

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9905180086 DOC.DATE: 98/12/31 NOTARIZED: NO DOCKET #
 FACIL: 50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light Co 05000261
 AUTH.NAME AUTHOR AFFILIATION
 WARDEN, R.L. Carolina Power & Light Co.
 RECIP.NAME RECIPIENT AFFILIATION

*See
 Rad Environ Operating
 Rpts*

SUBJECT: "1998 Radiological Environ Operating Rept for Robinson Nuclear Plant." With 990514 ltr.

DISTRIBUTION CODE: C001D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 118
 TITLE: Licensing Submittal: Environmental Rept Amdt & Related Correspondence

NOTES:

	<div style="display: flex; justify-content: space-between;"> <div> RECIPIENT ID CODE/NAME SUBBARATNAM </div> <div> COPIES LTTR ENCL 1 1 </div> </div>	<div style="display: flex; justify-content: space-between;"> <div> RECIPIENT ID CODE/NAME </div> <div> COPIES LTTR ENCL </div> </div>	
INTERNAL: FILE CENTER 01	1 1	LA	1 1
NUDOCS-ABSTRACT	1 1	OGC/HDS3	1 0
RGN2 DRS/RSB	1 1		
EXTERNAL: NOAC	1 1	NRC PDR	1 1

C
A
T
E
G
O
R
Y

1

D
O
C
U
M
E
N
T

NOTE TO ALL "RIDS" RECIPIENTS:
 PLEASE HELP US TO REDUCE WASTE. TO HAVE YOUR NAME OR ORGANIZATION REMOVED FROM DISTRIBUTION LISTS
 OR REDUCE THE NUMBER OF COPIES RECEIVED BY YOU OR YOUR ORGANIZATION, CONTACT THE DOCUMENT CONTROL
 DESK (DCD) ON EXTENSION 415-2083

TOTAL NUMBER OF COPIES REQUIRED: LTTR 8 ENCL 7



Carolina Power & Light Company

Robinson Nuclear Plant
3581 West Entrance Road
Hartsville SC 29550

Robinson File No: 12510C

Serial: RNP-RA/99-0082

MAY 14 1999

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

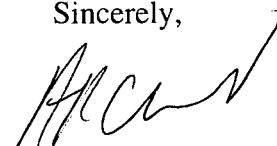
1998 RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

Dear Sir or Madam:

The purpose of this letter is to transmit the 1998 Radiological Environmental Operating Report for the period of January 1, 1998, through December 31, 1998, for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. This report is submitted in accordance with HBRSEP, Unit No. 2 Technical Specifications, Section 5.6.2.

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

Sincerely,


for R. L. Warden
Manager - Regulatory Affairs

87015

MSL/msl
Attachment

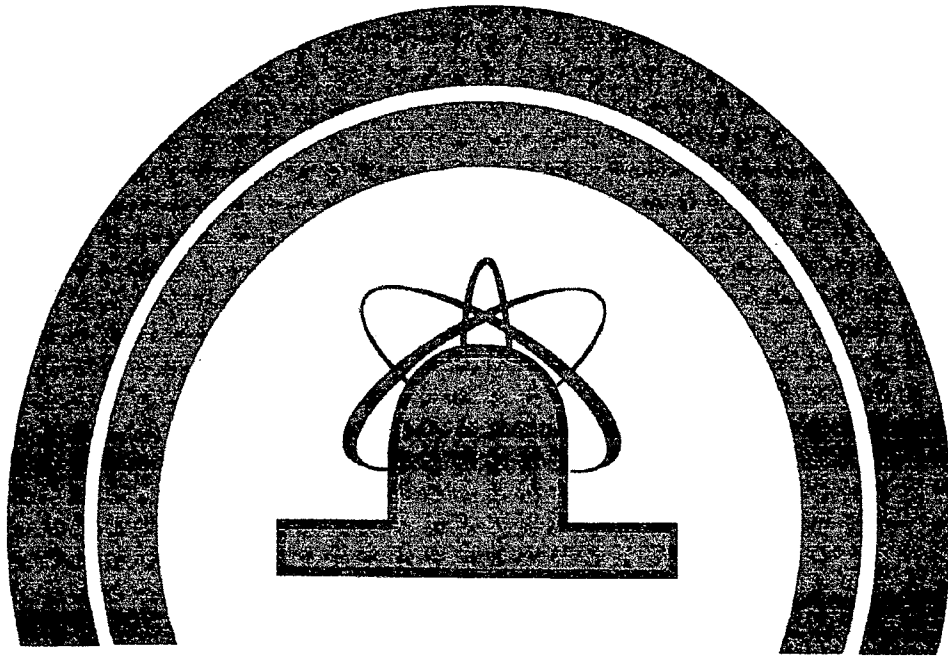
c: Mr. L. A. Reyes, NRC, Region II
Mr. R. Subbaratnam, NRR, NRC
NRC Resident Inspector, HBRSEP

9905180086 981231
PDR ADOCK 05000261
R PDR

1/1
COU

**RADIOLOGICAL
ENVIRONMENTAL OPERATING
REPORT**

1998



**ROBINSON NUCLEAR PLANT
CAROLINA POWER & LIGHT**

Harris Energy & Environmental Center

Carolina Power & Light Company

New Hill, North Carolina

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, 1998

Prepared by:

Shawn P. Langdon

Reviewed by:

W. M. Payne II

TABLE OF CONTENTS

<u>Title</u>	<u>Page</u>
Table of Contents	i
List of Figures	ii
List of Tables	iii
Executive Summary	1
Introduction to Nuclear Operations	2
Benefits of Nuclear Power	2
Radiation and Radioactivity	3
Radiation Interaction with Matter	6
Radiation Quantities and Units of Measure	7
Sources of Radiation	8
Health Effects of Radiation	10
General Health Risk	11
Nuclear Power Plant Operation	12
Plants Systems	14
Reactor Safety	18
Radiological Environmental Monitoring Program	19
Purpose and Requirements for the Radiological Monitoring Program	19
General Site Description	20
Radiological Monitoring Program Quality Assurance	21
Radiological Monitoring Program General Description	22
Summary of Radiological Monitoring Program	27
Interpretations and Conclusions	34
Missed Samples and Analyses	38
Analytical Procedures	39
Land-Use Census	
Purpose of the Land-Use Census	45
Methodology	45
1998 Land-Use Census Results	46
References	48

LIST OF FIGURES

Figure	Page
1 CP&L Service Area	2
2 1998 Energy Sources	2
3 The Atom	3
4 Radioactive Decay	5
5 Ionization	6
6 Radiation Ranges & Shielding	6
7 Source of Radiation Dose (BIER V)	9
8 Man-Made Radiation (BIER V)	9
9 Nuclear Fission	12
10 Nuclear Fuel Cycle	13
11 Fuel Pellets, Rods & Assemblies	13
12 Major Plant Systems for the Pressurized Water Reactor	14
13 Reactor Vessel	15
14 Primary Containment Structure	17
15 Location of Robinson Plant	20
16 Radiological Sampling Locations (Distant from Plant)	23
17 Radiological Sampling Locations (Nearest Plant)	24
18 Plot of Air Particulate Gross Beta Activity (Location 2)	49
19 Plot of Air Particulate Gross Beta Activity (Location 3)	50
20 Plot of Air Particulate Gross Beta Activity (Location 4)	51
21 Plot of Air Particulate Gross Beta Activity (Location 5)	52
22 Plot of Air Particulate Gross Beta Activity (Location 6)	53
23 Plot of Air Particulate Gross Beta Activity (Location 7)	54
24 Plot of Air Particulate Gross Beta Activity (Location 55)	55
25 Plot of Milk Iodine-131 Activity (Location 54)	56
26 Plot of Aquatic Vegetation Gamma Activity	57
27 Plot of Surface Water Tritium Activity (Location 40 and 57)	58
28 Plot of TLD Averages for Inner and Outer Rings	59

LIST OF TABLES

Table		Page
1	Quality Factors for Various Types of Radiation	8
2	Reduction In Average Life Expectancy	11
3	Media Used to Assess Exposure Pathways to Man	22
4	Radiological Monitoring Sampling Locations	25
5	Radiological Environmental Monitoring Program Data Summary	29
6	Radioactivity in Environmental Samples Attributed to Plant Operations	32
7	Reporting Levels for Radioactivity Concentrations in Environmental Samples	33
8	Typical Lower Limits of Detection (a priori) Gamma Spectrometry	43
9	Land-Use Census Comparisons (1997-1998) Nearest Pathway (miles)	47

EXECUTIVE SUMMARY

The Robinson Nuclear Plant is operated by Carolina Power & Light Company under a license granted by the Nuclear Regulatory Commission. Provisions of the Nuclear Regulatory Commission's Regulatory Guide 4.8, Robinson Nuclear Plant Technical Specifications, and the Robinson Nuclear Plant 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, 1998 through December 31, 1998.

The Radiological Monitoring program was established in 1973. Radiation and radioactivity in various environmental media have been monitored for more than 25 years. Monitoring is also provided for control locations which would not be impacted by operations of the Robinson Nuclear Plant. Using these control locations and data collected prior to operation allows comparison of data collected at locations near the Robinson Nuclear Plant 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-operation monitoring. These observations are also consistent with past operational data.
- Milk monitoring results are similar to past data and are all less than the lower limits of detection.
- Terrestrial vegetation includes broadleaf vegetation and food crops. Results indicate detectable concentrations of Cs-137 in both the indicator and control locations. No other gamma activity was detected in any samples.
- Aquatic organism monitoring includes fish and aquatic vegetation. Aquatic vegetation results indicated detectable gamma activity (see Table 5).
- 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.

The continued operation of the Robinson Nuclear Plant 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



Figure 1: CP&L SERVICE AREA

Carolina Power & Light Company (CP&L) 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 3,500,000 people.

The energy sources 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 1998 nuclear energy supplied 46.0% 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.

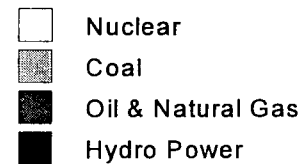
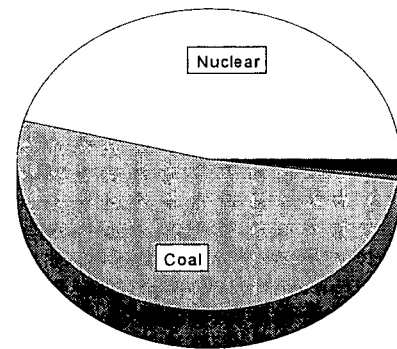


Figure 2: 1998 ENERGY SOURCES

BENEFITS OF NUCLEAR POWER

Nuclear energy is a viable, clean, safe, and readily available source of energy. The operation of the Robinson Nuclear Plant 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 more than twenty percent of the nation's electrical energy. 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 green-house 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

All matter consist of **atoms**. An atom is the smallest unit 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. And the electron is negatively charged (-).

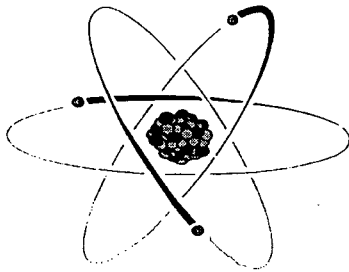


Figure 3: The Atom

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 can not 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 known 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 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

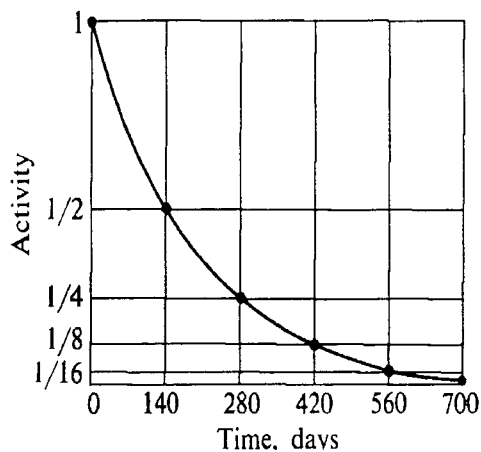


Figure 4: Radioactive Decay

K(potassium)-40, C(carbon)-14, H(hydrogen)-3 are significant contributors to background radiation levels, which are addressed in greater detail later.

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. 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.

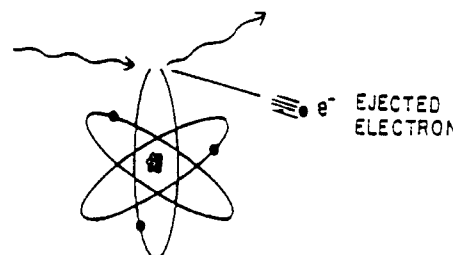


Figure 5: Ionization

Each type of radiation we have discussed interacts with the matter they travel through differently 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 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.

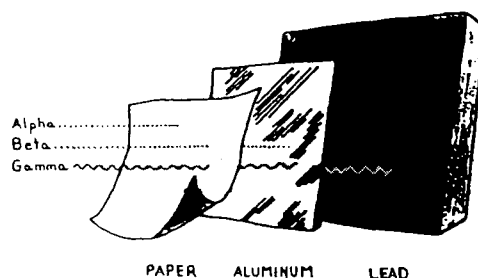


Figure 6: Radiation Ranges & Shielding

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	1×10^{-12}
nano	.000000001	1×10^{-9}
micro	.000001	1×10^{-6}
milli	.001	1×10^{-3}
centi	.01	1×10^{-2}
kilo	1,000.	1×10^3
mega	1,000,000.	1×10^6

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 allows 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**. 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 discussed is illustrated below

Table 1
Quality Factors for Various Types of Radiation

Radiation	Quality Factor
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.

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, to 20 to 50 mrem (.020 to .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 (.0028 rem) per flight.

Another important contributor to external absorbed dose is **terrestrial radiation**. 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 about 15 to 140 mrem (.015 to .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 if the most significant contributors is **radon**. 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

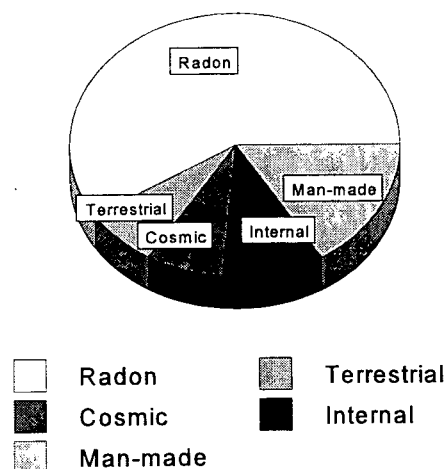


Figure 7: Radiation Sources (BIER V)

Man-Made Radiation

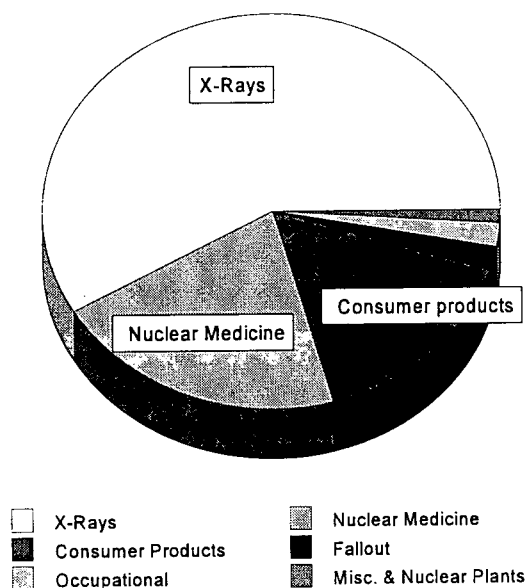


Figure 8: Man-Made Radiation Sources (BIER V)

Man-made radiation is important to completing our understanding of sources of radiation. 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 has 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 from animal experiments, accidents handling radioactive materials, and war time nuclear weapons use and its survivors. 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 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 important 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 breath, 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 can not 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 can not readily sense and may not have a personal knowledge about. There are other similar hazards we tend to accept such as micro-wave 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 you will find a table of common activities and the associated reduction in life expectancy.

Table 2
REDUCTION IN AVERAGE LIFE EXPECTANCY

ACTIVITY	REDUCTION IN LIFE EXPECTANCY
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. 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.

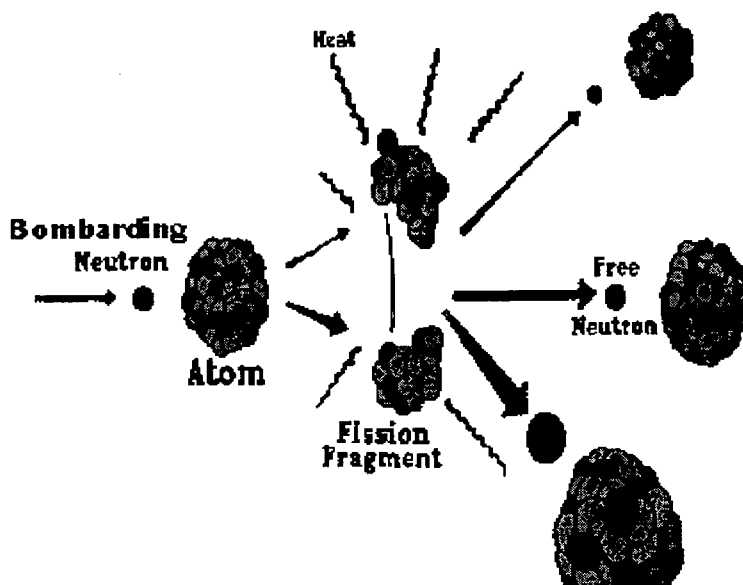


Figure 9: Nuclear Fission

Uranium Fuel

Uranium is mined from the earth the same as many minerals are as an ore. 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 UF_6) While in this form it is 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 UO_2). At this point the uranium dioxide is a gray powder. The next process takes this powder and under high pressure, and temperature creates a ceramic pellet of uranium dioxide. This process is part of the **fuel fabrication**. The fuel

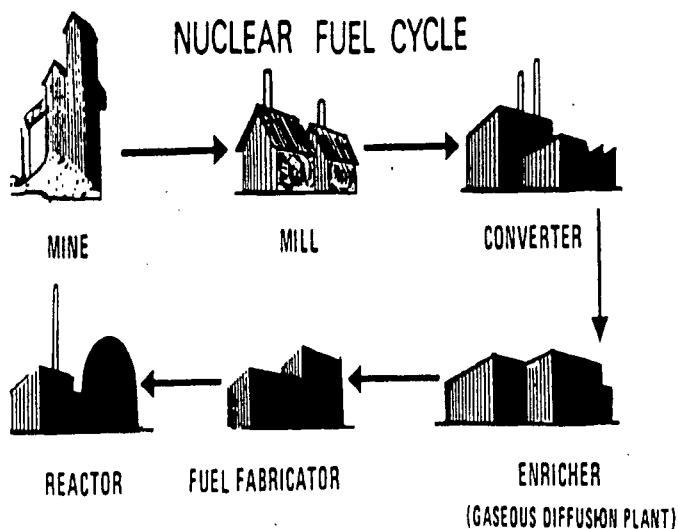


Figure 10: The Nuclear Fuel Cycle

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**. 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.

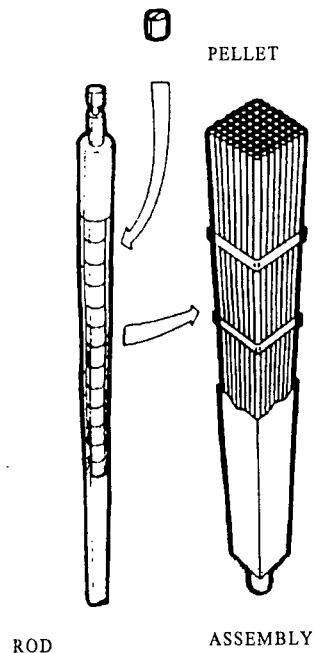


Figure 11: Fuel Pellets, Rods & Assemblies

PLANT SYSTEMS

System Summary

There are four (4) groupings of major plant systems and these are the reactor, the turbine generator, the condensate and feed water systems, and various support systems including various emergency systems. The reactor and 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 from there to the customers in the service area and sold to neighboring utilities.

After the steam has spent most all 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**.

