 55 (RED)

44 (BLACK), 57 (BLUE)

40, 42, 43 (BLUE)

50, 51, 52 (BLUE)

40, 41, 57 (BLUE)

1-39, 55, 56 (BLACK EXCEPT SHARED LOCATIONS)

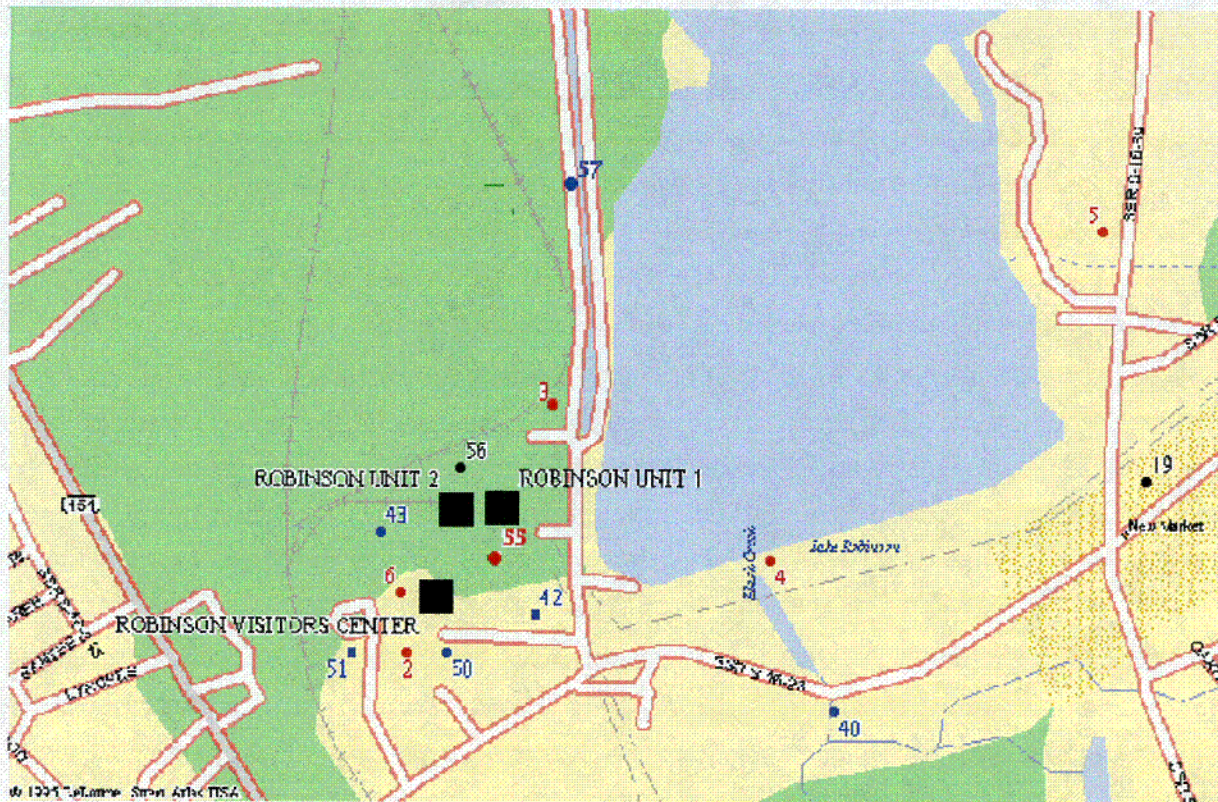
45-47 (BLUE)

49, 54, 58

41, 45, 46, 54 (BLUE)



## Radiological Sampling Locations



**Figure 17: Radiological Sampling Locations (Nearest Plant) (Scale 1 inch = .25 miles)**

Thermoluminescent dosimeter locations (only) are displayed in black, ingestion and waterborne pathways in blue, and inhalation or air sampling stations in red. Locations distant from the plant are shown on Figure 16.

Stations 1 through 7 and 55 include air sampling and thermoluminescent dosimeters.

### Sample Types

### Sample Locations

Air Cartridge & Particulate	1-7, 55 (RED)
Shoreline Sediment	44 (BLACK), 57 (BLUE)
Ground Water	40, 42, 43 (BLUE)
Broadleaf Vegetation	50, 51, 52 (BLUE)
Surface Water	40, 41, 57 (BLUE)
Thermoluminescent Dosimeter	1-39, 55, 56 (BLACK, EXCEPT SHARED LOCATIONS)
Fish	45-47 (BLUE)
Food Products	49, 54, 58
Aquatic Vegetation & Bottom Sediment	41, 45, 46, 54 (BLUE)



**Table 4**  
**Robinson Nuclear Plant**  
**Radiological Monitoring Sampling Locations**

Sample Type	Location & Description	Frequency	Sample Size	Analysis
Air Cartridge (AC)	1--26 miles ESE Florence* 2--0.2 mile S Information Center 3--0.7 mile N Microwave Tower 4--0.4 mile ESE Spillway 5--0.9 mile ENE Near Johnson's Landing 6--0.3 mile SW Near Information Center 7--6.3 miles ESE Hartsville Substation 55--0.3 mile SSE Near Site	Weekly	800 m <sup>3</sup>	Iodine
Air Particulate (AP)	1--26 miles ESE Florence* 2--0.2 mile S Information Center 3--0.7 mile N Microwave Tower 4--0.4 mile ESE Spillway 5--0.9 mile ENE Near Johnson's Landing 6--0.3 mile SW Near Information Center 7--6.3 miles ESE Hartsville Substation 55--0.3 mile SSE Near Site	Weekly	800 m <sup>3</sup>	Gross Beta (Weekly) Composite Gamma (Quarterly)
Fish (FI)	45--Site varies within Lake Robinson 46--4.9 miles ESE Prestwood Lake 47--13.0 miles NW Bee Lake or 12.5 miles NNW May Lake or Juniper Lake or Lake not influenced by plant discharge*	Semiannual (In Season)	500 grams (wet)	Gamma (edible portions only)
Broadleaf Vegetation (BL)	50--0.25 mile SSE CP&L Property 51--0.25 mile SSW CP&L Property 52--10 miles W Bethune*	Monthly (As available)	500 grams (wet)	Gamma
Shoreline Sediment (SS)	44--1.9 miles NNE Shady Rest Club 57--0.9 mile NNW Ash Pond	Semiannual	500 grams	Gamma
Aquatic Veg. (AV) & Bottom Sediments (SD)	46--4.9 miles ESE--Prestwood Lake 41--7.2 miles NNW Black Creek at US-1 * 45--Site varies within Lake Robinson 54--10.1 miles E Auburndale Plantation	Annual	500 grams	
Ground Water (GW)	40--0.6 miles ESE Black Creek at Road 16-23 42--Unit 1 Deep Well 43--Unit 2 Deep Well	Quarterly (as of 7/98)	4 liters	Gamma Tritium
Surface Water (SW)	40--0.6 miles ESE Black Creek at Road 16-23 41--7.2 miles NNW Black Creek at US 1 * 57--0.9 miles NNW Ash Pond	Monthly Composite	4 liters	Gamma Tritium
Food Products (FP)	58--Site varies from plant 49--10.0 miles W or greater than 5 miles from plant * 54--10.1 miles E Auburndale Plantation	Twice per year at Harvest	500 grams	Gamma

\* Control Stations



**Table 4 (Continued)**

**Robinson Nuclear Plant**

**Radiological Monitoring Sampling Locations**

Sample Type	Location & Description	Frequency	Sample Size	Analysis
Thermoluminescent Dosimetry (TLD)	1--10 miles ESE Florence * 2--0.2 mile S Information Center 3--0.7 mile N Microwave Tower 4--0.4 mile ESE Spillway 5--0.9 mile ENE Near Johnson's Landing 6--0.3 mile SW Near Information Center 7--6.3 miles ESE Hartsville Substation 8--0.8 mile SSE Near Transmission Tower 9--1.0 mile S on Transmission Tower 10--1.0 mile WSW at Church of God Cemetery 11--1.0 mile SW Near Old Camden Road 12--1.2 miles SSW Intersection of Dirt Road Near Roads 16-23 and 16-413 13--1.0 mile W; 0.5 mile Down Extension of Road 16-846 14--0.9 mile WNW at Pine Ridge Church 15--1.0 mile NW Near Ash Pond 16--1.0 mile NNW Darlington Co. IC Turbine Plant 17--1.2 miles N Discharge Canal at Darlington Co. Emergency Water Pumping Station 18--0.7 miles SSE Near Old Railroad Trestle at Black Creek 19--1.0 mile E; 0.1 mile from Intersection of Road 16-23 and Road 16-39 20--1.3 miles ENE; 0.5 mile N of Intersection of Roads 16-23 and 16-39 21--1.4 miles NE Near Atkinson's Boat Landing 22--1.9 miles NNE Shady Rest Club 23--1.2 miles ESE on Road 16-39; 0.5 mile S of Intersection of Roads 16-23 and 16-39 24--5.0 miles NW; 1.5 miles from Intersection of SR 151, 13-711, 13-172 25--4.6 miles NNW on Road 13-346 26--5.0 miles N, on Road 13-346 27--5.0 miles NNE Road 13-763 28--4.8 miles NE on Road 13-39 29--4.1 miles ENE on Road 16-20 at Transmission Tower 30--4.6 miles E, Near Intersection of Roads 16-20 and 16-492 31--4.6 miles ESE on Lakeshore Drive 32--4.5 miles SE Transmission Tower at end of Kalber Drive 33--4.6 miles SSE on Road 16-493 34--4.6 miles S on Road 16-772 35--4.4 miles SSW Near Intersection of Roads 31-51 and 16-12 36--4.7 miles SW on Road 16-1127 37--5.0 miles WSW Transmission Tower Nearest Clay Road 38--4.9 miles W at Union Church Cemetery 39--5.0 miles WNW, 1/2 mile from Intersection of Road 16-231 and 13-172 55--0.3 mile SSE Near Site Boundary 56--300 feet N of ISFSI	Quarterly	Not Applicable	TLD Reading

\*Control Station

## SUMMARY OF RADIOLOGICAL MONITORING PROGRAM

The Radiological Environmental Monitoring Program (REMP) was conducted in accordance with the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 Off-Site Dose Calculation Manual (ODCM), and approved procedures.

The purpose of the REMP is to measure accumulation of radioactivity in the environment, to determine whether this radioactivity is the result of the operations of the HBRSEP, Unit No. 2, and to assess the potential dose to the off-site population based on the cumulative measurements of radioactivity of plant origin. Approximately 1,150 samples were collected from indicator and control locations and 1,200 analyses and measurements were made during 2000. Detectable radioactivity resulting from plant operations was found in all 24 indicator samples of surface water (Table 6). Only the tritium activity in fish samples constituted a potential source of public exposure. Using the methodology of 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, dated October 1977," the potentially most exposed individual of the public (being an adult) from the fish consumption of approximately 46 pounds (21 kg of fish per year) and assuming that tritium concentration is in equilibrium with the fish flesh is 0.005 millirem per year.

1. A statistical summary of all the data gathered in 2000 has been compiled in Table 5.
2. Radioactivity in environmental samples which could be attributed to the plant operations in 2000 is summarized in Table 6.
3. All detectable radionuclides in the environmental samples for 2000 were less than reporting levels as defined in HBRSEP, Unit No. 2 ODCM. Table 7 summarizes the reportable levels.
4. Environmental sampling and analyses performed during 2000 demonstrated that the HBRSEP, Unit No. 2 continues to operate with minimum impact on the environment and minimal dose to the general public.

5. The following locations are used as control locations and are intended to indicate conditions away from the HBRSEP, Unit No. 2 influence:

Thermoluminescent Dosimeters, Airborne and Particulate Samples	Florence, S.C. (Location 1)
Surface Water, Bottom Sediment, and Aquatic Vegetation	Black Creek at US 1 (Location 41)
Fish	Lake Bee or May Lake or Juniper Lake or a Lake not influenced by plant discharge (Location 47)
Broadleaf Vegetation	10 Miles W. Bethune (Location 52)
Food Products	> 5 Miles from plant--Lowest D/Q (Location 49 - Bethune - site varies)

**TABLE 5**  
**ROBINSON NUCLEAR PLANT**  
**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM DATA SUMMARY**

H. B. Robinson Steam Electric Plant, Unit No. 2  
Darlington County, South Carolina

Docket Number - 50-261  
Calendar Year 2000

Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) <sup>(1)</sup>	All Indicator Locations Mean Range <sup>(2)</sup>	Location w/Highest Annual Mean		Control Locations Mean Range <sup>(2)</sup>	Number of Nonroutine Reported Measurements
				Name, Distance, and Direction	Mean Range <sup>(2)</sup>		
Air Cartridge (pCi/m <sup>3</sup> )	I-131 414 <sup>(3)</sup>	2.8E-2	All less than LLD	-----	-----	All less than LLD	0
Air Particulate (pCi/m <sup>3</sup> )	Gross Beta 414 <sup>(3)</sup>	1.0E-3	2.24E-2 (362/362) 1.12E-2 - 4.45E-2	Site Boundary 0.3 mile SSE	2.35E-2 (52/52) 1.17E-2 - 4.04E-2	2.37E-2 (52/52) 1.11E-2 - 5.36E-2	0
	Gamma 32	See Table 8	All less than LLD	-----	-----	All less than LLD	0
Aquatic Vegetation <sup>(5)</sup> (pCi/g, wet)	Gamma 4 I-131	3.5E-2	4.38E-1 (1/3) Single value	Auburndale Plantation 10.1 miles E	4.38E-1 (1/1) Single value	All less than LLD	0
Broadleaf Vegetation (pCi/g, wet)	Gamma 54 <sup>(3)(4)</sup> Cs-137	3.5E-2	8.86E-2 (2/36) 5.03E-2 - 1.27E-1	CP&L Property 0.25 miles SSW	8.86E-2 (2/18) 5.03E-2 - 1.27E-1	1.29E-1 (11/18) 4.92E-2 - 2.25E-1	0

**TABLE 5 (Cont.)**  
**ROBINSON NUCLEAR PLANT**  
**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM DATA SUMMARY**

H. B. Robinson Steam Electric Plant, Unit No. 2  
Darlington County, South Carolina

Docket Number - 50-261  
Calendar Year 2000

Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) <sup>(1)</sup>	All Indicator Locations Mean Range <sup>(2)</sup>	Location w/Highest Annual Mean		Control Locations Mean Range <sup>(2)</sup>	Number of Nonroutine Reported Measurements
				Name, Distance, and Direction	Mean Range <sup>(2)</sup>		
Fish (pCi/g, wet) Bottom-Feeder	Gamma 6 K-40	1.1E+0	3.30E+0 (4/4) 2.64E+0 – 3.97E+0	Prestwood Lake 4.9 miles ESE	3.58E+0 (2/2) 3.18E+0 – 3.97E+0	4.33E+0 (2/2) 2.79E+0 – 5.87E+0	0
Fish (pCi/g, wet) Free-Swimmer	Gamma 6 Cs-137	5.5E-2	8.14E-2 (1/4) Single value	Prestwood Lake 4.9 miles ESE	8.14E-2 (1/2) Single value	1.20E-1 (2/2) 1.17E-1 - 1.22E-1	0
	K-40	1.1E+0	2.92E+0 (4/4) 2.02E+0 – 3.50E+0	Prestwood Lake 4.9 miles ESE	3.43E+0 (2/2) 3.36E+0 – 3.50E+0	2.96E+0 (2/2) 1.36E+0 – 4.56E+0	0

**TABLE 5 (Cont.)**  
**ROBINSON NUCLEAR PLANT**  
**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM DATA SUMMARY**

H. B. Robinson Steam Electric Plant, Unit No. 2  
 Darlington County, South Carolina

Docket Number - 50-261  
 Calendar Year 2000

Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) <sup>(1)</sup>	All Indicator Locations Mean Range <sup>(2)</sup>	Location w/Highest Annual Mean		Control Locations Mean Range <sup>(2)</sup>	Number of Nonroutine Reported Measurements
				Name, Distance, and Direction	Mean Range <sup>(2)</sup>		
Food Products (pCi/g, wet)	Gamma 4 <sup>(3)</sup> K-40	3.9E-1	2.64E+0 (3/3) 1.49E+0 - 3.83E+0	Site varies from plant	3.83E+0 (1/1) Single value	1.57E+0 (1/1) Single value	0
Ground Water (pCi/l)	Gamma 8	See Table 8	All less than LLD	-----	-----	No control	0
	Tritium 8	3.25E+2 (8/8) <sup>(7)</sup>	All less than LLD	-----	-----	No control	0
Shoreline Sediment (pCi/g, dry)	Gamma 4	See Table 8	All less than LLD	-----	-----	No Control	0

**TABLE 5 (Cont.)**  
**ROBINSON NUCLEAR PLANT**  
**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM DATA SUMMARY**

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Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) <sup>(1)</sup>	All Indicator Locations Mean Range <sup>(2)</sup>	<u>Location w/Highest Annual Mean</u>		Control Locations Mean Range <sup>(2)</sup>	Number of Nonroutine Reported Measurements
				Name, Distance, and Direction	Mean Range <sup>(2)</sup>		
Bottom Sediment <sup>(5)</sup> (pCi/g, dry)	Gamma 4 Cs-137	4.7E-2	All less than LLD	-----	-----	1.54E-1 (1/1) Single value	0
Surface Water (pCi/l)	Gamma 36	See Table 8	All less than LLD	-----	-----	All less than LLD	0
	Tritium 36	3.25E+2 (12/36) <sup>(7)</sup> 1.0E+3 (24/36) <sup>(7)</sup>	2.12E+3 (24/24) 3.47E+2 - 4.10E+3	Black Creek @ 16-23 0.6 mile ESE	2.30E+3 (12/12) 7.20E+2 - 4.10E+3	All less than LLD	0
TLD (mR/qtr) <sup>(6)</sup>	TLD 163 <sup>(3)</sup>	N/A	1.39E+1 (159/159) 9.40E+0 - 2.18E+1	Near Intersection of Roads 31-51 and 16-12 4.4 miles SSW	2.09E+1 (4/4) 1.96E+1 - 2.18E+1	1.32E+1 (4/4) 1.27E+1 - 1.36E+1	0

## FOOTNOTES TO TABLE 5

1. Lower Limit of Detection (LLD) is the smallest concentration of radioactive material in a sample that will yield a net count above system background which will be detected with 95 percent probability with only 5 percent probability of falsely concluding that a blank observation represents a "real" signal. Due to counting statistics and varying volumes, occasionally lower LLDs are achieved.
2. Mean and range are based on detectable measurements only. The fractions of detectable measurements at specific locations are indicated in parentheses.
3. Missing samples are discussed in Missed Samples and Analyses.
4. Three types of broadleaf vegetation samples are collected monthly when available from three locations for a possible total of 108 samples.
5. Bottom sediment and aquatic vegetation sampling are not required by plant Offsite Dose Calculation Manual (ODCM). Sampling and analysis is performed to monitor any radionuclide buildup in the lake.
6. TLD exposure is reported in milliroentgen (mR) per 90-day period (quarter) beginning in 1995. This is the exposure standard used to compare data to the Nuclear Regulatory Commission (NRC).
7. Tritium LLD was lowered to  $3.25 \text{ E}+2$  pCi/l in June 1996 for samples that typically demonstrate activity less than the LLD (groundwater and surface water control). The LLD was lowered at the request of the plants in order to maintain comparable LLD and result values with the state (N.C. and S.C.) Agencies' laboratories. Other samples that typically exhibit activity greater than the LLD have a tritium Lower Limit of Detection (LLD) of  $1.0 \text{ E}+3$  pCi/l.



**TABLE 6**

**Radioactivity in Environmental Samples**

**Attributed to Plant Operations**

<b>Sample Media</b>	<b>Radionuclide</b>	<b>Average Concentration and Occurrence</b>	<b>Maximum Individual Dose</b>
Surface Water	H-3	2.12 E+3 (pCi/l) (24/24)	0.005 millirem/yr (from fish)

**TABLE 7****Reporting Levels for Radioactivity Concentrations****in Environmental Samples**

<b>Radionuclide</b>	<b>Water (pCi/l)</b>	<b>Airborne (pCi/m<sup>3</sup>)</b>	<b>Fish (pCi/kg, wet)</b>	<b>Milk (pCi/l)</b>	<b>Food Products (pCi/kg, wet)</b>
H-3	3E+04	----	----	----	----
Mn-54	1E+03	----	3E+04	----	----
Fe-59	4E+02	----	1E+04	----	----
Co-58	1E+03	----	3E+04	----	----
Co-60	3E+02	----	1E+04	----	----
Zn-65	3E+02	----	2E+04	----	----
Zr-Nb-95	4E+02	----	----	----	----
I-131	2E+00	9E-01	----	3E+00	1E+02
Cs-134	3E+01	1E+01	1E+03	6E+01	1E+03
Cs-137	5E+01	2E+01	2E+03	7E+01	2E+03
Ba-La-140	2E+02	----	----	3E+02	----

## **INTERPRETATIONS AND CONCLUSIONS**

### **Air Sampling**

Air samples collected during 2000 had a mean gross beta activity of  $2.24 \text{ E-2 pCi/m}^3$  for the indicator stations versus an average concentration of  $2.37 \text{ E-2 pCi/ m}^3$  for the control stations. These data are essentially unchanged from 1999; they are consistent with preoperational data obtained for the HBRSEP Unit No. 2 ( $1.40 \text{ E-1 pCi/ m}^3$ ), and reflect the occurrence of naturally occurring radionuclides of the region. Figures 18 through 24 depict the gross beta activity in air versus the control location. The lower current value is primarily due to the reduction of worldwide fallout over that which was occurring during the preoperational years. These figures confirm that the indicator stations show no significant increase over the control samples and hence no discernible impact from the plant operations is apparent in the data.

The quarterly composite gamma analyses for air particulate samples for all quarters revealed no radionuclides typical of plant effluents.

There was no Iodine-131 (I-131) detected in any of the 362 air cartridge samples from the indicator stations and 52 air cartridges from the control location.

### **Broadleaf Vegetation**

Broadleaf vegetation sampling is accomplished by collecting wild cherry, wax myrtle, and sassafras leaves. Three species of samples, when available, are collected monthly at three locations (one control and two indicator locations at the site boundary selected using historical meteorology with the highest calculated annual average ground level deposition). Broadleaf sampling is conducted since no milk animals are located within a radius of approximately five miles of the plant and is used to simulate dose to an individual via the milk pathway for compliance purposes.

During 2000, 2 of 36 samples taken from the indicator site demonstrated detectable concentrations of Cs-137 for an average value of  $8.86 \text{ E-2 pCi/g (wet)}$ . The control samples had detectable concentrations of Cs-137 in 11 of 18 samples with a mean concentration of  $1.29 \text{ E-1 pCi/g (wet)}$ . Upon comparing these results, it is concluded that the indicator values

reflect fallout Cs-137 contamination. Past sampling experience further supports this interpretation.

### **Fish**

Samples of free-swimming and bottom-feeding fish were taken from Lake Robinson and Prestwood Lake (the first downstream lake) and compared to similar fish from a control lake unaffected by plant operations. None of the bottom-feeding or free-swimming fish samples from the indicator and control locations contain any detectable Cs-137. Therefore, no plant-related dose was assigned to the presence of this radionuclide in 2000.

### **Ground Water**

No gamma or tritium activity was detected in the eight samples of ground water collected in 2000, which is consistent with the observations in previous years.

### **Milk**

Broadleaf sampling is conducted since no milk animals are located within a radius of approximately five miles of the plant in any sector and is used to simulate dose to an individual via the milk pathway for compliance purposes.

### **Food Crops**

Food products consisting of collards, corn, and tomatoes were sampled and analyzed in 2000, with no gamma activity associated with plant operations being detected in any samples.

### **Shoreline Sediment**

In 2000, no Cesium-137 activity was observed in the shoreline sediment indicator locations. The Cesium-137 activity seen in past years was attributed to worldwide fallout and not the plant operations, while the decreases and slight increases in radionuclide activity were likely due to the variability of bottom sediment sampling. No gamma activity associated with plant operations was detected in any sample in the semiannual shoreline sediment samples in 2000.

### **Bottom Sediment**

The 2000 data for Cobalt-60 activity in Lake Robinson is not detectable. Cesium-137 activity was not detectable in the three indicator location samples in 2000. Cesium-137 activity is attributed to worldwide fallout and not to plant operations.

### **Aquatic Vegetation**

In 2000, no gamma activity associated with plant operations was detected in any sample in the annual aquatic vegetation samples; however, iodine-131 (I-131) was detected in the Auburndale Plantation indicator sample (10.1 miles E). Additional samples were taken and it was concluded that the I-131 was not due to plant operations.

### **Surface Water**

Surface waters of Lake Robinson indicated the presence of tritium which is attributed to plant operations. See Figure 25 which displays the tritium activity throughout 2000. These surface waters do not supply drinking water at any downstream location and are not used for irrigation. Therefore, radiological dose via this pathway is limited to the consumption of fish from Lake Robinson. Using the methodology of Regulatory Guide 1.109, Equation A-1, a dose of 0.005 millirem/year to the maximum exposed individual could be assigned to this pathway.