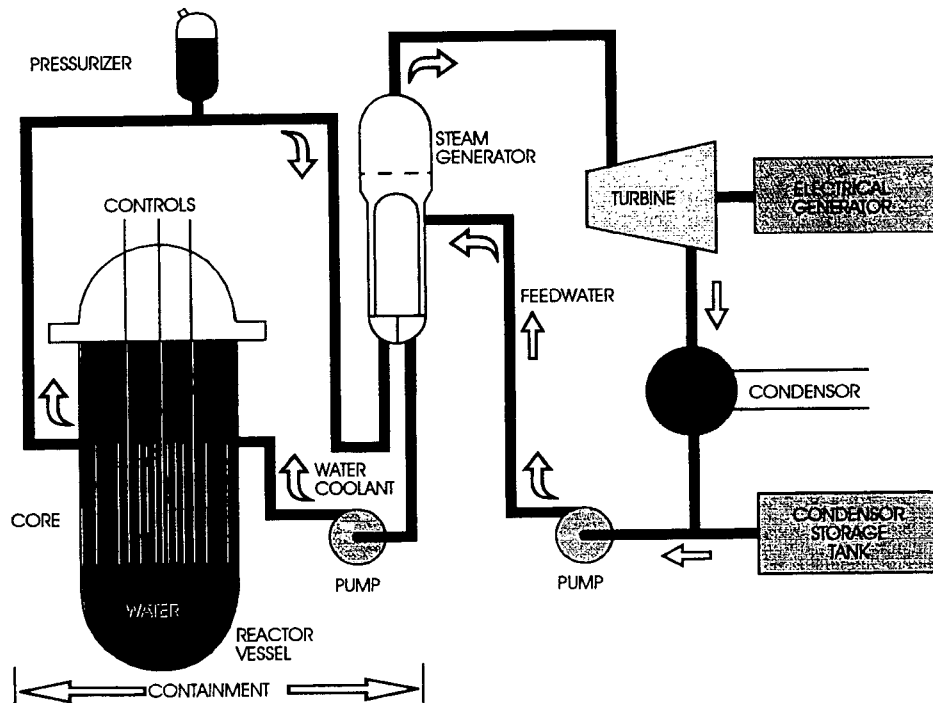


Figure 12: Major Plant Systems for The Pressurized Water Reactor

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 Robinson 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. 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 204 control rods.

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 separate

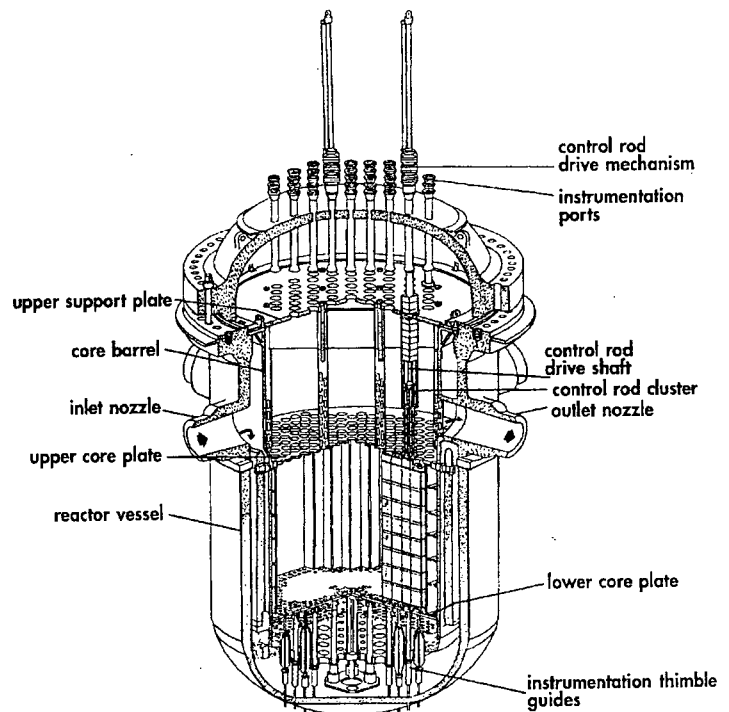


Figure 13: Reactor Vessel

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. Example 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 sources of radioactive emissions from nuclear power operations are 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.

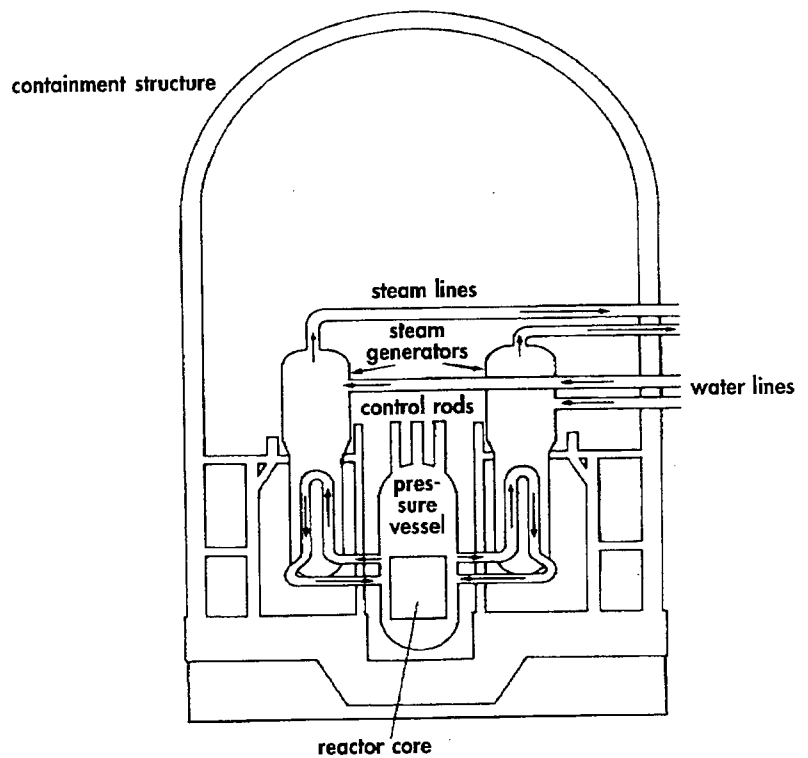


Figure 14: Primary Containment Structure

REACTOR SAFETY

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

- ◆ Commercial nuclear generating station can not explode as 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 and water to the reactor in the event these are required. Should there be breakage of piping carrying water to the reactor, this is referred to as a Loss of Coolant. These 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 delivery this supplemental source of water 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 backups.

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 environments, 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 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-five (25) 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 (Megawatts electric). The site is shared with a pulverized coal unit (Unit No.1), which established commercial operation in 1960. Commercial production was initiated by Unit No. Two 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.

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 contribute to the ingestion pathway.

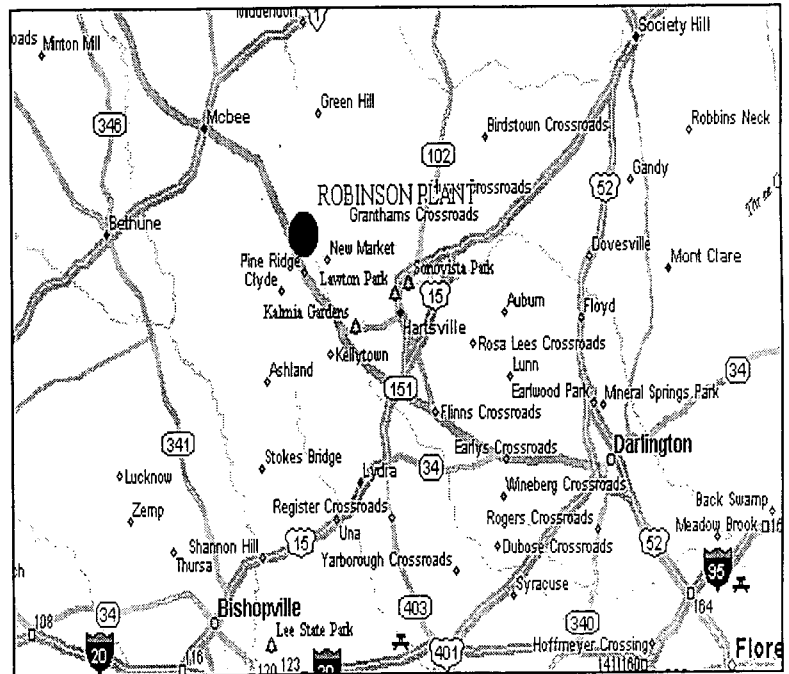


Figure 15 Location of Robinson Nuclear Plant

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 4.15, "Quality Assurance for Radiological Monitoring Programs. 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." NRC Regulatory Guide 4.15 B, Pg. 4.15-2. 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 the Analytics, Inc., Environmental Cross-Check 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, we have established this program to measure the exposure pathways to man. An exposure pathway describes the source of the radiological exposure. The primary forms of 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. Below in Table 3 is a list of the media used to assess each of these pathways.

Table 3
Media Used to Assess Exposure Pathways to Man

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

Sampling Locations

Sampling locations are chosen based upon meteorological factors, preoperation 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

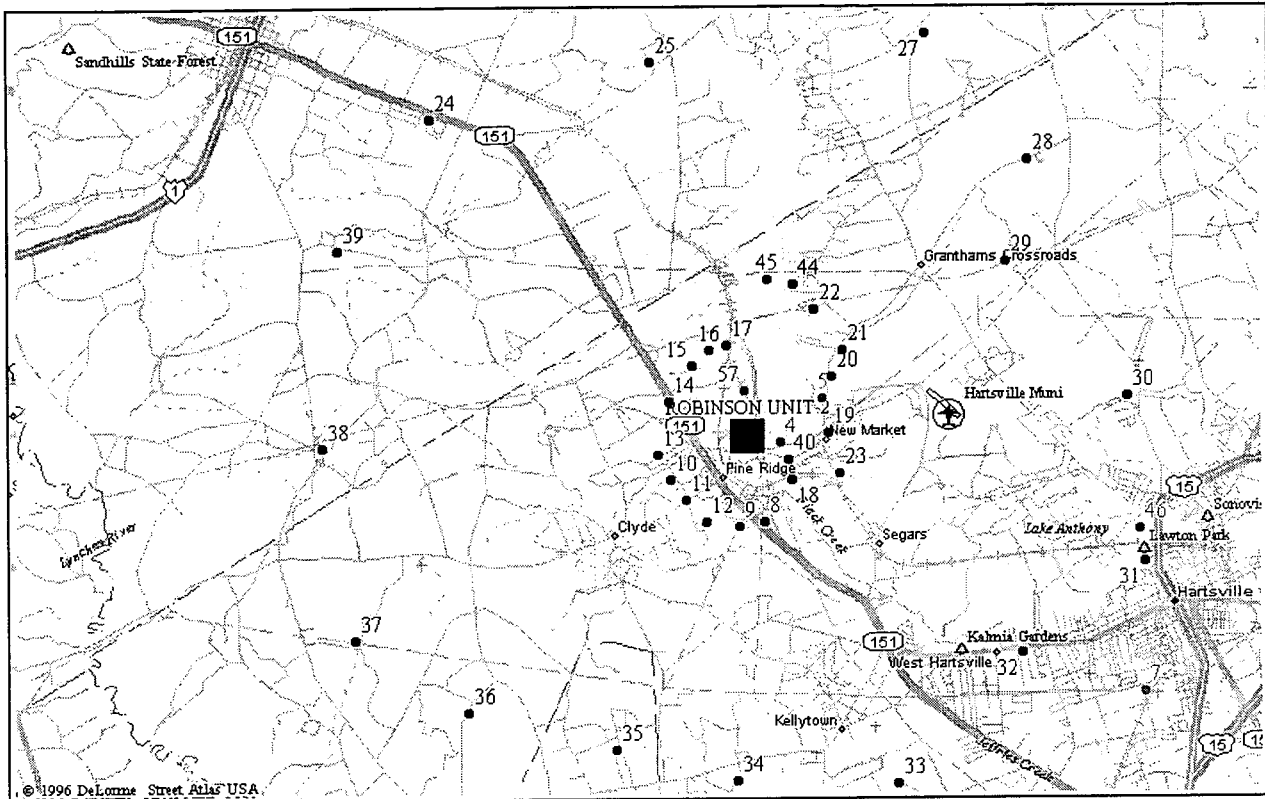


Figure 16: Radiological Sampling Locations (Distant from Plant) (Scale 1 inch = 2 miles)

Thermoluminescent dosimeter locations(only) are displayed in black, ingestion and waterborne pathways in blue, and inhalation or air sampling stations in red. Stations not show include 1, 41, 47(varies), 49(varies), 52, 54, and 58(varies).

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, 57
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)
Milk	54 (BLUE)
Fish	45-47 (BLUE)
Food Products	49, 54, 58 (BLUE)
Aquatic Vegetation & Bottom Sediment	41, 45, 46, 54 (BLUE)

Radiological Sampling Locations

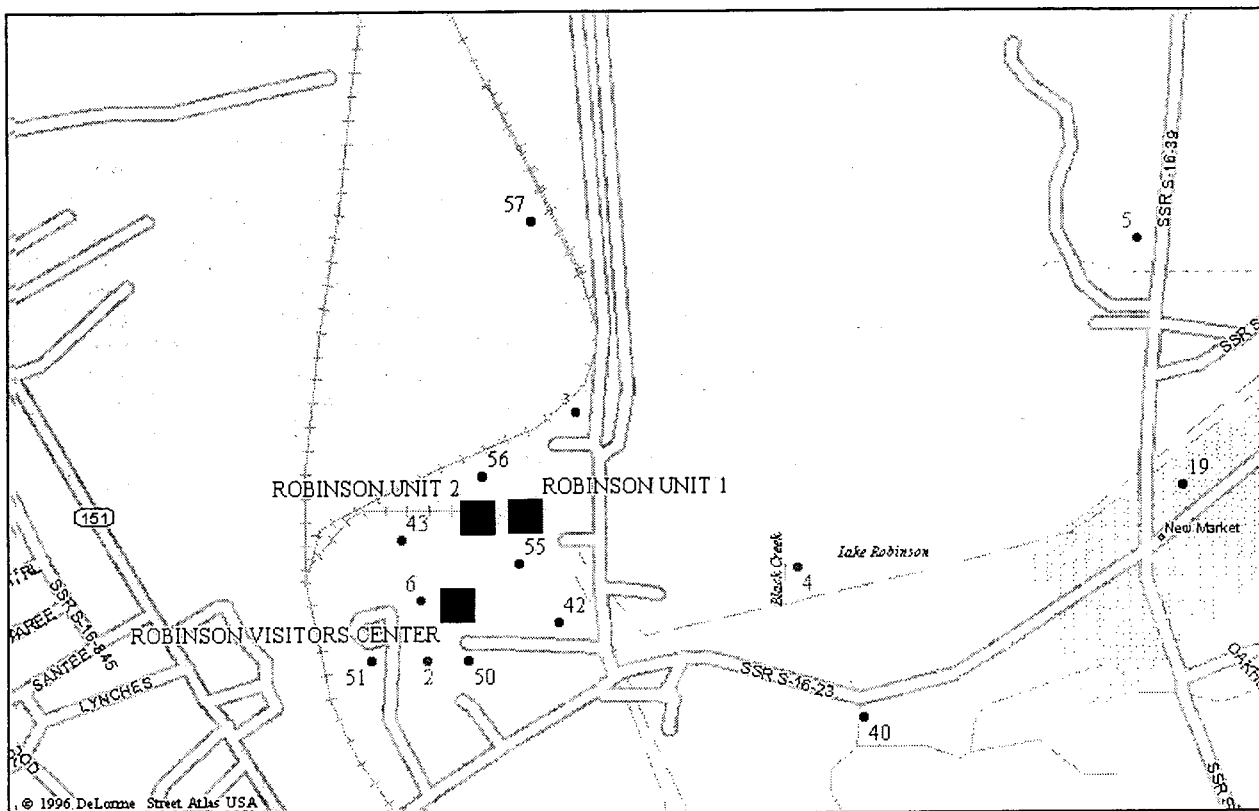


Figure 17 Radiological Sampling Locations (Nearest Plant) (Scale 1 inch = .25 miles)

Thermoluminescent dosimeter locations (only) are displayed in black, ingestion and waterborne pathways in blue, and inhalation or air sampling stations in red.

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

Milk

Fish

Food Products

Aquatic Vegetation & Bottom Sediment

Sample Locations

1-7, 55 (RED)

44, 57

40, 42, 43 (BLUE)

50, 51, 52 (BLUE)

40, 41, 57 (BLUE)

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

54 (BLUE)

45-47 (BLUE)

49, 54, 58 (BLUE)

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 ³	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 ³	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*	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--Ash Pond, 0.9 mile NNW	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	Gamma
Groundwater (GW)	40--0.6 miles ESE Black Creek at Road 16-23 42--Unit 1 Deep Well 43--Unit 2 Deep Well	Monthly/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
Milk (MK)	54--10.1 miles E Auburndale Plantation	Semimonthly (animals on pasture) or monthly until 7/98	8 liters	Gamma Tritium
Food Products (FP)	58--Site varies from plant 49--10.0 miles W--Control	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 Sz	Analysis
Thermoluminescent Dosimetry (TLD)	1--10 miles ESE Florence--Control 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; O. 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, 1.5 mile from Intersection of Road 16-231 and 13-172 55--0.3 mile SSE Near Site Boundary 56--300 feet N of ISFSI 56--0.4 mile N of the center of the ISFSI	Quarterly	Not Applicable	TLD Reading

SUMMARY OF RADIOLOGICAL MONITORING PROGRAM

The Radiological Environmental Monitoring Program (REMP) was conducted in accordance with the H. B. Robinson Steam Electric Plant (HBRSEP), 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 1,170 samples were collected from indicator and control locations and 1,230 analyses and measurements were made during 1998. Detectable radioactivity resulting from plant operations was found in only 14 samples (Table 6) of surface water, bottom sediment, and aquatic vegetation. 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 0.004 millirem per year.

1. A statistical summary of all the data gathered in 1998 has been compiled in Table 5.
2. Radioactivity in environmental samples which could be attributed to the plant operations in 1998 is summarized in Table 6.
3. All detectable radionuclides in the environmental samples for 1998 were less than reporting levels as defined in HBRSEP ODCM. Table 7 summarizes the reportable levels.
4. Environmental sampling and analyses performed during 1998 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 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
(Location 47)

Milk

(Location 63) - Cunningham Dairy -
Ceased operation as of 5/12/96

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 1998

Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) ⁽¹⁾	All Indicator Locations Mean Range ⁽²⁾	Location w/Highest Annual Mean		Control Locations Mean Range ⁽²⁾	Number of Nonroutine Reported Measurements
				Name, Distance, and Direction	Mean Range ⁽²⁾		
Air Cartridge (pCi/m ³)	I-131 414 ⁽³⁾	2.4E-2	All less than LLD		All less than LLD	All less than LLD	0
Air Particulate (pCi/m ³)	Gross Beta 414 ⁽³⁾	1.0E-3	2.15E-2 (362/362) 8.71E-3 - 4.71E-2	Spillway 0.4 mile ESE	2.41E-2 (52/52) 1.15E-2 - 4.04E-2	2.27E-2 (51/51) 1.15E-2 - 4.01E-2	0
	Gamma 32	See Table 8	All less than LLD		All less than LLD	All less than LLD	0
Broadleaf Vegetation (pCi/g, wet)	Gamma 54 ⁽³⁾⁽⁴⁾		8.95E-2 (11/36) 3.22E-2 - 3.13E-1	CP&L Property 0.25 miles SSW	1.96E-1 (2/10) 7.86E-2 - 3.13E-1	1.49E-1 (10/18) 5.29E-2 - 3.79E-1	0
	Cs-137	2.9E-2					
Fish (pCi/g, wet) Bottom-Feeder	Gamma 6		1.19E-1 (1/4) Single value	Lake Robinson Site varies	5.11E-2 (1/2) Single value	1.14E-1 (2/2) 1.05E-1 - 1.24E-1	0
	Cs-137	6.7E-2					
	K-40	1.5E+0	3.32E+0 (4/4) 2.56E+0 - 3.94E+0	Prestwood Lake 4.9 miles ESE	3.65E+0 (2/2) 3.36E+0 - 3.94E+0	4.33E+0 (2/2) 4.25E+0 - 4.41E+0	0
Fish (pCi/g, wet) Free-Swimmer	Gamma 6		1.19E-1 (1/4) Single value	Prestwood Lake 4.9 miles ESE	1.19E-1 (1/2) Single value	2.16E-1 (2/2) 1.70E-1 - 2.61E-1	0
	Cs-137	6.7E-2					
	K-40	1.5E+0	3.19E+0 (4/4) 2.12E+0 - 4.69E+0	Lake Robinson Site varies	3.40E+0 (2/2) 2.12E+0 - 4.69E+0	3.84E+0 (2/2) 3.35E+0 - 4.33E+0	0
Food Products (pCi/g, wet)	Gamma 9 ⁽⁵⁾		4.53E+0 (6/6) 9.16E-1 - 1.49E+1	Auburndale Plantation 10.1 miles E	1.49E+1 (1/1) Single value	2.01E+0 (3/3) 1.71E+0 - 2.33E+0	0
	K-40	7.4E-1					
Groundwater (pCi/l) ⁽⁸⁾	Gamma 16	See Table 8	All less than LLD		All less than LLD	No control	0
	Tritium 16	3.25E+2 (16/16) ⁽⁷⁾	All less than LLD		All less than LLD	No control	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 1998

Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) ⁽¹⁾	All Indicator Locations Mean Range ⁽²⁾	Location w/Highest Annual Mean		Control Locations Mean Range ⁽²⁾	Number of Nonroutine Reported Measurements
				Name, Distance, and Direction	Mean Range ⁽²⁾		
Milk (pCi/l)	I-131 14 ⁽³⁾	1.0E+0	All less than LLD		All less than LLD	No Control	0
	Gamma 14 ⁽³⁾	See Table 8	All less than LLD		All less than LLD	No Control	0
Shoreline Sediment (pCi/g, dry)	Gamma 4	See Table 8	All less than LLD		All less than LLD	No Control	0
Bottom Sediment ⁽⁵⁾ (pCi/g, dry)	Gamma 4		9.56E-1 (1/3) Single value	Lake Robinson Site varies	9.56E-1 (1/1) Single value	All less than LLD	0
	Co-60	4.2E-2	2.50E-1 (2/3) 1.64E-1 - 3.36E-1	Lake Robinson Site varies	3.36E-1 (1/1) Single value	9.14E-2 (1/1) Single value	0
	Cs-137	4.7E-2					
Aquatic Vegetation ⁽⁶⁾ (pCi/g, wet)	Gamma 4	3.2E-2	6.30E-2 (1/3) Single value	Lake Robinson Site varies	6.30E-2 (1/1) Single value	All less than LLD	0
	Mn-54						
	Co-58	3.0E-2	1.56E-1 (3/3) 5.91E-2 - 2.83E-1	Lake Robinson Site varies	2.83E-1 (1/1) Single value	All less than LLD	0
	Co-60	3.1E-2	1.07E-1 (1/3) Single value	Lake Robinson Site varies	1.07E-1 (1/1) Single value	All less than LLD	0
	Cs-137	2.9E-2	4.00E-2 (2/3) 3.69E-2 - 4.32E-2	Auburndale Plantation 10.1 miles E	4.32E-2 (1/1) Single value	All less than LLD	0
Surface Water (pCi/l)	Gamma 36	See Table 8	All less than LLD		All less than LLD	All less than LLD	0
	Tritium 36	3.25E+2 (12/36) ⁽⁷⁾ 1.0E+3 (24/36) ⁽⁷⁾	1.68E+3 (22/24) 1.59E+3 - 1.76E+3	Black Creek @ 16-23 0.6 mile ESE	1.76E+3 (11/12) 6.06E+2 - 4.36E+3	All less than LLD	0
TLD (mR/qtr) ⁽⁶⁾	TLD 158 ⁽³⁾	N/A	1.44E+1 (154/154) 9.40E+0 - 2.30E+1	Transmission Tower 5.0 miles WSW	2.10E+1 (4/4) 1.92E+1 - 2.30E+1	1.39E+1 (4/4) 1.37E+1 - 1.42E+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 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 Lower Limit of Detection (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.
8. Ground water sampling frequency changed from Monthly to Quarterly, ground water sample (GW-43) was deleted from the program in July 1998, and GW-42 was changed to Unit 1 or Unit 2 Deepwell.

TABLE 6

Radioactivity in Environmental Samples
Attributed to Plant Operations

Sample Media	Radionuclide	Average Concentration and Occurrence	Maximum Individual Dose
Bottom Sediment	Co-60	9.56 E-1 (pCi/g dry) (1/3)	*
Aquatic Vegetation	Mn-54	6.30 E-2 (pCi/g wet) (1/3)	*
	Co-58	1.56 E-1 (pCi/g wet) (3/3)	*
	Co-60	1.07 E-1 (pCi/g wet) (1/3)	*
Surface Water	H-3	1.68 E+3 (pCi/l) (22/24)	0.004 millirem/yr (from fish)

*No dose calculated since no general population exposure pathway exists.

TABLE 7

Reporting Levels for Radioactivity Concentrations
in Environmental Samples

Radionuclide	Water (pCi/l)	Airborne (pCi/m ³)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)
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 1998 had a mean gross beta activity of 2.15 E-2 pCi/m^3 for the indicator stations versus an average concentration of 2.27 E-2 pCi/m^3 for the control stations. These data are essentially unchanged from 1997; they are consistent with preoperational data obtained for the HBRSEP Unit No. 2 (1.40 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, persimmons, wild grapes, maple, wax myrtle, and sassafras leaves. Three species of samples, when available, are collected monthly at three locations (one control and two 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 1998, 11 of 36 samples taken from the indicator site demonstrated detectable concentrations of Cs-137 for an average value of $8.95 \text{ E-2 pCi/g (wet)}$. The control samples had detectable concentrations of Cs-137 in 10 of 18 samples with a mean concentration of $1.49 \text{ E-1 pCi/g (wet)}$. 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. Six of twelve fish samples from the indicator and control locations contained traces of Cs-137. The activity levels of bottom-feeding fish from the indicator locations were slightly lower than the control samples. Comparatively, free-swimming fish were also slightly lower than controls. Therefore, no plant-related dose was assigned to the presence of this radionuclide. These data are similar to the results on 1997 samples.

Groundwater

No gamma or tritium activity was detected in the 16 samples of groundwater collected in 1998 which is consistent with the observations in previous years. Ground water sample 43 (GW-43) was deleted from the program starting in July 1998, GW-42 was changed to Unit 1 or Unit 2 Deepwell, and the sampling frequency changed from monthly to quarterly all due to changes in RNP procedure EMP-001.

Milk

Fourteen samples from an indicator location were collected. Iodine-131 and gamma activities were all less than LLD (see Figure 25). As of July 17, 1998, the Auburndale Plantation dairy (Mk-54) went out of business. The cows were sold and no milk sample has been available in the area.

Food Crops

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

Shoreline Sediment

In 1998, no gamma activity associated with plant operations was detected in any sample in the semiannual shoreline sediment sample.

Bottom Sediment

The 1998 data for Cobalt-60 activity in Lake Robinson averages higher (0.96 pCi/g dry) than the values for 1997 (0.3 pCi/g dry) and 1996 (range 0.5 - 0.2 pCi/g dry). Cesium-137 activity was observed in two out of three indicator locations in 1998, one indicator location in 1997, and in all three locations in 1996. The range for 1998 data (0.16 to 0.34 pCi/g dry) is well with the 1997 and 1996 values (1997 single value of 0.7 pCi/g dry and 1996 data 0.06 to 0.8 pCi/g dry). Cesium-137 activity is attributed to worldwide fallout and not the plant operations.

These decreases and slight increases in radionuclide activity are likely due to the variability of bottom sediment sampling.

Aquatic Vegetation

In 1998; Manganese-54, Cobalt-58, Cobalt-60, and Cesium-137 were observed in the annual aquatic vegetation sample from Lake Robinson (AV-45), or from Prestwood Lake (AV-46), or the Auburndale Plantation (AV-54). Cobalt-58 was observed in three out of three indicator locations with an average value of 0.16 pCi/g wet. Cobalt-60 was observed in the single sample from AV-45 with a value of 0.11 pCi/g wet. Manganese-54 was observed in the single sample from AV-45 with a value of 0.063 pCi/g wet. Cesium-137 appeared in two out of three indicator locations (AV-45 and AV-54) with an average value of 0.040 pCi/g wet. A single sample from Location 45 with a value of 0.085 pCi/g wet, which is less than that observed in 1996 (0.15 pCi/g wet) (See Figure 26).

Surface Water

Surface waters of Lake Robinson indicated the presence of tritium which is attributed to plant operations see Figure 27 which displays the tritium activity throughout 1998. These surface waters do not supply drinking water at any downstream location and irrigation practices downstream have not been used since 1989; 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 0.004 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 Exposure

Direct radiation exposure in the H. B. Robinson 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 28).

Asiatic Clams

Benthic samples from Lake Robinson during 1998 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-5, April 13, low volume due to blown fuse.
- AC/AP-55, June 15, due to a tripped breaker.

Low AC/AP Volumes for:

- AC/AP-4, February 23, due to a blown fuse.
- AC/AP-2, June 15, due to a blown fuse.
- AC/AP-7, October 5, due to a blown fuse.
- AC/AP-7, October 12, due to a pump being replaced.
- AC/AP-7, October 19, starter tripped. Reset and working fine, a Deficiency Log Entry was written.

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, April, November, and December of 1998 due to the seasonal nature of broadleaf vegetation.

Food Crops

Food crop vegetation samples were not available during the months of January, February, March, April, May, June, and October of 1998 due to the seasonal nature of food crops.

Milk

The indicator sample, Milk 54 of the Auburndale Plantation Dairy, was not available as of July 20, 1998. The dairy went out of business as of July 17, 1998. The cows were sold.

Ground Water

The Ground Water sample (GW-43) was deleted from the program starting in July, per the e-mail sent July 8, 1998, Ground Water (GW-42) was changed to Unit 1 or Unit 2 Deep well, and the Ground Water sampling frequency changed from monthly to quarterly. These changes were made due to a RNP procedure change to EMP-001.

Thermoluminescent Dosimeters (TLDs)

Six of a possible 164 TLD samples were missing during 1998 due to vandalism. They were:

- First Quarter - TLD 38 was missing in the field.
- Second Quarter - TLD 12 was missing in the field.
- Third Quarter - TLD 38 was missing in the field.
- Fourth Quarter - TLDs 12, 23, and 24 were 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/m³.

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 1000 pCi/L for samples that typically exhibit activity greater than the LLD. As of June 1996, 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 (325 pCi/L) with the State Agencies reportable concentrations in the Split Sample Program Report. This change to a lower LLD was per the plants' request.

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 E-2 pCi/m^3 .

Iodine-131 in milk is determined by an instrumental method. Analysis involves passing 4 liters over an anion-exchange resin and direct gamma analysis of the resin with an intrinsic Ge detector. The LLD using the Germanium (Ge) detector is approximately 5.0 E-1 pCi/L for milk using a 25,000 second count time. (RNP - No milk samples Dairy out of business.)

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 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, and placed in a 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 lighttight 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. The change in vendors for the Interlaboratory Program was due to the EPA Environmental Cross-Check Program's termination for utility participation as of December 31, 1995.

During 1998, 61 analyses were completed on 16 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 61 analyses have been received from Analytics, Inc.. A comparison of the average of our reported values with Analytics, Inc. known activity and standard deviation is provided below:

<u>Standard Deviation From Known Activity</u>	<u>Percent of Analyses</u>
≤ 1 standard deviation	38
≤ 2 standard deviation	79
≤ 3 standard deviation	93

Four of 61 analyses exceeded the 3 sigma action level; however, three of these four were well within the $\pm 20\%$ ratio to the known value. A condition report (CR # NGG 99-08644) was generated to investigate further the outliers.

Lower Limits of Detection

The samples analyzed met the LLD required by the applicable 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**

<u>Surface Water/Groundwater Samples</u>	
Isotope	LLD (pCi/ℓ)
Mn-54	6
Co-58	7
Fe-59	11
Co-60	9
Zn-65	16
Zr-Nb-95	6
I-131	1.0*
Cs-134	6
Cs-137	6
Ba-La-140	1
Other Expected Gamma Emitters	1 to 103
<u>Air Particulates</u> (Quarterly Composite)	
Isotope	LLD (pCi/m³)
I-131	0.041
Cs-134	0.001
Cs-137	0.001
Other Expected Gamma Emitters	0.001 to 0.041
<u>Milk</u> (Gamma Scan)	
Isotope	LLD (pCi/ℓ)
I-131	1.0*
Cs-134	10
Cs-137	10
Ba-La-140	12
Other Expected Gamma Emitters	7 to 202

*Instrumental analysis of resin concentrates of samples.

Table 8 (cont.)

Sediments (Shoreline or Bottom)	
Isotope	LLD (pCi/kg, dry)
Cs-134	74
Cs-137	47
Other Expected Gamma Emitters	42 to 1738
Fish	
Isotope	LLD (pCi/kg, wet)
Mn-54	39
Co-58	46
Fe-59	125
Co-60	73
Zn-65	128
Cs-134	63
Cs-137	67
Other Expected Gamma Emitters	39 to 1535
Food Products and Vegetation	
Isotope	LLD (pCi/kg, wet)
I-131	38
Cs-134	37
Cs-137	29
Other Expected Gamma Emitters	22 to 741

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.

1998 Land-Use Census Results

The 1998 and 1997 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 NNE, W, WNW sectors from 1997 to 1998. Garden locations changed in 1997, see Table 9 for specific sector changes. Meat animal locations have changed in the following sectors from 1997 to 1998: NE, ENE, SE, NW. The single indicator milk location in the REMP went out of business as of July 17, 1998. See Table 9 for exact changes from 1997 to 1998.

The results of the 1998 census, 1997 meteorological data, and a review of the ten years of average meteorology for the site were compared to the 1997 data. This comparison determined that there were no significant changes in land- use. The likely most exposed individual is an adult with the estimated dose to this individual being 0.004 millirem/year whole body. This value is small compared to the natural background radiation in this area which is 58 millirem/year.

TABLE 9

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

LAND-USE CENSUS COMPARISONS (1997-1998)
NEAREST PATHWAY (MILES)

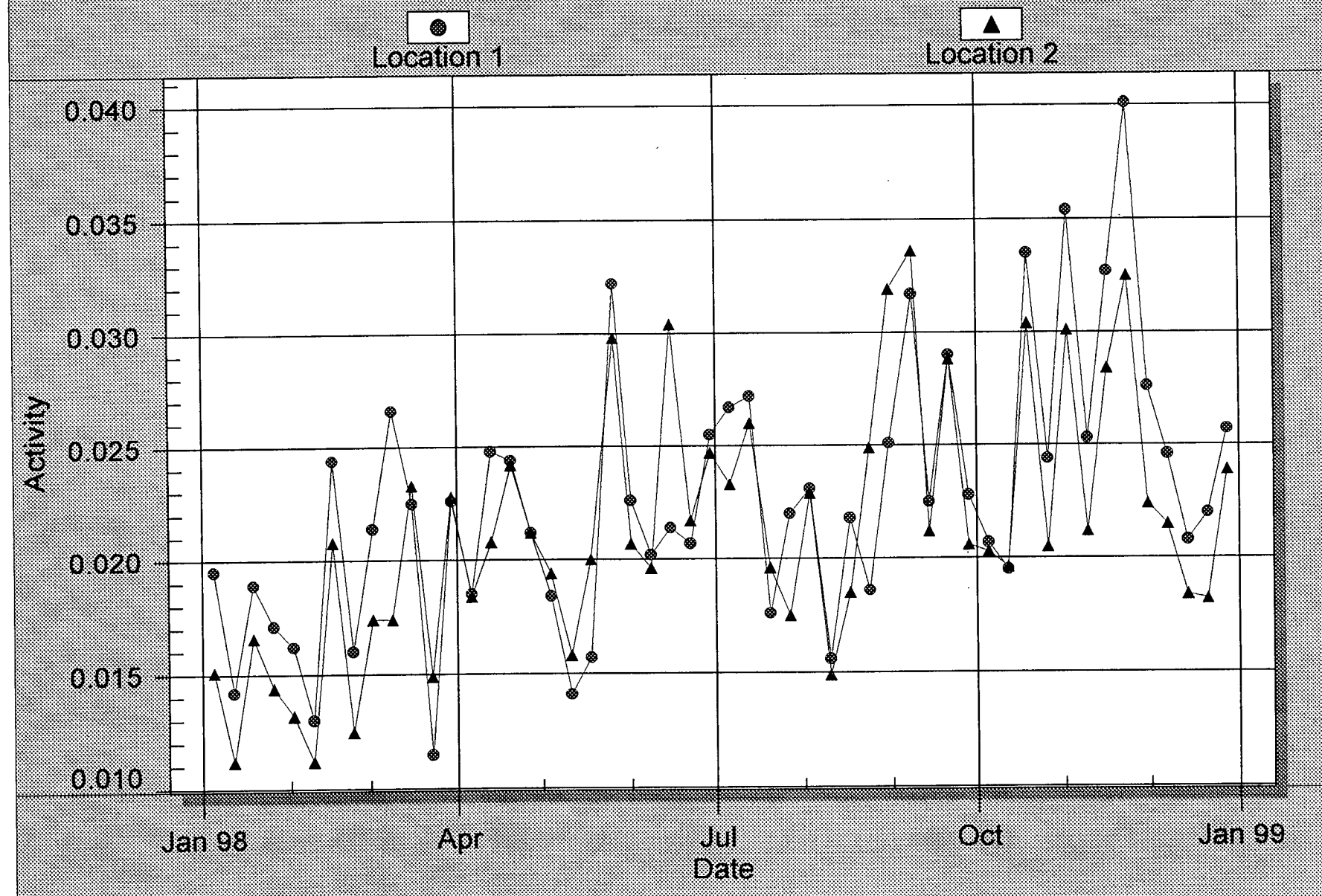
SECTOR	RESIDENT		GARDEN		MEAT		MILK	
	1997	1998	1997	1998	1997	1998	1997	1998
N	2.9	2.9	3.0	3.0	2.9	2.9	---	---
NNE	1.6	*1.6	2.6	*2.2	1.6	1.6	---	---
NE	1.1	1.1	1.1	1.1	2.9	*1.1	---	---
ENE	0.8	0.8	1.9	*1.0	2.9	*2.4	---	---
E	0.8	0.8	2.1	2.1	3.0	3.0	11.2	*---
ESE	0.6	0.6	0.6	*1.18	0.9	0.9	---	---
SE	0.6	0.6	2.2	*1.9	---	*1.9	---	---
SSE	0.4	0.4	---	*0.4	---	---	---	---
S	0.4	0.4	0.4	*2.3	2.3	2.3	---	---
SSW	0.4	0.4	0.8	*0.8	0.8	0.8	---	---
SW	0.5	0.5	1.1	*1.37	4.3	4.3	---	---
WSW	0.5	0.5	0.6	*0.6	2.3	2.3	---	---
W	0.6	*0.5	0.6	*0.5	0.6	0.6	---	---
WNW	0.9	*0.7	0.9	*1.8	---	---	---	---
NW	1.6	1.6	2.0	2.0	---	*2.0	---	---
NNW	2.1	2.1	---	---	4.0	4.0	---	---

*Changes from 1997.