#### **Equation A-1**

$$R_{aipj} = C_{ip} U_{ap} D_{aipj}$$

where as:

$R_{aipj}$	=	total body dose in mrem/yr of H-3
$C_{ip}$	=	concentration of nuclide (H-3) in pCi/kg = pCi/l
$U_{ap}$	=	maximum exposed individual's consumption (Reg. Guide 1.109, Table E-5) (46 lbs. of fish per year = 21 kg of fish/yr.)
$D_{aipj}$	=	ingestion dose factor for total body of individual (adult) in $U_{ap}$ in mrem/pCi (Reg. Guide 1.109 Table E-12)

The monthly composite gamma analyses for surface water samples revealed no radionuclides typical of plant effluents.

### **External Radiation**

Direct radiation exposure in the HBRSEP, Unit No. 2 environs was measured by the placement of thermoluminescent dosimeters (TLDs) about the plant forming an inner ring at approximately 1 mile and an outer ring at 5 miles. The expectation would be that if a plant effect existed, the inner ring dose measurements would exceed those made in the outer ring. This condition was not observed since the outer ring was slightly higher than the inner; therefore, any direct radiation dose to the off -site population was determined to be insignificant (Figure 26).

### **Asiatic Clams**

Benthic samples from Lake Robinson during 2000 continue to confirm the absence of any substantial populations of Asiatic clams (*Corbicula fluminea*). The natural chemistry of the lake (i.e., low alkalinity and hardness) inhibits their proliferation.

## **MISSED SAMPLES AND ANALYSES**

### **Air Cartridges and Air Particulates**

No samples were available for:

- AC/AP-3, January 31, low volume due to weather related power outages
- AC/AP-7, March 6, due to a blown fuse

The above problems were addressed through the plant maintenance program.

### **Broadleaf Vegetation**

Broadleaf vegetation samples were not available during the months of January, February, March, October, November, and December of 2000 due to the seasonal nature of broadleaf vegetation.

## **Food Crops**

Food crop vegetation samples were not available during the months of January, March, April, May, June, August, September, October, November, and December of 2000 due to the seasonal nature of food crops.

## **Thermoluminescent Dosimeters (TLDs)**

One of a possible 164 TLD samples were missing during 2000 due to vandalism. It was:

- Second Quarter - TLD 24 was missing in the field.

## **ANALYTICAL PROCEDURES**

### **Gross Beta**

Gross beta radioactivity measurements are made utilizing a Tennelec Low-Background Alpha/Beta Counting System. The LLD for air particulates is approximately  $1.0 \text{ E-3 pCi/m}^3$ .

Air particulate samples are mounted in 2-inch stainless steel planchets and counted directly for 50 minutes.

### **Tritium**

Liquid samples requiring tritium analysis are treated with a small amount of sodium hydroxide and potassium permanganate crystals and then distilled. Five milliliters of the distillate are mixed with thirteen milliliters of liquid scintillation cocktail and counted in a liquid scintillation counter for 60 minutes to achieve an LLD of approximately  $1.0 \text{ E+3 pCi/l}$  for samples that typically exhibit activity greater than the LLD. Samples that typically demonstrate activity less than the LLD are counted 500 minutes. The longer count time was necessary to achieve a lower, more compatible LLD ( $3.25 \text{ E+2 pCi/l}$ ) with the State Agencies reportable concentrations in the Split Sample Program Report.

## **Iodine-131**

Iodine-131 airborne concentrations are analyzed by the intrinsic germanium (Ge) gamma spectrometry systems. The cartridges are placed on the detector and each charcoal cartridge is counted 500 seconds individually with an approximate LLD of  $2.2 \text{ E-2 pCi/m}^3$ .

## **Gamma Spectrometry**

Gamma spectrum analysis utilizes intrinsic germanium detectors with thin aluminum windows housed in steel and lead shields. The analyzer system is the Canberra Nuclear 9900 Gamma Spectroscopy System. Table 8 summarizes LLD values derived from instrument sensitivity based upon a blank sample background.

Air particulate filter quarterly composites are placed in a Petri dish and analyzed directly for 1,500 seconds.

Liquid samples are boiled down to reduce the volume, transferred to a PB-50 beaker, and analyzed directly for 7,000 seconds.

Shoreline and bottom sediments are dried, ground, weighed, and then analyzed in a 1-liter Marinelli beaker for 1,500 seconds.

Broadleaf and aquatic vegetation and food product samples are weighed wet and analyzed in a Marinelli beaker for 7,500 seconds.

Fish samples are cleaned, dressed (raw edible portions), and placed in a 1-liter Marinelli beaker for analysis for 1,500 seconds.

## **Thermoluminescent Dosimetry**

Each area monitoring station includes a TLD packet, which is a polyethylene bag containing three calcium sulfate phosphors contained in a Panasonic UD-814 badge. The TLD is light tight and the bag is weather-resistant.



Dosimeters are machine annealed before field placement. Following exposure in the field, each dosimeter is read utilizing a Panasonic TLD reader. This instrument integrates the light photons emitted from traps as the dosimeter is heated above 150°C. The photons from the lower-energy traps are automatically eliminated through a preheat cycle. Calibration is checked regularly using dosimeters irradiated to known doses. Prior to the measurement of each dosimeter, the instrument is checked through use of an internal constant light source as a secondary standard.

The exposure reported is corrected for exposure received in transit and during storage through the use of control dosimeters.

### **Interlaboratory Comparison Program**

The Radiochemistry Laboratory at the Harris Energy & Environmental Center in New Hill, North Carolina, provides radioanalytical services for CP&L's nuclear plant radiological environmental surveillance programs. In fulfillment of ODCM Operational Requirements, the laboratory is a participant in the Analytics, Inc., Environmental Cross Check Program and uses its performance in this program as a major determinant of the accuracy and precision of its analytical results.

During 2000, 46 analyses were completed on 12 samples representing five major environmental media (water, milk, air filters, soil, and air cartridges). Data on the known activities and the standard deviations for the 46 analyses have been received from Analytics, Inc. A comparison of the average of our reported values with the Analytics, Inc., known activity and its standard deviation is provided below:

<b>Standard Deviation</b>	
<b><u>From Known Activity</u></b>	<b><u>Percent of Analyses</u></b>
$\leq 1$ Standard Deviation	61
$\leq 2$ Standard Deviation	80
$\leq 3$ Standard Deviation	87

If any Cross Check samples or checks exceed internal controls, corrective actions are taken. Six of 46 analyses exceeded the three-sigma action level; however, four of the six were well within

the  $\pm 20\%$  ratio to the known value. The analyses that exceeded the three-sigma action level do not indicate a trend and the related environmental analyses' results were not impacted. The results that lie at greater than three standard deviations from the known value have an evaluation performed to identify any recommended remedial actions and to reduce anomalous errors. Complete documentation on the evaluation by a condition report will be available and will be provided to the NRC upon request.

### **Lower Limits of Detection**

The samples analyzed met the LLD required by the ODCM. Typical "a priori" LLD values for the samples analyzed are listed in Table 8.

**Table 8**

**Typical Lower Limits of Detection (a priori)**

**Gamma Spectrometry**

<b><u>Surface Water/Groundwater Samples</u></b>	
<b>Isotope</b>	<b>LLD (pCi/l)</b>
Mn-54	7
Co-58	5
Fe-59	14
Co-60	7
Zn-65	15
Zr-Nb-95	6
I-131	1.0*
Cs-134	8
Cs-137	6
Ba-La-140	8
Other Expected Gamma Emitters	3 to 164
<b><u>Air Particulates</u></b> <b>(Quarterly Composite)</b>	
<b>Isotope</b>	<b>LLD (pCi/m<sup>3</sup>)</b>
I-131	0.028
Cs-134	0.001
Cs-137	0.001
Other Expected Gamma Emitters	0.001 to 0.030

**\*Instrumental analysis of resin concentrates of samples.**

**Table 8 (cont.)**

<b><u>Sediments</u></b> <b>(Shoreline or Bottom)</b>	
<b>Isotope</b>	<b>LLD (pCi/kg, dry)</b>
Cs-134	73
Cs-137	47
Other Expected Gamma Emitters	42 to 1675
<b><u>Fish</u></b>	
<b>Isotope</b>	<b>LLD (pCi/kg, wet)</b>
Mn-54	50
Co-58	40
Fe-59	98
Co-60	70
Zn-65	139
Cs-134	65
Cs-137	55
Other Expected Gamma Emitters	38 to 1121
<b><u>Food Products and Vegetation</u></b>	
<b>Isotope</b>	<b>LLD (pCi/kg, wet)</b>
I-131	35
Cs-134	25
Cs-137	35
Other Expected Gamma Emitters	20 to 625

# **LAND USE CENSUS**

## **PURPOSE OF THE LAND USE CENSUS**

The land use census identifies the pathways (or routes) that radioactive material may reach the general populations near commercial nuclear generating stations. This is accomplished by completing studies each year that identify how the surrounding lands are used by the population. A comprehensive census of the use of the land within a five-mile distance of the plant is completed during the growing season each year. This information is used for dose assessment and to identify changes to the stations sampled and the type of samples. These results ensure that the Radiological Environmental Monitoring Program (REMP) is based upon current data regarding human activity in the vicinity of the plant. Therefore the purpose of the land-use census is both to ensure the monitoring program is current as well as provide data for the calculation of estimated radiation exposure.

The pathways that are evaluated are:

- Ingestion Pathway - Results from eating food crops that may have radioactive materials deposited on them, incorporated radioactive materials from the soil or atmosphere. Another pathway is through drinking milk from local cows or goats if these are present. The grass used to feed these animals may have incorporated or had deposited on it radioactive materials that can be transferred to the milk.
- Direct Radiation Exposure Pathway- Results from deposition of radioactive materials on the ground or from passage of these radioactive materials in the air.
- Inhalation Pathway- Results from breathing radioactive materials transported in the air.

## **Methodology**

The following must be identified within the five (5) mile radius of the plant for each of the sixteen meteorological sectors (compass direction the winds may blow, for example NNE [North North East]):

- The nearest resident
- The nearest garden of greater than 500 square feet, producing broadleaf vegetables
- The nearest milk animal

The primary method is visual inspection from roadside within the five (5) mile radius. This information is supplemented with data from aerial photographs, information from county extension agents, farm supply businesses, and knowledge of the area.

## **2000 Land Use Census Results**

The 2000 and 1999 results of the survey for the nearest resident, garden, milk and meat animals in each sector are compared in Table 9.

The nearest resident in each sector remained the same in all but the SSW sector from 1999 to 2000. Garden locations that changed in 2000 can be seen in Table 9 for specific sector changes. Meat animal locations have changed in the following sectors from 1999 to 2000: N, SSE, SSW, SW, and W. The single indicator milk location in the REMP went out of business as of July 17, 1998. See Table 9 for all the exact changes from 1999 to 2000.

The results of the 2000 census, 1999 meteorological data, and a review of the ten years of average meteorology for the site were compared to the 1999 data. This comparison determined that there were no significant changes in land use; therefore, there were no changes that require an ODCM change, additional dose calculations, or procedure changes. The likely most exposed individual is an adult with the estimated dose to this individual being 0.005 millirem/year whole body.

No milk animal was identified within five miles of the site in any sector. Sampling of miscellaneous food products (Non-leafy) in the vicinity of the site will continue until leafy vegetables are identified. Milk sampling will resume if a new sample location is identified. Also, no garden (at the time of the census) is growing leafy vegetables. Vegetables like tomatoes, squash, okra, cucumbers, etc. are examples of the vegetables of choice for this area and are what has been sampled in the past.

**TABLE 9****H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2****LAND USE CENSUS COMPARISONS (1999-2000)  
NEAREST PATHWAY (MILES)**

SECTOR	RESIDENT		GARDEN		MEAT		MILK	
	1999	2000	1999	2000	1999	2000	1999	2000
N	2.9	2.9	3.0	*3.8	2.9	*3.3	---	---
NNE	1.6	1.6	2.2	*2.9	1.6	1.6	---	---
NE	1.1	1.1	1.1	1.1	1.8	1.8	---	---
ENE	0.8	0.8	1.0	1.0	2.4	2.4	---	---
E	0.8	0.8	1.9	1.9	3.0	3.0	---	---
ESE	0.6	0.6	1.2	1.2	0.9	0.9	---	---
SE	0.6	0.6	1.6	*1.25	1.9	1.9	---	---
SSE	0.4	0.4	2.6	2.6	---	*0.46	---	---
S	0.4	0.4	2.3	*0.85	2.3	2.3	---	---
SSW	0.4	*0.35	0.8	0.8	2.0	*0.94	---	---
SW	0.5	0.5	1.4	*2.02	4.3	*4.0	---	---
WSW	0.5	0.5	0.8	0.8	1.2	1.2	---	---
W	0.5	0.5	0.5	0.5	3.7	*1.1	---	---
WNW	0.6	0.6	0.7	0.7	4.3	4.3	---	---
NW	1.6	1.6	2.0	2.0	2.0	2.0	---	---
NNW	2.1	2.1	---	---	4.0	4.0	---	---

\*Changes from 1999.

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Figure 18 For RNP From 1/1/2000 To 12/31/2000  
AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

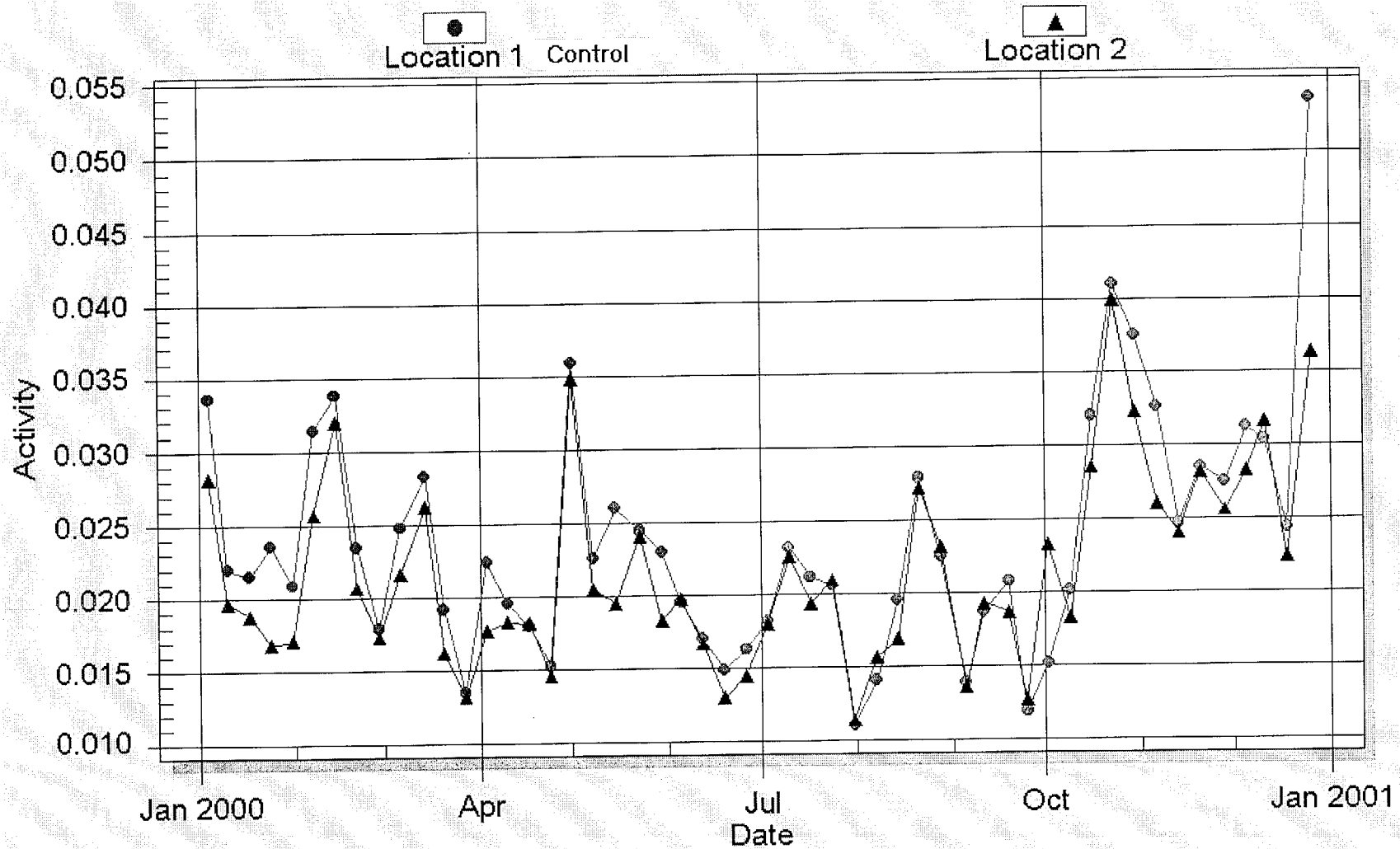


Figure 19 For RNP From 1/1/2000 To 12/31/2000  
AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

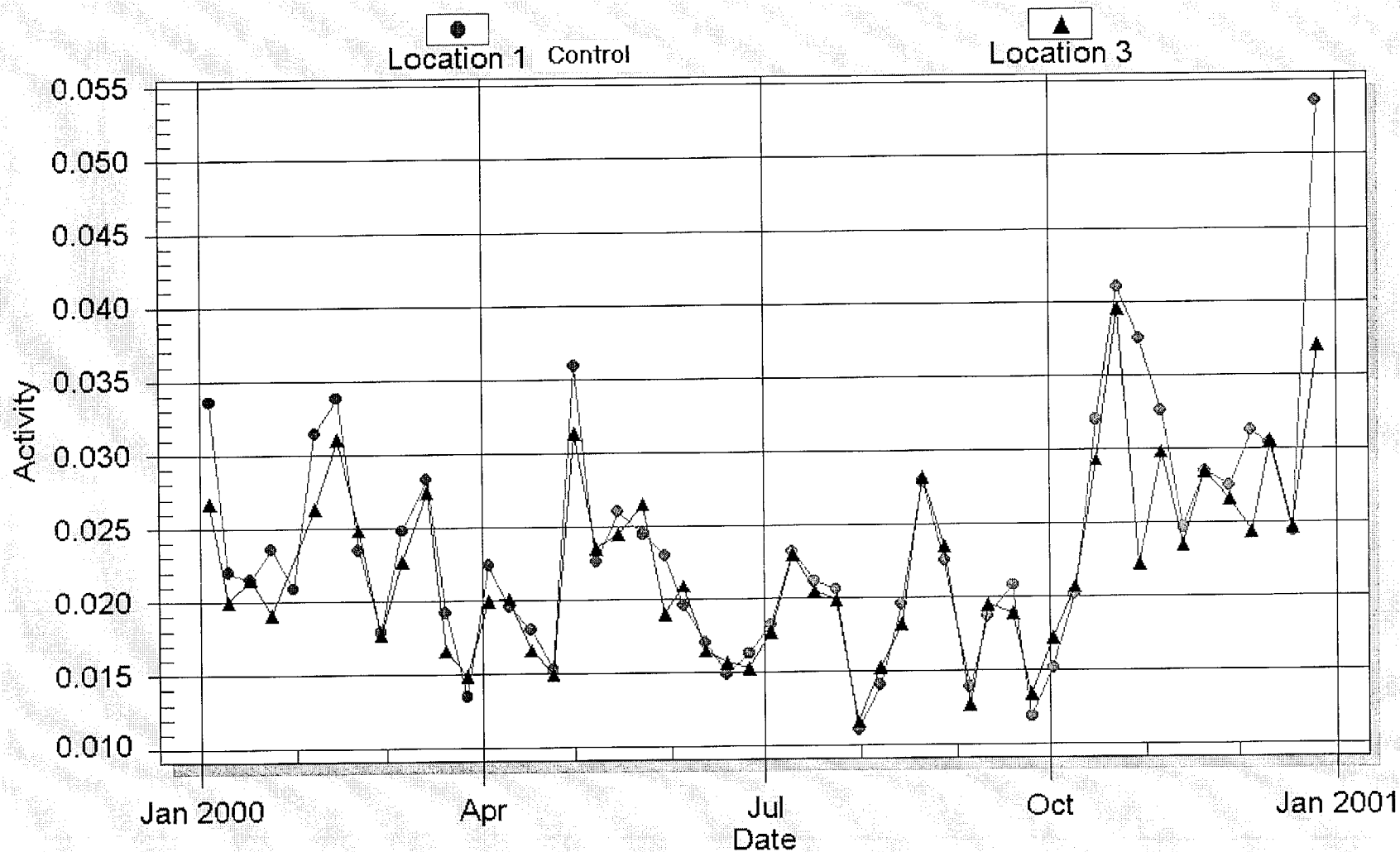
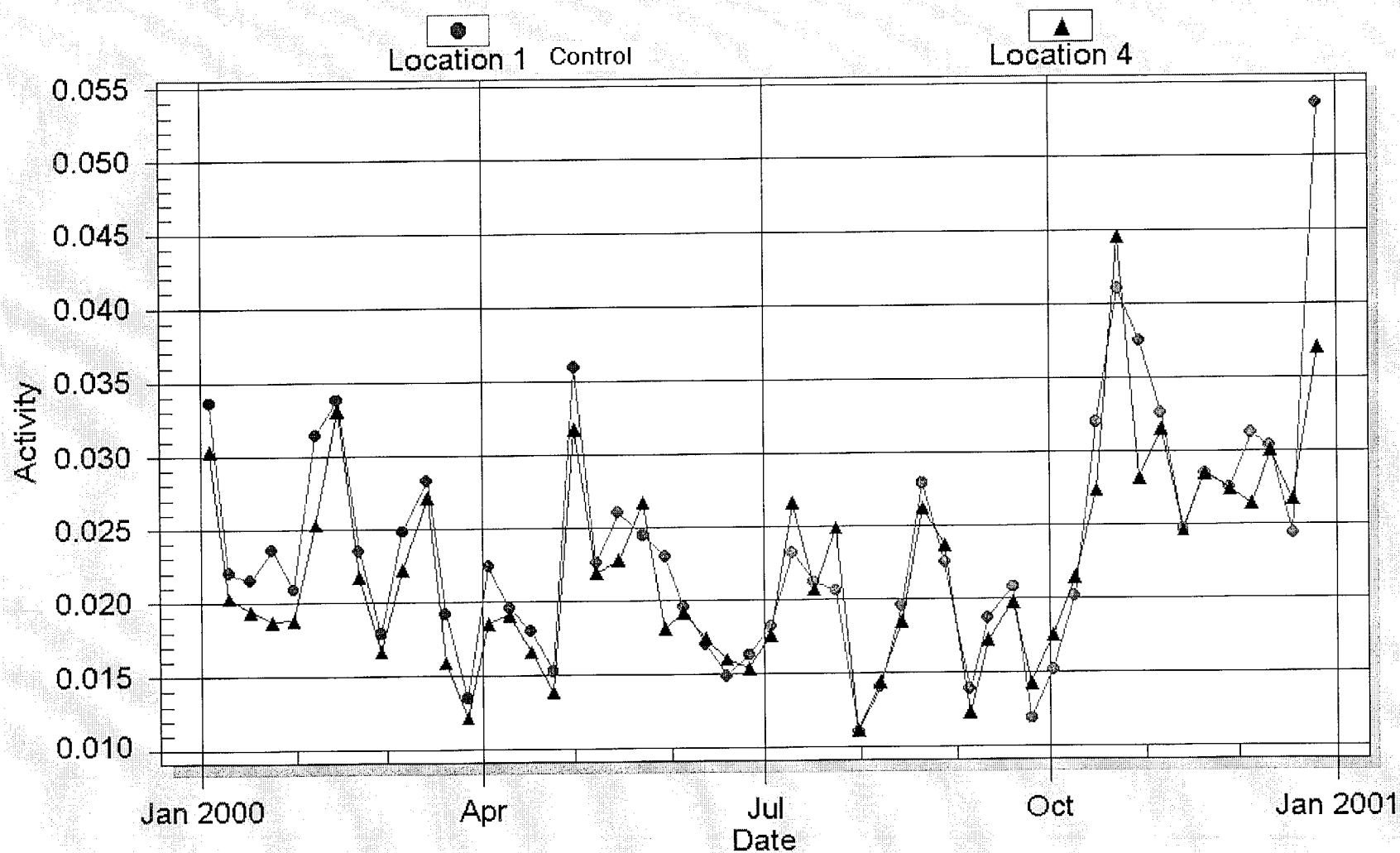
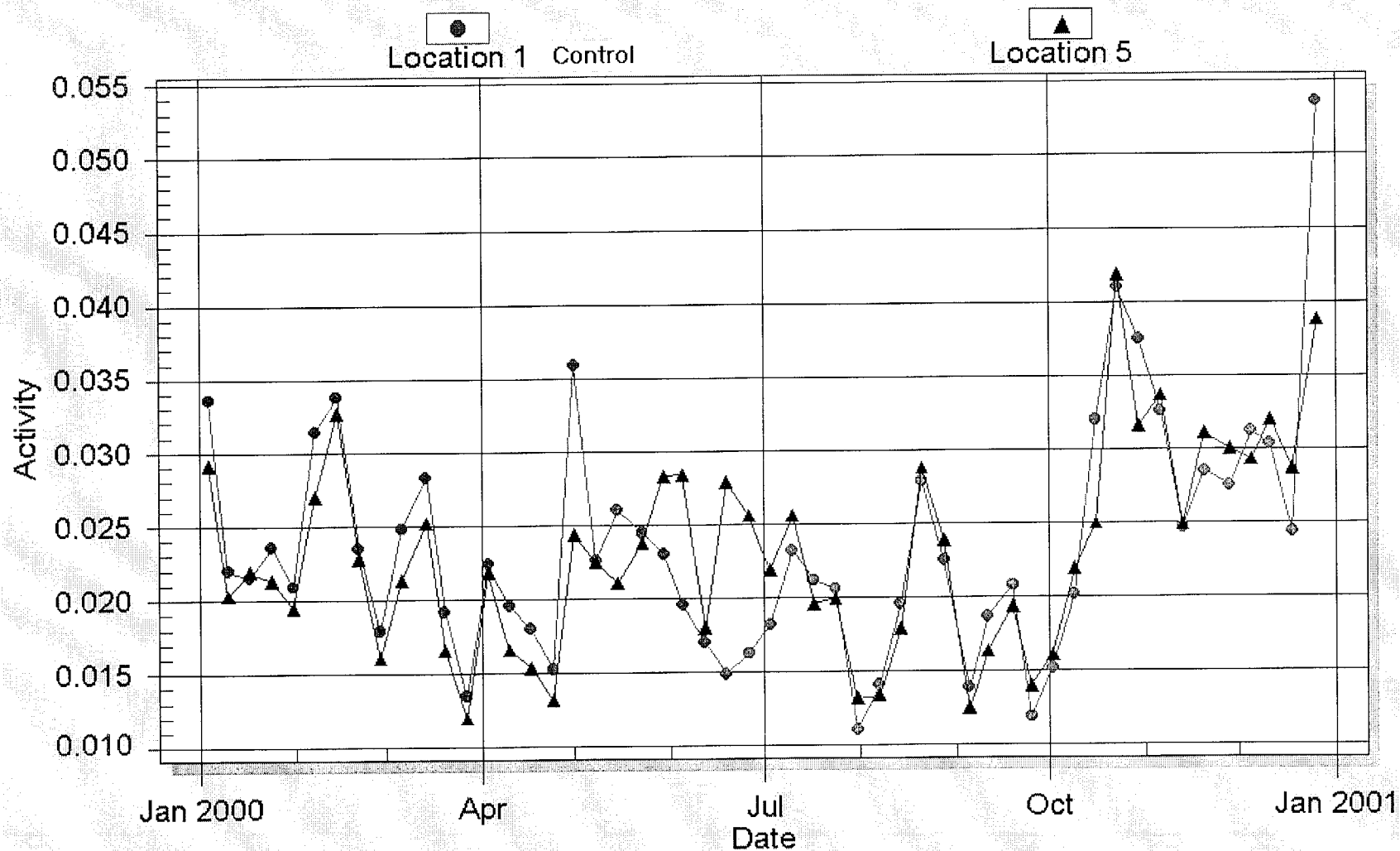