REFERENCES

- "Annual Radiological Environmental Operating Report," Davis -Bessie Nuclear Power Station (1994)
- "Basic Radiation Protection Criteria," Report No. 39, National Council on Radiation Protection and Measurement, Washington, D.C. (January 1971)
- Cember, H., "Introduction to Health Physics," Pergamon Press Inc., Elmsford, N.Y. (1969)
- "Domestic Licensing of Production and Utilization Facilities," Title 10, Part 50, Code of Federal Regulations, Washington, D.C.
- Eisenbud, M., "Environmental Radioactivity," Academic Press, Inc. Orlando FL. (1987)
- "Environmental Radiation Protection Standard for Nuclear Power Operations," Title 40, Part 190, Code of Federal Regulations, Washington, D.C.
- Evans, R., "The Atomic Nucleus," McGraw-Hill, New York, N.Y. (1967)
- "Exposure of the Population in the United States and Canada from Natural Background Radiation," Report No. 94, National Council on Radiation Protection and Measurements, Washington, D.C. (December 1987)
- Grosh, D. and Hopwood, L., "Biological Effects of Radiations," Academic Press Inc., New York, N.Y. (1979)
- "Health Effects of Exposure to Low Levels of Ionizing Radiation: BEIR V, " Committee on the Biological Effects of Ionizing Radiations, Board on Radiation Effects Research Commission of Life Sciences, National Research Council, National Academy Press, Washington D.C. (1990)
- "Ionizing Radiation Exposure of the Population of the United States," Report No. 93, National Council on Radiation Protection and Measurements, Washington, D.C. (September 1987)
- Morgan, K. & Turner, J., "Principles of Radiation Protection," John Wiley & Sons, Inc., New York, N.Y. (1968)
- "Public Radiation Exposure from Nuclear Power Generation in the United States," Report No. 92, National Council on Radiation Protection and Measurements, Washington, D.C. (December 1987)
- "Sources, Effects and Risk of Ionizing Radiation," United Nations Scientific Committee on the Effects of Atomic Radiation, 1988 Report to the General Assembly, United Nations, New York, N.Y. (1988)
- "Standard for Protection Against Radiation," Title 10, Part 20, Code of Federal Regulations, Washington, D.C.
- "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation: 1980," Committee on the Biological Effects of Ionizing Radiations, Division of Medical Sciences, Assembly of Life Sciences, National Research Council, National Academy Press, Washington, D.C. (1980)
- "Tritium in the Environment," Report No. 62, National Council on Radiation Protection and Measurements, Washington, D.C. (March 1979)

Figure 18 For RNP From 1/1/98 To 12/31/98
 AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)



AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

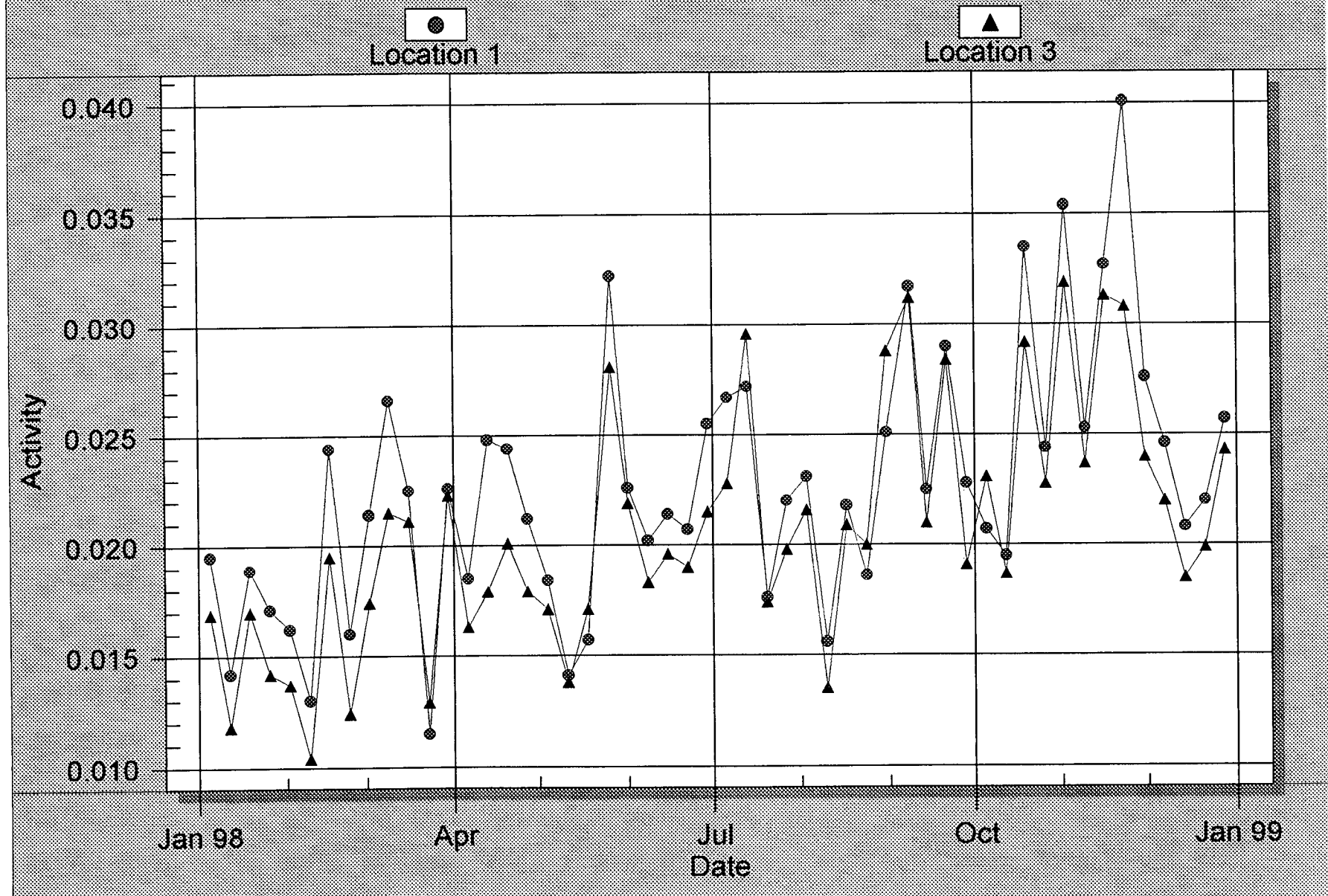


Figure 20 For RNP From 1/1/98 To 12/31/98
AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

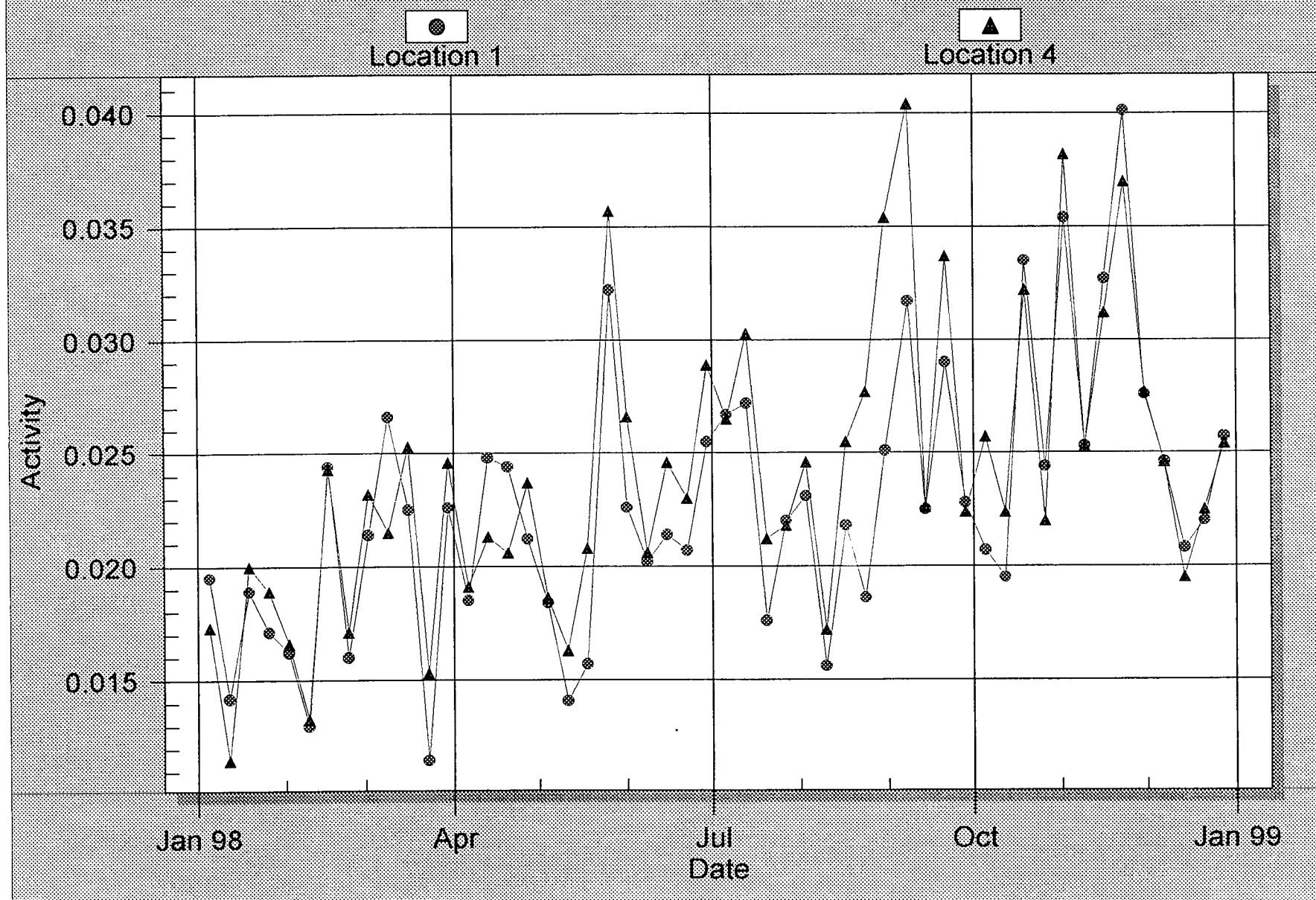


Figure 21 For RNP From 1/1/98 To 12/31/98
AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

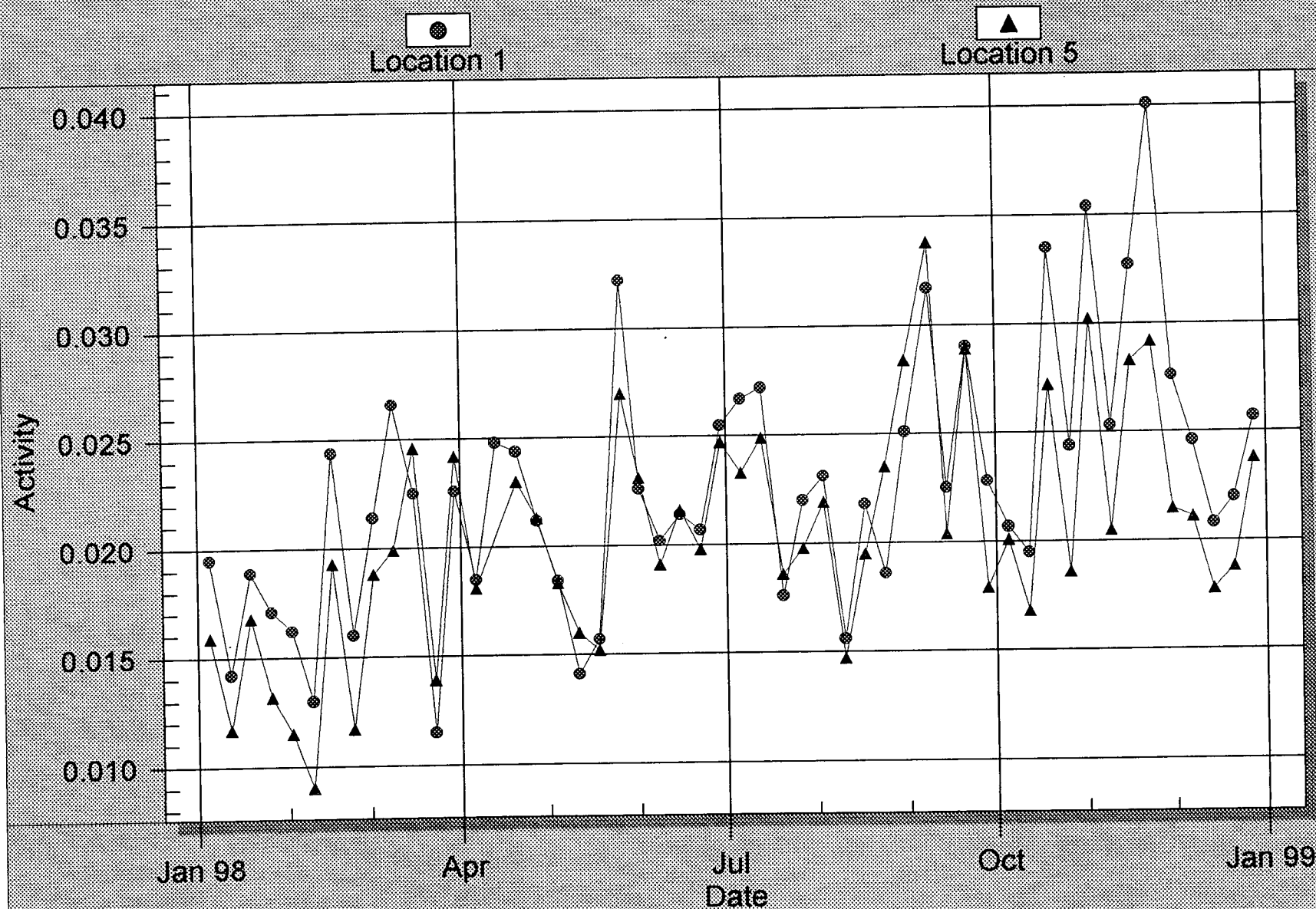


Figure 22 For RNP From 1/1/98 To 12/31/98
AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

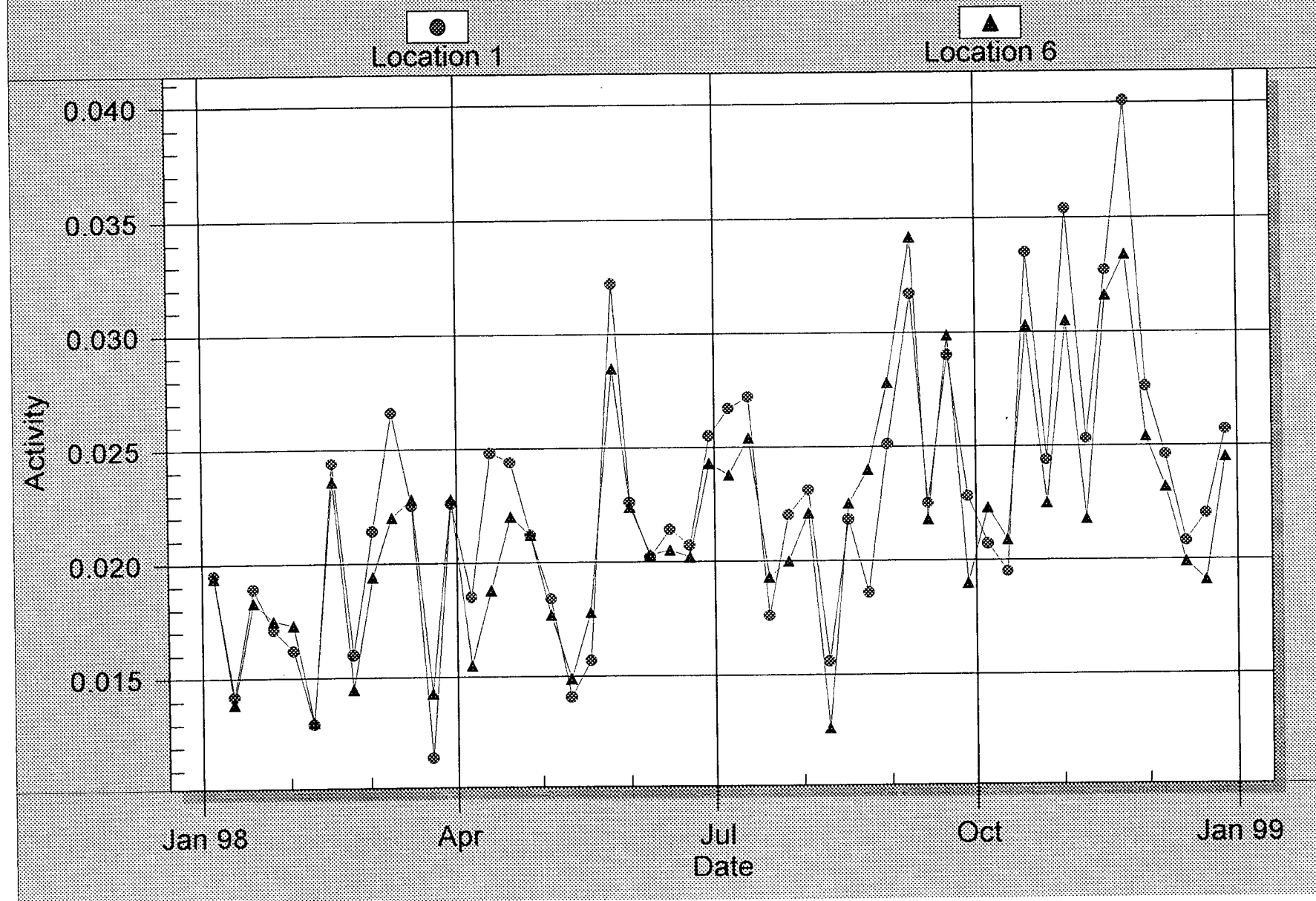


Figure 23 For RNP From 1/1/98 To 12/31/98

AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

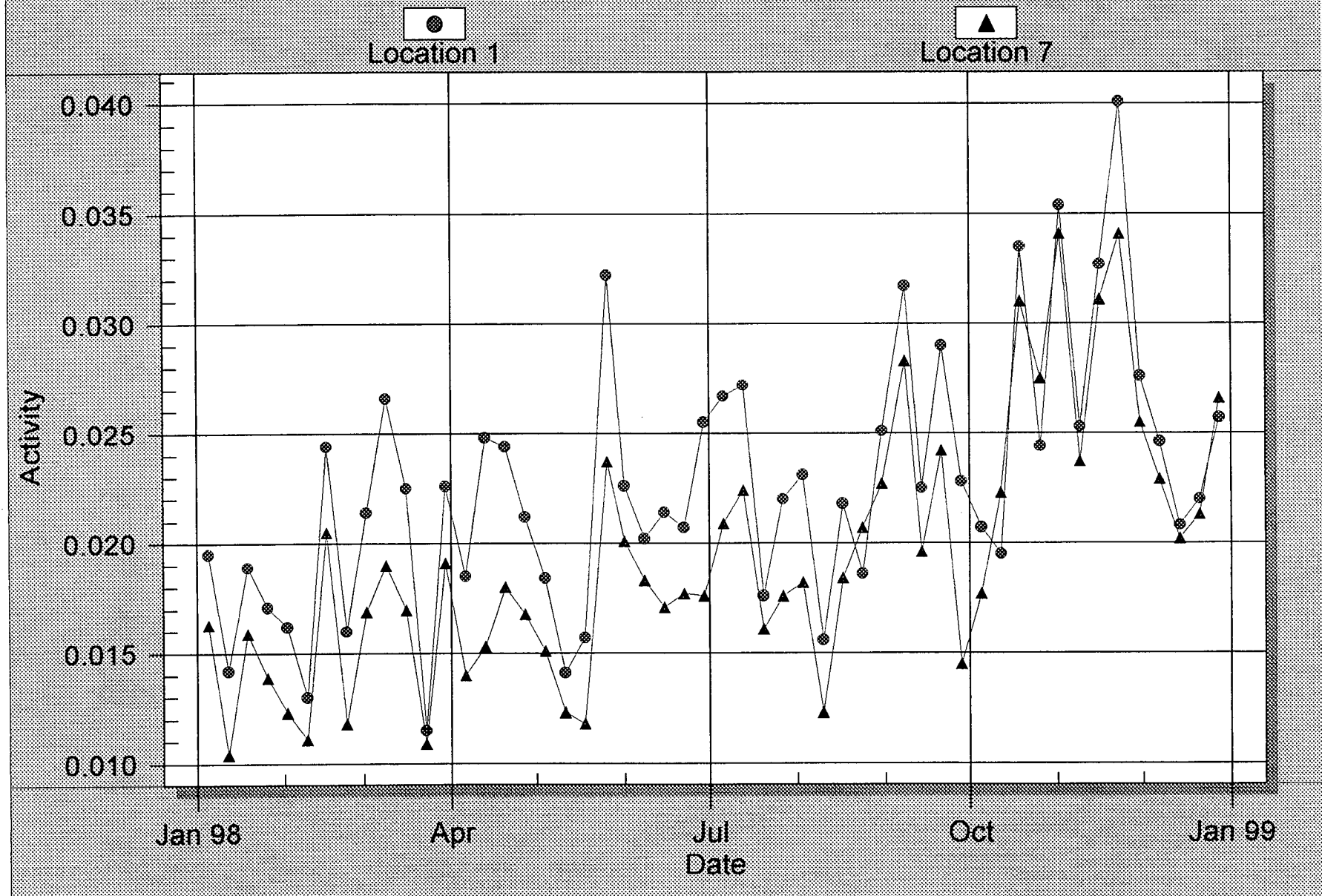


Figure 24 For RNP From 1/1/98 To 12/31/98

AIR PARTICULATE for GROSS BETA - Activity (pCi/cubic meter)

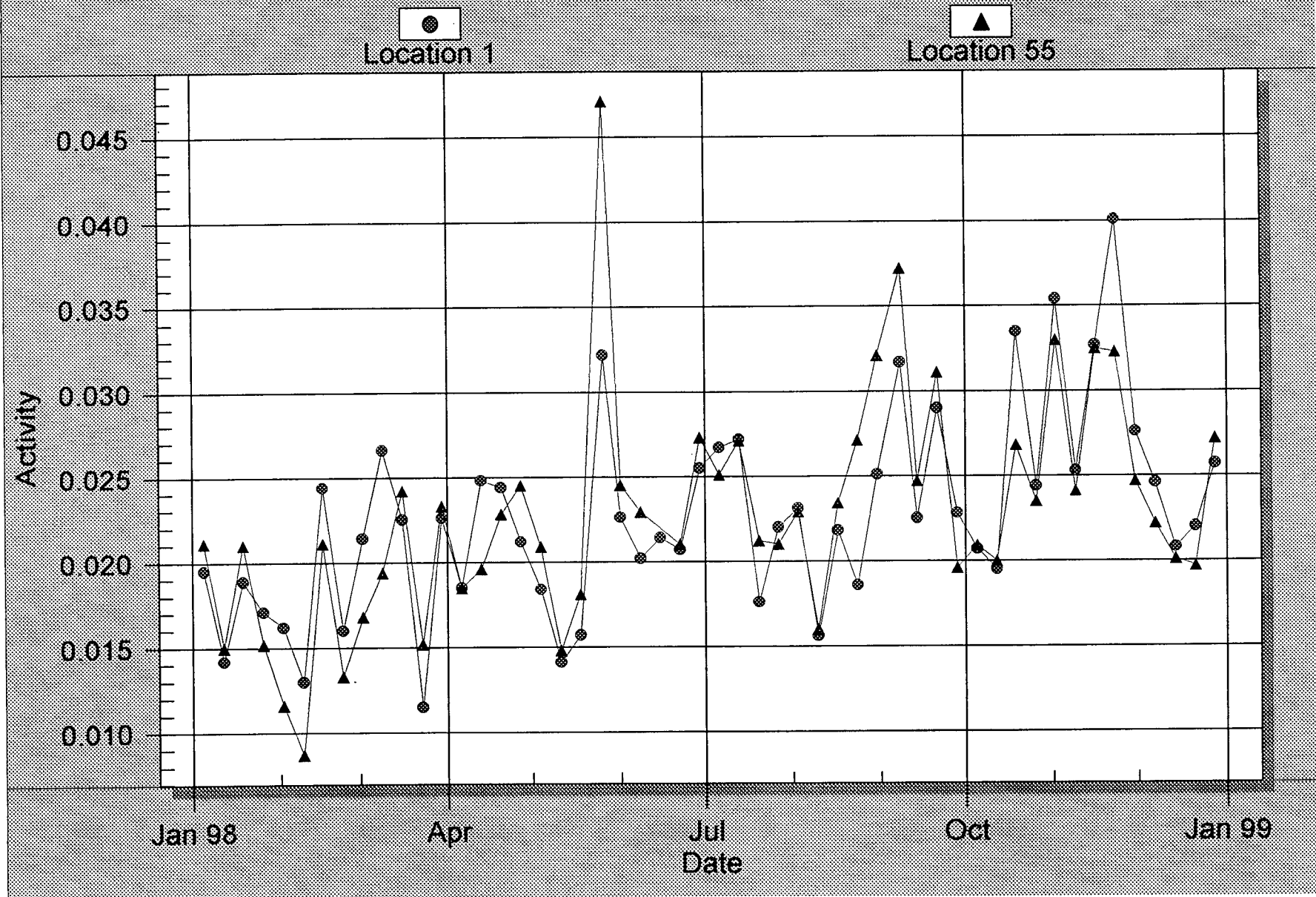


Figure 25 RNP 1998 Milk Samples Iodine-131 Activity (pCi/ Liter)

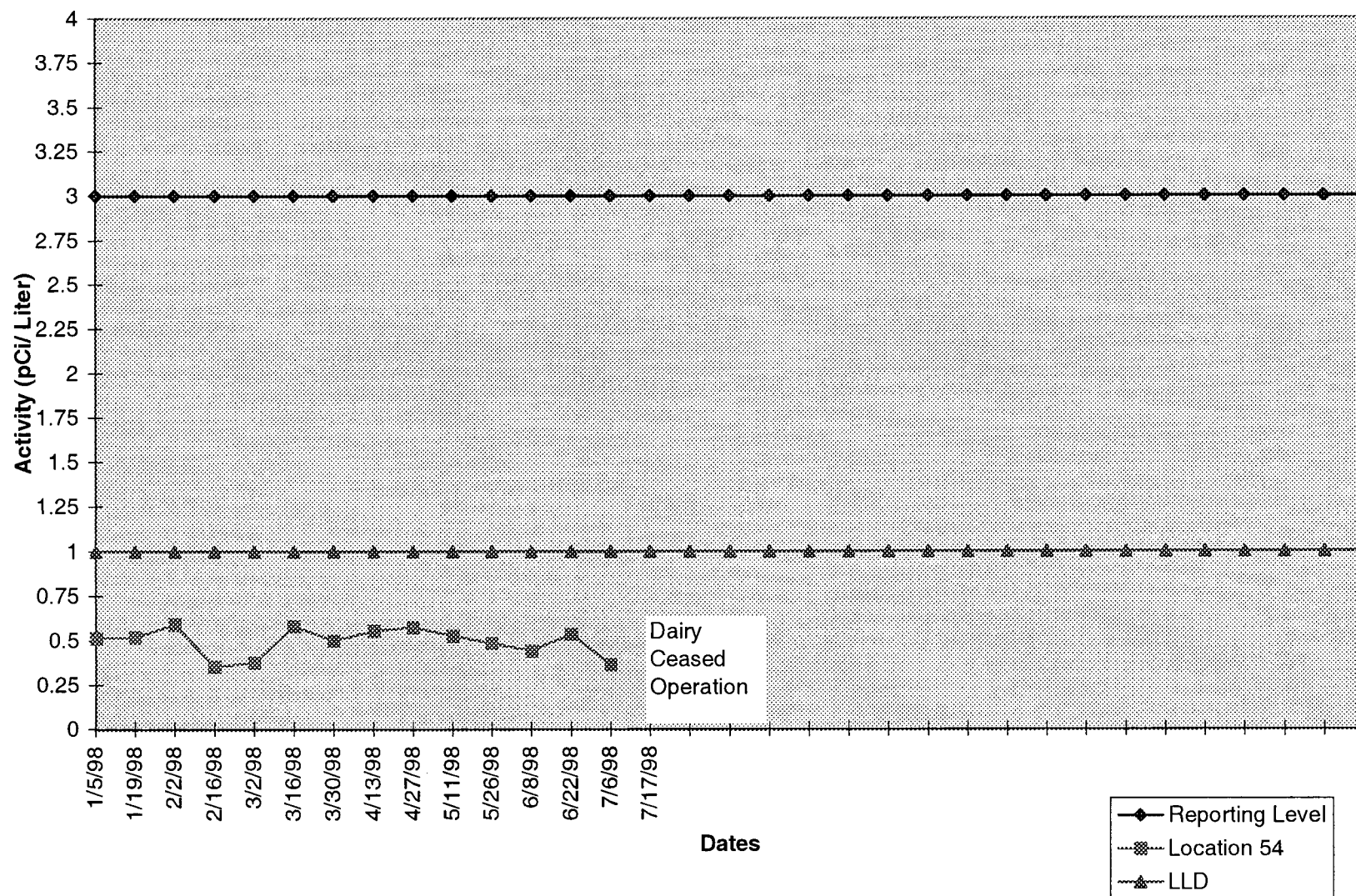


Figure 26 RNP 1998 Aquatic Vegetation Gamma Activity (pCi/gram wet)

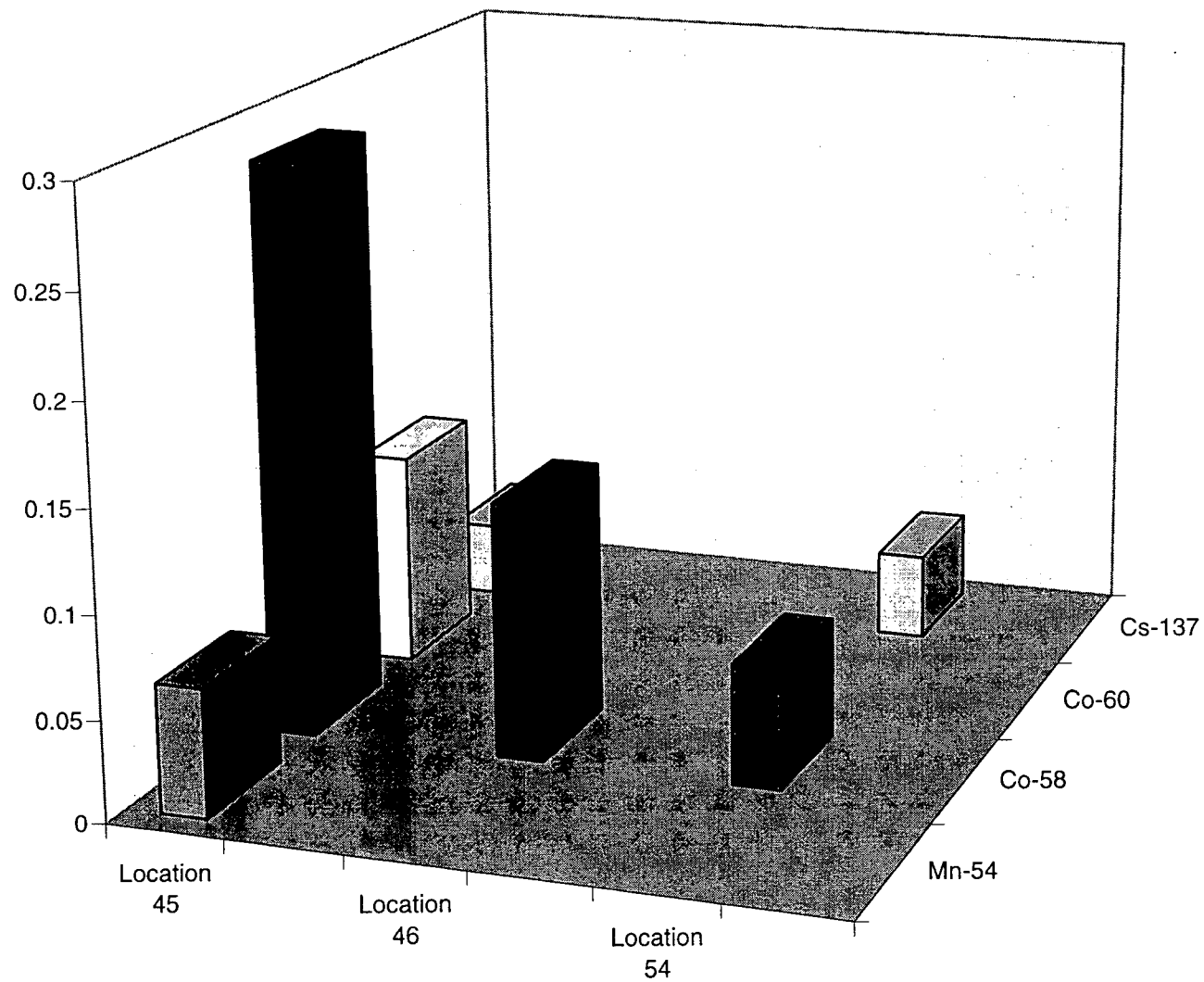


Figure 27 RNP 1998 Surface Water Tritium

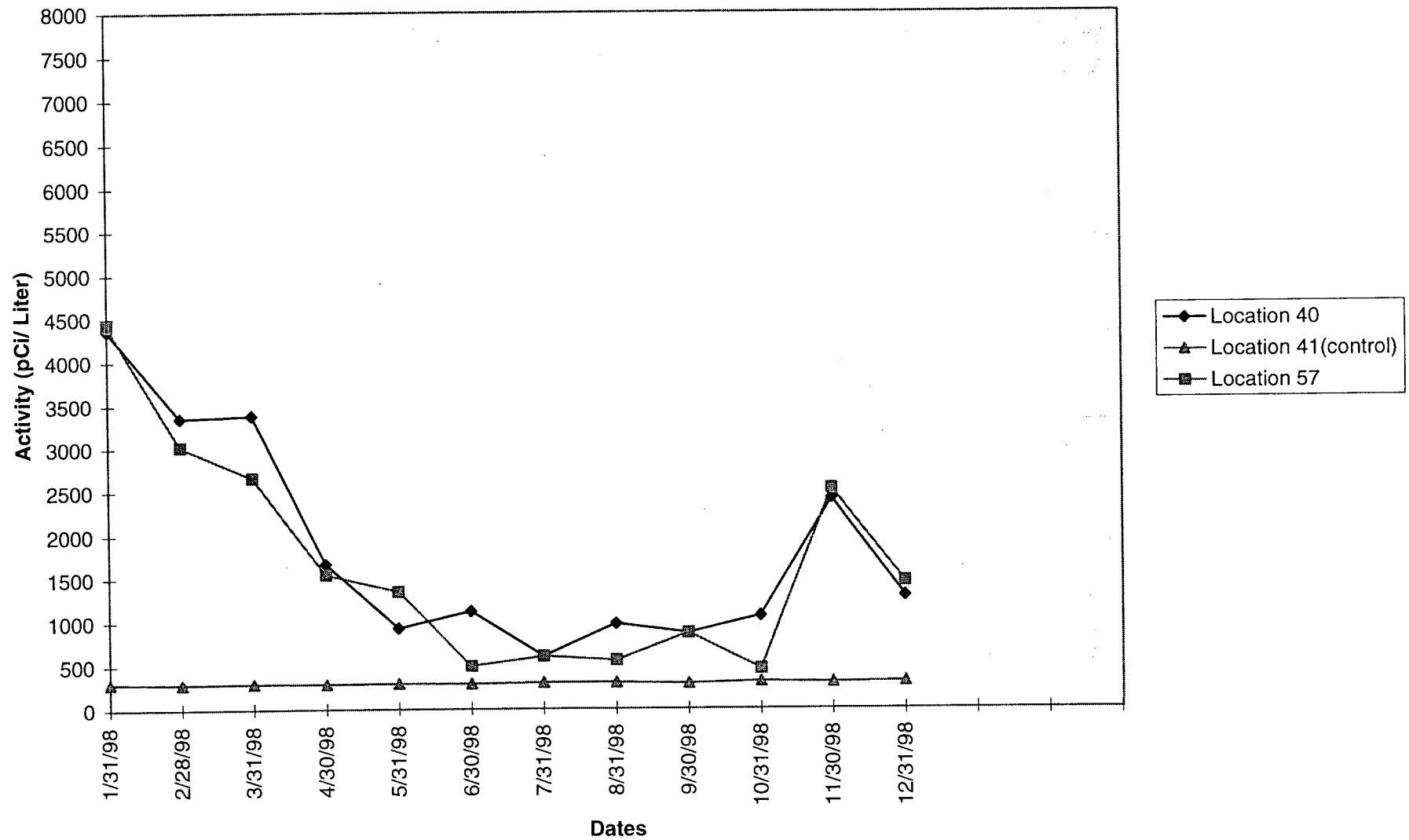
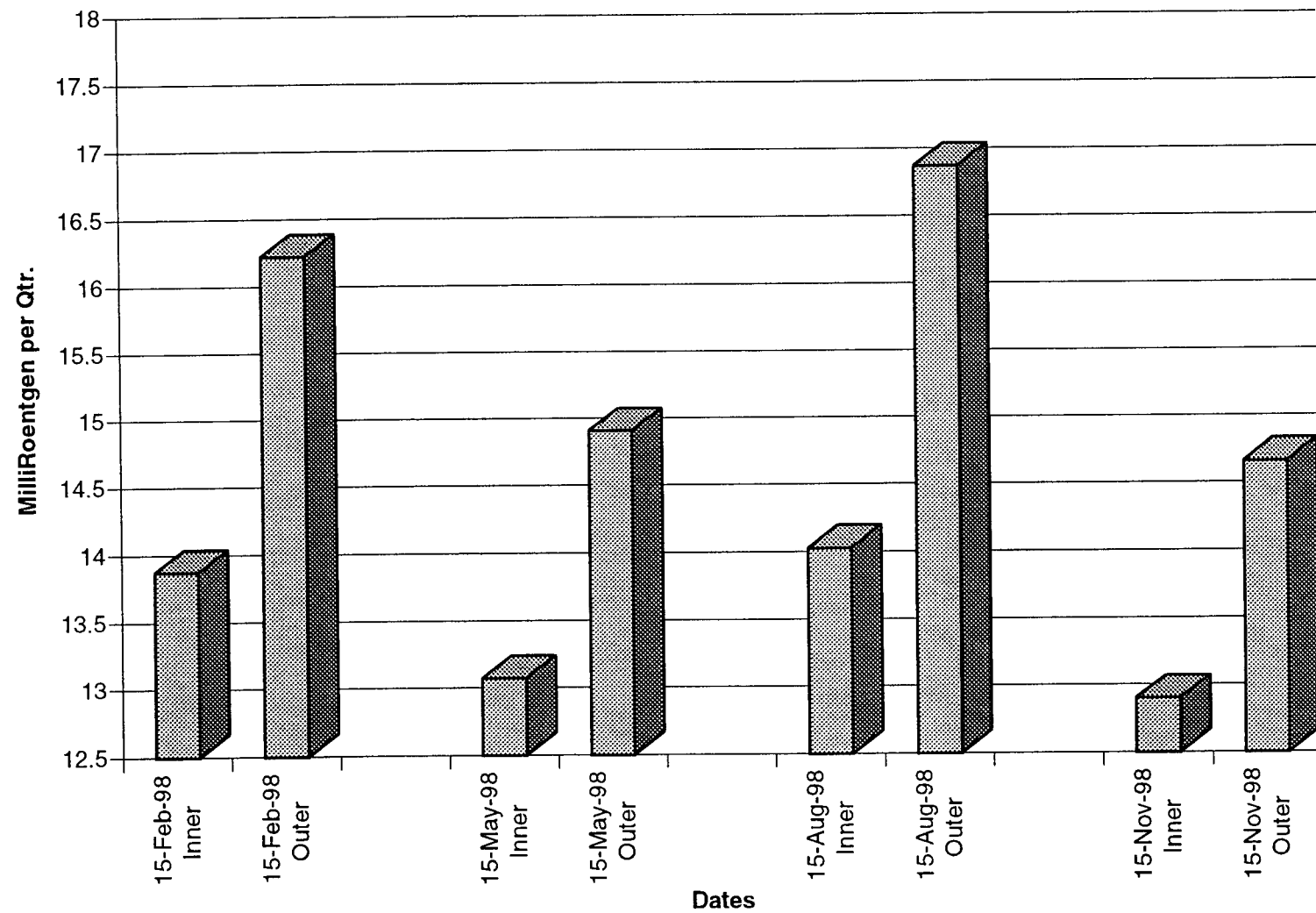
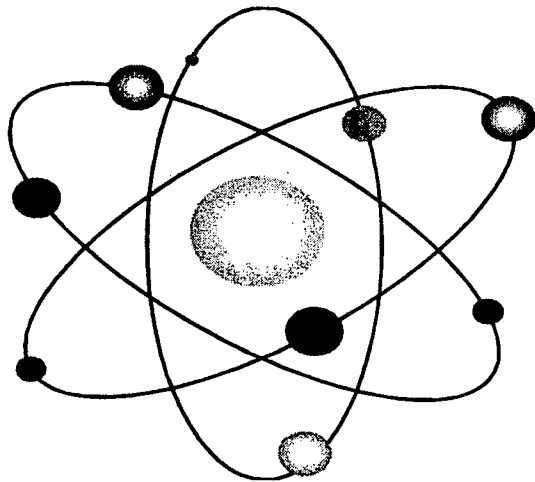


Figure 28 RNP 1998 TLD Averages for Inner and Outer Ring Locations





CP&L
Radiological Environmental Monitoring
Analysis Report

12/14/98

Semiannual Analysis Report

CP&L Radiological Environmental Monitoring Analysis Report

12/14/98

Plant: RNP

TLD in mR/QTR

Sample Point

SampleDate

Dose

2 SigmaError

1 - 26 MI ESE - FLORENCE - CONTROL	2/15/98	1.42E+001	2.50E+000
1	5/15/98	1.41E+001	1.80E+000
2 - 0.2 MI S - INFORMATION CENTER	2/15/98	1.24E+001	2.40E+000
2	5/15/98	1.25E+001	7.00E-001
3 - 0.7 MI N - MICROWAVE TOWER	2/15/98	1.52E+001	2.20E+000
3	5/15/98	1.46E+001	1.30E+000
4 - 0.4 MI ESE - SPILLWAY	2/15/98	1.24E+001	2.30E+000
4	5/15/98	1.21E+001	8.00E-001
5 - 0.9 MI ENE - JOHNSONS LANDING	2/15/98	1.58E+001	2.60E+000
5	5/15/98	1.36E+001	1.00E+000
6 - 0.3 MI SW - INFORMATION CENTER	2/15/98	1.50E+001	3.30E+000
6	5/15/98	1.33E+001	9.00E-001
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	2/15/98	1.38E+001	2.30E+000
7	5/15/98	1.14E+001	8.00E-001
8 - 0.8 MI SSE - POWER POLES FROM HBR	2/15/98	1.18E+001	2.70E+000
8	5/15/98	1.04E+001	1.30E+000
9 - 1.0 MI S - POWER POLE NEAR HWY 151	2/15/98	1.95E+001	3.40E+000
9	5/15/98	1.86E+001	1.10E+000
10 - 1.0 MI WSW - CHURCH OF GOD CEMETERY	2/15/98	1.15E+001	2.20E+000
10	5/15/98	1.16E+001	1.60E+000
11 - 1.0 MI SW - POWER POLE AT OLD CAMDEN RD	2/15/98	1.04E+001	2.20E+000
11	5/15/98	1.04E+001	9.00E-001
12 - 1.2 MI SSW-PINE TREE AT 2ND INT DIRT RD	2/15/98	1.36E+001	2.40E+000
13 - 1.0 MI W-PINE TREE WHERE DIRT RD SPLITS	2/15/98	1.33E+001	4.50E+000
13	5/15/98	1.11E+001	7.00E-001
14 - 0.9 MI WNW - HWY 151 AT PINE RIDGE CH	2/15/98	1.70E+001	2.70E+000
14	5/15/98	1.61E+001	1.70E+000
15 - 1.0 MI NW -DIRT RD NEAR ASH POND	2/15/98	1.09E+001	2.30E+000
15	5/15/98	1.00E+001	7.00E-001
16 - 1.0 MI NNW - DARLINGTON IC TURBINE PLANT	2/15/98	1.26E+001	2.50E+000
16	5/15/98	1.25E+001	2.00E+000
17 - 1.1 MI N - DIS CANAL RD AT UNIT 1 WEIR	2/15/98	1.39E+001	2.20E+000
17	5/15/98	1.31E+001	1.10E+000
18 - 0.7 MI SE - TRAIN TRESTLE OVER BLACK CR	2/15/98	1.16E+001	2.60E+000
18	5/15/98	1.12E+001	9.00E-001
19 - 1.0 MI E - RD S-16-23	2/15/98	1.29E+001	2.20E+000
19	5/15/98	1.20E+001	9.00E-001
20 - 1.3 MI ENE - RD S-16-39 NORTH	2/15/98	1.54E+001	2.30E+000
20	5/15/98	1.38E+001	8.00E-001
21 - ATKINSONS BOAT LANDING	2/15/98	1.25E+001	2.70E+000
21	5/15/98	1.20E+001	8.00E-001