Figure 20 For RNP From 1/1/2000 To 12/31/2000  
AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

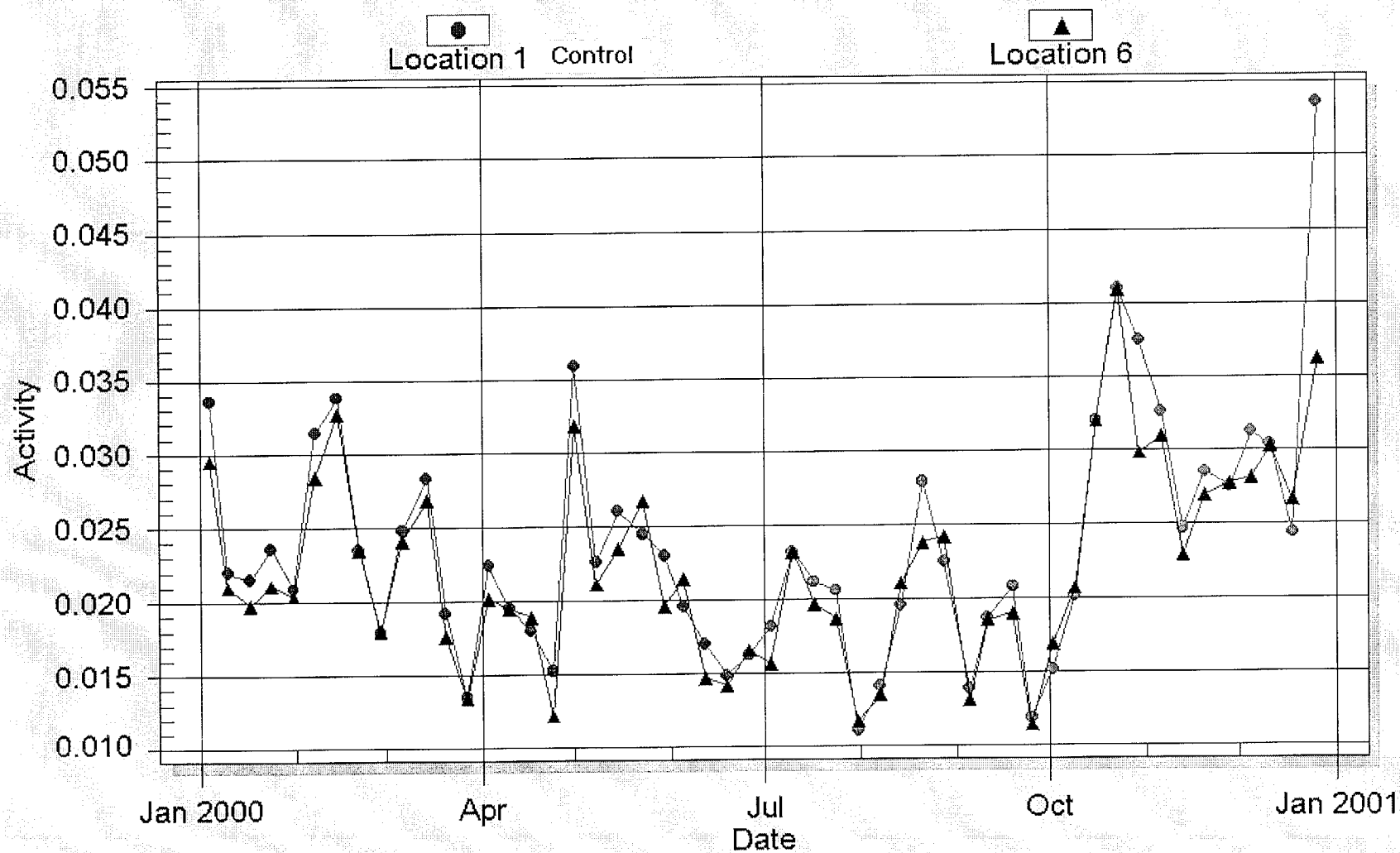




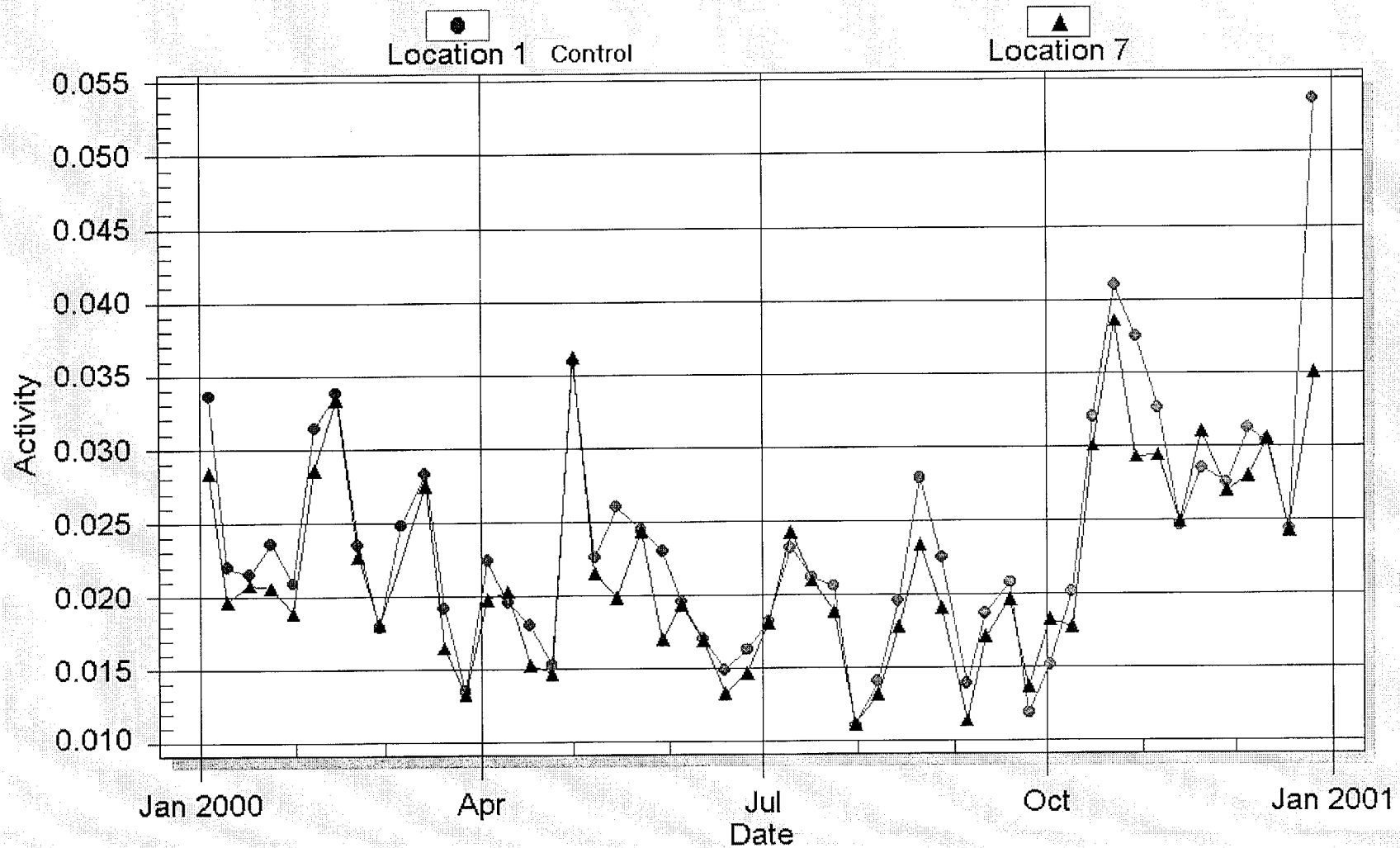
**Figure 21 For RNP From 1/1/2000 To 12/31/2000**  
 AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)



**Figure 22 For RNP From 1/1/2000 To 12/31/2000**  
 AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)



**Figure 23 For RNP From 1/1/2000 To 12/31/2000**  
 AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)



**Figure 24 For RNP From 1/1/2000 To 12/31/2000**  
 AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

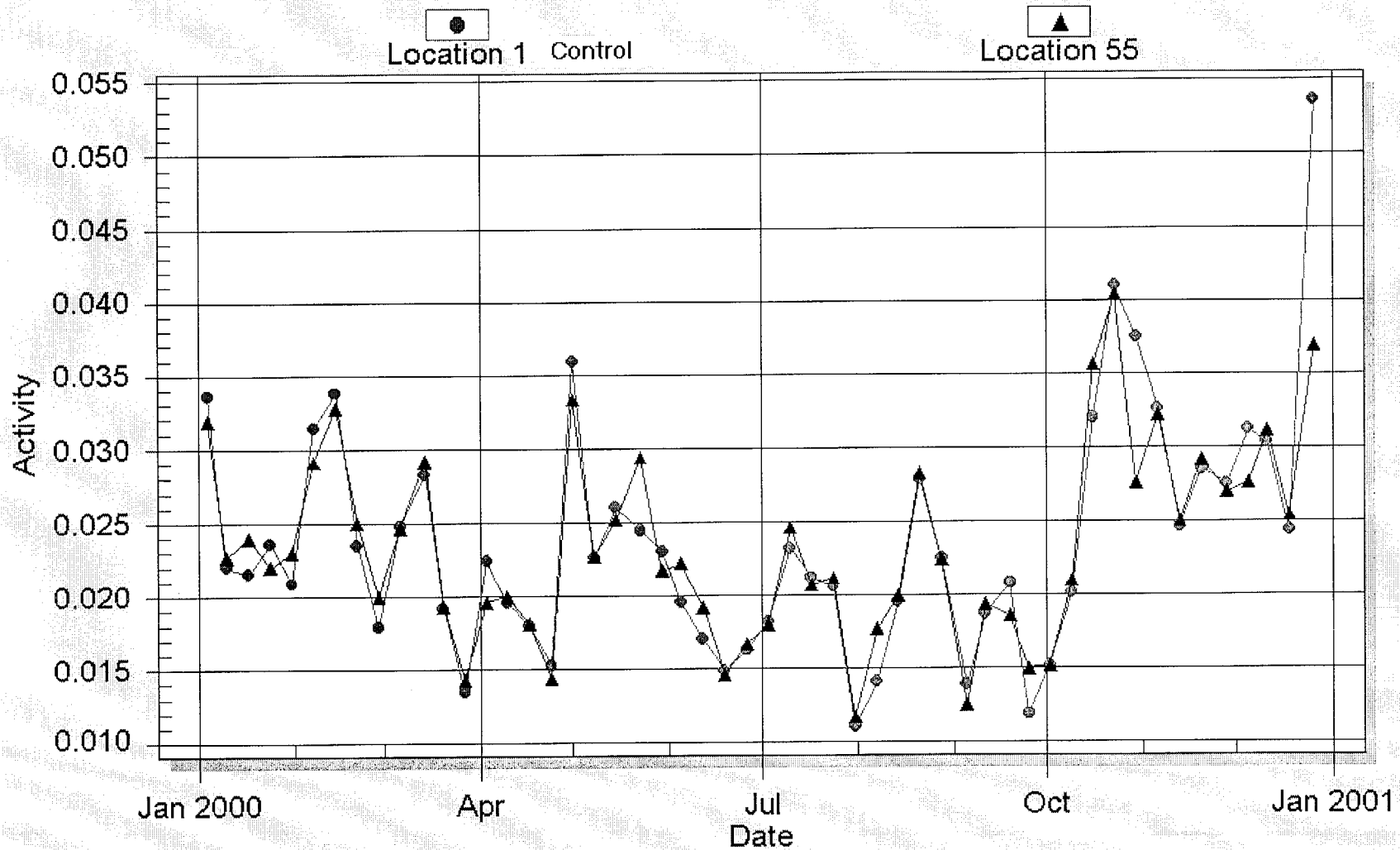


Figure 25 RNP 2000 Surface Water Tritium

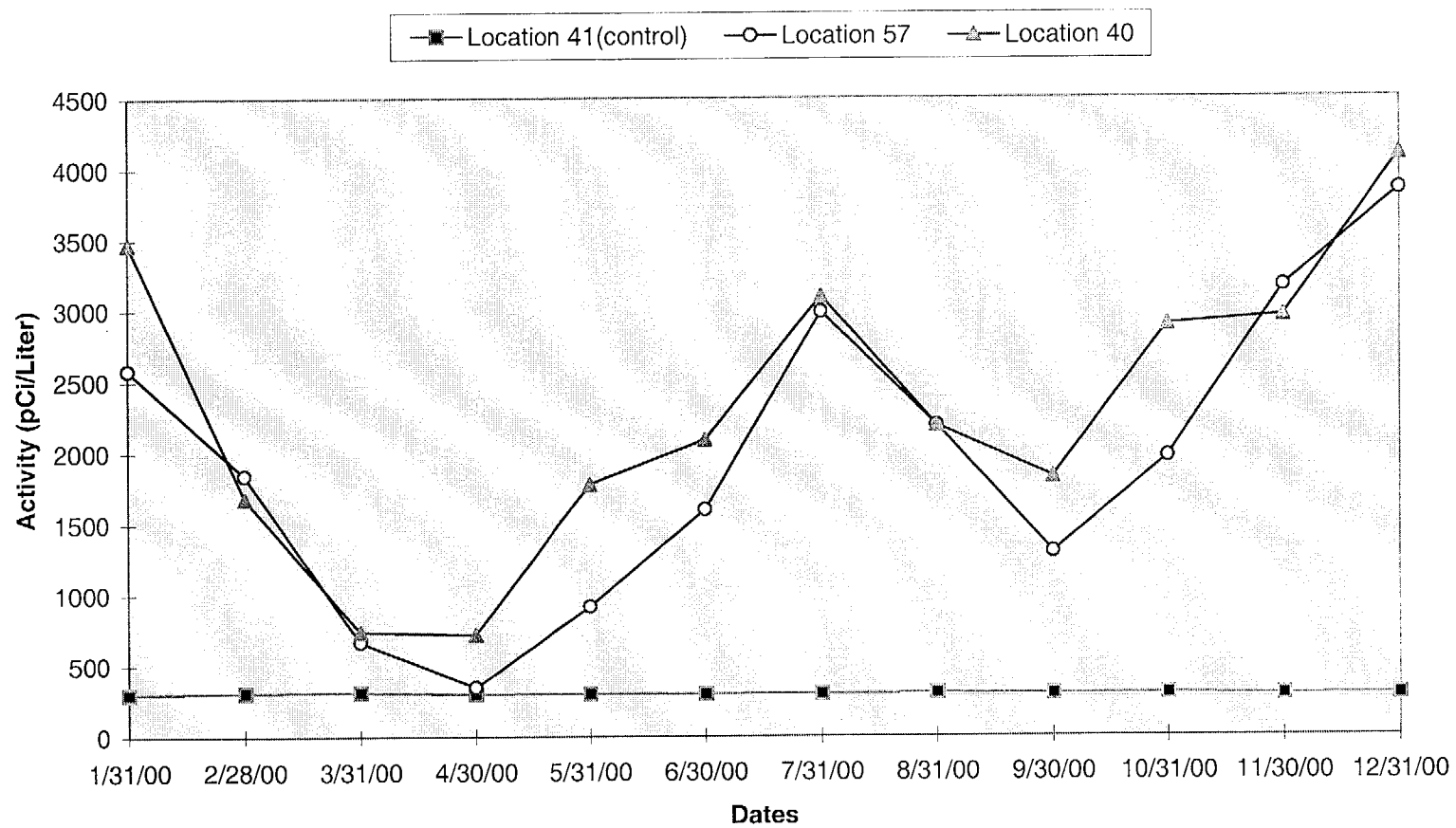
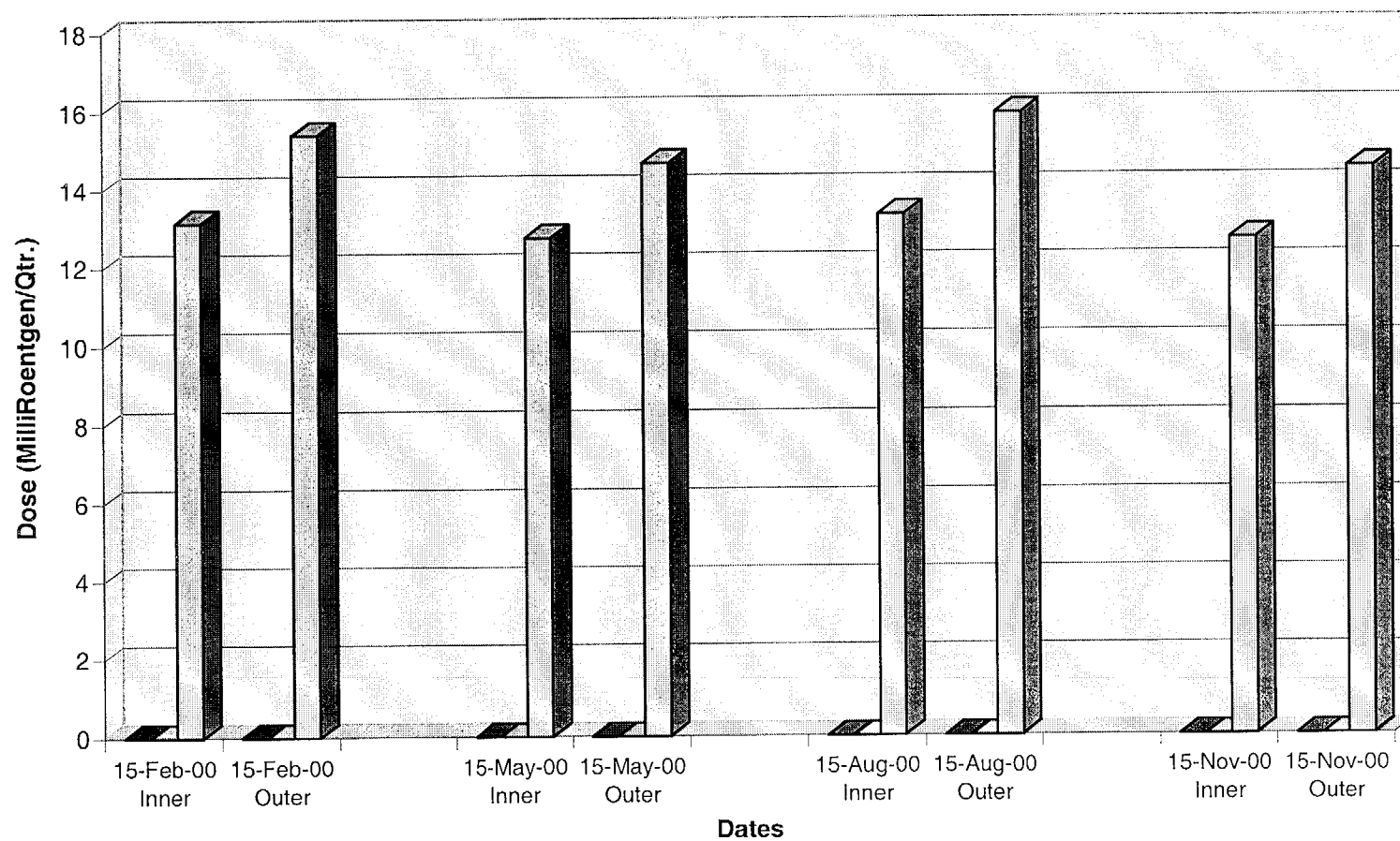




Figure 26 RNP 2000 TLD Averages for Inner and Outer Ring Locations



**CP&L**

**2000 Radiological Environmental**

**Monitoring TLD Report**

**Robinson Nuclear Plant**

# RNP Radiological Environmental TLD Report

Dose: mR/std. qtr.