Semiannual Analysis Report

CP&L Radiological Environmental Monitoring Analysis Report

12/14/98

Plant: RNP

TLD in mR/QTR

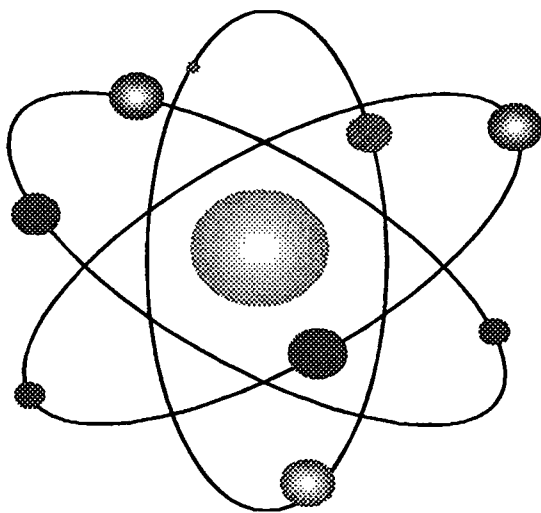
Sample Point

SampleDate

Dose

2 SigmaError

22 - 1.9 MI NNE - SHADY REST NEAR DOCK	2/15/98	1.51E+001	2.60E+000
22	5/15/98	1.25E+001	1.30E+000
23 - 1.2 MI ESE - INT RD 41E-5 AND S-16-39	2/15/98	1.65E+001	3.00E+000
23	5/15/98	1.56E+001	1.80E+000
24 - 5.0 MI NW - S-13-711 PAST PEACH FARM	2/15/98	1.63E+001	2.20E+000
24	5/15/98	1.58E+001	8.00E-001
25 - 4.6 MI NNW - RD S-13-346 OFF 151 NORTH	2/15/98	1.51E+001	2.30E+000
25	5/15/98	1.29E+001	1.10E+000
26 - 5.0 MI N - RD S-13-346	2/15/98	1.51E+001	2.30E+000
26	5/15/98	1.43E+001	3.80E+000
27 - 5.0 MI NNE - RD S-13-763 NEAR INTER	2/15/98	1.08E+001	2.30E+000
27	5/15/98	1.10E+001	1.10E+000
28 - 4.8 MI NE - NEAR DUMPSTER RD S-13-39	2/15/98	1.95E+001	3.10E+000
28	5/15/98	1.63E+001	8.00E-001
29 - RD S-16-20 SOUTH OF LOOKOUT TOWER	2/15/98	1.62E+001	2.40E+000
29	5/15/98	1.46E+001	1.70E+000
30 - 4.6 MI E - RD S-16-20 JOHNSON FENCE CO	2/15/98	1.70E+001	2.40E+000
30	5/15/98	1.40E+001	7.00E-001
31 - 4.6 MI ESE - LAKESHORE DRIVE	2/15/98	1.66E+001	2.70E+000
31	5/15/98	1.42E+001	1.50E+000
32 - 4.5 MI SE - END OF KALBER DRIVE	2/15/98	1.40E+001	2.60E+000
32	5/15/98	1.37E+001	7.00E-001
33 - 4.6 MI SSE-RD S16-493 NEAR SEGARS ENTR	2/15/98	1.43E+001	2.90E+000
33	5/15/98	1.57E+001	1.00E+000
34 - 4.6 MI S - RD S-16-772	2/15/98	1.06E+001	2.40E+000
34	5/15/98	9.80E+000	1.20E+000
35 - 4.4 MI SSW - INT RD S-31-51 & S-16-12	2/15/98	2.09E+001	4.10E+000
35	5/15/98	2.02E+001	1.50E+000
36 - 4.7 MI SW - PAVED RD OFF RD S-16-85	2/15/98	1.95E+001	2.70E+000
36	5/15/98	1.87E+001	1.70E+000
37 - 5.0 MI WSW - TRANS TOWER NEAR CLAY RD	2/15/98	2.20E+001	2.90E+000
37	5/15/98	1.97E+001	1.10E+000
38 - 4.9 MI W - RD S-16-231 AT UNION CHURCH	2/15/98	1.69E+001	2.40E+000
38	5/15/98	1.70E+001	1.10E+000
39 - 5.0 MI WNW - POWER POLE IN FIELD	2/15/98	1.53E+001	2.50E+000
39	5/15/98	1.46E+001	1.10E+000
55 - 0.3 MI SSE - SITE BOUNDARY	2/15/98	1.41E+001	2.40E+000
55	5/15/98	1.50E+001	1.40E+000
56 - 300 FT N OF ISFSI	2/15/98	1.72E+001	3.10E+000
56	5/15/98	1.41E+001	7.00E-001



CP&L
Radiological Environmental Monitoring
Analysis Report

4/ 9/99

Semiannual Analysis Report

4/ 9/99

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
Plant: RNP Analysis: BETA MediaType: AIR PARTICULATE CUBIC METERS						
1 - 26 MI ESE - FLORENCE - CONTROL	1/ 5/98	533.70000	3.78E-001	1.95E-002	2.21E-003	1.94E-003
	1/12/98	527.30000	3.78E-001	1.42E-002	1.98E-003	1.91E-003
	1/19/98	530.90000	3.78E-001	1.89E-002	2.17E-003	1.89E-003
	1/26/98	531.90000	3.78E-001	1.71E-002	2.13E-003	2.00E-003
	2/ 9/98	531.40000	3.78E-001	1.30E-002	1.91E-003	1.90E-003
	2/ 2/98	531.00000	3.78E-001	1.62E-002	2.10E-003	2.02E-003
	2/16/98	521.20000	3.78E-001	2.44E-002	2.36E-003	1.74E-003
	2/23/98	528.80000	3.78E-001	1.60E-002	2.01E-003	1.78E-003
	3/ 2/98	524.70000	3.78E-001	2.14E-002	2.30E-003	1.96E-003
	3/ 9/98	534.30000	3.77E-001	2.66E-002	2.46E-003	1.89E-003
	3/16/98	623.10000	3.77E-001	2.25E-002	2.11E-003	1.64E-003
	3/23/98	650.30000	3.77E-001	1.15E-002	1.62E-003	1.58E-003
	3/30/98	610.90000	3.77E-001	2.26E-002	2.11E-003	1.57E-003
	4/ 6/98	591.60000	3.77E-001	1.85E-002	2.01E-003	1.68E-003
	4/13/98	600.00000	3.77E-001	2.48E-002	2.24E-003	1.71E-003
	4/20/98	575.00000	3.77E-001	2.44E-002	2.24E-003	1.62E-003
	4/27/98	597.00000	3.77E-001	2.12E-002	2.10E-003	1.67E-003
	5/ 4/98	595.00000	3.77E-001	1.84E-002	1.98E-003	1.61E-003
	5/11/98	594.30000	3.77E-001	1.41E-002	1.85E-003	1.77E-003
	5/18/98	592.40000	3.77E-001	1.57E-002	1.92E-003	1.76E-003
	5/26/98	686.30000	3.77E-001	3.22E-002	2.33E-003	1.58E-003
	6/ 1/98	486.40000	3.77E-001	2.26E-002	2.51E-003	2.23E-003
	6/ 8/98	588.80000	3.77E-001	2.02E-002	2.11E-003	1.77E-003
	6/15/98	612.60000	3.77E-001	2.14E-002	2.12E-003	1.77E-003
	6/22/98	561.50000	3.77E-001	2.07E-002	2.18E-003	1.84E-003
	6/29/98	604.40000	3.77E-001	2.55E-002	2.25E-003	1.67E-003
2 - 0.2 MI S - INFORMATION CENTER	1/ 5/98	822.70000	3.78E-001	1.51E-002	1.53E-003	1.26E-003
	1/12/98	804.40000	3.78E-001	1.12E-002	1.38E-003	1.25E-003
	1/19/98	818.20000	3.78E-001	1.66E-002	1.58E-003	1.23E-003
	1/26/98	821.40000	3.78E-001	1.44E-002	1.51E-003	1.30E-003
	2/ 9/98	823.40000	3.78E-001	1.12E-002	1.36E-003	1.23E-003
	2/ 2/98	824.70000	3.78E-001	1.32E-002	1.46E-003	1.30E-003
	2/16/98	808.50000	3.78E-001	2.08E-002	1.71E-003	1.12E-003
	2/23/98	820.30000	3.78E-001	1.25E-002	1.39E-003	1.15E-003
	3/ 2/98	822.40000	3.78E-001	1.74E-002	1.61E-003	1.25E-003
	3/ 9/98	816.70000	3.77E-001	1.74E-002	1.61E-003	1.23E-003
	3/16/98	703.50000	3.77E-001	2.33E-002	1.99E-003	1.45E-003
	3/23/98	741.70000	3.77E-001	1.49E-002	1.62E-003	1.38E-003
	3/30/98	699.30000	3.77E-001	2.28E-002	1.95E-003	1.37E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
2 - 0.2 MI S - INFORMATION CENTER	4/ 6/98	695.70000	3.77E-001	1.84E-002	1.81E-003	1.43E-003
	4/13/98	713.10000	3.77E-001	2.08E-002	1.89E-003	1.44E-003
	4/20/98	701.40000	3.77E-001	2.42E-002	1.99E-003	1.33E-003
	4/27/98	714.90000	3.77E-001	2.12E-002	1.88E-003	1.39E-003
	5/ 4/98	707.80000	3.77E-001	1.94E-002	1.82E-003	1.35E-003
	5/11/98	695.70000	3.77E-001	1.58E-002	1.73E-003	1.51E-003
	5/18/98	711.90000	3.77E-001	2.00E-002	1.86E-003	1.47E-003
	5/26/98	775.90000	3.77E-001	2.98E-002	2.10E-003	1.40E-003
	6/ 1/98	595.60000	3.77E-001	2.07E-002	2.13E-003	1.82E-003
	6/ 8/98	695.80000	3.77E-001	1.96E-002	1.88E-003	1.50E-003
	6/15/98	381.60000	3.77E-001	3.04E-002	3.26E-003	2.84E-003
	6/22/98	694.30000	3.77E-001	2.17E-002	1.95E-003	1.49E-003
	6/29/98	681.40000	3.77E-001	2.47E-002	2.07E-003	1.48E-003
3 - 0.7 MI N - MICROWAVE TOWER	1/ 5/98	739.20000	3.78E-001	1.69E-002	1.70E-003	1.40E-003
	1/12/98	729.40000	3.78E-001	1.18E-002	1.50E-003	1.38E-003
	1/19/98	736.80000	3.78E-001	1.70E-002	1.70E-003	1.36E-003
	1/26/98	745.00000	3.78E-001	1.42E-002	1.60E-003	1.43E-003
	2/ 9/98	745.90000	3.78E-001	1.04E-002	1.41E-003	1.36E-003
	2/ 2/98	739.10000	3.78E-001	1.37E-002	1.60E-003	1.45E-003
	2/16/98	732.70000	3.78E-001	1.95E-002	1.76E-003	1.24E-003
	2/23/98	739.40000	3.78E-001	1.24E-002	1.48E-003	1.27E-003
	3/ 2/98	729.50000	3.78E-001	1.74E-002	1.73E-003	1.41E-003
	3/ 9/98	752.20000	3.77E-001	2.15E-002	1.84E-003	1.34E-003
	3/16/98	746.30000	3.77E-001	2.11E-002	1.84E-003	1.37E-003
	3/23/98	785.30000	3.77E-001	1.29E-002	1.48E-003	1.31E-003
	3/30/98	726.00000	3.77E-001	2.23E-002	1.89E-003	1.32E-003
	4/ 6/98	746.70000	3.77E-001	1.63E-002	1.65E-003	1.33E-003
	4/13/98	745.10000	3.77E-001	1.79E-002	1.73E-003	1.38E-003
	4/20/98	739.50000	3.77E-001	2.01E-002	1.79E-003	1.26E-003
	4/27/98	754.90000	3.77E-001	1.79E-002	1.70E-003	1.32E-003
	5/ 4/98	747.30000	3.77E-001	1.71E-002	1.67E-003	1.28E-003
	5/11/98	733.60000	3.77E-001	1.38E-002	1.60E-003	1.43E-003
	5/18/98	741.20000	3.77E-001	1.71E-002	1.71E-003	1.41E-003
	5/26/98	826.20000	3.77E-001	2.81E-002	1.97E-003	1.31E-003
	6/ 1/98	620.60000	3.77E-001	2.19E-002	2.12E-003	1.75E-003
	6/ 8/98	738.80000	3.77E-001	1.83E-002	1.76E-003	1.41E-003
	6/15/98	746.00000	3.77E-001	1.96E-002	1.81E-003	1.45E-003
	6/22/98	724.70000	3.77E-001	1.90E-002	1.80E-003	1.42E-003
	6/29/98	733.70000	3.77E-001	2.15E-002	1.87E-003	1.37E-003
4 - 0.4 MI ESE - SPILLWAY	1/ 5/98	707.00000	3.78E-001	1.73E-002	1.77E-003	1.47E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
4 - 0.4 MI ESE - SPILLWAY	1/12/98	704.20000	3.78E-001	1.15E-002	1.52E-003	1.43E-003
	1/19/98	689.30000	3.78E-001	2.00E-002	1.88E-003	1.46E-003
	1/26/98	697.90000	3.78E-001	1.89E-002	1.86E-003	1.53E-003
	2/ 9/98	708.70000	3.78E-001	1.33E-002	1.59E-003	1.43E-003
	2/ 2/98	701.50000	3.78E-001	1.66E-002	1.77E-003	1.53E-003
	2/16/98	697.10000	3.78E-001	2.43E-002	1.99E-003	1.30E-003
	2/23/98	271.20000	3.78E-001	1.71E-002	3.24E-003	3.47E-003
	3/ 2/98	701.80000	3.78E-001	2.32E-002	1.99E-003	1.47E-003
	3/ 9/98	716.90000	3.77E-001	2.15E-002	1.90E-003	1.41E-003
	3/16/98	720.60000	3.77E-001	2.53E-002	2.02E-003	1.42E-003
	3/23/98	742.20000	3.77E-001	1.53E-002	1.64E-003	1.38E-003
	3/30/98	705.80000	3.77E-001	2.46E-002	2.00E-003	1.36E-003
	4/ 6/98	707.40000	3.77E-001	1.91E-002	1.82E-003	1.41E-003
	4/13/98	722.90000	3.77E-001	2.13E-002	1.89E-003	1.42E-003
	4/20/98	717.10000	3.77E-001	2.06E-002	1.83E-003	1.30E-003
	4/27/98	716.50000	3.77E-001	2.37E-002	1.97E-003	1.39E-003
	5/ 4/98	695.40000	3.77E-001	1.86E-002	1.80E-003	1.38E-003
	5/11/98	701.30000	3.77E-001	1.63E-002	1.74E-003	1.50E-003
	5/18/98	709.20000	3.77E-001	2.08E-002	1.90E-003	1.47E-003
	5/26/98	789.20000	3.77E-001	3.57E-002	2.24E-003	1.38E-003
	6/ 1/98	582.80000	3.77E-001	2.66E-002	2.38E-003	1.86E-003
	6/ 8/98	680.90000	3.77E-001	2.06E-002	1.94E-003	1.53E-003
	6/15/98	687.20000	3.77E-001	2.46E-002	2.08E-003	1.58E-003
	6/22/98	676.10000	3.77E-001	2.30E-002	2.03E-003	1.53E-003
	6/29/98	669.50000	3.77E-001	2.89E-002	2.23E-003	1.51E-003
5 - 0.9 MI ENE - JOHNSONS LANDING	1/ 5/98	721.50000	3.78E-001	1.59E-002	1.69E-003	1.44E-003
	1/12/98	730.50000	3.78E-001	1.17E-002	1.49E-003	1.38E-003
	1/19/98	707.30000	3.78E-001	1.68E-002	1.74E-003	1.42E-003
	1/26/98	796.30000	3.78E-001	1.32E-002	1.50E-003	1.34E-003
	2/ 9/98	901.30000	3.78E-001	9.02E-003	1.19E-003	1.12E-003
	2/ 2/98	906.70000	3.78E-001	1.15E-002	1.31E-003	1.18E-003
	2/16/98	742.30000	3.78E-001	1.93E-002	1.74E-003	1.22E-003
	2/23/98	760.10000	3.78E-001	1.17E-002	1.43E-003	1.24E-003
	3/ 2/98	785.20000	3.78E-001	1.88E-002	1.71E-003	1.31E-003
	3/ 9/98	715.80000	3.77E-001	1.99E-002	1.84E-003	1.41E-003
	3/16/98	700.30000	3.77E-001	2.46E-002	2.03E-003	1.46E-003
	3/23/98	714.10000	3.77E-001	1.39E-002	1.62E-003	1.44E-003
	3/30/98	704.70000	3.77E-001	2.42E-002	1.99E-003	1.36E-003
	4/ 6/98	718.80000	3.77E-001	1.81E-002	1.77E-003	1.39E-003
	4/20/98	683.30000	3.77E-001	2.30E-002	1.97E-003	1.36E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
5 - 0.9 MI ENE - JOHNSONS LANDING	4/27/98	708.30000	3.77E-001	2.13E-002	1.90E-003	1.41E-003
	5/ 4/98	715.50000	3.77E-001	1.83E-002	1.76E-003	1.34E-003
	5/11/98	696.00000	3.77E-001	1.60E-002	1.74E-003	1.51E-003
	5/18/98	714.30000	3.77E-001	1.52E-002	1.68E-003	1.46E-003
	5/26/98	795.00000	3.77E-001	2.70E-002	1.98E-003	1.37E-003
	6/ 1/98	606.40000	3.77E-001	2.31E-002	2.20E-003	1.79E-003
	6/ 8/98	712.30000	3.77E-001	1.91E-002	1.83E-003	1.47E-003
	6/15/98	723.80000	3.77E-001	2.16E-002	1.92E-003	1.50E-003
	6/22/98	710.10000	3.77E-001	1.98E-002	1.86E-003	1.45E-003
	6/29/98	715.70000	3.77E-001	2.47E-002	2.01E-003	1.41E-003
6 - 0.3 MI SW - INFORMATION CENTER	1/ 5/98	703.50000	3.78E-001	1.94E-002	1.85E-003	1.47E-003
	1/12/98	708.20000	3.78E-001	1.39E-002	1.62E-003	1.42E-003
	1/19/98	699.10000	3.78E-001	1.83E-002	1.81E-003	1.44E-003
	1/26/98	694.40000	3.78E-001	1.75E-002	1.81E-003	1.53E-003
	2/ 9/98	693.40000	3.78E-001	1.31E-002	1.61E-003	1.46E-003
	2/ 2/98	695.70000	3.78E-001	1.73E-002	1.80E-003	1.54E-003
	2/16/98	683.90000	3.78E-001	2.36E-002	1.98E-003	1.33E-003
	2/23/98	704.00000	3.78E-001	1.45E-002	1.62E-003	1.34E-003
	3/ 2/98	708.70000	3.78E-001	1.94E-002	1.84E-003	1.45E-003
	3/ 9/98	687.80000	3.77E-001	2.20E-002	1.96E-003	1.47E-003
	3/16/98	698.90000	3.77E-001	2.28E-002	1.98E-003	1.46E-003
	3/23/98	741.10000	3.77E-001	1.43E-002	1.60E-003	1.39E-003
	3/30/98	716.90000	3.77E-001	2.28E-002	1.92E-003	1.34E-003
	4/ 6/98	716.50000	3.77E-001	1.55E-002	1.67E-003	1.39E-003
	4/13/98	732.40000	3.77E-001	1.88E-002	1.78E-003	1.40E-003
	4/20/98	728.10000	3.77E-001	2.20E-002	1.87E-003	1.28E-003
	4/27/98	735.90000	3.77E-001	2.12E-002	1.85E-003	1.35E-003
	5/ 4/98	731.70000	3.77E-001	1.77E-002	1.72E-003	1.31E-003
	5/11/98	724.10000	3.77E-001	1.49E-002	1.66E-003	1.45E-003
	5/18/98	746.00000	3.77E-001	1.78E-002	1.73E-003	1.40E-003
	5/26/98	818.80000	3.77E-001	2.85E-002	1.99E-003	1.33E-003
	6/ 1/98	639.30000	3.77E-001	2.24E-002	2.10E-003	1.70E-003
	6/ 8/98	740.60000	3.77E-001	2.03E-002	1.83E-003	1.41E-003
	6/15/98	742.40000	3.77E-001	2.05E-002	1.85E-003	1.46E-003
	6/22/98	741.80000	3.77E-001	2.02E-002	1.82E-003	1.39E-003
	6/29/98	733.20000	3.77E-001	2.43E-002	1.97E-003	1.38E-003
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	1/ 5/98	676.90000	3.78E-001	1.63E-002	1.78E-003	1.53E-003
	1/12/98	686.20000	3.78E-001	1.04E-002	1.49E-003	1.47E-003
	1/19/98	679.90000	3.78E-001	1.59E-002	1.74E-003	1.48E-003
	1/26/98	683.80000	3.78E-001	1.39E-002	1.68E-003	1.56E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	2/ 9/98	674.10000	3.78E-001	1.11E-002	1.55E-003	1.50E-003
	2/ 2/98	660.70000	3.78E-001	1.23E-002	1.66E-003	1.62E-003
	2/16/98	661.30000	3.78E-001	2.05E-002	1.91E-003	1.37E-003
	2/23/98	669.10000	3.78E-001	1.18E-002	1.55E-003	1.41E-003
	3/ 2/98	706.40000	3.78E-001	1.69E-002	1.75E-003	1.46E-003
	3/ 9/98	647.40000	3.77E-001	1.90E-002	1.92E-003	1.56E-003
	3/16/98	728.30000	3.77E-001	1.70E-002	1.72E-003	1.40E-003
	3/23/98	736.10000	3.77E-001	1.09E-002	1.46E-003	1.39E-003
	3/30/98	720.90000	3.77E-001	1.91E-002	1.79E-003	1.33E-003
	4/ 6/98	739.50000	3.77E-001	1.40E-002	1.58E-003	1.35E-003
	4/13/98	718.60000	3.77E-001	1.53E-002	1.67E-003	1.43E-003
	4/20/98	733.30000	3.77E-001	1.80E-002	1.72E-003	1.27E-003
	4/27/98	734.10000	3.77E-001	1.68E-002	1.69E-003	1.36E-003
	5/ 4/98	730.90000	3.77E-001	1.51E-002	1.62E-003	1.31E-003
	5/11/98	729.80000	3.77E-001	1.23E-002	1.54E-003	1.44E-003
	5/18/98	729.40000	3.77E-001	1.18E-002	1.52E-003	1.43E-003
	5/26/98	807.80000	3.77E-001	2.37E-002	1.86E-003	1.34E-003
	6/ 1/98	635.80000	3.77E-001	2.01E-002	2.03E-003	1.71E-003
	6/ 8/98	732.30000	3.77E-001	1.83E-002	1.77E-003	1.43E-003
	6/15/98	734.30000	3.77E-001	1.71E-002	1.74E-003	1.48E-003
	6/22/98	750.20000	3.77E-001	1.77E-002	1.72E-003	1.38E-003
	6/29/98	726.20000	3.77E-001	1.76E-002	1.74E-003	1.39E-003
55 - 0.3 MI SSE - SITE BOUNDARY	1/ 5/98	617.50000	3.78E-001	2.11E-002	2.07E-003	1.68E-003
	1/12/98	630.50000	3.78E-001	1.50E-002	1.79E-003	1.60E-003
	1/19/98	596.90000	3.78E-001	2.10E-002	2.10E-003	1.68E-003
	1/26/98	702.40000	3.78E-001	1.52E-002	1.71E-003	1.52E-003
	2/ 9/98	908.80000	3.78E-001	8.71E-003	1.17E-003	1.11E-003
	2/ 2/98	902.30000	3.78E-001	1.16E-002	1.32E-003	1.19E-003
	2/16/98	724.60000	3.78E-001	2.11E-002	1.83E-003	1.25E-003
	2/23/98	724.30000	3.78E-001	1.33E-002	1.54E-003	1.30E-003
	3/ 2/98	730.30000	3.78E-001	1.68E-002	1.71E-003	1.41E-003
	3/ 9/98	723.10000	3.77E-001	1.94E-002	1.81E-003	1.39E-003
	3/16/98	665.00000	3.77E-001	2.42E-002	2.08E-003	1.53E-003
	3/23/98	690.70000	3.77E-001	1.52E-002	1.71E-003	1.49E-003
	3/30/98	659.80000	3.77E-001	2.33E-002	2.04E-003	1.45E-003
	4/ 6/98	664.90000	3.77E-001	1.85E-002	1.87E-003	1.50E-003
	4/13/98	669.80000	3.77E-001	1.96E-002	1.91E-003	1.53E-003
	4/20/98	657.40000	3.77E-001	2.28E-002	2.01E-003	1.42E-003
	4/27/98	669.30000	3.77E-001	2.45E-002	2.08E-003	1.49E-003
	5/ 4/98	667.40000	3.77E-001	2.09E-002	1.94E-003	1.44E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
55 - 0.3 MI SSE - SITE BOUNDARY	5/11/98	653.40000	3.77E-001	1.48E-002	1.76E-003	1.61E-003
	5/18/98	593.80000	3.77E-001	1.81E-002	2.01E-003	1.76E-003
	5/26/98	529.70000	3.77E-001	4.71E-002	3.17E-003	2.05E-003
	6/ 1/98	569.20000	3.77E-001	2.45E-002	2.34E-003	1.91E-003
	6/ 8/98	621.00000	3.77E-001	2.29E-002	2.14E-003	1.68E-003
	6/22/98	664.80000	3.77E-001	2.10E-002	1.98E-003	1.55E-003
	6/29/98	652.20000	3.77E-001	2.73E-002	2.21E-003	1.55E-003
Plant: RNP Analysis: IODINE MediaType: AIR CARTRIDGE CUBIC METERS						
1 - 26 MI ESE - FLORENCE - CONTROL	1/19/98	530.90000				3.29E-002
	1/12/98	527.30000				1.31E-002
	1/ 5/98	533.70000				2.78E-002
	1/26/98	531.90000				2.29E-002
	2/ 2/98	531.00000				1.95E-002
	2/ 9/98	531.40000				1.23E-002
	2/16/98	521.20000				2.01E-002
	2/23/98	528.80000				1.62E-002
	3/ 2/98	524.70000				2.52E-002
	3/ 9/98	534.30000				1.71E-002
	3/16/98	623.10000				2.08E-002
	3/23/98	650.30000				2.22E-002
	3/30/98	610.90000				1.77E-002
	4/ 6/98	591.60000				1.46E-002
	4/13/98	600.00000				2.91E-002
	4/20/98	575.00000				2.10E-002
	4/27/98	597.00000				2.71E-002
	5/ 4/98	595.00000				1.18E-002
	5/11/98	594.30000				1.28E-002
	5/18/98	592.40000				2.18E-002
	5/26/98	686.30000				1.62E-002
	6/ 1/98	486.40000				2.01E-002
	6/ 8/98	588.80000				2.29E-002
	6/15/98	612.60000				1.72E-002
	6/22/98	561.50000				1.91E-002
	6/29/98	604.40000				2.36E-002
2 - 0.2 MI S - INFORMATION CENTER	1/19/98	818.20000				1.43E-002
	1/12/98	804.40000				1.79E-002
	1/ 5/98	822.70000				2.34E-002
	1/26/98	821.40000				1.69E-002
	2/ 2/98	824.70000				2.75E-002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
2 - 0.2 MI S - INFORMATION CENTER	2/ 9/98	823.40000				1.39E-002
	2/16/98	808.50000				1.22E-002
	2/23/98	820.30000				1.97E-002
	3/ 2/98	822.40000				1.96E-002
	3/ 9/98	816.70000				1.64E-002
	3/16/98	703.50000				2.26E-002
	3/23/98	741.70000				2.01E-002
	3/30/98	699.30000				6.90E-003
	4/ 6/98	695.70000				2.48E-002
	4/13/98	713.10000				1.30E-002
	4/20/98	701.40000				1.84E-002
	4/27/98	714.90000				1.06E-002
	5/ 4/98	707.80000				2.08E-002
	5/11/98	695.70000				2.41E-002
	5/18/98	711.90000				1.39E-002
	5/26/98	775.90000				1.04E-002
	6/ 1/98	595.60000				1.62E-002
	6/ 8/98	695.80000				1.74E-002
	6/15/98	381.60000				5.82E-002
	6/22/98	694.30000				1.71E-002
3 - 0.7 MI N - MICROWAVE TOWER	6/29/98	681.40000				2.76E-002
	1/19/98	736.80000				2.55E-002
	1/12/98	729.40000				2.21E-002
	1/ 5/98	739.20000				2.80E-002
	1/26/98	745.00000				3.17E-002
	2/ 2/98	739.10000				2.11E-002
	2/ 9/98	745.90000				2.21E-002
	2/16/98	732.70000				1.49E-002
	2/23/98	739.40000				3.22E-002
	3/ 2/98	729.50000				2.68E-002
	3/ 9/98	752.20000				1.79E-002
	3/16/98	746.30000				9.38E-003
	3/23/98	785.30000				2.35E-002
	3/30/98	726.00000				1.51E-002
	4/ 6/98	746.70000				1.82E-002
	4/13/98	745.10000				1.35E-002
	4/20/98	739.50000				1.70E-002
	4/27/98	754.90000				1.11E-002
	5/ 4/98	747.30000				1.80E-002
	5/11/98	733.60000				1.60E-002