TLD	TLD Location Description	Sample Date	Dose	2 Sigma Error
1	26 MI ESE - FLORENCE - CONTROL	2/15/00	13.6	2.1
1	26 MI ESE - FLORENCE - CONTROL	5/15/00	13.3	1.6
1	26 MI ESE - FLORENCE - CONTROL	8/15/00	12.7	1.8
1	26 MI ESE - FLORENCE - CONTROL	11/15/00	13.0	0.7
2	0.2 MI S - INFORMATION CENTER	2/15/00	11.9	2.2
2	0.2 MI S - INFORMATION CENTER	5/15/00	11.5	0.5
2	0.2 MI S - INFORMATION CENTER	8/15/00	12.4	1.9
2	0.2 MI S - INFORMATION CENTER	11/15/00	11.5	1.2
3	0.7 MI N - MICROWAVE TOWER	2/15/00	13.8	1.9
3	0.7 MI N - MICROWAVE TOWER	5/15/00	14.3	0.9
3	0.7 MI N - MICROWAVE TOWER	8/15/00	14.2	1.9
3	0.7 MI N - MICROWAVE TOWER	11/15/00	13.5	0.7
4	0.4 MI ESE - SPILLWAY	2/15/00	11.8	2.2
4	0.4 MI ESE - SPILLWAY	5/15/00	12.4	0.8
4	0.4 MI ESE - SPILLWAY	8/15/00	12.2	2.0
4	0.4 MI ESE - SPILLWAY	11/15/00	12.7	1.0
5	0.9 MI ENE - JOHNSONS LANDING	2/15/00	15.2	1.9
5	0.9 MI ENE - JOHNSONS LANDING	5/15/00	12.9	0.9
5	0.9 MI ENE - JOHNSONS LANDING	8/15/00	16.0	2.1
5	0.9 MI ENE - JOHNSONS LANDING	11/15/00	13.0	1.1
6	0.3 MI SW - INFORMATION CENTER	2/15/00	12.0	2.1
6	0.3 MI SW - INFORMATION CENTER	5/15/00	13.1	1.7
6	0.3 MI SW - INFORMATION CENTER	8/15/00	12.6	0.2
6	0.3 MI SW - INFORMATION CENTER	11/15/00	12.8	1.4
7	6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	2/15/00	13.2	2.3
7	6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	5/15/00	10.8	1.4
7	6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	8/15/00	13.8	2.2
7	6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	11/15/00	10.6	1.0
8	0.8 MI SSE - POWER POLES FROM HBR	2/15/00	11.1	2.1
8	0.8 MI SSE - POWER POLES FROM HBR	5/15/00	10.0	0.5
8	0.8 MI SSE - POWER POLES FROM HBR	8/15/00	11.1	2.0
8	0.8 MI SSE - POWER POLES FROM HBR	11/15/00	10.0	1.0

# RNP Radiological Environmental TLD Report

Dose: mR/std. qtr.				
TLD	TLD Location Description	Sample Date	Dose	2 Sigma Error
9	1.0 MI S - POWER POLE NEAR HWY 151	2/15/00	18.8	2.1
9	1.0 MI S - POWER POLE NEAR HWY 151	5/15/00	18.7	2.1
9	1.0 MI S - POWER POLE NEAR HWY 151	8/15/00	18.3	2.1
9	1.0 MI S - POWER POLE NEAR HWY 151	11/15/00	18.8	1.8
10	1.0 MI WSW - CHURCH OF GOD CEMETERY	2/15/00	11.1	2.2
10	1.0 MI WSW - CHURCH OF GOD CEMETERY	5/15/00	11.4	0.8
10	1.0 MI WSW - CHURCH OF GOD CEMETERY	8/15/00	11.0	1.9
10	1.0 MI WSW - CHURCH OF GOD CEMETERY	11/15/00	11.4	1.4
11	1.0 MI SW - POWER POLE AT OLD CAMDEN RD	2/15/00	10.3	2.0
11	1.0 MI SW - POWER POLE AT OLD CAMDEN RD	5/15/00	10.0	0.6
11	1.0 MI SW - POWER POLE AT OLD CAMDEN RD	8/15/00	10.4	1.9
11	1.0 MI SW - POWER POLE AT OLD CAMDEN RD	11/15/00	10.1	0.9
12	1.2 MI SSW-PINE TREE AT 2ND INT DIRT RD	2/15/00	13.9	2.1
12	1.2 MI SSW-PINE TREE AT 2ND INT DIRT RD	5/15/00	13.4	1.5
12	1.2 MI SSW-PINE TREE AT 2ND INT DIRT RD	8/15/00	14.3	2.0
12	1.2 MI SSW-PINE TREE AT 2ND INT DIRT RD	11/15/00	14.2	1.0
13	1.0 MI W-PINE TREE WHERE DIRT RD SPLITS	2/15/00	11.9	2.1
13	1.0 MI W-PINE TREE WHERE DIRT RD SPLITS	5/15/00	10.5	1.1
13	1.0 MI W-PINE TREE WHERE DIRT RD SPLITS	8/15/00	11.9	2.2
13	1.0 MI W-PINE TREE WHERE DIRT RD SPLITS	11/15/00	10.4	0.7
14	0.9 MI WNW - HWY 151 AT PINE RIDGE CH	2/15/00	16.1	2.0
14	0.9 MI WNW - HWY 151 AT PINE RIDGE CH	5/15/00	15.7	0.6
14	0.9 MI WNW - HWY 151 AT PINE RIDGE CH	8/15/00	16.7	2.3
14	0.9 MI WNW - HWY 151 AT PINE RIDGE CH	11/15/00	15.7	0.9
15	1.0 MI NW -DIRT RD NEAR ASH POND	2/15/00	10.3	2.0
15	1.0 MI NW -DIRT RD NEAR ASH POND	5/15/00	9.9	0.6
15	1.0 MI NW -DIRT RD NEAR ASH POND	8/15/00	10.7	2.0
15	1.0 MI NW -DIRT RD NEAR ASH POND	11/15/00	9.4	0.6
16	1.0 MI NNW - DARLINGTON IC TURBINE PLANT	2/15/00	12.0	2.1
16	1.0 MI NNW - DARLINGTON IC TURBINE PLANT	5/15/00	11.9	0.7
16	1.0 MI NNW - DARLINGTON IC TURBINE PLANT	8/15/00	12.3	2.0
16	1.0 MI NNW - DARLINGTON IC TURBINE PLANT	11/15/00	11.8	0.9

# RNP Radiological Environmental TLD Report

Dose: mR/std. qtr.

TLD	TLD Location Description	Sample Date	Dose	2 Sigma Error
17	1.1 MI N - DIS CANAL RD AT UNIT 1 WEIR	2/15/00	12.3	2.0
17	1.1 MI N - DIS CANAL RD AT UNIT 1 WEIR	5/15/00	12.5	1.2
17	1.1 MI N - DIS CANAL RD AT UNIT 1 WEIR	8/15/00	13.7	1.9
17	1.1 MI N - DIS CANAL RD AT UNIT 1 WEIR	11/15/00	12.0	1.0
18	0.7 MI SE - TRAIN TRESTLE OVER BLACK CR	2/15/00	11.9	2.5
18	0.7 MI SE - TRAIN TRESTLE OVER BLACK CR	5/15/00	12.5	0.7
18	0.7 MI SE - TRAIN TRESTLE OVER BLACK CR	8/15/00	11.9	1.9
18	0.7 MI SE - TRAIN TRESTLE OVER BLACK CR	11/15/00	11.9	0.6
19	1.0 MI E - RD S-16-23	2/15/00	14.0	5.5
19	1.0 MI E - RD S-16-23	5/15/00	12.0	0.8
19	1.0 MI E - RD S-16-23	8/15/00	12.5	1.9
19	1.0 MI E - RD S-16-23	11/15/00	11.9	0.5
20	1.3 MI ENE - RD S-16-39 NORTH	2/15/00	14.3	2.0
20	1.3 MI ENE - RD S-16-39 NORTH	5/15/00	13.0	1.2
20	1.3 MI ENE - RD S-16-39 NORTH	8/15/00	15.1	2.0
20	1.3 MI ENE - RD S-16-39 NORTH	11/15/00	12.9	0.6
21	ATKINSONS BOAT LANDING	2/15/00	11.3	2.2
21	ATKINSONS BOAT LANDING	5/15/00	12.4	1.3
21	ATKINSONS BOAT LANDING	8/15/00	14.6	1.9
21	ATKINSONS BOAT LANDING	11/15/00	12.7	0.8
22	1.9 MI NNE - SHADY REST NEAR DOCK	2/15/00	14.3	2.5
22	1.9 MI NNE - SHADY REST NEAR DOCK	5/15/00	11.9	1.5
22	1.9 MI NNE - SHADY REST NEAR DOCK	8/15/00	11.7	2.1
22	1.9 MI NNE - SHADY REST NEAR DOCK	11/15/00	11.8	1.0
23	1.2 MI ESE - INT RD 41E-5 AND S-16-39	2/15/00	15.3	2.5
23	1.2 MI ESE - INT RD 41E-5 AND S-16-39	5/15/00	14.5	0.5
23	1.2 MI ESE - INT RD 41E-5 AND S-16-39	8/15/00	14.8	2.7
23	1.2 MI ESE - INT RD 41E-5 AND S-16-39	11/15/00	14.7	1.1
24	5.0 MI NW - S-13-711 PAST PEACH FARM	2/15/00	14.7	1.9
24	5.0 MI NW - S-13-711 PAST PEACH FARM	8/15/00	16.3	2.0
24	5.0 MI NW - S-13-711 PAST PEACH FARM	11/15/00	15.5	1.4

# RNP Radiological Environmental TLD Report

Dose: mR/std. qtr.

TLD	TLD Location Description	Sample Date	Dose	2 Sigma Error
25	4.6 MI NNW - RD S-13-346 OFF 151 NORTH	2/15/00	13.9	2.0
25	4.6 MI NNW - RD S-13-346 OFF 151 NORTH	5/15/00	12.4	1.2
25	4.6 MI NNW - RD S-13-346 OFF 151 NORTH	8/15/00	15.5	3.3
25	4.6 MI NNW - RD S-13-346 OFF 151 NORTH	11/15/00	12.3	0.5
26	5.0 MI N - RD S-13-346	2/15/00	14.4	2.7
26	5.0 MI N - RD S-13-346	5/15/00	13.8	1.0
26	5.0 MI N - RD S-13-346	8/15/00	14.4	2.4
26	5.0 MI N - RD S-13-346	11/15/00	13.4	0.6
27	5.0 MI NNE - RD S-13-763 NEAR INTER	2/15/00	10.6	2.0
27	5.0 MI NNE - RD S-13-763 NEAR INTER	5/15/00	11.2	0.6
27	5.0 MI NNE - RD S-13-763 NEAR INTER	8/15/00	12.2	1.9
27	5.0 MI NNE - RD S-13-763 NEAR INTER	11/15/00	10.8	0.5
28	4.8 MI NE - NEAR DUMPSTER RD S-13-39	2/15/00	18.7	2.2
28	4.8 MI NE - NEAR DUMPSTER RD S-13-39	5/15/00	17.9	1.5
28	4.8 MI NE - NEAR DUMPSTER RD S-13-39	8/15/00	16.4	1.2
28	4.8 MI NE - NEAR DUMPSTER RD S-13-39	11/15/00	17.5	1.1
29	RD S-16-20 SOUTH OF LOOKOUT TOWER	2/15/00	14.7	2.0
29	RD S-16-20 SOUTH OF LOOKOUT TOWER	5/15/00	15.2	1.7
29	RD S-16-20 SOUTH OF LOOKOUT TOWER	8/15/00	18.1	2.2
29	RD S-16-20 SOUTH OF LOOKOUT TOWER	11/15/00	15.0	1.8
30	4.6 MI E - RD S-16-20 JOHNSON FENCE CO	2/15/00	16.4	1.9
30	4.6 MI E - RD S-16-20 JOHNSON FENCE CO	5/15/00	13.8	1.6
30	4.6 MI E - RD S-16-20 JOHNSON FENCE CO	8/15/00	14.4	2.2
30	4.6 MI E - RD S-16-20 JOHNSON FENCE CO	11/15/00	13.6	0.5
31	4.6 MI ESE - LAKESHORE DRIVE	2/15/00	15.5	2.5
31	4.6 MI ESE - LAKESHORE DRIVE	5/15/00	13.4	1.4
31	4.6 MI ESE - LAKESHORE DRIVE	8/15/00	16.6	2.1
31	4.6 MI ESE - LAKESHORE DRIVE	11/15/00	13.4	1.5
32	4.5 MI SE - END OF KALBER DRIVE	2/15/00	13.3	1.9
32	4.5 MI SE - END OF KALBER DRIVE	5/15/00	13.0	1.5
32	4.5 MI SE - END OF KALBER DRIVE	8/15/00	13.7	2.2
32	4.5 MI SE - END OF KALBER DRIVE	11/15/00	12.9	0.7



# RNP Radiological Environmental TLD Report

Dose: mR/std. qtr.

TLD	TLD Location Description	Sample Date	Dose	2 Sigma Error
33	4.6 MI SSE-RD S16-493 NEAR SEGARS ENTR	2/15/00	14.0	2.2
33	4.6 MI SSE-RD S16-493 NEAR SEGARS ENTR	5/15/00	14.9	1.3
33	4.6 MI SSE-RD S16-493 NEAR SEGARS ENTR	8/15/00	14.7	1.9
33	4.6 MI SSE-RD S16-493 NEAR SEGARS ENTR	11/15/00	14.3	1.2
34	4.6 MI S - RD S-16-772	2/15/00	10.2	2.3
34	4.6 MI S - RD S-16-772	5/15/00	9.5	1.0
34	4.6 MI S - RD S-16-772	8/15/00	10.0	2.0
34	4.6 MI S - RD S-16-772	11/15/00	9.4	1.1
35	4.4 MI SSW - INT RD S-31-51 & S-16-12	2/15/00	21.8	2.4
35	4.4 MI SSW - INT RD S-31-51 & S-16-12	5/15/00	20.4	1.7
35	4.4 MI SSW - INT RD S-31-51 & S-16-12	8/15/00	21.7	2.9
35	4.4 MI SSW - INT RD S-31-51 & S-16-12	11/15/00	19.6	1.4
36	4.7 MI SW - PAVED RD OFF RD S-16-85	2/15/00	19.3	2.3
36	4.7 MI SW - PAVED RD OFF RD S-16-85	5/15/00	18.2	1.1
36	4.7 MI SW - PAVED RD OFF RD S-16-85	8/15/00	19.0	2.5
36	4.7 MI SW - PAVED RD OFF RD S-16-85	11/15/00	18.2	1.8
37	5.0 MI WSW - TRANS TOWER NEAR CLAY RD	2/15/00	19.4	2.3
37	5.0 MI WSW - TRANS TOWER NEAR CLAY RD	5/15/00	19.0	1.2
37	5.0 MI WSW - TRANS TOWER NEAR CLAY RD	8/15/00	21.8	3.1
37	5.0 MI WSW - TRANS TOWER NEAR CLAY RD	11/15/00	19.2	2.2
38	4.9 MI W - RD S-16-231 AT UNION CHURCH	2/15/00	15.8	2.8
38	4.9 MI W - RD S-16-231 AT UNION CHURCH	5/15/00	16.7	0.6
38	4.9 MI W - RD S-16-231 AT UNION CHURCH	8/15/00	16.6	1.9
38	4.9 MI W - RD S-16-231 AT UNION CHURCH	11/15/00	16.9	0.9
39	5.0 MI WNW - POWER POLE IN FIELD	2/15/00	14.5	2.7
39	5.0 MI WNW - POWER POLE IN FIELD	5/15/00	13.5	0.5
39	5.0 MI WNW - POWER POLE IN FIELD	8/15/00	15.2	2.4
39	5.0 MI WNW - POWER POLE IN FIELD	11/15/00	13.2	1.0
55	0.3 MI SSE - SITE BOUNDARY	2/15/00	13.8	2.0
55	0.3 MI SSE - SITE BOUNDARY	5/15/00	14.4	0.9
55	0.3 MI SSE - SITE BOUNDARY	8/15/00	15.6	2.2
55	0.3 MI SSE - SITE BOUNDARY	11/15/00	14.7	0.9

# RNP Radiological Environmental TLD Report

Dose: mR/std. qtr.				
TLD	TLD Location Description	Sample Date	Dose	2 Sigma Error
56	300 FT N OF ISFSI	2/15/00	16.0	2.0
56	300 FT N OF ISFSI	5/15/00	14.3	1.6
56	300 FT N OF ISFSI	8/15/00	15.4	2.0
56	300 FT N OF ISFSI	11/15/00	13.8	1.4

**CP&L**

**2000 Radiological Environmental**

**Monitoring**

**Analysis Report**

**Robinson Nuclear Plant**

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate**

Analysis: **Beta**

Quantity: cubic meters

Concentration (Activity): pCi/cubic meter

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
1 - 26 MI ESE - FLORENCE - CONTROL	1/ 4/00	588.80	3.74E-001	3.36E-002	2.57E-003	1.75E-003
	1/10/00	513.80	3.74E-001	2.20E-002	2.39E-003	2.07E-003
	1/17/00	594.50	3.74E-001	2.15E-002	2.20E-003	1.92E-003
	1/24/00	607.00	3.74E-001	2.36E-002	2.21E-003	1.74E-003
	1/31/00	682.40	3.74E-001	2.09E-002	1.95E-003	1.53E-003
	2/ 7/00	601.40	3.74E-001	3.14E-002	2.46E-003	1.67E-003
	2/14/00	617.20	3.74E-001	3.38E-002	2.46E-003	1.47E-003
	2/21/00	615.30	3.74E-001	2.35E-002	2.20E-003	1.76E-003
	2/28/00	611.90	3.74E-001	1.79E-002	1.93E-003	1.58E-003
	3/ 6/00	611.80	3.77E-001	2.48E-002	2.21E-003	1.64E-003
	3/14/00	605.30	3.77E-001	2.83E-002	2.34E-003	1.66E-003
	3/20/00	640.10	3.77E-001	1.92E-002	1.91E-003	1.45E-003
	3/27/00	583.50	3.77E-001	1.35E-002	1.82E-003	1.74E-003
	4/ 3/00	603.90	3.77E-001	2.24E-002	2.14E-003	1.68E-003
	4/10/00	633.80	3.77E-001	1.96E-002	1.98E-003	1.60E-003
	4/17/00	605.80	3.77E-001	1.80E-002	1.98E-003	1.70E-003
	4/24/00	579.50	3.77E-001	1.53E-002	1.88E-003	1.65E-003
	5/ 1/00	604.40	3.77E-001	3.59E-002	2.59E-003	1.67E-003
	5/ 8/00	595.20	3.77E-001	2.26E-002	2.13E-003	1.58E-003
	5/15/00	596.10	3.77E-001	2.60E-002	2.28E-003	1.67E-003
	5/23/00	595.60	3.77E-001	2.45E-002	2.26E-003	1.80E-003
	5/30/00	670.90	3.77E-001	2.30E-002	2.01E-003	1.46E-003
	6/ 5/00	542.80	3.77E-001	1.96E-002	2.12E-003	1.68E-003
	6/12/00	589.40	3.77E-001	1.70E-002	1.95E-003	1.69E-003
	6/19/00	605.90	3.77E-001	1.49E-002	1.82E-003	1.61E-003
	6/26/00	604.30	3.77E-001	1.63E-002	1.89E-003	1.66E-003
	7/ 3/00	605.10	3.77E-001	1.82E-002	1.96E-003	1.64E-003
	7/10/00	589.80	3.77E-001	2.32E-002	2.19E-003	1.68E-003
	7/17/00	607.20	3.77E-001	2.12E-002	2.11E-003	1.75E-003
	7/24/00	601.70	3.77E-001	2.06E-002	2.08E-003	1.70E-003
	7/31/00	602.10	3.77E-001	1.11E-002	1.67E-003	1.67E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
1 - 26 MI ESE - FLORENCE - CONTROL	8/ 7/00	599.30	3.77E-001	1.41E-002	1.85E-003	1.77E-003
	8/14/00	597.70	3.77E-001	1.96E-002	2.04E-003	1.66E-003
	8/21/00	592.00	3.77E-001	2.79E-002	2.38E-003	1.78E-003
	8/28/00	597.80	3.77E-001	2.25E-002	2.19E-003	1.81E-003
	9/ 5/00	702.10	3.77E-001	1.39E-002	1.63E-003	1.44E-003
	9/11/00	494.30	3.77E-001	1.87E-002	2.27E-003	2.05E-003
	9/19/00	598.50	3.77E-001	2.08E-002	2.12E-003	1.78E-003
	9/25/00	618.20	3.77E-001	1.19E-002	1.64E-003	1.53E-003
	10/ 2/00	579.00	3.77E-001	1.52E-002	1.93E-003	1.82E-003
	10/ 9/00	598.20	3.77E-001	2.02E-002	2.09E-003	1.77E-003
	10/16/00	601.10	3.62E-001	3.20E-002	2.54E-003	1.77E-003
	10/23/00	596.30	3.77E-001	4.10E-002	2.74E-003	1.61E-003
	10/30/00	623.80	3.62E-001	3.75E-002	2.66E-003	1.72E-003
	11/ 6/00	562.70	3.62E-001	3.26E-002	2.68E-003	1.97E-003
	11/13/00	600.00	3.62E-001	2.47E-002	2.30E-003	1.81E-003
	11/20/00	602.60	3.62E-001	2.85E-002	2.45E-003	1.90E-003
	11/28/00	607.30	3.62E-001	2.75E-002	2.36E-003	1.71E-003
	12/ 5/00	602.90	3.62E-001	3.12E-002	2.50E-003	1.72E-003
	12/11/00	604.20	3.62E-001	3.03E-002	2.44E-003	1.61E-003
	12/18/00	605.00	3.62E-001	2.44E-002	2.31E-003	1.89E-003
	12/26/00	547.70	3.62E-001	5.36E-002	3.33E-003	1.91E-003
2 - 0.2 MI S - INFORMATION CENTER	1/ 4/00	789.60	3.74E-001	2.82E-002	2.02E-003	1.30E-003
	1/10/00	711.60	3.74E-001	1.97E-002	1.87E-003	1.50E-003
	1/17/00	810.60	3.74E-001	1.88E-002	1.72E-003	1.41E-003
	1/24/00	817.90	3.74E-001	1.68E-002	1.61E-003	1.29E-003
	1/31/00	940.60	3.74E-001	1.71E-002	1.48E-003	1.11E-003
	2/ 7/00	818.00	3.74E-001	2.57E-002	1.89E-003	1.23E-003
	2/14/00	834.00	3.74E-001	3.20E-002	2.03E-003	1.09E-003
	2/21/00	829.80	3.74E-001	2.07E-002	1.74E-003	1.30E-003
	2/28/00	813.80	3.74E-001	1.73E-002	1.60E-003	1.19E-003
	3/ 6/00	786.10	3.77E-001	2.16E-002	1.80E-003	1.27E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
2 - 0.2 MI S - INFORMATION CENTER	3/14/00	934.90	3.77E-001	2.62E-002	1.76E-003	1.07E-003
	3/20/00	710.10	3.77E-001	1.62E-002	1.68E-003	1.30E-003
	3/27/00	789.60	3.77E-001	1.32E-002	1.48E-003	1.28E-003
	4/ 3/00	793.60	3.77E-001	1.77E-002	1.65E-003	1.28E-003
	4/10/00	815.40	3.77E-001	1.83E-002	1.65E-003	1.24E-003
	4/17/00	792.60	3.77E-001	1.82E-002	1.68E-003	1.30E-003
	4/24/00	800.80	3.77E-001	1.46E-002	1.51E-003	1.20E-003
	5/ 1/00	804.20	3.77E-001	3.48E-002	2.17E-003	1.25E-003
	5/ 8/00	793.00	3.77E-001	2.05E-002	1.73E-003	1.18E-003
	5/15/00	793.40	3.77E-001	1.95E-002	1.71E-003	1.26E-003
	5/23/00	900.80	3.77E-001	2.41E-002	1.76E-003	1.19E-003
	5/30/00	788.10	3.77E-001	1.83E-002	1.67E-003	1.24E-003
	6/ 5/00	660.30	3.77E-001	1.98E-002	1.89E-003	1.38E-003
	6/12/00	769.70	3.77E-001	1.67E-002	1.64E-003	1.29E-003
	6/19/00	787.00	3.77E-001	1.30E-002	1.46E-003	1.24E-003
	6/26/00	773.00	3.77E-001	1.45E-002	1.55E-003	1.30E-003
	7/ 3/00	771.90	3.77E-001	1.80E-002	1.68E-003	1.28E-003
	7/10/00	760.70	3.77E-001	2.26E-002	1.86E-003	1.30E-003
	7/17/00	792.00	3.77E-001	1.94E-002	1.73E-003	1.34E-003
	7/24/00	764.00	3.77E-001	2.10E-002	1.81E-003	1.34E-003
	7/31/00	781.00	3.77E-001	1.14E-002	1.42E-003	1.29E-003
	8/ 7/00	747.90	3.77E-001	1.57E-002	1.66E-003	1.42E-003
	8/14/00	779.60	3.77E-001	1.69E-002	1.63E-003	1.27E-003
	8/21/00	771.40	3.77E-001	2.72E-002	2.02E-003	1.37E-003
	8/28/00	784.60	3.77E-001	2.32E-002	1.88E-003	1.38E-003
	9/ 5/00	861.40	3.77E-001	1.36E-002	1.42E-003	1.17E-003
	9/11/00	666.00	3.77E-001	1.93E-002	1.90E-003	1.52E-003
	9/19/00	880.60	3.77E-001	1.87E-002	1.60E-003	1.21E-003
	9/25/00	660.70	3.77E-001	1.27E-002	1.61E-003	1.43E-003
	10/ 2/00	225.60	3.77E-001	2.33E-002	4.24E-003	4.68E-003
	10/ 9/00	681.70	3.77E-001	1.83E-002	1.86E-003	1.55E-003



# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
2 - 0.2 MI S - INFORMATION CENTER	10/16/00	657.70	3.62E-001	2.86E-002	2.30E-003	1.62E-003
	10/23/00	645.20	3.77E-001	3.99E-002	2.59E-003	1.48E-003
	10/30/00	681.90	3.62E-001	3.23E-002	2.37E-003	1.58E-003
	11/ 6/00	637.40	3.62E-001	2.60E-002	2.28E-003	1.74E-003
	11/13/00	653.70	3.62E-001	2.41E-002	2.17E-003	1.66E-003
	11/20/00	657.50	3.62E-001	2.82E-002	2.32E-003	1.74E-003
	11/28/00	757.30	3.62E-001	2.56E-002	2.01E-003	1.37E-003
	12/ 5/00	663.50	3.62E-001	2.83E-002	2.27E-003	1.56E-003
	12/11/00	568.90	3.62E-001	3.16E-002	2.57E-003	1.71E-003
	12/18/00	673.00	3.62E-001	2.24E-002	2.09E-003	1.70E-003
	12/26/00	713.40	3.62E-001	3.63E-002	2.42E-003	1.46E-003
3 - 0.7 MI N - MICROWAVE TOWER	1/ 4/00	744.20	3.74E-001	2.67E-002	2.04E-003	1.38E-003
	1/10/00	682.50	3.74E-001	2.00E-002	1.93E-003	1.56E-003
	1/17/00	771.90	3.74E-001	2.15E-002	1.87E-003	1.48E-003
	1/24/00	750.50	3.74E-001	1.91E-002	1.78E-003	1.41E-003
	2/ 7/00	782.00	3.74E-001	2.63E-002	1.96E-003	1.28E-003
	2/14/00	777.50	3.74E-001	3.10E-002	2.08E-003	1.16E-003
	2/21/00	779.30	3.74E-001	2.48E-002	1.94E-003	1.39E-003
	2/28/00	771.10	3.74E-001	1.77E-002	1.67E-003	1.25E-003
	3/ 6/00	754.60	3.77E-001	2.27E-002	1.88E-003	1.33E-003
	3/14/00	887.20	3.77E-001	2.74E-002	1.85E-003	1.13E-003
	3/20/00	654.80	3.77E-001	1.66E-002	1.78E-003	1.41E-003
	3/27/00	765.70	3.77E-001	1.49E-002	1.59E-003	1.32E-003
	4/ 3/00	757.10	3.77E-001	2.00E-002	1.78E-003	1.34E-003
	4/10/00	766.40	3.77E-001	2.01E-002	1.78E-003	1.32E-003
	4/17/00	757.50	3.77E-001	1.66E-002	1.66E-003	1.34E-003
	4/24/00	751.30	3.77E-001	1.50E-002	1.58E-003	1.28E-003
	5/ 1/00	754.40	3.77E-001	3.13E-002	2.15E-003	1.34E-003
	5/ 8/00	751.80	3.77E-001	2.35E-002	1.89E-003	1.25E-003
	5/15/00	755.70	3.77E-001	2.45E-002	1.93E-003	1.32E-003
	5/23/00	850.50	3.77E-001	2.65E-002	1.89E-003	1.26E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
3 - 0.7 MI N - MICROWAVE TOWER	5/30/00	754.10	3.77E-001	1.90E-002	1.74E-003	1.30E-003
	6/ 5/00	635.60	3.77E-001	2.09E-002	1.98E-003	1.43E-003
	6/12/00	769.40	3.77E-001	1.65E-002	1.63E-003	1.29E-003
	6/19/00	781.20	3.77E-001	1.57E-002	1.58E-003	1.25E-003
	6/26/00	764.90	3.77E-001	1.53E-002	1.60E-003	1.31E-003
	7/ 3/00	763.50	3.77E-001	1.77E-002	1.68E-003	1.30E-003
	7/10/00	754.20	3.77E-001	2.30E-002	1.88E-003	1.31E-003
	7/17/00	778.90	3.77E-001	2.05E-002	1.79E-003	1.36E-003
	7/24/00	760.90	3.77E-001	1.99E-002	1.78E-003	1.34E-003
	7/31/00	749.10	3.77E-001	1.16E-002	1.46E-003	1.35E-003
	8/ 7/00	761.10	3.77E-001	1.53E-002	1.62E-003	1.40E-003
	8/14/00	751.20	3.77E-001	1.82E-002	1.72E-003	1.32E-003
	8/21/00	773.70	3.77E-001	2.82E-002	2.04E-003	1.37E-003
	8/28/00	748.40	3.77E-001	2.35E-002	1.94E-003	1.44E-003
	9/ 5/00	867.50	3.77E-001	1.27E-002	1.38E-003	1.16E-003
	9/11/00	655.20	3.77E-001	1.95E-002	1.93E-003	1.55E-003
	9/19/00	865.50	3.77E-001	1.89E-002	1.63E-003	1.23E-003
	9/25/00	647.60	3.77E-001	1.34E-002	1.66E-003	1.46E-003
	10/ 2/00	758.90	3.77E-001	1.72E-002	1.70E-003	1.39E-003
	10/ 9/00	754.40	3.77E-001	2.07E-002	1.83E-003	1.40E-003
	10/16/00	765.70	3.62E-001	2.93E-002	2.13E-003	1.39E-003
	10/23/00	777.40	3.77E-001	3.95E-002	2.33E-003	1.23E-003
	10/30/00	768.00	3.62E-001	2.22E-002	1.90E-003	1.40E-003
	11/ 6/00	747.10	3.62E-001	2.98E-002	2.19E-003	1.48E-003
	11/13/00	761.20	3.62E-001	2.35E-002	1.96E-003	1.43E-003
	11/20/00	769.60	3.62E-001	2.85E-002	2.12E-003	1.48E-003
	11/28/00	882.70	3.62E-001	2.66E-002	1.87E-003	1.18E-003
	12/ 5/00	771.00	3.62E-001	2.44E-002	1.95E-003	1.35E-003
	12/11/00	666.50	3.62E-001	3.05E-002	2.31E-003	1.46E-003
	12/18/00	773.10	3.62E-001	2.47E-002	1.99E-003	1.48E-003
	12/26/00	927.20	3.62E-001	3.70E-002	2.11E-003	1.13E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
4 - 0.4 MI ESE - SPILLWAY	1/ 4/00	459.70	3.74E-001	3.03E-002	2.86E-003	2.24E-003
	1/10/00	726.00	3.74E-001	2.03E-002	1.87E-003	1.47E-003
	1/17/00	838.90	3.74E-001	1.94E-002	1.70E-003	1.36E-003
	1/24/00	862.90	3.74E-001	1.87E-002	1.63E-003	1.23E-003
	1/31/00	956.20	3.74E-001	1.88E-002	1.53E-003	1.09E-003
	2/ 7/00	880.60	3.74E-001	2.53E-002	1.80E-003	1.14E-003
	2/14/00	855.30	3.74E-001	3.31E-002	2.04E-003	1.06E-003
	2/21/00	857.50	3.74E-001	2.17E-002	1.74E-003	1.26E-003
	2/28/00	850.40	3.74E-001	1.67E-002	1.54E-003	1.14E-003
	3/ 6/00	842.10	3.77E-001	2.22E-002	1.75E-003	1.19E-003
	3/14/00	971.50	3.77E-001	2.71E-002	1.75E-003	1.03E-003
	3/20/00	727.00	3.77E-001	1.59E-002	1.64E-003	1.27E-003
	3/27/00	835.90	3.77E-001	1.22E-002	1.39E-003	1.21E-003
	4/ 3/00	830.50	3.77E-001	1.85E-002	1.64E-003	1.22E-003
	4/10/00	846.80	3.77E-001	1.91E-002	1.64E-003	1.20E-003
	4/17/00	836.00	3.77E-001	1.66E-002	1.57E-003	1.24E-003
	4/24/00	822.30	3.77E-001	1.39E-002	1.46E-003	1.16E-003
	5/ 1/00	845.50	3.77E-001	3.17E-002	2.03E-003	1.19E-003
	5/ 8/00	816.50	3.77E-001	2.19E-002	1.75E-003	1.15E-003
	5/15/00	769.00	3.77E-001	2.28E-002	1.86E-003	1.30E-003
	5/23/00	916.70	3.77E-001	2.67E-002	1.81E-003	1.17E-003
	5/30/00	798.60	3.77E-001	1.81E-002	1.65E-003	1.22E-003
	6/ 5/00	686.70	3.77E-001	1.92E-002	1.82E-003	1.33E-003
	6/12/00	781.30	3.77E-001	1.74E-002	1.65E-003	1.27E-003
	6/19/00	800.80	3.77E-001	1.60E-002	1.57E-003	1.22E-003
	6/26/00	782.40	3.77E-001	1.54E-002	1.58E-003	1.28E-003
	7/ 3/00	798.40	3.77E-001	1.76E-002	1.64E-003	1.24E-003
	7/10/00	785.30	3.77E-001	2.66E-002	1.96E-003	1.26E-003
	7/17/00	795.50	3.77E-001	2.07E-002	1.77E-003	1.34E-003
	7/24/00	462.10	3.77E-001	2.49E-002	2.64E-003	2.21E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
4 - 0.4 MI ESE - SPILLWAY	7/31/00	798.90	3.77E-001	1.12E-002	1.39E-003	1.26E-003
	8/ 7/00	776.10	3.77E-001	1.44E-002	1.57E-003	1.37E-003
	8/14/00	788.50	3.77E-001	1.85E-002	1.68E-003	1.26E-003
	8/21/00	766.50	3.77E-001	2.62E-002	1.99E-003	1.38E-003
	8/28/00	784.40	3.77E-001	2.37E-002	1.89E-003	1.38E-003
	9/ 5/00	879.60	3.77E-001	1.23E-002	1.35E-003	1.15E-003
	9/11/00	656.40	3.77E-001	1.72E-002	1.84E-003	1.55E-003
	9/19/00	861.90	3.77E-001	1.98E-002	1.66E-003	1.24E-003
	9/25/00	656.20	3.77E-001	1.43E-002	1.69E-003	1.44E-003
	10/ 2/00	651.20	3.77E-001	1.75E-002	1.88E-003	1.62E-003
	10/ 9/00	658.80	3.77E-001	2.14E-002	2.01E-003	1.60E-003
	10/16/00	493.90	3.62E-001	2.74E-002	2.69E-003	2.15E-003
	10/23/00	663.70	3.77E-001	4.45E-002	2.68E-003	1.44E-003
	10/30/00	680.50	3.62E-001	2.82E-002	2.25E-003	1.58E-003
	11/ 6/00	667.00	3.62E-001	3.15E-002	2.39E-003	1.66E-003
	11/13/00	668.40	3.62E-001	2.46E-002	2.16E-003	1.63E-003
	11/20/00	684.50	3.62E-001	2.85E-002	2.27E-003	1.67E-003
	11/28/00	786.00	3.62E-001	2.74E-002	2.03E-003	1.32E-003
	12/ 5/00	679.10	3.62E-001	2.64E-002	2.17E-003	1.53E-003
	12/11/00	584.80	3.62E-001	3.00E-002	2.48E-003	1.66E-003
	12/18/00	689.20	3.62E-001	2.67E-002	2.21E-003	1.66E-003
	12/26/00	949.50	3.62E-001	3.70E-002	2.08E-003	1.10E-003
5 - 0.9 MI ENE - JOHNSONS LANDING	1/ 4/00	717.40	3.74E-001	2.92E-002	2.16E-003	1.43E-003
	1/10/00	621.80	3.74E-001	2.03E-002	2.06E-003	1.71E-003
	1/17/00	717.80	3.74E-001	2.19E-002	1.97E-003	1.59E-003
	1/24/00	708.20	3.74E-001	2.13E-002	1.93E-003	1.50E-003
	1/31/00	817.10	3.74E-001	1.95E-002	1.70E-003	1.27E-003
	2/ 7/00	789.10	3.74E-001	2.70E-002	1.97E-003	1.27E-003
	2/14/00	782.10	3.74E-001	3.27E-002	2.13E-003	1.16E-003
	2/21/00	801.50	3.74E-001	2.28E-002	1.85E-003	1.35E-003
	2/28/00	811.00	3.74E-001	1.61E-002	1.56E-003	1.19E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
5 - 0.9 MI ENE - JOHNSONS LANDING	3/ 6/00	777.10	3.77E-001	2.13E-002	1.80E-003	1.29E-003
	3/14/00	933.20	3.77E-001	2.52E-002	1.73E-003	1.07E-003
	3/20/00	697.20	3.77E-001	1.66E-002	1.71E-003	1.33E-003
	3/27/00	787.40	3.77E-001	1.20E-002	1.44E-003	1.29E-003
	4/ 3/00	236.90	3.77E-001	2.18E-002	3.94E-003	4.28E-003
	4/10/00	697.90	3.77E-001	1.66E-002	1.75E-003	1.45E-003
	4/17/00	799.20	3.77E-001	1.54E-002	1.57E-003	1.29E-003
	4/24/00	812.50	3.77E-001	1.32E-002	1.44E-003	1.18E-003
	5/ 1/00	788.40	3.77E-001	2.44E-002	1.89E-003	1.28E-003
	5/ 8/00	811.70	3.77E-001	2.25E-002	1.77E-003	1.16E-003
	5/15/00	831.80	3.77E-001	2.11E-002	1.72E-003	1.20E-003
	5/23/00	923.60	3.77E-001	2.38E-002	1.72E-003	1.16E-003
	5/30/00	265.80	3.77E-001	2.83E-002	3.89E-003	3.68E-003
	6/ 5/00	362.60	3.77E-001	2.84E-002	3.13E-003	2.51E-003
	6/12/00	650.90	3.77E-001	1.80E-002	1.87E-003	1.53E-003
	6/19/00	210.10	3.77E-001	2.79E-002	4.54E-003	4.65E-003
	6/26/00	145.80	3.77E-001	2.56E-002	5.85E-003	6.87E-003
	7/ 3/00	441.40	3.77E-001	2.19E-002	2.57E-003	2.24E-003
	7/10/00	614.10	3.77E-001	2.56E-002	2.22E-003	1.61E-003
	7/17/00	618.00	3.77E-001	1.96E-002	2.03E-003	1.72E-003
	7/24/00	613.80	3.77E-001	2.00E-002	2.03E-003	1.66E-003
	7/31/00	630.20	3.77E-001	1.32E-002	1.71E-003	1.60E-003
	8/ 7/00	617.80	3.77E-001	1.34E-002	1.78E-003	1.72E-003
	8/14/00	609.60	3.77E-001	1.79E-002	1.94E-003	1.62E-003
	8/21/00	610.10	3.77E-001	2.88E-002	2.37E-003	1.73E-003
	8/28/00	626.20	3.77E-001	2.39E-002	2.18E-003	1.72E-003
	9/ 5/00	681.00	3.77E-001	1.25E-002	1.60E-003	1.48E-003
	9/11/00	534.70	3.77E-001	1.64E-002	2.06E-003	1.90E-003
	9/19/00	681.20	3.77E-001	1.94E-002	1.90E-003	1.57E-003
	9/25/00	521.40	3.77E-001	1.40E-002	1.94E-003	1.81E-003
	10/ 2/00	551.10	3.77E-001	1.61E-002	2.04E-003	1.92E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
5 - 0.9 MI ENE - JOHNSONS LANDING	10/ 9/00	571.40	3.77E-001	2.19E-002	2.22E-003	1.85E-003
	10/16/00	565.70	3.62E-001	2.50E-002	2.39E-003	1.88E-003
	10/23/00	590.90	3.77E-001	4.19E-002	2.78E-003	1.62E-003
	10/30/00	595.60	3.62E-001	3.16E-002	2.55E-003	1.81E-003
	11/ 6/00	570.70	3.62E-001	3.37E-002	2.69E-003	1.94E-003
	11/13/00	569.10	3.62E-001	2.49E-002	2.39E-003	1.91E-003
	11/20/00	568.60	3.62E-001	3.11E-002	2.63E-003	2.01E-003
	11/28/00	644.50	3.62E-001	3.00E-002	2.36E-003	1.61E-003
	12/ 5/00	558.10	3.62E-001	2.93E-002	2.55E-003	1.86E-003
	12/11/00	483.30	3.62E-001	3.20E-002	2.84E-003	2.01E-003
	12/18/00	563.50	3.62E-001	2.87E-002	2.57E-003	2.03E-003
	12/26/00	593.00	3.62E-001	3.88E-002	2.77E-003	1.76E-003
6 - 0.3 MI SW - INFORMATION CENTER	1/ 4/00	548.60	3.74E-001	2.95E-002	2.55E-003	1.88E-003
	1/10/00	486.60	3.74E-001	2.10E-002	2.44E-003	2.19E-003
	1/17/00	553.40	3.74E-001	1.98E-002	2.24E-003	2.06E-003
	1/24/00	540.00	3.74E-001	2.11E-002	2.28E-003	1.96E-003
	1/31/00	631.70	3.74E-001	2.04E-002	2.03E-003	1.65E-003
	2/ 7/00	577.50	3.74E-001	2.84E-002	2.42E-003	1.74E-003
	2/14/00	595.30	3.74E-001	3.27E-002	2.48E-003	1.52E-003
	2/21/00	595.30	3.74E-001	2.35E-002	2.24E-003	1.82E-003
	2/28/00	595.00	3.74E-001	1.80E-002	1.97E-003	1.62E-003
	3/ 6/00	571.60	3.77E-001	2.41E-002	2.27E-003	1.75E-003
	3/14/00	687.60	3.77E-001	2.68E-002	2.12E-003	1.46E-003
	3/20/00	515.90	3.77E-001	1.76E-002	2.11E-003	1.79E-003
	3/27/00	577.30	3.77E-001	1.34E-002	1.83E-003	1.76E-003
	4/ 3/00	583.30	3.77E-001	2.02E-002	2.10E-003	1.74E-003
	4/10/00	595.60	3.77E-001	1.95E-002	2.05E-003	1.70E-003
	4/17/00	580.60	3.77E-001	1.89E-002	2.07E-003	1.78E-003
	4/24/00	592.60	3.77E-001	1.22E-002	1.71E-003	1.62E-003
	5/ 1/00	592.00	3.77E-001	3.18E-002	2.49E-003	1.70E-003
	5/ 8/00	596.80	3.77E-001	2.11E-002	2.07E-003	1.57E-003



# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**

Analysis: **Beta**

Quantity: cubic meters

Concentration (Activity): pCi/cubic meter

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
6 - 0.3 MI SW - INFORMATION CENTER	5/15/00	600.80	3.77E-001	2.35E-002	2.18E-003	1.66E-003
	5/23/00	684.30	3.77E-001	2.67E-002	2.15E-003	1.57E-003
	5/30/00	599.80	3.77E-001	1.96E-002	2.03E-003	1.63E-003
	6/ 5/00	493.40	3.77E-001	2.14E-002	2.32E-003	1.85E-003
	6/12/00	573.90	3.77E-001	1.47E-002	1.89E-003	1.74E-003
	6/19/00	595.00	3.77E-001	1.42E-002	1.81E-003	1.64E-003
	6/26/00	586.60	3.77E-001	1.66E-002	1.95E-003	1.71E-003
	7/ 3/00	582.60	3.77E-001	1.57E-002	1.91E-003	1.70E-003
	7/10/00	577.60	3.77E-001	2.32E-002	2.22E-003	1.71E-003
	7/17/00	599.60	3.77E-001	1.97E-002	2.07E-003	1.77E-003
	7/24/00	579.50	3.77E-001	1.87E-002	2.06E-003	1.76E-003
	7/31/00	587.60	3.77E-001	1.17E-002	1.73E-003	1.72E-003
	8/ 7/00	569.00	3.77E-001	1.35E-002	1.88E-003	1.87E-003
	8/14/00	592.40	3.77E-001	2.11E-002	2.11E-003	1.67E-003
	8/21/00	585.20	3.77E-001	2.38E-002	2.26E-003	1.81E-003
	8/28/00	591.40	3.77E-001	2.42E-002	2.27E-003	1.83E-003
	9/ 5/00	647.10	3.77E-001	1.31E-002	1.68E-003	1.56E-003
	9/11/00	497.70	3.77E-001	1.86E-002	2.26E-003	2.04E-003
	9/19/00	660.30	3.77E-001	1.90E-002	1.93E-003	1.62E-003
	9/25/00	496.90	3.77E-001	1.14E-002	1.88E-003	1.90E-003
	10/ 2/00	568.40	3.77E-001	1.69E-002	2.03E-003	1.86E-003
	10/ 9/00	573.90	3.77E-001	2.07E-002	2.17E-003	1.84E-003
	10/16/00	566.00	3.62E-001	3.20E-002	2.63E-003	1.88E-003
	10/23/00	565.10	3.77E-001	4.09E-002	2.82E-003	1.70E-003
	10/30/00	592.30	3.62E-001	2.98E-002	2.49E-003	1.82E-003
	11/ 6/00	554.50	3.62E-001	3.09E-002	2.65E-003	2.00E-003
	11/13/00	566.30	3.62E-001	2.29E-002	2.32E-003	1.92E-003
	11/20/00	559.20	3.62E-001	2.69E-002	2.52E-003	2.04E-003
	11/28/00	640.60	3.62E-001	2.77E-002	2.30E-003	1.62E-003
	12/ 5/00	557.00	3.62E-001	2.81E-002	2.51E-003	1.86E-003
	12/11/00	479.30	3.62E-001	3.02E-002	2.79E-003	2.02E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point		Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
6	- 0.3 MI SW - INFORMATION CENTER	12/18/00	566.70	3.62E-001	2.66E-002	2.48E-003	2.02E-003
		12/26/00	655.30	3.62E-001	3.62E-002	2.54E-003	1.59E-003
7	- 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	1/ 4/00	568.30	3.74E-001	2.84E-002	2.45E-003	1.81E-003
		1/10/00	494.70	3.74E-001	1.97E-002	2.36E-003	2.15E-003
		1/17/00	568.70	3.74E-001	2.08E-002	2.24E-003	2.00E-003
		1/24/00	548.90	3.74E-001	2.06E-002	2.23E-003	1.93E-003
		1/31/00	616.20	3.74E-001	1.89E-002	2.00E-003	1.69E-003
		2/ 7/00	582.30	3.74E-001	2.86E-002	2.41E-003	1.72E-003
		2/14/00	565.10	3.74E-001	3.34E-002	2.58E-003	1.60E-003
		2/21/00	602.30	3.74E-001	2.27E-002	2.19E-003	1.80E-003
		2/28/00	585.70	3.74E-001	1.81E-002	2.00E-003	1.65E-003
		3/14/00	668.90	3.77E-001	2.75E-002	2.18E-003	1.50E-003
		3/20/00	496.90	3.77E-001	1.65E-002	2.11E-003	1.86E-003
		3/27/00	589.10	3.77E-001	1.33E-002	1.80E-003	1.72E-003
		4/ 3/00	579.10	3.77E-001	1.98E-002	2.10E-003	1.75E-003
		4/10/00	599.00	3.77E-001	2.03E-002	2.07E-003	1.69E-003
		4/17/00	582.80	3.77E-001	1.53E-002	1.92E-003	1.77E-003
		4/24/00	591.50	3.77E-001	1.47E-002	1.83E-003	1.62E-003
		5/ 1/00	587.90	3.77E-001	3.62E-002	2.64E-003	1.72E-003
		5/ 8/00	592.60	3.77E-001	2.15E-002	2.09E-003	1.58E-003
		5/15/00	602.90	3.77E-001	1.99E-002	2.04E-003	1.65E-003
		5/23/00	286.00	3.77E-001	2.44E-002	3.65E-003	3.75E-003
		5/30/00	583.30	3.77E-001	1.70E-002	1.95E-003	1.68E-003
		6/ 5/00	480.40	3.77E-001	1.94E-002	2.28E-003	1.90E-003
		6/12/00	567.40	3.77E-001	1.69E-002	2.00E-003	1.76E-003
		6/19/00	576.90	3.77E-001	1.33E-002	1.81E-003	1.69E-003
		6/26/00	579.00	3.77E-001	1.47E-002	1.88E-003	1.73E-003
		7/ 3/00	550.60	3.77E-001	1.81E-002	2.08E-003	1.80E-003
		7/10/00	580.30	3.77E-001	2.43E-002	2.25E-003	1.71E-003
		7/17/00	570.70	3.77E-001	2.10E-002	2.19E-003	1.86E-003
		7/24/00	572.40	3.77E-001	1.89E-002	2.08E-003	1.78E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	7/31/00	560.00	3.77E-001	1.12E-002	1.76E-003	1.80E-003
	8/ 7/00	582.40	3.77E-001	1.32E-002	1.84E-003	1.82E-003
	8/14/00	573.90	3.77E-001	1.78E-002	2.02E-003	1.72E-003
	8/21/00	561.30	3.77E-001	2.34E-002	2.30E-003	1.88E-003
	8/28/00	582.80	3.77E-001	1.91E-002	2.10E-003	1.85E-003
	9/ 5/00	643.60	3.77E-001	1.14E-002	1.61E-003	1.57E-003
	9/11/00	489.20	3.77E-001	1.71E-002	2.22E-003	2.07E-003
	9/19/00	648.00	3.77E-001	1.97E-002	1.97E-003	1.65E-003
	9/25/00	490.30	3.77E-001	1.37E-002	2.01E-003	1.93E-003
	10/ 2/00	562.80	3.77E-001	1.83E-002	2.10E-003	1.88E-003
	10/ 9/00	563.20	3.77E-001	1.78E-002	2.08E-003	1.88E-003
	10/16/00	560.00	3.62E-001	3.01E-002	2.59E-003	1.90E-003
	10/23/00	560.90	3.77E-001	3.86E-002	2.76E-003	1.71E-003
	10/30/00	564.60	3.62E-001	2.93E-002	2.55E-003	1.90E-003
	11/ 6/00	550.80	3.62E-001	2.94E-002	2.61E-003	2.01E-003
	11/13/00	558.40	3.62E-001	2.49E-002	2.42E-003	1.95E-003
	11/20/00	555.60	3.62E-001	3.10E-002	2.67E-003	2.06E-003
	11/28/00	632.80	3.62E-001	2.70E-002	2.29E-003	1.64E-003
	12/ 5/00	551.00	3.62E-001	2.80E-002	2.52E-003	1.88E-003
	12/11/00	473.30	3.62E-001	3.05E-002	2.82E-003	2.05E-003
55 - 0.3 MI SSE - SITE BOUNDARY	12/18/00	548.40	3.62E-001	2.43E-002	2.45E-003	2.08E-003
	12/26/00	652.70	3.62E-001	3.50E-002	2.51E-003	1.60E-003
	1/ 4/00	458.40	3.74E-001	3.19E-002	2.93E-003	2.24E-003
	1/10/00	399.40	3.74E-001	2.27E-002	2.84E-003	2.67E-003
	1/17/00	462.50	3.74E-001	2.40E-002	2.69E-003	2.46E-003
	1/24/00	453.10	3.74E-001	2.20E-002	2.59E-003	2.34E-003
	1/31/00	535.40	3.74E-001	2.30E-002	2.35E-003	1.94E-003
	2/ 7/00	475.00	3.74E-001	2.91E-002	2.75E-003	2.11E-003
	2/14/00	485.40	3.74E-001	3.28E-002	2.79E-003	1.86E-003
	2/21/00	476.50	3.74E-001	2.50E-002	2.64E-003	2.27E-003
	2/28/00	483.30	3.74E-001	2.00E-002	2.34E-003	2.00E-003