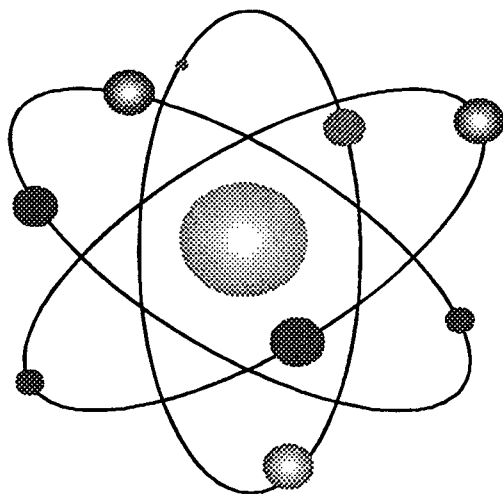
Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
3 - 0.7 MI N - MICROWAVE TOWER	5/18/98	741.20000				2.48E-002
	5/26/98	826.20000				1.88E-002
	6/ 1/98	620.60000				2.91E-002
	6/ 8/98	738.80000				2.33E-002
	6/15/98	746.00000				3.13E-002
	6/22/98	724.70000				1.29E-002
	6/29/98	733.70000				2.94E-002
4 - 0.4 MI ESE - SPILLWAY	1/19/98	689.30000				2.62E-002
	1/12/98	704.20000				3.23E-002
	1/ 5/98	707.00000				1.73E-002
	1/26/98	697.90000				1.90E-002
	2/ 2/98	701.50000				2.39E-002
	2/ 9/98	708.70000				2.24E-002
	2/16/98	697.10000				2.52E-002
	2/23/98	271.20000				3.70E-002
	3/ 2/98	701.80000				1.89E-002
	3/ 9/98	716.90000				1.98E-002
	3/16/98	720.60000				3.03E-002
	3/23/98	742.20000				2.78E-002
	3/30/98	705.80000				1.76E-002
	4/ 6/98	707.40000				2.18E-002
	4/13/98	722.90000				1.47E-002
	4/20/98	717.10000				2.68E-002
	4/27/98	716.50000				1.65E-002
	5/ 4/98	695.40000				2.14E-002
	5/11/98	701.30000				2.01E-002
	5/18/98	709.20000				2.59E-002
	5/26/98	789.20000				1.85E-002
	6/ 1/98	582.80000				2.68E-002
	6/ 8/98	680.90000				2.46E-002
	6/15/98	687.20000				1.23E-002
	6/22/98	676.10000				3.10E-002
	6/29/98	669.50000				2.98E-002
5 - 0.9 MI ENE - JOHNSONS LANDING	1/19/98	707.30000				9.79E-003
	1/12/98	730.50000				1.98E-002
	1/ 5/98	721.50000				1.19E-002
	1/26/98	796.30000				1.48E-002
	2/ 2/98	906.70000				1.23E-002
	2/ 9/98	901.30000				1.11E-002
	2/16/98	742.30000				1.16E-002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
5 - 0.9 MI ENE - JOHNSONS LANDING	2/23/98	760.10000				1.58E-002
	3/ 2/98	785.20000				1.08E-002
	3/ 9/98	715.80000				1.63E-002
	3/16/98	700.30000				2.56E-002
	3/23/98	714.10000				1.57E-002
	3/30/98	704.70000				1.98E-002
	4/ 6/98	718.80000				1.89E-002
	4/20/98	683.30000				2.34E-002
	4/27/98	708.30000				2.27E-002
	5/ 4/98	715.50000				1.47E-002
	5/11/98	696.00000				1.69E-002
	5/18/98	714.30000				1.57E-002
	5/26/98	795.00000				2.20E-002
	6/ 1/98	606.40000				1.04E-002
	6/ 8/98	712.30000				1.88E-002
	6/15/98	723.80000				1.33E-002
	6/22/98	710.10000				2.14E-002
	6/29/98	715.70000				2.78E-002
6 - 0.3 MI SW - INFORMATION CENTER	1/19/98	699.10000				2.11E-002
	1/12/98	708.20000				2.89E-002
	1/ 5/98	703.50000				2.19E-002
	1/26/98	694.40000				1.79E-002
	2/ 2/98	695.70000				2.54E-002
	2/ 9/98	693.40000				2.81E-002
	2/16/98	683.90000				1.02E-002
	2/23/98	704.00000				1.69E-002
	3/ 2/98	708.70000				2.76E-002
	3/ 9/98	687.80000				3.45E-002
	3/16/98	698.90000				2.63E-002
	3/23/98	741.10000				1.01E-002
	3/30/98	716.90000				1.87E-002
	4/ 6/98	716.50000				1.88E-002
	4/13/98	732.40000				2.63E-002
	4/20/98	728.10000				1.50E-002
	4/27/98	735.90000				2.32E-002
	5/ 4/98	731.70000				2.62E-002
	5/11/98	724.10000				1.95E-002
	5/18/98	746.00000				1.33E-002
	5/26/98	818.80000				1.33E-002
	6/ 1/98	639.30000				3.18E-002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
6 - 0.3 MI SW - INFORMATION CENTER	6/ 8/98	740.60000				1.42E-002
	6/15/98	742.40000				2.14E-002
	6/22/98	741.80000				1.60E-002
	6/29/98	733.20000				2.87E-002
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	1/19/98	679.90000				2.02E-002
	1/12/98	686.20000				1.92E-002
	1/ 5/98	676.90000				2.60E-002
	1/26/98	683.80000				2.78E-002
	2/ 2/98	660.70000				1.64E-002
	2/ 9/98	674.10000				1.55E-002
	2/16/98	661.30000				2.62E-002
	2/23/98	669.10000				2.22E-002
	3/ 2/98	706.40000				2.30E-002
	3/ 9/98	647.40000				1.73E-002
	3/16/98	728.30000				8.99E-003
	3/23/98	736.10000				2.75E-002
	3/30/98	720.90000				1.88E-002
	4/ 6/98	739.50000				8.21E-003
	4/13/98	718.60000				3.49E-002
	4/20/98	733.30000				2.02E-002
	4/27/98	734.10000				2.04E-002
	5/ 4/98	730.90000				1.49E-002
	5/11/98	729.80000				1.56E-002
	5/18/98	729.40000				2.26E-002
	5/26/98	807.80000				1.32E-002
	6/ 1/98	635.80000				1.80E-002
	6/ 8/98	732.30000				1.35E-002
	6/15/98	734.30000				1.44E-002
	6/22/98	750.20000				2.50E-002
	6/29/98	726.20000				1.87E-002
55 - 0.3 MI SSE - SITE BOUNDARY	1/19/98	596.90000				2.87E-002
	1/12/98	630.50000				1.10E-002
	1/ 5/98	617.50000				3.66E-002
	1/26/98	702.40000				1.88E-002
	2/ 2/98	902.30000				1.90E-002
	2/ 9/98	908.80000				1.51E-002
	2/16/98	724.60000				2.17E-002
	2/23/98	724.30000				2.89E-002
	3/ 2/98	730.30000				1.49E-002
	3/ 9/98	723.10000				2.18E-002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
55 - 0.3 MI SSE - SITE BOUNDARY	3/16/98	665.00000				2.68E-002
	3/23/98	690.70000				1.89E-002
	3/30/98	659.80000				1.77E-002
	4/ 6/98	664.90000				1.65E-002
	4/13/98	669.80000				1.39E-002
	4/20/98	657.40000				3.04E-002
	4/27/98	669.30000				2.43E-002
	5/ 4/98	667.40000				2.24E-002
	5/11/98	653.40000				1.92E-002
	5/18/98	593.80000				2.30E-002
	5/26/98	529.70000				2.88E-002
	6/ 1/98	569.20000				2.26E-002
	6/ 8/98	621.00000				2.11E-002
	6/22/98	664.80000				2.14E-002
	6/29/98	652.20000				2.89E-002
Plant: RNP Analysis: IODINE MediaType: MILK LITERS						
54 - 10.1 MI E - AUBURNDALE PLANTATION	1/ 5/98	4.00000				5.15E-001
	1/19/98	4.00000				5.20E-001
	2/16/98	4.00000				3.54E-001
	2/ 2/98	4.00000				5.93E-001
	3/ 2/98	4.00000				3.76E-001
	3/16/98	4.00000				5.82E-001
	3/30/98	4.00000				5.02E-001
	4/13/98	4.00000				5.56E-001
	4/27/98	4.00000				5.76E-001
	5/11/98	4.00000				5.28E-001
	5/26/98	4.00000				4.87E-001
	6/ 8/98	4.00000				4.44E-001
	6/22/98	4.00000				5.38E-001
Plant: RNP Analysis: TRITIUM MediaType: GROUNDWATER LITERS						
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	1/15/98	.00500	2.82E-001	0.00E+000	0.00E+000	3.02E+002
	2/ 9/98	.00500	2.82E-001	0.00E+000	0.00E+000	2.99E+002
	3/ 9/98	.00500	2.83E-001	0.00E+000	0.00E+000	2.97E+002
	4/13/98	.00500	2.83E-001	0.00E+000	0.00E+000	2.97E+002
42 - UNIT 1 DEEP WELL NEAR SITE ENTRANCE	1/15/98	.00500	2.82E-001	0.00E+000	0.00E+000	3.02E+002
	2/ 9/98	.00500	2.82E-001	0.00E+000	0.00E+000	2.99E+002
	3/ 9/98	.00500	2.83E-001	0.00E+000	0.00E+000	2.97E+002
	4/13/98	.00500	2.83E-001	0.00E+000	0.00E+000	2.97E+002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
43 - UNIT 2 DEEP WELL	1/15/98	.00500	2.82E-001	0.00E+000	0.00E+000	3.02E+002
	2/ 9/98	.00500	2.82E-001	0.00E+000	0.00E+000	2.99E+002
	3/ 9/98	.00500	2.83E-001	0.00E+000	0.00E+000	2.97E+002
	4/13/98	.00500	2.83E-001	0.00E+000	0.00E+000	2.97E+002
Plant: RNP Analysis: TRITIUM MediaType: SURFACE WATER LITERS						
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	1/31/98	.00500	4.37E-001	4.36E+003	3.82E+002	4.82E+002
	2/28/98	.00500	2.83E-001	3.35E+003	2.01E+002	2.94E+002
	3/31/98	.00500	2.83E-001	3.38E+003	5.82E+002	8.51E+002
	4/30/98	.00500	2.86E-001	1.67E+003	5.41E+002	8.36E+002
	5/31/98	.00500	2.84E-001	9.31E+002	5.35E+002	8.51E+002
	6/30/98	.00500	2.86E-001	1.12E+003	5.32E+002	8.40E+002
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	1/31/98	.00500	2.82E-001	0.00E+000	0.00E+000	3.02E+002
	2/28/98	.00500	2.83E-001	0.00E+000	0.00E+000	2.94E+002
	3/31/98	.00500	2.83E-001	0.00E+000	0.00E+000	2.97E+002
	4/30/98	.00500	2.86E-001	0.00E+000	0.00E+000	2.90E+002
	5/31/98	.00500	2.84E-001	0.00E+000	0.00E+000	3.00E+002
	6/30/98	.00500	2.86E-001	0.00E+000	0.00E+000	2.93E+002
57 - 0.9 MI NNW - ASH POND	1/31/98	.00500	4.37E-001	4.42E+003	3.83E+002	4.82E+002
	2/28/98	.00500	2.83E-001	3.02E+003	1.99E+002	2.94E+002
	3/31/98	.00500	2.83E-001	2.66E+003	5.69E+002	8.51E+002
	4/30/98	.00500	2.86E-001	1.55E+003	5.38E+002	8.36E+002
	5/31/98	.00500	2.84E-001	1.35E+003	5.44E+002	8.51E+002
	6/30/98	.00500	2.86E-001	4.95E+002	1.81E+002	2.92E+002