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Particulate (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
55 - 0.3 MI SSE - SITE BOUNDARY	3/ 6/00	477.60	3.77E-001	2.47E-002	2.56E-003	2.10E-003
	3/14/00	558.10	3.77E-001	2.92E-002	2.49E-003	1.80E-003
	3/20/00	412.10	3.77E-001	1.93E-002	2.52E-003	2.24E-003
	3/27/00	477.70	3.77E-001	1.43E-002	2.13E-003	2.12E-003
	4/ 3/00	476.00	3.77E-001	1.96E-002	2.37E-003	2.13E-003
	4/10/00	482.70	3.77E-001	2.00E-002	2.37E-003	2.10E-003
	4/17/00	480.00	3.77E-001	1.81E-002	2.31E-003	2.15E-003
	4/24/00	473.30	3.77E-001	1.44E-002	2.10E-003	2.02E-003
	5/ 1/00	485.90	3.77E-001	3.33E-002	2.85E-003	2.08E-003
	5/ 8/00	485.80	3.77E-001	2.27E-002	2.42E-003	1.93E-003
	5/15/00	484.50	3.77E-001	2.52E-002	2.56E-003	2.06E-003
	5/23/00	559.40	3.77E-001	2.94E-002	2.53E-003	1.92E-003
	5/30/00	481.10	3.77E-001	2.17E-002	2.42E-003	2.03E-003
	6/ 5/00	438.20	3.77E-001	2.22E-002	2.54E-003	2.08E-003
	6/12/00	502.40	3.77E-001	1.92E-002	2.26E-003	1.98E-003
	6/19/00	517.10	3.77E-001	1.46E-002	2.00E-003	1.89E-003
	6/26/00	503.60	3.77E-001	1.67E-002	2.15E-003	1.99E-003
	7/ 3/00	512.10	3.77E-001	1.80E-002	2.18E-003	1.93E-003
	7/10/00	505.80	3.77E-001	2.46E-002	2.46E-003	1.96E-003
	7/17/00	521.80	3.77E-001	2.07E-002	2.31E-003	2.04E-003
	7/24/00	494.50	3.77E-001	2.12E-002	2.38E-003	2.06E-003
	7/31/00	508.70	3.77E-001	1.17E-002	1.91E-003	1.98E-003
	8/ 7/00	500.70	3.77E-001	1.77E-002	2.24E-003	2.12E-003
	8/14/00	510.20	3.77E-001	2.00E-002	2.27E-003	1.94E-003
	8/21/00	497.80	3.77E-001	2.83E-002	2.66E-003	2.12E-003
	8/28/00	508.90	3.77E-001	2.24E-002	2.42E-003	2.12E-003
	9/ 5/00	573.00	3.77E-001	1.25E-002	1.80E-003	1.76E-003
	9/11/00	430.10	3.77E-001	1.94E-002	2.52E-003	2.36E-003
	9/19/00	565.90	3.77E-001	1.86E-002	2.11E-003	1.89E-003
	9/25/00	432.80	3.77E-001	1.50E-002	2.25E-003	2.18E-003
	10/ 2/00	485.50	3.77E-001	1.52E-002	2.18E-003	2.18E-003

# **RNP Radiological Environmental Monitoring Analysis Report**

MediaType: **Air Particulate (Continued)**  
 Quantity: cubic meters  
 Concentration (Activity): pCi/cubic meter

Analysis: **Beta**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
55 - 0.3 MI SSE - SITE BOUNDARY	10/ 9/00	489.90	3.77E-001	2.10E-002	2.41E-003	2.16E-003
	10/16/00	488.80	3.62E-001	3.56E-002	3.00E-003	2.17E-003
	10/23/00	486.20	3.77E-001	4.04E-002	3.06E-003	1.97E-003
	10/30/00	501.10	3.62E-001	2.76E-002	2.68E-003	2.15E-003
	11/ 6/00	468.00	3.62E-001	3.22E-002	2.99E-003	2.36E-003
	11/13/00	489.10	3.62E-001	2.50E-002	2.63E-003	2.22E-003
	11/20/00	483.10	3.62E-001	2.92E-002	2.84E-003	2.36E-003
	11/28/00	549.50	3.62E-001	2.70E-002	2.49E-003	1.89E-003
	12/ 5/00	477.80	3.62E-001	2.76E-002	2.74E-003	2.17E-003
	12/11/00	407.70	3.62E-001	3.11E-002	3.11E-003	2.38E-003
	12/18/00	484.40	3.62E-001	2.54E-002	2.70E-003	2.36E-003
	12/26/00	579.80	3.62E-001	3.69E-002	2.74E-003	1.80E-003

MediaType: **Air Cartridge**  
 Quantity: cubic meters  
 Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
1 - 26 MI ESE - FLORENCE - CONTROL	1/ 4/00	588.80		< LLD		1.74E-002
	1/10/00	513.80		< LLD		2.79E-002
	1/17/00	594.50		< LLD		1.73E-002
	1/24/00	607.00		< LLD		1.88E-002
	1/31/00	682.40		< LLD		2.08E-002
	2/ 7/00	601.40		< LLD		1.73E-002
	2/14/00	617.20		< LLD		1.50E-002
	2/21/00	615.30		< LLD		1.82E-002
	2/28/00	611.90		< LLD		2.35E-002
	3/ 6/00	611.80		< LLD		2.09E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
1 - 26 MI ESE - FLORENCE - CONTROL	3/14/00	605.30		< LLD		1.14E-002
	3/20/00	640.10		< LLD		2.13E-002
	3/27/00	583.50		< LLD		2.97E-002
	4/ 3/00	603.90		< LLD		2.14E-002
	4/10/00	633.80		< LLD		7.54E-003
	4/17/00	605.80		< LLD		9.83E-003
	4/24/00	579.50		< LLD		1.84E-002
	5/ 1/00	604.40		< LLD		1.62E-002
	5/ 8/00	595.20		< LLD		3.10E-002
	5/15/00	596.10		< LLD		8.70E-003
	5/22/00	595.60		< LLD		2.47E-002
	5/30/00	670.90		< LLD		1.61E-002
	6/ 5/00	542.80		< LLD		2.42E-002
	6/12/00	589.40		< LLD		1.94E-002
	6/19/00	605.90		< LLD		1.62E-002
	6/26/00	604.30		< LLD		2.40E-002
	7/ 3/00	605.10		< LLD		1.93E-002
	7/10/00	589.80		< LLD		1.72E-002
	7/17/00	607.20		< LLD		2.50E-002
	7/24/00	601.70		< LLD		1.54E-002
	7/31/00	602.10		< LLD		1.02E-002
	8/ 7/00	599.30		< LLD		1.53E-002
	8/14/00	597.70		< LLD		2.47E-002
	8/21/00	592.00		< LLD		2.07E-002
	8/28/00	597.80		< LLD		1.76E-002
	9/ 5/00	702.10		< LLD		1.62E-002
	9/11/00	494.30		< LLD		2.38E-002
	9/19/00	598.50		< LLD		2.45E-002
	9/25/00	618.20		< LLD		1.16E-002
	10/ 2/00	579.00		< LLD		2.36E-002
	10/ 9/00	598.20		< LLD		2.66E-002



# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**

Analysis: **Iodine**

Quantity: cubic meters

Concentration (Activity): pCi/cubic meter

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
1 - 26 MI ESE - FLORENCE - CONTROL	10/16/00	601.10		< LLD		2.53E-002
	10/23/00	596.30		< LLD		1.03E-002
	10/30/00	623.80		< LLD		1.86E-002
	11/ 6/00	562.70		< LLD		1.18E-002
	11/13/00	600.00		< LLD		1.64E-002
	11/20/00	602.60		< LLD		1.83E-002
	11/28/00	607.30		< LLD		3.13E-002
	12/ 5/00	602.90		< LLD		2.07E-002
	12/11/00	604.20		< LLD		2.37E-002
	12/18/00	605.00		< LLD		1.56E-002
	12/26/00	547.70		< LLD		4.70E-002
2 - 0.2 MI S - INFORMATION CENTER	1/ 4/00	789.60		< LLD		1.30E-002
	1/10/00	711.60		< LLD		2.86E-002
	1/17/00	810.60		< LLD		1.58E-002
	1/24/00	817.90		< LLD		1.74E-002
	1/31/00	940.60		< LLD		2.28E-002
	2/ 7/00	818.00		< LLD		1.69E-002
	2/14/00	834.00		< LLD		1.17E-002
	2/21/00	829.80		< LLD		1.55E-002
	2/28/00	813.80		< LLD		1.53E-002
	3/ 6/00	786.10		< LLD		1.96E-002
	3/14/00	934.90		< LLD		8.47E-003
	3/20/00	710.10		< LLD		1.02E-002
	3/27/00	789.60		< LLD		1.49E-002
	4/ 3/00	793.60		< LLD		1.76E-002
	4/10/00	815.40		< LLD		2.13E-002
	4/17/00	792.60		< LLD		1.87E-002
	4/24/00	800.80		< LLD		1.21E-002
	5/ 1/00	804.20		< LLD		2.09E-002
	5/ 8/00	793.00		< LLD		8.82E-003
	5/15/00	793.40		< LLD		1.89E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
2 - 0.2 MI S - INFORMATION CENTER	5/22/00	900.80		< LLD		2.01E-002
	5/30/00	788.10		< LLD		9.61E-003
	6/ 5/00	660.30		< LLD		2.68E-002
	6/12/00	769.70		< LLD		2.14E-002
	6/19/00	787.00		< LLD		1.75E-002
	6/26/00	773.00		< LLD		2.01E-002
	7/ 3/00	771.90		< LLD		1.62E-002
	7/10/00	760.70		< LLD		2.04E-002
	7/17/00	792.00		< LLD		2.05E-002
	7/24/00	764.00		< LLD		1.45E-002
	7/31/00	781.00		< LLD		2.57E-002
	8/ 7/00	747.90		< LLD		2.19E-002
	8/14/00	779.60		< LLD		1.57E-002
	8/21/00	771.40		< LLD		2.08E-002
	8/28/00	784.60		< LLD		1.05E-002
	9/ 5/00	861.40		< LLD		2.16E-002
	9/11/00	666.00		< LLD		1.34E-002
	9/19/00	880.60		< LLD		1.75E-002
	9/25/00	660.70		< LLD		1.91E-002
	10/ 2/00	225.60		< LLD		2.73E-002
	10/ 9/00	681.70		< LLD		1.55E-002
	10/16/00	657.70		< LLD		2.71E-002
	10/23/00	645.20		< LLD		1.64E-002
	10/30/00	681.90		< LLD		1.84E-002
	11/ 6/00	637.40		< LLD		2.64E-002
	11/13/00	653.70		< LLD		3.09E-002
	11/20/00	657.50		< LLD		1.29E-002
	11/28/00	757.30		< LLD		1.17E-002
	12/ 5/00	663.50		< LLD		2.07E-002
	12/11/00	568.90		< LLD		2.31E-002
	12/18/00	673.00		< LLD		2.13E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**

Analysis: **Iodine**

Quantity: cubic meters

Concentration (Activity): pCi/cubic meter

Sample Point		Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
2	- 0.2 MI S - INFORMATION CENTER	12/26/00	713.40		< LLD		2.20E-002
3	- 0.7 MI N - MICROWAVE TOWER	1/ 4/00	744.20		< LLD		2.08E-002
		1/10/00	682.50		< LLD		1.26E-002
		1/17/00	771.90		< LLD		8.51E-003
		1/24/00	750.50		< LLD		1.69E-002
		2/ 7/00	782.00		< LLD		2.69E-002
		2/14/00	777.50		< LLD		1.85E-002
		2/21/00	779.30		< LLD		1.24E-002
		2/28/00	771.10		< LLD		1.09E-002
		3/ 6/00	754.60		< LLD		1.43E-002
		3/14/00	887.20		< LLD		1.70E-002
		3/20/00	654.80		< LLD		1.72E-002
		3/27/00	765.70		< LLD		1.78E-002
		4/ 3/00	757.10		< LLD		2.27E-002
		4/10/00	766.40		< LLD		3.04E-002
		4/17/00	757.50		< LLD		1.73E-002
		4/24/00	751.30		< LLD		2.14E-002
		5/ 1/00	754.40		< LLD		2.46E-002
		5/ 8/00	751.80		< LLD		2.05E-002
		5/15/00	755.70		< LLD		2.06E-002
		5/22/00	850.50		< LLD		2.80E-002
		5/30/00	754.10		< LLD		2.16E-002
		6/ 5/00	635.60		< LLD		2.73E-002
		6/12/00	769.40		< LLD		3.21E-002
		6/19/00	781.20		< LLD		1.86E-002
		6/26/00	764.90		< LLD		1.42E-002
		7/ 3/00	763.50		< LLD		3.13E-002
		7/10/00	754.20		< LLD		1.44E-002
		7/17/00	778.90		< LLD		1.83E-002
		7/24/00	760.90		< LLD		2.67E-002
		7/31/00	749.10		< LLD		1.16E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**

Analysis: **Iodine**

Quantity: cubic meters

Concentration (Activity): pCi/cubic meter

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
3 - 0.7 MI N - MICROWAVE TOWER	8/ 7/00	761.10		< LLD		1.09E-002
	8/14/00	751.20		< LLD		2.21E-002
	8/21/00	773.70		< LLD		2.22E-002
	8/28/00	748.40		< LLD		2.50E-002
	9/ 5/00	867.50		< LLD		1.30E-002
	9/11/00	655.20		< LLD		1.95E-002
	9/19/00	865.50		< LLD		1.74E-002
	9/25/00	647.60		< LLD		2.35E-002
	10/ 2/00	758.90		< LLD		1.02E-002
	10/ 9/00	754.40		< LLD		1.92E-002
	10/16/00	765.70		< LLD		2.46E-002
	10/23/00	777.40		< LLD		2.09E-002
	10/30/00	768.00		< LLD		1.91E-002
	11/ 6/00	747.10		< LLD		1.16E-002
	11/13/00	761.20		< LLD		2.62E-002
	11/20/00	769.60		< LLD		2.25E-002
	11/28/00	882.70		< LLD		1.66E-002
	12/ 5/00	771.00		< LLD		2.15E-002
	12/11/00	666.50		< LLD		2.44E-002
	12/18/00	773.10		< LLD		1.28E-002
	12/26/00	927.20		< LLD		1.60E-002
4 - 0.4 MI ESE - SPILLWAY	1/ 4/00	459.70		< LLD		3.40E-002
	1/10/00	726.00		< LLD		3.27E-002
	1/17/00	838.90		< LLD		1.32E-002
	1/24/00	862.90		< LLD		1.94E-002
	1/31/00	956.20		< LLD		1.74E-002
	2/ 7/00	880.60		< LLD		1.42E-002
	2/14/00	855.30		< LLD		1.94E-002
	2/21/00	857.50		< LLD		1.35E-002
	2/28/00	850.40		< LLD		1.60E-002
	3/ 6/00	842.10		< LLD		1.14E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
 Quantity: cubic meters  
 Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
4 - 0.4 MI ESE - SPILLWAY	3/14/00	971.50		< LLD		2.33E-002
	3/20/00	727.00		< LLD		3.12E-002
	3/27/00	835.90		< LLD		2.03E-002
	4/ 3/00	830.50		< LLD		1.50E-002
	4/10/00	846.80		< LLD		3.15E-002
	4/17/00	836.00		< LLD		1.67E-002
	4/24/00	822.30		< LLD		2.60E-002
	5/ 1/00	845.50		< LLD		1.80E-002
	5/ 8/00	816.50		< LLD		2.34E-002
	5/15/00	769.00		< LLD		2.91E-002
	5/22/00	916.70		< LLD		2.21E-002
	5/30/00	798.60		< LLD		2.43E-002
	6/ 5/00	686.70		< LLD		3.14E-002
	6/12/00	781.30		< LLD		1.56E-002
	6/19/00	800.80		< LLD		2.90E-002
	6/26/00	782.40		< LLD		1.21E-002
	7/ 3/00	798.40		< LLD		2.07E-002
	7/10/00	785.30		< LLD		7.82E-003
	7/17/00	795.50		< LLD		2.39E-002
	7/24/00	462.10		< LLD		3.53E-002
	7/31/00	798.90		< LLD		2.25E-002
	8/ 7/00	776.10		< LLD		1.76E-002
	8/14/00	788.50		< LLD		2.08E-002
	8/21/00	766.50		< LLD		3.09E-002
	8/28/00	784.40		< LLD		2.24E-002
	9/ 5/00	879.60		< LLD		1.44E-002
	9/11/00	656.40		< LLD		2.27E-002
	9/19/00	861.90		< LLD		1.17E-002
	9/25/00	656.20		< LLD		1.80E-002
	10/ 2/00	651.20		< LLD		3.08E-002
	10/ 9/00	658.80		< LLD		3.77E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
4 - 0.4 MI ESE - SPILLWAY	10/16/00	493.90		< LLD		4.14E-002
	10/23/00	663.70		< LLD		3.38E-002
	10/30/00	680.50		< LLD		2.05E-002
	11/ 6/00	667.00		< LLD		2.09E-002
	11/13/00	668.40		< LLD		2.90E-002
	11/20/00	684.50		< LLD		1.80E-002
	11/28/00	786.00		< LLD		1.66E-002
	12/ 5/00	679.10		< LLD		1.60E-002
	12/11/00	584.80		< LLD		3.92E-002
	12/18/00	689.20		< LLD		1.34E-002
	12/26/00	949.50		< LLD		1.54E-002
	1/ 4/00	717.40		< LLD		2.05E-002
	1/10/00	621.80		< LLD		2.54E-002
5 - 0.9 MI ENE - JOHNSONS LANDING	1/17/00	717.80		< LLD		1.89E-002
	1/24/00	708.20		< LLD		2.92E-002
	1/31/00	817.10		< LLD		1.31E-002
	2/ 7/00	789.10		< LLD		9.22E-003
	2/14/00	782.10		< LLD		1.81E-002
	2/21/00	801.50		< LLD		2.06E-002
	2/28/00	811.00		< LLD		1.09E-002
	3/ 6/00	777.10		< LLD		1.99E-002
	3/14/00	933.20		< LLD		1.84E-002
	3/20/00	697.20		< LLD		9.04E-003
	3/27/00	787.40		< LLD		2.07E-002
	4/ 3/00	236.90		< LLD		4.83E-002
	4/10/00	697.90		< LLD		1.36E-002
	4/17/00	799.20		< LLD		1.44E-002
	4/24/00	812.50		< LLD		8.00E-003
	5/ 1/00	788.40		< LLD		1.70E-002
	5/ 8/00	811.70		< LLD		2.09E-002
	5/15/00	831.80		< LLD		1.11E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
5 - 0.9 MI ENE - JOHNSONS LANDING	5/22/00	923.60		< LLD		1.47E-002
	5/30/00	265.80		< LLD		4.08E-002
	6/ 5/00	362.60		< LLD		4.27E-002
	6/12/00	650.90		< LLD		1.76E-002
	6/19/00	210.10		< LLD		6.96E-002
	6/26/00	145.80		< LLD		1.04E-001
	7/ 3/00	441.40		< LLD		2.31E-002
	7/10/00	614.10		< LLD		1.85E-002
	7/17/00	618.00		< LLD		1.50E-002
	7/24/00	613.80		< LLD		3.48E-002
	7/31/00	630.20		< LLD		1.92E-002
	8/ 7/00	617.80		< LLD		1.07E-002
	8/14/00	609.60		< LLD		2.36E-002
	8/21/00	610.10		< LLD		1.30E-002
	8/28/00	626.20		< LLD		1.38E-002
	9/ 5/00	681.00		< LLD		2.15E-002
	9/11/00	534.70		< LLD		2.33E-002
	9/19/00	681.20		< LLD		2.22E-002
	9/25/00	521.40		< LLD		2.59E-002
	10/ 2/00	551.10		< LLD		1.11E-002
	10/ 9/00	571.40		< LLD		2.55E-002
	10/16/00	565.70		< LLD		2.69E-002
	10/23/00	590.90		< LLD		2.13E-002
	10/30/00	595.60		< LLD		2.03E-002
	11/ 6/00	570.70		< LLD		1.44E-002
	11/13/00	569.10		< LLD		3.54E-002
	11/20/00	568.60		< LLD		2.65E-002
	11/28/00	644.50		< LLD		2.19E-002
	12/ 5/00	558.10		< LLD		1.20E-002
	12/11/00	483.30		< LLD		3.21E-002
	12/18/00	563.50		< LLD		2.72E-002



# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
 Quantity: cubic meters  
 Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point		Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
5	- 0.9 MI ENE - JOHNSONS LANDING	12/26/00	593.00		< LLD		1.49E-002
6	- 0.3 MI SW - INFORMATION CENTER	1/ 4/00	548.60		< LLD		2.82E-002
		1/10/00	486.60		< LLD		1.61E-002
		1/17/00	553.40		< LLD		2.84E-002
		1/24/00	540.00		< LLD		4.14E-002
		1/31/00	631.70		< LLD		2.29E-002
		2/ 7/00	577.50		< LLD		1.32E-002
		2/14/00	595.30		< LLD		2.21E-002
		2/21/00	595.30		< LLD		1.61E-002
		2/28/00	595.00		< LLD		2.09E-002
		3/ 6/00	571.60		< LLD		1.88E-002
		3/14/00	687.60		< LLD		1.47E-002
		3/20/00	515.90		< LLD		1.40E-002
		3/27/00	577.30		< LLD		3.71E-002
		4/ 3/00	583.30		< LLD		2.64E-002
		4/10/00	595.60		< LLD		2.44E-002
		4/17/00	580.60		< LLD		2.16E-002
		4/24/00	592.60		< LLD		1.78E-002
		5/ 1/00	592.00		< LLD		3.61E-002
		5/ 8/00	596.80		< LLD		3.49E-002
		5/15/00	600.80		< LLD		1.76E-002
		5/22/00	684.30		< LLD		3.17E-002
		5/30/00	599.80		< LLD		1.64E-002
		6/ 5/00	493.40		< LLD		3.45E-002
		6/12/00	573.90		< LLD		2.96E-002
		6/19/00	595.00		< LLD		1.89E-002
		6/26/00	586.60		< LLD		2.30E-002
		7/ 3/00	582.60		< LLD		2.52E-002
		7/10/00	577.60		< LLD		2.31E-002
		7/17/00	599.60		< LLD		1.21E-002
		7/24/00	579.50		< LLD		2.19E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
6 - 0.3 MI SW - INFORMATION CENTER	7/31/00	587.60		< LLD		2.17E-002
	8/ 7/00	569.00		< LLD		2.76E-002
	8/14/00	592.40		< LLD		3.73E-002
	8/21/00	585.20		< LLD		2.24E-002
	8/28/00	591.40		< LLD		2.16E-002
	9/ 5/00	647.10		< LLD		2.10E-002
	9/11/00	497.70		< LLD		3.66E-002
	9/19/00	660.30		< LLD		2.76E-002
	9/25/00	496.90		< LLD		4.91E-002
	10/ 2/00	568.40		< LLD		1.33E-002
	10/ 9/00	573.90		< LLD		3.41E-002
	10/16/00	566.00		< LLD		2.85E-002
	10/23/00	565.10		< LLD		1.47E-002
	10/30/00	592.30		< LLD		2.12E-002
	11/ 6/00	554.50		< LLD		3.02E-002
	11/13/00	566.30		< LLD		1.47E-002
	11/20/00	559.20		< LLD		2.78E-002
	11/28/00	640.60		< LLD		3.03E-002
	12/ 5/00	557.00		< LLD		2.24E-002
	12/11/00	479.30		< LLD		3.64E-002
	12/18/00	566.70		< LLD		3.12E-002
	12/26/00	655.30		< LLD		2.72E-002
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	1/ 4/00	568.30		< LLD		2.72E-002
	1/10/00	494.70		< LLD		5.13E-002
	1/17/00	568.70		< LLD		2.99E-002
	1/24/00	548.90		< LLD		2.45E-002
	1/31/00	616.20		< LLD		2.94E-002
	2/ 7/00	582.30		< LLD		3.91E-002
	2/14/00	565.10		< LLD		2.54E-002
	2/21/00	602.30		< LLD		3.00E-002
	2/28/00	585.70		< LLD		2.03E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	3/14/00	668.90		< LLD		2.27E-002
	3/20/00	496.90		< LLD		1.61E-002
	3/27/00	589.10		< LLD		1.11E-002
	4/ 3/00	579.10		< LLD		1.54E-002
	4/10/00	599.00		< LLD		3.12E-002
	4/17/00	582.80		< LLD		1.75E-002
	4/24/00	591.50		< LLD		1.43E-002
	5/ 1/00	587.90		< LLD		2.18E-002
	5/ 8/00	592.60		< LLD		2.31E-002
	5/15/00	602.90		< LLD		3.66E-002
	5/22/00	286.00		< LLD		6.08E-002
	5/30/00	583.30		< LLD		3.47E-002
	6/ 5/00	480.40		< LLD		3.62E-002
	6/12/00	567.40		< LLD		2.12E-002
	6/19/00	576.90		< LLD		2.27E-002
	6/26/00	579.00		< LLD		2.59E-002
	7/ 3/00	550.60		< LLD		1.73E-002
	7/10/00	580.30		< LLD		2.33E-002
	7/17/00	570.70		< LLD		2.59E-002
	7/24/00	572.40		< LLD		3.17E-002
	7/31/00	560.00		< LLD		1.56E-002
	8/ 7/00	582.40		< LLD		2.47E-002
	8/14/00	573.90		< LLD		2.81E-002
	8/21/00	561.30		< LLD		2.41E-002
	8/28/00	582.80		< LLD		2.04E-002
	9/ 5/00	643.60		< LLD		1.77E-002
	9/11/00	489.20		< LLD		3.38E-002
	9/19/00	648.00		< LLD		1.69E-002
	9/25/00	490.30		< LLD		4.25E-002
	10/ 2/00	562.80		< LLD		1.84E-002
	10/ 9/00	563.20		< LLD		3.46E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
Quantity: cubic meters  
Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	10/16/00	560.00		< LLD		3.74E-002
	10/23/00	560.90		< LLD		2.31E-002
	10/30/00	564.60		< LLD		3.36E-002
	11/ 6/00	550.80		< LLD		2.10E-002
	11/13/00	558.40		< LLD		3.89E-002
	11/20/00	555.60		< LLD		2.41E-002
	11/28/00	632.80		< LLD		2.30E-002
	12/ 5/00	551.00		< LLD		3.36E-002
	12/11/00	473.30		< LLD		2.72E-002
	12/18/00	548.40		< LLD		2.71E-002
	12/26/00	652.70		< LLD		2.68E-002
55 - 0.3 MI SSE - SITE BOUNDARY	1/ 4/00	458.40		< LLD		4.39E-002
	1/10/00	399.40		< LLD		5.61E-002
	1/17/00	462.50		< LLD		4.99E-002
	1/24/00	453.10		< LLD		3.52E-002
	1/31/00	535.40		< LLD		1.90E-002
	2/ 7/00	475.00		< LLD		1.79E-002
	2/14/00	485.40		< LLD		2.87E-002
	2/21/00	476.50		< LLD		2.83E-002
	2/28/00	483.30		< LLD		1.94E-002
	3/ 6/00	477.60		< LLD		2.05E-002
	3/14/00	558.10		< LLD		2.01E-002
	3/20/00	412.10		< LLD		5.32E-002
	3/27/00	477.70		< LLD		4.27E-002
	4/ 3/00	476.00		< LLD		2.20E-002
	4/10/00	482.70		< LLD		4.01E-002
	4/17/00	480.00		< LLD		3.66E-002
	4/24/00	473.30		< LLD		3.47E-002
	5/ 1/00	485.90		< LLD		2.56E-002
	5/ 8/00	485.80		< LLD		3.24E-002
	5/15/00	484.50		< LLD		3.74E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
 Quantity: cubic meters  
 Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
55 - 0.3 MI SSE - SITE BOUNDARY	5/22/00	559.40		< LLD		2.88E-002
	5/30/00	481.10		< LLD		4.32E-002
	6/ 5/00	438.20		< LLD		5.12E-002
	6/12/00	502.40		< LLD		2.44E-002
	6/19/00	517.10		< LLD		2.94E-002
	6/26/00	503.60		< LLD		2.42E-002
	7/ 3/00	512.10		< LLD		2.45E-002
	7/10/00	505.80		< LLD		1.84E-002
	7/17/00	521.80		< LLD		1.30E-002
	7/24/00	494.50		< LLD		3.03E-002
	7/31/00	508.70		< LLD		3.14E-002
	8/ 7/00	500.70		< LLD		4.38E-002
	8/14/00	510.20		< LLD		4.28E-002
	8/21/00	497.80		< LLD		4.07E-002
	8/28/00	508.90		< LLD		3.45E-002
	9/ 5/00	573.00		< LLD		1.69E-002
	9/11/00	430.10		< LLD		4.33E-002
	9/19/00	565.90		< LLD		2.50E-002
	9/25/00	432.80		< LLD		2.77E-002
	10/ 2/00	485.50		< LLD		4.94E-002
	10/ 9/00	489.90		< LLD		3.92E-002
	10/16/00	488.80		< LLD		4.65E-002
	10/23/00	486.20		< LLD		2.41E-002
	10/30/00	501.10		< LLD		3.42E-002
	11/ 6/00	486.00		< LLD		3.49E-002
	11/13/00	489.10		< LLD		2.92E-002
	11/20/00	483.10		< LLD		2.60E-002
	11/28/00	549.50		< LLD		3.44E-002
	12/ 5/00	477.80		< LLD		3.07E-002
	12/11/00	407.70		< LLD		2.39E-002
	12/18/00	484.40		< LLD		2.98E-002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Air Cartridge (Continued)**  
 Quantity: cubic meters  
 Concentration (Activity): pCi/cubic meter

Analysis: **Iodine**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
55 - 0.3 MI SSE - SITE BOUNDARY	12/26/00	579.800		< LLD		3.94E-002

MediaType: **Groundwater**  
 Quantity: Liters  
 Concentration (Activity): pCi/Liter

Analysis: **Tritium**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	2/29/00	0.005	4.31E-001	< LLD		3.10E+002
	5/ 8/00	0.005	4.38E-001	< LLD		2.98E+002
	8/ 7/00	0.005	4.36E-001	< LLD		3.03E+002
	11/13/00	0.005	4.37E-001	< LLD		3.07E+002
42 - UNIT 1 DEEP WELL NEAR SITE ENTRANCE	5/ 8/00	0.005	4.36E-001	< LLD		2.99E+002
	8/ 7/00	0.005	4.36E-001	< LLD		3.03E+002
	11/13/00	0.005	4.37E-001	< LLD		3.07E+002
43 - UNIT 2 DEEP WELL	2/29/00	0.005	4.34E-001	< LLD		3.08E+002

MediaType: **Surface Water**  
 Quantity: Liters  
 Concentration (Activity): pCi/Liter

Analysis: **Tritium**

Sample Point	Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	1/31/00	0.005	2.85E-001	3.47E+003	5.76E+002	8.38E+002
	2/29/00	0.005	2.85E-001	1.68E+003	5.46E+002	8.44E+002
	3/31/00	0.005	4.39E-001	7.39E+002	1.99E+002	3.11E+002
	4/30/00	0.005	4.38E-001	7.20E+002	1.91E+002	2.98E+002

# RNP Radiological Environmental Monitoring Analysis Report

MediaType: **Surface Water (Continued)**

Analysis: **Tritium**

Quantity: Liters

Concentration (Activity): pCi/Liter

Sample Point		Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
40	- 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	5/31/00	0.005	4.34E-001	1.78E+003	2.09E+002	3.04E+002
		6/30/00	0.005	4.36E-001	2.09E+003	2.12E+002	3.02E+002
		7/31/00	0.005	4.36E-001	3.10E+003	2.26E+002	3.03E+002
		8/31/00	0.005	4.35E-001	2.19E+003	2.16E+002	3.07E+002
		9/30/00	0.005	4.38E-001	1.83E+003	2.08E+002	3.00E+002
		10/31/00	0.005	4.37E-001	2.90E+003	2.23E+002	3.03E+002
		11/30/00	0.005	4.38E-001	2.96E+003	2.19E+002	2.94E+002
		12/31/00	0.005	4.35E-001	4.10E+003	2.34E+002	2.95E+002
		1/31/00	0.005	2.85E-001	< LLD		2.99E+002
		2/29/00	0.005	4.30E-001	< LLD		3.11E+002
		3/31/00	0.005	4.38E-001	< LLD		3.12E+002
		4/30/00	0.005	4.37E-001	< LLD		2.99E+002
41	- 7.2 MI NNW - BLACK CREEK - CONTROL	5/31/00	0.005	4.35E-001	< LLD		3.03E+002
		6/30/00	0.005	4.36E-001	< LLD		2.99E+002
		7/31/00	0.005	4.39E-001	< LLD		3.01E+002
		8/31/00	0.005	4.35E-001	< LLD		3.07E+002
		9/30/00	0.005	4.39E-001	< LLD		2.99E+002
		10/31/00	0.005	4.39E-001	< LLD		3.02E+002
		11/30/00	0.005	4.38E-001	< LLD		2.94E+002
		12/31/00	0.005	4.34E-001	< LLD		2.96E+002
		1/31/00	0.005	2.85E-001	2.58E+003	5.60E+002	8.38E+002
		2/29/00	0.005	2.85E-001	1.84E+003	5.49E+002	8.44E+002
		3/31/00	0.005	4.38E-001	6.66E+002	1.99E+002	3.12E+002
		4/30/00	0.005	4.38E-001	3.47E+002	1.86E+002	2.98E+002
57	- 0.9 MI NNW - ASH POND	5/31/00	0.005	4.34E-001	9.20E+002	1.98E+002	3.04E+002
		6/30/00	0.005	4.36E-001	1.60E+003	2.06E+002	3.02E+002
		7/31/00	0.005	4.36E-001	2.99E+003	2.25E+002	3.03E+002
		8/31/00	0.005	4.35E-001	2.19E+003	2.16E+002	3.07E+002
		9/30/00	0.005	4.40E-001	1.30E+003	2.00E+002	2.99E+002
		10/31/00	0.005	4.37E-001	1.97E+003	2.11E+002	3.03E+002
		11/30/00	0.005	4.36E-001	3.17E+003	2.23E+002	2.96E+002



# RNP Radiological Environmental Monitoring Analysis Report

Media Type: **Surface Water (Continued)**  
Quantity: Liters  
Concentration (Activity): pCi/Liter

Analysis: **Tritium**

Sample Point		Sample Date	Quantity	Efficiency	Activity	2 Sigma Error	LLD
57	- 0.9 MI NNW - ASH POND	12/31/00	0.005	4.32E-001	3.85E+003	2.32E+002	2.97E+002

**CP&L**

**2000 Radiological Environmental**

**Monitoring Gamma Isotopic**

**Report**

**Robinson Nuclear Plant**

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **AIR PARTICULATE**

Quantity: CUBIC METERS

Activity: pCi/cubic meter

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
1 - 26 MI ESE - FLORENCE - CONTROL	2/15/00	7873.00	BE-7	1.35E-001	1.97E-002	
	5/15/00	7827.60	BE-7	1.15E-001	1.59E-002	
	5/15/00	7827.60	PB-214	1.91E-003	8.75E-004	
	8/15/00	7805.80	BE-7	1.01E-001	1.74E-002	
	11/15/00	7730.80	BE-7	9.53E-002	1.83E-002	
2 - 0.2 MI S - INFORMATION CENTER	2/15/00	10586.60	BE-7	1.16E-001	1.75E-002	
	5/15/00	10271.90	BE-7	1.15E-001	1.53E-002	
	8/15/00	10021.80	BE-7	1.02E-001	1.62E-002	
	11/15/00	8216.80	BE-7	9.02E-002	1.62E-002	
	2/15/00	9258.30	BE-7	1.45E-001	1.71E-002	
3 - 0.7 MI N - MICROWAVE TOWER	5/15/00	9849.90	BE-7	1.43E-001	1.67E-002	
	8/15/00	9876.80	BE-7	1.04E-001	1.43E-002	
	11/15/00	10122.80	BE-7	9.31E-002	1.64E-002	
	2/15/00	10664.00	BE-7	1.10E-001	1.76E-002	
	5/15/00	10533.10	BE-7	1.18E-001	1.67E-002	
4 - 0.4 MI ESE - SPILLWAY	8/15/00	9809.80	BE-7	9.94E-002	1.33E-002	
	8/15/00	9809.80	K-40	1.65E-002	7.73E-003	
	11/15/00	8856.60	BE-7	8.95E-002	1.93E-002	
	2/15/00	9960.90	BE-7	1.24E-001	1.61E-002	
	5/15/00	7537.20	BE-7	1.07E-001	1.54E-002	
5 - 0.9 MI ENE - JOHNSONS LANDING	5/15/00	7537.20	K-40	1.04E-002	8.15E-003	
	8/15/00	7899.50	BE-7	8.96E-002	1.71E-002	
	11/15/00	7425.50	BE-7	8.05E-002	1.50E-002	
	2/15/00	7475.80	BE-7	1.28E-001	1.75E-002	
	5/15/00	7674.70	BE-7	1.13E-001	1.79E-002	
6 - 0.3 MI SW - INFORMATION CENTER	8/15/00	7566.90	BE-7	9.97E-002	1.65E-002	
	11/15/00	7444.60	BE-7	9.10E-002	2.28E-002	
	11/15/00	7444.60	PB-214	4.80E-003	2.10E-003	

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **AIR PARTICULATE (Continued)**

Quantity: CUBIC METERS

Activity: pCi/cubic meter

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	2/15/00	6976.20	BE-7	1.25E-001	1.87E-002	
	5/15/00	7208.80	BE-7	9.30E-002	1.78E-002	
	8/15/00	7405.50	BE-7	9.60E-002	1.63E-002	
	8/15/00	7405.50	PB-214	1.57E-003	1.04E-003	
	11/15/00	7334.50	BE-7	7.60E-002	1.43E-002	
55 - 0.3 MI SSE - SITE BOUNDARY	2/15/00	6154.50	BE-7	1.40E-001	2.05E-002	
	5/15/00	6370.00	BE-7	1.10E-001	1.69E-002	
	5/15/00	6370.00	K-40	2.07E-002	1.11E-002	
	8/15/00	6562.30	BE-7	7.21E-002	1.54E-002	
	11/15/00	6390.90	BE-7	9.28E-002	1.72E-002	

MediaType: **AQUATIC VEGETATION**

Quantity: GRAMS (wet)

Activity: pCi/gram wet

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	5/17/00	540.70	BE-7	1.80E-001	9.48E-002	
45 - SITE VARIES WITHIN LAKE ROBINSON	5/17/00	381.10	BE-7	5.33E-001	2.26E-001	
	5/17/00	381.10	K-40	7.17E-001	5.22E-001	
	5/17/00	381.10	BI-214	8.75E-002	5.69E-002	
	5/17/00	381.10	PB-214	1.03E-001	6.69E-002	
	5/17/00	381.10	AC-228	3.84E-001	1.35E-001	
46 - 4.9 MI ESE - PRESTWOOD LAKE	5/17/00	414.30	BE-7	6.00E-001	2.47E-001	
	5/17/00	414.30	K-40	1.11E+000	3.65E-001	
	5/17/00	414.30	BI-214	8.27E-002	5.34E-002	
	5/17/00	414.30	RA-226	8.19E-001	5.32E-001	
	5/17/00	414.30	AC-228	2.86E-001	1.40E-001	

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **AQUATIC VEGETATION (Continued)**

Quantity: GRAMS (wet)

Activity: pCi/gram wet

## Sample Point

54 - 10.1 MI E - AUBURNDALE PLANTATION

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
5/17/00	440.50	K-40	1.42E+000	4.81E-001	
5/17/00	440.50	TL-208	1.34E-001	4.48E-002	
5/17/00	440.50	PB-212	4.25E-001	5.01E-002	
5/17/00	440.50	BI-214	1.14E-001	6.51E-002	
5/17/00	440.50	PB-214	1.68E-001	7.40E-002	
5/17/00	440.50	RA-226	3.19E+000	7.36E-001	
5/17/00	440.50	AC-228	1.36E+000	1.86E-001	
5/17/00	440.50	I-131	4.38E-001	5.19E-002	

MediaType: **BOTTOM FEEDERS**

Quantity: GRAMS (wet)

Activity: pCi/gram wet

## Sample Point

45 - SITE VARIES WITHIN LAKE ROBINSON

46 - 4.9 MI ESE - PRESTWOOD LAKE

47 - 13 MI NNW - LAKE BEE - CONTROL

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
5/18/00	509.50	K-40	2.64E+000	1.11E+000	
11/ 7/00	600.00	K-40	3.41E+000	8.51E-001	
5/18/00	511.30	K-40	3.97E+000	1.11E+000	
11/ 7/00	582.20	K-40	3.18E+000	9.41E-001	
5/18/00	386.80	K-40	2.79E+000	1.17E+000	
11/ 6/00	428.00	K-40	5.87E+000	1.30E+000	

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BOTTOM SEDIMENT**

Quantity: GRAMS (dry)

Activity: pCi/gram dry

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	6/ 8/00	696.20	K-40	1.47E+000	6.96E-001	
	6/ 8/00	696.20	TL-208	7.42E-001	1.01E-001	
	6/ 8/00	696.20	BI-214	1.40E+000	2.13E-001	
	6/ 8/00	696.20	PB-214	1.69E+000	1.86E-001	
	6/ 8/00	696.20	AC-228	1.83E+000	3.41E-001	
	6/ 8/00	696.20	CS-137	1.54E-001	9.28E-002	
45 - SITE VARIES WITHIN LAKE ROBINSON	6/ 8/00	1578.80	TL-208	6.22E-002	2.85E-002	
	6/ 8/00	1578.80	PB-212	2.19E-001	3.90E-002	
	6/ 8/00	1578.80	PB-214	1.93E-001	6.28E-002	
	6/ 8/00	1578.80	RA-226	5.66E-001	4.44E-001	
	6/ 8/00	1578.80	AC-228	2.78E-001	9.54E-002	
	6/ 8/00	1637.40	TL-208	2.02E-001	4.00E-002	
46 - 4.9 MI ESE - PRESTWOOD LAKE	6/ 8/00	1637.40	BI-214	5.42E-001	9.38E-002	
	6/ 8/00	1637.40	PB-214	4.19E-001	7.75E-002	
	6/ 8/00	1637.40	AC-228	5.73E-001	1.36E-001	
	6/ 8/00	1593.40	K-40	1.32E+000	6.16E-001	
54 - 10.1 MI E - AUBURNDALE PLANTATION	6/ 8/00	1593.40	TL-208	5.16E-001	6.60E-002	
	6/ 8/00	1593.40	PB-212	1.30E+000	8.90E-002	
	6/ 8/00	1593.40	BI-214	9.17E-001	1.29E-001	
	6/ 8/00	1593.40	PB-214	9.59E-001	1.22E-001	
	6/ 8/00	1593.40	RA-226	3.31E+000	1.17E+000	
	6/ 8/00	1593.40	AC-228	1.24E+000	2.11E-001	

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION**

Quantity: GRAMS

Activity: pCi/gram

Media: **Cherry**

## Sample Point

50 - SSE - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
4/21/00	277.10	K-40	4.25E+000	6.98E-001	
4/21/00	277.10	I-131	< LLD		4.55E-002
4/21/00	277.10	CS-134	< LLD		3.55E-002
4/21/00	277.10	CS-137	< LLD		3.38E-002
5/26/00	295.10	K-40	3.46E+000	5.86E-001	
5/26/00	295.10	I-131	< LLD		3.53E-002
5/26/00	295.10	CS-134	< LLD		3.83E-002
5/26/00	295.10	CS-137	< LLD		3.01E-002
6/27/00	476.20	BE-7	4.64E-001	1.53E-001	
6/27/00	476.20	K-40	2.60E+000	5.08E-001	
6/27/00	476.20	I-131	< LLD		2.74E-002
6/27/00	476.20	CS-134	< LLD		2.89E-002
6/27/00	476.20	CS-137	< LLD		2.65E-002
7/28/00	396.80	BE-7	5.40E-001	1.70E-001	
7/28/00	396.80	K-40	2.57E+000	4.48E-001	
7/28/00	396.80	BI-214	4.99E-002	4.35E-002	
7/28/00	396.80	RA-226	4.81E-001	3.43E-001	
7/28/00	396.80	I-131	< LLD		2.70E-002
7/28/00	396.80	CS-134	< LLD		2.91E-002
7/28/00	396.80	CS-137	< LLD		2.46E-002
8/29/00	310.60	BE-7	1.10E+000	3.07E-001	
8/29/00	310.60	K-40	2.47E+000	6.47E-001	
8/29/00	310.60	I-131	< LLD		3.22E-002
8/29/00	310.60	CS-134	< LLD		4.67E-002
8/29/00	310.60	CS-137	< LLD		4.32E-002

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Media: **Cherry**

Quantity: GRAMS

Activity: pCi/gram

## Sample Point

50 - SSE - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
9/26/00	423.30	BE-7	1.20E+000	2.53E-001	
9/26/00	423.30	K-40	1.57E+000	4.90E-001	
9/26/00	423.30	TL-208	6.02E-002	2.99E-002	
9/26/00	423.30	RA-226	7.99E-001	6.00E-001	
9/26/00	423.30	AC-228	1.95E-001	1.17E-001	
9/26/00	423.30	I-131	< LLD		2.95E-002
9/26/00	423.30	CS-134	< LLD		3.68E-002
9/26/00	423.30	CS-137	< LLD		3.50E-002

51 - SSW - CP&L PROPERTY

4/21/00	238.50	BE-7	6.32E-001	2.68E-001	
4/21/00	238.50	K-40	4.55E+000	7.41E-001	
4/21/00	238.50	PB-214	8.26E-002	5.89E-002	
4/21/00	238.50	I-131	< LLD		4.63E-002
4/21/00	238.50	CS-134	< LLD		4.19E-002
4/21/00	238.50	CS-137	< LLD		4.22E-002
5/26/00	287.30	BE-7	4.39E-001	1.83E-001	
5/26/00	287.30	K-40	4.31E+000	6.83E-001	
5/26/00	287.30	I-131	< LLD		3.66E-002
5/26/00	287.30	CS-134	< LLD		3.84E-002
5/26/00	287.30	CS-137	< LLD		3.43E-002
6/27/00	492.20	BE-7	3.08E-001	1.85E-001	
6/27/00	492.20	K-40	3.66E+000	4.69E-001	
6/27/00	492.20	I-131	< LLD		2.64E-002
6/27/00	492.20	CS-134	< LLD		2.96E-002
6/27/00	492.20	CS-137	< LLD		3.02E-002
7/28/00	387.70	K-40	4.29E+000	6.35E-001	
7/28/00	387.70	I-131	< LLD		3.63E-002
7/28/00	387.70	CS-134	< LLD		4.17E-002
7/28/00	387.70	CS-137	< LLD		3.25E-002
8/29/00	293.60	BE-7	5.90E-001	1.92E-001	
8/29/00	293.60	K-40	4.74E+000	6.65E-001	
8/29/00	293.60	PB-212	7.55E-002	4.57E-002	



# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Media: **Cherry**

Quantity: GRAMS

Activity: pCi/gram

## Sample Point

51 - SSW - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
8/29/00	293.60	I-131	< LLD		2.84E-002
8/29/00	293.60	CS-134	< LLD		4.10E-002
8/29/00	293.60	CS-137	< LLD		3.12E-002
9/26/00	320.70	K-40	3.77E+000	5.61E-001	
9/26/00	320.70	TL-208	4.26E-002	2.93E-002	
9/26/00	320.70	PB-212	7.04E-002	4.82E-002	
9/26/00	320.70	BI-214	4.65E-002	3.97E-002	
9/26/00	320.70	PB-214	6.16E-002	5.13E-002	
9/26/00	320.70	I-131	< LLD		2.81E-002
9/26/00	320.70	CS-134	< LLD		3.16E-002
9/26/00	320.70	CS-137	< LLD		3.61E-002
4/21/00	313.60	K-40	3.30E+000	7.38E-001	
4/21/00	313.60	I-131	< LLD		5.04E-002
4/21/00	313.60	CS-134	< LLD		4.44E-002
4/21/00	313.60	CS-137	< LLD		4.94E-002
5/26/00	284.40	BE-7	4.27E-001	2.76E-001	
5/26/00	284.40	K-40	3.17E+000	7.81E-001	
5/26/00	284.40	I-131	< LLD		5.06E-002
5/26/00	284.40	CS-134	< LLD		4.18E-002
5/26/00	284.40	CS-137	< LLD		4.86E-002
6/27/00	455.70	BE-7	8.16E-001	1.93E-001	
6/27/00	455.70	K-40	1.88E+000	3.61E-001	
6/27/00	455.70	I-131	< LLD		1.86E-002
6/27/00	455.70	CS-134	< LLD		2.22E-002
6/27/00	455.70	CS-137	< LLD		2.55E-002
7/28/00	402.50	BE-7	3.73E-001	2.74E-002	
7/28/00	402.50	K-40	3.19E+000	5.82E-001	
7/28/00	402.50	I-131	< LLD		3.93E-002
7/28/00	402.50	CS-134	< LLD		3.48E-002
7/28/00	402.50	CS-137	< LLD		3.67E-002
8/29/00	414.40	BE-7	4.71E-001	2.36E-001	
8/29/00	414.40	K-40	3.12E+000	5.48E-001	

52 - 10 MI W - BETHUNE - CONTROL

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Quantity: GRAMS

Activity: pCi/gram

Media: **Cherry**

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
52 - 10 MI W - BETHUNE - CONTROL	8/29/00	414.40	TL-208	3.94E-002	2.30E-002	
	8/29/00	414.40	I-131	< LLD		2.91E-002
	8/29/00	414.40	CS-134	< LLD		3.26E-002
	8/29/00	414.40	CS-137	< LLD		3.72E-002
	9/26/00	380.40	BE-7	7.42E-001	2.50E-001	
	9/26/00	380.40	K-40	2.34E+000	4.96E-001	
	9/26/00	380.40	I-131	< LLD		3.26E-002
	9/26/00	380.40	CS-134	< LLD		3.63E-002
	9/26/00	380.40	CS-137	< LLD		3.36E-002

MediaType: **BROADLEAF VEGETATION**

Quantity: GRAMS

Activity: pCi/gram

Media: **Sassafras**

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
50 - SSE - CP&L PROPERTY	4/21/00	290.80	K-40	3.81E+000	7.36E-001	
	4/21/00	290.80	I-131	< LLD		5.75E-002
	4/21/00	290.80	CS-134	< LLD		4.86E-002
	4/21/00	290.80	CS-137	< LLD		3.99E-002
	5/26/00	267.90	BE-7	6.67E-001	2.53E-001	
	5/26/00	267.90	K-40	3.44E+000	7.49E-001	
	5/26/00	267.90	I-131	< LLD		5.22E-002
	5/26/00	267.90	CS-134	< LLD		5.35E-002
	5/26/00	267.90	CS-137	< LLD		4.65E-002
	6/27/00	433.20	BE-7	8.47E-001	1.83E-001	
	6/27/00	433.20	K-40	2.74E+000	4.82E-001	
	6/27/00	433.20	TL-208	1.80E-002	1.76E-002	
	6/27/00	433.20	I-131	< LLD		2.08E-002
	6/27/00	433.20	CS-134	< LLD		2.38E-002
	6/27/00	433.20	CS-137	< LLD		2.65E-002

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Media: **Sassafras**

Quantity: GRAMS

Activity: pCi/gram

## Sample Point

50 - SSE - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
7/28/00	404.20	BE-7	2.09E+000	3.02E-001	
7/28/00	404.20	K-40	2.04E+000	5.06E-001	
7/28/00	404.20	I-131	< LLD		3.04E-002
7/28/00	404.20	CS-134	< LLD		3.24E-002
7/28/00	404.20	CS-137	< LLD		3.40E-002
8/29/00	334.50	BE-7	1.57E+000	2.83E-001	
8/29/00	334.50	K-40	1.76E+000	5.24E-001	
8/29/00	334.50	BI-214	1.43E-001	6.47E-002	
8/29/00	334.50	PB-214	1.45E-001	4.88E-002	
8/29/00	334.50	I-131	< LLD		2.74E-002
8/29/00	334.50	CS-134	< LLD		3.06E-002
8/29/00	334.50	CS-137	< LLD		3.36E-002
9/26/00	344.20	BE-7	2.58E+000	3.62E-001	
9/26/00	344.20	K-40	1.37E+000	4.44E-001	
9/26/00	344.20	RA-226	1.19E+000	6.94E-001	
9/26/00	344.20	I-131	< LLD		3.34E-002
9/26/00	344.20	CS-134	< LLD		3.70E-002
9/26/00	344.20	CS-137	< LLD		3.64E-002
4/21/00	291.50	BE-7	7.18E-001	3.58E-001	
4/21/00	291.50	K-40	2.94E+000	7.24E-001	
4/21/00	291.50	CS-137	1.27E-001	3.78E-002	
4/21/00	291.50	I-131	< LLD		5.72E-002
4/21/00	291.50	CS-134	< LLD		4.27E-002
5/26/00	288.40	BE-7	7.88E-001	3.22E-001	
5/26/00	288.40	K-40	3.02E+000	6.77E-001	
5/26/00	288.40	I-131	< LLD		5.53E-002
5/26/00	288.40	CS-134	< LLD		3.72E-002
5/26/00	288.40	CS-137	< LLD		4.46E-002

51 - SSW - CP&L PROPERTY

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Quantity: GRAMS

Activity: pCi/gram

Media: **Sassafras**

## Sample Point

51 - SSW - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
6/27/00	496.20	BE-7	7.72E-001	1.76E-001	
6/27/00	496.20	K-40	3.12E+000	4.71E-001	
6/27/00	496.20	CS-137	5.03E-002	2.24E-002	
6/27/00	496.20	I-131	< LLD		2.77E-002
6/27/00	496.20	CS-134	< LLD		2.75E-002
7/28/00	391.80	BE-7	9.20E-001	2.54E-001	
7/28/00	391.80	K-40	2.85E+000	5.36E-001	
7/28/00	391.80	I-131	< LLD		3.38E-002
7/28/00	391.80	CS-134	< LLD		2.99E-002
7/28/00	391.80	CS-137	< LLD		4.16E-002
8/29/00	345.70	BE-7	8.08E-001	2.01E-001	
8/29/00	345.70	K-40	1.68E+000	4.90E-001	
8/29/00	345.70	I-131	< LLD		2.27E-002
8/29/00	345.70	CS-134	< LLD		3.16E-002
8/29/00	345.70	CS-137	< LLD		2.79E-002
9/26/00	372.60	BE-7	1.29E+000	2.62E-001	
9/26/00	372.60	K-40	1.42E+000	4.30E-001	
9/26/00	372.60	I-131	< LLD		3.28E-002
9/26/00	372.60	CS-134	< LLD		3.74E-002
9/26/00	372.60	CS-137	< LLD		3.80E-002
4/21/00	302.40	BE-7	2.93E-001	2.10E-001	
4/21/00	302.40	K-40	4.98E+000	9.34E-001	
4/21/00	302.40	I-131	< LLD		4.82E-002
4/21/00	302.40	CS-134	< LLD		4.64E-002
4/21/00	302.40	CS-137	< LLD		4.82E-002
5/26/00	279.20	BE-7	4.76E-001	3.10E-001	
5/26/00	279.20	K-40	2.73E+000	6.60E-001	
5/26/00	279.20	CS-137	1.17E-001	6.10E-002	
5/26/00	279.20	I-131	< LLD		5.16E-002
5/26/00	279.20	CS-134	< LLD		4.53E-002

52 - 10 MI W - BETHUNE - CONTROL

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Quantity: GRAMS

Activity: pCi/gram

Media: **Sassafras**

## Sample Point

52 - 10 MI W - BETHUNE - CONTROL

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
6/27/00	425.40	BE-7	9.25E-001	2.41E-001	
6/27/00	425.40	K-40	1.01E+000	3.97E-001	
6/27/00	425.40	CS-137	1.19E-001	3.28E-002	
6/27/00	425.40	I-131	< LLD		3.26E-002
6/27/00	425.40	CS-134	< LLD		3.32E-002
7/28/00	369.30	BE-7	1.71E+000	3.60E-001	
7/28/00	369.30	K-40	1.46E+000	4.35E-001	
7/28/00	369.30	RA-226	7.87E-001	6.10E-001	
7/28/00	369.30	CS-137	5.59E-002	3.32E-002	
7/28/00	369.30	I-131	< LLD		3.88E-002
7/28/00	369.30	CS-134	< LLD		4.18E-002
8/29/00	447.80	BE-7	1.41E+000	2.37E-001	
8/29/00	447.80	K-40	1.39E+000	4.18E-001	
8/29/00	447.80	CS-137	1.51E-001	3.27E-002	
8/29/00	447.80	I-131	< LLD		2.73E-002
8/29/00	447.80	CS-134	< LLD		3.11E-002
9/26/00	356.70	BE-7	1.22E+000	3.07E-001	
9/26/00	356.70	K-40	1.12E+000	5.45E-001	
9/26/00	356.70	CS-137	4.92E-002	3.27E-002	
9/26/00	356.70	I-131	< LLD		3.49E-002
9/26/00	356.70	CS-134	< LLD		3.70E-002

MediaType: **BROADLEAF VEGETATION**

Quantity: GRAMS

Activity: pCi/gram

Media: **Wax Myrtle**

## Sample Point

50 - SSE - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
4/21/00	360.20	BE-7	1.57E+000	3.04E-001	
4/21/00	360.20	K-40	1.91E+000	5.73E-001	
4/21/00	360.20	PB-214	1.13E-001	6.55E-002	

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Media: **Wax Myrtle**

Quantity: GRAMS

Activity: pCi/gram

## Sample Point

50 - SSE - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
4/21/00	360.20	I-131	< LLD		4.40E-002
4/21/00	360.20	CS-134	< LLD		3.68E-002
4/21/00	360.20	CS-137	< LLD		3.34E-002
5/26/00	400.30	BE-7	3.92E-001	2.25E-001	
5/26/00	400.30	K-40	2.14E+000	5.33E-001	
5/26/00	400.30	I-131	< LLD		3.48E-002
5/26/00	400.30	CS-134	< LLD		2.97E-002
5/26/00	400.30	CS-137	< LLD		3.01E-002
6/27/00	447.50	BE-7	5.20E-001	2.33E-002	
6/27/00	447.50	K-40	2.44E+000	5.03E-001	
6/27/00	447.50	AC-228	1.06E-001	7.15E-002	
6/27/00	447.50	I-131	< LLD		2.58E-002
6/27/00	447.50	CS-134	< LLD		2.92E-002
6/27/00	447.50	CS-137	< LLD		3.46E-002
7/28/00	437.30	BE-7	9.60E-001	2.61E-001	
7/28/00	437.30	K-40	1.71E+000	4.63E-001	
7/28/00	437.30	I-131	< LLD		2.95E-002
7/28/00	437.30	CS-134	< LLD		3.16E-002
7/28/00	437.30	CS-137	< LLD		2.97E-002
8/29/00	453.00	BE-7	1.10E+000	2.57E-001	
8/29/00	453.00	K-40	2.00E+000	4.68E-001	
8/29/00	453.00	TL-208	6.98E-002	2.69E-002	
8/29/00	453.00	PB-212	1.75E-001	4.84E-002	
8/29/00	453.00	PB-214	1.30E-001	6.84E-002	
8/29/00	453.00	I-131	< LLD		2.71E-002
8/29/00	453.00	CS-134	< LLD		3.43E-002
8/29/00	453.00	CS-137	< LLD		3.36E-002
9/26/00	446.70	BE-7	1.04E+000	2.86E-001	
9/26/00	446.70	K-40	2.31E+000	5.01E-001	
9/26/00	446.70	PB-212	6.24E-002	4.21E-002	
9/26/00	446.70	PB-214	9.17E-002	5.09E-002	

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Media: **Wax Myrtle**

Quantity: GRAMS

Activity: pCi/gram

## Sample Point

50 - SSE - CP&L PROPERTY

51 - SSW - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
9/26/00	446.70	RA-226	5.71E-001	4.93E-001	
9/26/00	446.70	I-131	< LLD		2.87E-002
9/26/00	446.70	CS-134	< LLD		3.41E-002
9/26/00	446.70	CS-137	< LLD		3.04E-002
4/21/00	352.90	BE-7	7.36E-001	3.16E-001	
4/21/00	352.90	K-40	4.60E+000	7.11E-001	
4/21/00	352.90	I-131	< LLD		4.46E-002
4/21/00	352.90	CS-134	< LLD		4.04E-002
4/21/00	352.90	CS-137	< LLD		3.92E-002
5/26/00	358.30	BE-7	4.34E-001	1.64E-001	
5/26/00	358.30	K-40	2.75E+000	5.24E-001	
5/26/00	358.30	I-131	< LLD		3.21E-002
5/26/00	358.30	CS-134	< LLD		3.13E-002
5/26/00	358.30	CS-137	< LLD		2.48E-002
6/27/00	488.10	BE-7	6.95E-001	2.46E-001	
6/27/00	488.10	K-40	2.60E+000	5.11E-001	
6/27/00	488.10	I-131	< LLD		2.80E-002
6/27/00	488.10	CS-134	< LLD		3.67E-002
6/27/00	488.10	CS-137	< LLD		3.24E-002
7/28/00	562.70	BE-7	8.29E-001	1.85E-001	
7/28/00	562.70	K-40	1.94E+000	4.09E-001	
7/28/00	562.70	RA-226	4.61E-001	3.40E-001	
7/28/00	562.70	I-131	< LLD		2.35E-002
7/28/00	562.70	CS-134	< LLD		2.64E-002
7/28/00	562.70	CS-137	< LLD		2.59E-002
8/29/00	444.50	BE-7	1.28E+000	2.42E-001	
8/29/00	444.50	K-40	2.32E+000	5.64E-001	
8/29/00	444.50	TL-208	1.20E-001	3.33E-002	
8/29/00	444.50	PB-212	2.69E-001	5.19E-002	
8/29/00	444.50	I-131	< LLD		2.63E-002
8/29/00	444.50	CS-134	< LLD		3.70E-002
8/29/00	444.50	CS-137	< LLD		3.05E-002

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Media: **Wax Myrtle**

Quantity: GRAMS

Activity: pCi/gram

## Sample Point

51 - SSW - CP&L PROPERTY

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
9/26/00	454.90	BE-7	8.61E-001	2.19E-001	
9/26/00	454.90	K-40	3.57E+000	4.38E-001	
9/26/00	454.90	TL-208	2.81E-002	2.21E-002	
9/26/00	454.90	PB-212	8.09E-002	3.97E-002	
9/26/00	454.90	AC-228	1.62E-001	1.10E-001	
9/26/00	454.90	I-131	< LLD		2.85E-002
9/26/00	454.90	CS-134	< LLD		3.79E-002
9/26/00	454.90	CS-137	< LLD		2.78E-002
4/21/00	298.50	BE-7	3.36E+000	3.39E-001	
4/21/00	298.50	K-40	2.60E+000	5.65E-001	
4/21/00	298.50	CS-137	8.94E-002	3.46E-002	
4/21/00	298.50	I-131	< LLD		4.44E-002
4/21/00	298.50	CS-134	< LLD		3.35E-002
5/26/00	376.80	BE-7	5.62E-001	2.37E-001	
5/26/00	376.80	K-40	2.05E+000	5.29E-001	
5/26/00	376.80	CS-137	1.52E-001	4.56E-002	
5/26/00	376.80	I-131	< LLD		4.11E-002
5/26/00	376.80	CS-134	< LLD		3.69E-002
6/27/00	429.80	BE-7	1.33E+000	2.90E-001	
6/27/00	429.80	K-40	2.39E+000	4.30E-001	
6/27/00	429.80	RA-226	7.91E-001	5.64E-001	
6/27/00	429.80	CS-137	1.53E-001	3.40E-002	
6/27/00	429.80	I-131	< LLD		3.14E-002
6/27/00	429.80	CS-134	< LLD		3.13E-002
7/28/00	375.30	BE-7	1.88E+000	3.75E-001	
7/28/00	375.30	K-40	1.37E+000	5.19E-001	
7/28/00	375.30	CS-137	2.25E-001	4.57E-002	
7/28/00	375.30	I-131	< LLD		3.64E-002
7/28/00	375.30	CS-134	< LLD		3.43E-002

52 - 10 MI W - BETHUNE - CONTROL



# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **BROADLEAF VEGETATION (Continued)**

Quantity: GRAMS

Activity: pCi/gram

Media: **Wax Myrtle**

## Sample Point

52 - 10 MI W - BETHUNE - CONTROL

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
8/29/00	440.50	BE-7	2.15E+000	2.59E-001	
8/29/00	440.50	K-40	1.86E+000	4.04E-001	
8/29/00	440.50	CS-137	1.63E-001	3.40E-002	
8/29/00	440.50	I-131	< LLD		2.66E-002
8/29/00	440.50	CS-134	< LLD		3.02E-002
9/26/00	407.90	BE-7	1.48E+000	3.17E-001	
9/26/00	407.90	K-40	1.71E+000	5.02E-001	
9/26/00	407.90	CS-137	1.42E-001	3.17E-002	
9/26/00	407.90	I-131	< LLD		3.22E-002
9/26/00	407.90	CS-134	< LLD		3.65E-002

MediaType: **FOOD CROP**

Quantity: GRAMS

Activity: pCi/gram

Media: **Collards**

## Sample Point

58 - SITE VARIES FROM PLANT

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
2/ 4/00	382.50	K-40	3.83E+000	6.88E-001	
2/ 4/00	382.50	I-131	< LLD		3.63E-02
2/ 4/00	382.50	CS-134	< LLD		3.79E-02
2/ 4/00	382.50	CS-137	< LLD		3.30E-02

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **FOOD CROP**

Quantity: GRAMS

Activity: pCi/gram

Media: **Corn**

## Sample Point

54 - 10.1 MI E - AUBURNDALE PLANTATION

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
7/31/00	686.20	K-40	2.60E+000	3.76E-001	
7/31/00	686.20	I-131	< LLD		1.80E-002
7/31/00	686.20	CS-134	< LLD		2.03E-002
7/31/00	686.20	CS-137	< LLD		1.72E-002

MediaType: **FOOD CROP**

Quantity: GRAMS

Activity: pCi/gram

Media: **Tomatoes**

## Sample Point

49 - GREATER THAN 5 MI FROM SITE - CONTROL

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
7/21/00	999.70	K-40	1.57E+000	2.46E-001	
7/21/00	999.70	I-131	< LLD		1.31E-002
7/21/00	999.70	CS-134	< LLD		1.44E-002
7/21/00	999.70	CS-137	< LLD		1.26E-002
7/21/00	827.60	K-40	1.49E+000	2.60E-001	
7/21/00	827.60	I-131	< LLD		1.60E-002
7/21/00	827.60	CS-134	< LLD		1.82E-002
7/21/00	827.60	CS-137	< LLD		1.69E-002

58 - SITE VARIES FROM PLANT

MediaType: **FREE SWIMMER**

Quantity: GRAMS (wet)

Activity: pCi/gram (wet)

## Sample Point

45 - SITE VARIES WITHIN LAKE ROBINSON

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
5/18/00	500.10	K-40	2.02E+000	1.29E+000	
11/ 7/00	533.70	K-40	2.77E+000	8.77E-001	
5/18/00	512.90	K-40	3.36E+000	9.36E-001	
5/18/00	512.90	CS-137	8.14E-002	3.13E-002	
11/ 7/00	476.50	K-40	3.50E+000	1.11E+000	

46 - 4.9 MI ESE - PRESTWOOD LAKE

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **FREE SWIMMER (Continued)**

Quantity: GRAMS (wet)

Activity: pCi/gram (wet)

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
47 - 13 MI NNW - LAKE BEE - CONTROL	5/18/00	501.10	K-40	1.36E+000	8.74E-001	
	5/18/00	501.10	CS-137	1.17E-001	6.07E-002	
	11/ 6/00	458.20	K-40	4.56E+000	1.36E+000	
	11/ 6/00	458.20	CS-137	1.22E-001	6.03E-002	

MediaType: **GROUNDWATER**

Quantity: Liters

Activity: pCi/Liter

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	2/29/00	1.00	NO-ACT			
	5/ 8/00	1.00	NO-ACT			
	8/ 7/00	1.00	NO-ACT			
	11/13/00	1.00	NO-ACT			
42 - UNIT 1 DEEP WELL NEAR SITE ENTRANCE	5/ 8/00	1.00	NO-ACT			
	8/ 7/00	1.00	NO-ACT			
	11/13/00	1.00	NO-ACT			
43 - UNIT 2 DEEP WELL	2/29/00	1.00	NO-ACT			

MediaType: **SHORELINE SEDIMENT**

Quantity: GRAMS (dry)

Activity: pCi/gram (dry)

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
44 - 1.9 MI NNE - SHADY REST CLUB	2/16/00	1657.80	TL-208	6.52E-002	2.53E-002	
	2/16/00	1657.80	PB-212	2.22E-001	4.67E-002	
	2/16/00	1657.80	PB-214	2.23E-001	5.59E-002	
	2/16/00	1657.80	RA-226	8.10E-001	5.59E-001	

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **SHORELINE SEDIMENT (Continued)**

Quantity: GRAMS (dry)

Activity: pCi/gram (dry)

## Sample Point

44 - 1.9 MI NNE - SHADY REST CLUB

57 - 0.9 MI NNW - ASH POND

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
2/16/00	1657.80	AC-228	2.55E-001	8.93E-002	
7/28/00	1311.30	TL-208	2.45E-002	1.91E-002	
7/28/00	1311.30	PB-214	1.64E-001	5.25E-002	
2/16/00	1180.20	K-40	5.11E+000	8.27E-001	
2/16/00	1180.20	TL-208	3.63E-001	9.32E-002	
2/16/00	1180.20	PB-212	1.11E+000	9.90E-002	
2/16/00	1180.20	BI-214	1.10E+000	1.55E-001	
2/16/00	1180.20	PB-214	1.02E+000	1.56E-001	
2/16/00	1180.20	RA-226	1.76E+000	8.75E-001	
2/16/00	1180.20	AC-228	8.86E-001	2.69E-001	
7/28/00	750.20	K-40	2.14E+001	1.72E+000	
7/28/00	750.20	TL-208	1.38E+000	1.46E-001	
7/28/00	750.20	PB-212	3.98E+000	1.87E-001	
7/28/00	750.20	BI-214	5.42E+000	3.45E-001	
7/28/00	750.20	PB-214	5.70E+000	3.19E-001	
7/28/00	750.20	RA-226	1.13E+001	2.06E+000	
7/28/00	750.20	AC-228	3.53E+000	4.15E-001	

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **SURFACE WATER**

Quantity: Liters

Activity: pCi/Liter

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	1/31/00	1.00	K-40	9.52E+001	6.98E+001	
	2/29/00	1.00	NO-ACT			
	3/31/00	1.00	NO-ACT			
	5/31/00	1.00	NO-ACT			
	4/30/00	1.00	NO-ACT			
	6/30/00	1.00	NO-ACT			
	7/31/00	1.00	NO-ACT			
	8/31/00	1.00	NO-ACT			
	9/30/00	1.00	NO-ACT			
	10/31/00	1.00	NO-ACT			
	11/30/00	1.00	NO-ACT			
	12/31/00	1.00	NO-ACT			
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	1/31/00	1.00	K-40	1.18E+002	8.95E+001	
	2/29/00	1.00	NO-ACT			
	3/31/00	1.00	NO-ACT			
	4/30/00	1.00	NO-ACT			
	5/31/00	1.00	NO-ACT			
	6/30/00	1.00	NO-ACT			
	7/31/00	1.00	NO-ACT			
	8/31/00	1.00	NO-ACT			
	9/30/00	1.00	RA-226	1.15E+002	8.03E+001	
	10/31/00	1.00	NO-ACT			
	11/30/00	1.00	NO-ACT			
	12/31/00	1.00	NO-ACT			

# RNP Radiological Environmental Monitoring Gamma Isotopic Report

MediaType: **SURFACE WATER (Continued)**

Quantity: Liters

Activity: pCi/Liter

## Sample Point

57 - 0.9 MI NNW - ASH POND

SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
1/31/00	1.00	TL-208	7.78E+000	5.41E+000	
2/29/00	1.00	NO-ACT			
3/31/00	1.00	NO-ACT			
4/30/00	1.00	NO-ACT			
5/31/00	1.00	NO-ACT			
6/30/00	1.00	NO-ACT			
7/31/00	1.00	NO-ACT			
8/31/00	1.00	NO-ACT			
9/30/00	1.00	K-40	8.68E+001	7.35E+001	
10/31/00	1.00	NO-ACT			
11/30/00	1.00	NO-ACT			
12/31/00	1.00	NO-ACT			