CP&L
Radiological Environmental Monitoring
Isotopic Analysis Report

4/ 9/99

Semiannual Analysis Report

4/ 9/99

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
Plant: RNP Analysis: GAMMA MediaType: AIR PARTICULATE Units: CUBIC METERS						
1 - 26 MI ESE - FLORENCE - CONTROL	2/15/98	7179.50000	BE-7	1.16E-001	2.20E-002	
	5/15/98	7685.30000	BE-7	1.48E-001	2.39E-002	
2 - 0.2 MI S - INFORMATION CENTER	2/15/98	10327.20000	BE-7	1.30E-001	1.93E-002	
	5/15/98	8765.10000	BE-7	1.65E-001	1.78E-002	
	5/15/98	8765.10000	K-40	8.10E-003	6.81E-003	
	5/15/98	8765.10000	PB-214	2.08E-003	1.20E-003	
3 - 0.7 MI N - MICROWAVE TOWER	2/15/98	9646.80000	BE-7	1.15E-001	2.13E-002	
	5/15/98	9598.30000	BE-7	1.35E-001	1.63E-002	
4 - 0.4 MI ESE - SPILLWAY	2/15/98	8764.20000	BE-7	1.18E-001	2.08E-002	
	5/15/98	9055.50000	BE-7	1.61E-001	1.85E-002	
5 - 0.9 MI ENE - JOHNSONS LANDING	2/15/98	9886.10000	BE-7	1.24E-001	1.87E-002	
	5/15/98	8507.70000	BE-7	1.35E-001	1.70E-002	
6 - 0.3 MI SW - INFORMATION CENTER	2/15/98	9135.60000	BE-7	1.31E-001	2.14E-002	
	5/15/98	9530.80000	BE-7	1.57E-001	1.65E-002	
	5/15/98	9530.80000	K-40	7.46E-003	6.27E-003	
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	2/15/98	8931.10000	BE-7	9.77E-002	2.11E-002	
	5/15/98	9502.20000	BE-7	1.52E-001	1.82E-002	
55 - 0.3 MI SSE - SITE BOUNDARY	2/15/98	9276.20000	BE-7	1.08E-001	2.24E-002	
	5/15/98	7691.10000	BE-7	1.46E-001	1.81E-002	
Plant: RNP Analysis: GAMMA MediaType: AQUATIC VEGETATION Units: GRAMS						
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	5/26/98	500.70000	TL-208	3.22E-002	2.11E-002	
	5/26/98	500.70000	I-131			3.69E-002
	5/26/98	500.70000	CS-134			2.55E-002
	5/26/98	500.70000	CS-137			3.04E-002
	5/26/98	500.70000	K-40			7.73E-001
45 - SITE VARIES WITHIN LAKE ROBINSON	5/27/98	544.10000	BE-7	1.26E+000	2.36E-001	
	5/27/98	544.10000	K-40	1.50E+000	3.37E-001	
	5/27/98	544.10000	TL-208	2.98E-001	3.10E-002	
	5/27/98	544.10000	BI-212	5.78E-001	2.00E-001	
	5/27/98	544.10000	PB-212	9.03E-001	3.69E-002	
	5/27/98	544.10000	BI-214	1.75E+000	8.30E-002	
	5/27/98	544.10000	PB-214	1.83E+000	7.80E-002	
	5/27/98	544.10000	RA-226	6.86E+000	4.56E-001	
	5/27/98	544.10000	AC-228	3.05E+000	1.45E-001	
	5/27/98	544.10000	MN-54	6.30E-002	1.94E-002	
	5/27/98	544.10000	CO-58	2.83E-001	2.85E-002	
	5/27/98	544.10000	CO-60	1.07E-001	2.32E-002	
	5/27/98	544.10000	CS-137	3.69E-002	2.36E-002	
	5/27/98	544.10000	I-131			4.55E-002

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
45 - SITE VARIES WITHIN LAKE ROBINSON	5/27/98	544.10000	CS-134			4.36E-002
46 - 4.9 MI ESE - PRESTWOOD LAKE	5/27/98	527.10000	BE-7	4.35E-001	1.84E-001	
	5/27/98	527.10000	K-40	4.22E-001	3.41E-001	
	5/27/98	527.10000	PB-212	9.71E-002	3.63E-002	
	5/27/98	527.10000	BI-214	2.51E-001	6.55E-002	
	5/27/98	527.10000	PB-214	1.85E-001	5.21E-002	
	5/27/98	527.10000	CO-58	1.26E-001	3.02E-002	
	5/27/98	527.10000	I-131			4.22E-002
	5/27/98	527.10000	CS-134			3.32E-002
	5/27/98	527.10000	CS-137			2.84E-002
54 - 10.1 MI E - AUBURNDALE PLANTATION	5/26/98	556.70000	BE-7	8.01E-001	1.98E-001	
	5/26/98	556.70000	K-40	6.21E-001	2.62E-001	
	5/26/98	556.70000	TL-208	2.60E-002	2.28E-002	
	5/26/98	556.70000	PB-212	1.08E-001	2.37E-002	
	5/26/98	556.70000	BI-214	1.49E-001	4.20E-002	
	5/26/98	556.70000	PB-214	1.44E-001	3.65E-002	
	5/26/98	556.70000	AC-228	2.34E-001	6.00E-002	
	5/26/98	556.70000	CO-58	5.91E-002	2.47E-002	
	5/26/98	556.70000	CS-137	4.32E-002	1.75E-002	
	5/26/98	556.70000	I-131			3.26E-002
	5/26/98	556.70000	CS-134			2.22E-002
Plant: RNP Analysis: GAMMA MediaType: BOTTOM FEEDER Units: GRAMS						
45 - SITE VARIES WITHIN LAKE ROBINSON	5/26/98	463.20000	K-40	3.45E+000	1.05E+000	
46 - 4.9 MI ESE - PRESTWOOD LAKE	5/27/98	479.70000	K-40	3.94E+000	1.08E+000	
47 - 13 MI NNW - LAKE BEE - CONTROL	5/27/98	310.20000	K-40	4.25E+000	1.20E+000	
	5/27/98	310.20000	CS-137	1.05E-001	7.35E-002	
	5/27/98	310.20000	PB-214	2.35E-001	1.24E-001	
Plant: RNP Analysis: GAMMA MediaType: BOTTOM SEDIMENT Units: GRAMS						
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	5/26/98	226.00000	K-40	1.07E+000	4.20E-001	
	5/26/98	226.00000	TL-208	2.23E-001	4.38E-002	
	5/26/98	226.00000	PB-212	5.42E-001	5.13E-002	
	5/26/98	226.00000	BI-214	4.15E-001	9.29E-002	
	5/26/98	226.00000	PB-214	5.33E-001	7.50E-002	
	5/26/98	226.00000	RA-226	8.32E-001	5.75E-001	
	5/26/98	226.00000	AC-228	5.78E-001	1.54E-001	
	5/26/98	226.00000	CS-137	9.14E-002	3.78E-002	
45 - SITE VARIES WITHIN LAKE ROBINSON	5/26/98	47.00000	K-40	1.52E+000	1.13E+000	
	5/26/98	47.00000	TL-208	3.12E-001	7.74E-002	
	5/26/98	47.00000	PB-212	8.63E-001	9.74E-002	

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
45 - SITE VARIES WITHIN LAKE ROBINSON	5/26/98	47.00000	BI-214	7.12E-001	1.81E-001	
	5/26/98	47.00000	PB-214	8.91E-001	1.76E-001	
	5/26/98	47.00000	RA-226	2.99E+000	1.47E+000	
	5/26/98	47.00000	AC-228	1.05E+000	2.51E-001	
	5/26/98	47.00000	CO-60	9.56E-001	1.35E-001	
	5/26/98	47.00000	CS-137	3.36E-001	8.67E-002	
46 - 4.9 MI ESE - PRESTWOOD LAKE	5/26/98	70.90000	K-40	1.51E+000	8.31E-001	
	5/26/98	70.90000	TL-208	1.73E-001	5.61E-002	
	5/26/98	70.90000	PB-212	4.64E-001	5.62E-002	
	5/26/98	70.90000	BI-214	9.61E-001	1.28E-001	
	5/26/98	70.90000	PB-214	8.84E-001	1.11E-001	
	5/26/98	70.90000	RA-226	2.29E+000	8.82E-001	
	5/26/98	70.90000	AC-228	4.73E-001	1.84E-001	
	5/26/98	70.90000	CS-137	1.64E-001	5.32E-002	
54 - 10.1 MI E - AUBURNDALE PLANTATION	5/26/98	459.10000	K-40	2.31E+000	7.24E-001	
	5/26/98	459.10000	TL-208	9.71E-001	1.24E-001	
	5/26/98	459.10000	PB-212	2.66E+000	1.69E-001	
	5/26/98	459.10000	BI-214	2.23E+000	2.69E-001	
	5/26/98	459.10000	PB-214	2.44E+000	2.41E-001	
	5/26/98	459.10000	RA-226	3.67E+000	1.58E+000	
	5/26/98	459.10000	AC-228	2.59E+000	4.19E-001	
Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: CHERRY						
50 - SSE - CP&L PROPERTY	5/13/98	394.50000	BE-7	5.89E-001	2.34E-001	
	5/13/98	394.50000	K-40	2.57E+000	6.03E-001	
	5/13/98	394.50000	TL-208	4.05E-002	2.73E-002	
	5/13/98	394.50000	I-131			2.70E-002
	5/13/98	394.50000	CS-134			3.55E-002
	5/13/98	394.50000	CS-137			4.21E-002
	6/12/98	491.10000	BE-7	3.08E-001	1.54E-001	
	6/12/98	491.10000	K-40	3.83E+000	4.69E-001	
	6/12/98	491.10000	I-131			2.90E-002
	6/12/98	491.10000	CS-134			3.31E-002
	6/12/98	491.10000	CS-137			3.26E-002
51 - SSW - CP&L PROPERTY	5/13/98	651.60000	BE-7	2.32E-001	1.35E-001	
	5/13/98	651.60000	K-40	2.79E+000	4.13E-001	
	5/13/98	651.60000	I-131			1.90E-002
	5/13/98	651.60000	CS-134			2.27E-002
	5/13/98	651.60000	CS-137			1.50E-002
	6/12/98	510.80000	BE-7	4.72E-001	2.24E-001	
	6/12/98	510.80000	K-40	4.07E+000	4.85E-001	

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
51 - SSW - CP&L PROPERTY	6/12/98	510.80000	I-131			3.29E-002
	6/12/98	510.80000	CS-134			2.90E-002
	6/12/98	510.80000	CS-137			3.06E-002
52 - 10 MI W - BETHUNE - CONTROL	5/13/98	516.80000	BE-7	2.80E-001	2.26E-001	
	5/13/98	516.80000	K-40	3.13E+000	5.01E-001	
	5/13/98	516.80000	CS-137	2.08E-001	3.24E-002	
	5/13/98	516.80000	I-131			2.55E-002
	5/13/98	516.80000	CS-134			2.99E-002
	6/12/98	440.10000	BE-7	3.20E-001	1.72E-001	
	6/12/98	440.10000	K-40	2.38E+000	3.82E-001	
	6/12/98	440.10000	CS-137	3.79E-001	3.90E-002	
	6/12/98	440.10000	I-131			2.97E-002
	6/12/98	440.10000	CS-134			2.72E-002
Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: PERSIMMOMS						
50 - SSE - CP&L PROPERTY	6/12/98	454.80000	BE-7	9.18E-001	2.57E-001	
	6/12/98	454.80000	K-40	3.09E+000	5.67E-001	
	6/12/98	454.80000	AC-228	1.51E-001	8.80E-002	
	6/12/98	454.80000	CS-137	4.57E-002	2.45E-002	
	6/12/98	454.80000	I-131			3.45E-002
	6/12/98	454.80000	CS-134			3.30E-002
51 - SSW - CP&L PROPERTY	6/12/98	502.20000	BE-7	8.62E-001	2.37E-001	
	6/12/98	502.20000	K-40	3.62E+000	5.47E-001	
	6/12/98	502.20000	I-131			3.40E-002
	6/12/98	502.20000	CS-134			3.02E-002
	6/12/98	502.20000	CS-137			2.83E-002
52 - 10 MI W - BETHUNE - CONTROL	6/12/98	526.30000	BE-7	5.13E-001	1.51E-001	
	6/12/98	526.30000	K-40	2.89E+000	3.81E-001	
	6/12/98	526.30000	CS-137	5.74E-002	1.70E-002	
	6/12/98	526.30000	I-131			2.22E-002
	6/12/98	526.30000	CS-134			2.38E-002
Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: SASSAFRAS						
50 - SSE - CP&L PROPERTY	5/13/98	419.30000	BE-7	1.71E+000	2.93E-001	
	5/13/98	419.30000	K-40	2.93E+000	5.40E-001	
	5/13/98	419.30000	TL-208	3.16E-002	2.62E-002	
	5/13/98	419.30000	PB-212	7.65E-002	4.18E-002	
	5/13/98	419.30000	I-131			2.65E-002
	5/13/98	419.30000	CS-134			3.29E-002
	5/13/98	419.30000	CS-137			3.92E-002
	6/12/98	500.90000	BE-7	5.05E-001	1.99E-001	

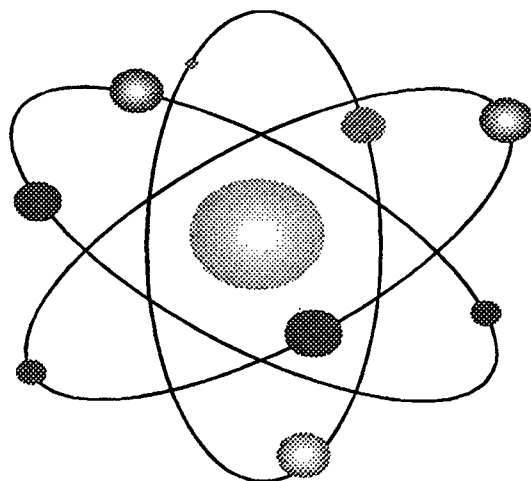
Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
50 - SSE - CP&L PROPERTY	6/12/98	500.90000	K-40	2.92E+000	4.45E-001	
	6/12/98	500.90000	CS-137	5.50E-002	2.41E-002	
	6/12/98	500.90000	I-131			3.19E-002
	6/12/98	500.90000	CS-134			2.85E-002
51 - SSW - CP&L PROPERTY	5/13/98	491.90000	BE-7	8.13E-001	2.30E-001	
	5/13/98	491.90000	K-40	2.83E+000	4.79E-001	
	5/13/98	491.90000	CS-137	3.13E-001	3.82E-002	
	5/13/98	491.90000	I-131			2.28E-002
	5/13/98	491.90000	CS-134			3.01E-002
	6/12/98	481.80000	BE-7	1.82E+000	2.90E-001	
	6/12/98	481.80000	K-40	2.63E+000	5.05E-001	
	6/12/98	481.80000	I-131			3.71E-002
	6/12/98	481.80000	CS-134			3.00E-002
	6/12/98	481.80000	CS-137			2.87E-002
	5/13/98	485.40000	BE-7	9.22E-001	1.75E-001	
	5/13/98	485.40000	K-40	2.67E+000	4.15E-001	
52 - 10 MI W - BETHUNE - CONTROL	5/13/98	485.40000	CS-137	2.73E-001	3.44E-002	
	5/13/98	485.40000	I-131			1.96E-002
	5/13/98	485.40000	CS-134			1.88E-002
	6/12/98	500.10000	BE-7	7.84E-001	1.79E-001	
	6/12/98	500.10000	K-40	1.91E+000	3.58E-001	
	6/12/98	500.10000	CS-137	1.14E-001	2.81E-002	
	6/12/98	500.10000	I-131			3.14E-002
	6/12/98	500.10000	CS-134			2.38E-002

Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: WILD GRAPES

50 - SSE - CP&L PROPERTY	5/13/98	484.00000	BE-7	1.29E+000	2.41E-001	
	5/13/98	484.00000	K-40	3.19E+000	4.61E-001	
	5/13/98	484.00000	TL-208	5.26E-002	2.36E-002	
	5/13/98	484.00000	CS-137	1.16E-001	2.63E-002	
	5/13/98	484.00000	I-131			2.27E-002
	5/13/98	484.00000	CS-134			2.92E-002
51 - SSW - CP&L PROPERTY	5/13/98	389.50000	BE-7	1.13E+000	2.66E-001	
	5/13/98	389.50000	K-40	2.91E+000	5.63E-001	
	5/13/98	389.50000	CS-137	1.00E-001	3.43E-002	
	5/13/98	389.50000	I-131			3.19E-002
	5/13/98	389.50000	CS-134			3.05E-002
52 - 10 MI W - BETHUNE - CONTROL	5/13/98	472.10000	BE-7	1.14E+000	1.91E-001	
	5/13/98	472.10000	K-40	2.83E+000	4.08E-001	
	5/13/98	472.10000	CS-137	5.76E-002	2.55E-002	
	5/13/98	472.10000	I-131			1.83E-002

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
52 - 10 MI W - BETHUNE - CONTROL	5/13/98	472.10000	CS-134			2.33E-002
Plant: RNP Analysis: GAMMA MediaType: FREE SWIMMER Units: GRAMS						
45 - SITE VARIES WITHIN LAKE ROBINSON	5/26/98	559.00000	K-40	2.12E+000	9.35E-001	
	5/26/98	559.00000	PB-214	1.34E-001	8.62E-002	
46 - 4.9 MI ESE - PRESTWOOD LAKE	5/27/98	390.90000	K-40	3.18E+000	1.37E+000	
	5/27/98	390.90000	PB-214	1.72E-001	9.62E-002	
47 - 13 MI NNW - LAKE BEE - CONTROL	5/27/98	288.50000	K-40	4.33E+000	1.36E+000	
	5/27/98	288.50000	CS-137	2.61E-001	9.15E-002	
Plant: RNP Analysis: GAMMA MediaType: GROUNDWATER Units: LITERS						
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WE	1/15/98	1.00000	NO-ACT			
	2/ 9/98	1.00000	NO-ACT			
	3/ 9/98	1.00000	NO-ACT			
	4/13/98	1.00000	NO-ACT			
42 - UNIT 1 DEEP WELL NEAR SITE ENTRANCE	1/15/98	1.00000	NO-ACT			
	2/ 9/98	1.00000	NO-ACT			
	3/ 9/98	1.00000	NO-ACT			
	4/13/98	1.00000	RA-226	6.79E+001	6.05E+001	
43 - UNIT 2 DEEP WELL	1/15/98	1.00000	TL-208	6.57E+000	5.04E+000	
	2/ 9/98	1.00000	NO-ACT			
	3/ 9/98	1.00000	NO-ACT			
	4/13/98	1.00000	NO-ACT			
Plant: RNP Analysis: GAMMA MediaType: MILK Units: LITERS						
54 - 10.1 MI E - AUBURNDALE PLANTATION	1/19/98	1.00000	K-40	1.16E+003	1.99E+002	
	1/ 5/98	1.00000	K-40	1.25E+003	2.03E+002	
	2/ 2/98	1.00000	K-40	1.10E+003	1.50E+002	
	2/16/98	1.00000	K-40	1.31E+003	1.98E+002	
	3/ 2/98	1.00000	K-40	1.31E+003	1.65E+002	
	3/16/98	1.00000	K-40	1.30E+003	1.81E+002	
	3/30/98	1.00000	K-40	1.36E+003	1.98E+002	
	4/13/98	1.00000	K-40	1.22E+003	1.73E+002	
	4/27/98	1.00000	K-40	1.33E+003	2.01E+002	
	5/11/98	1.00000	K-40	1.32E+003	1.72E+002	
	5/26/98	1.00000	K-40	1.25E+003	2.21E+002	
	6/ 8/98	1.00000	K-40	1.23E+003	1.96E+002	
	6/ 8/98	1.00000	TL-208	1.17E+001	1.04E+001	
	6/22/98	1.00000	K-40	1.71E+003	1.93E+002	
Plant: RNP Analysis: GAMMA MediaType: SHORELINE SEDIMENT Units: GRAMS						
44 - 1.9 MI NNE - SHADY REST CLUB	2/ 9/98	1306.00000	BE-7	3.40E-001	1.53E-001	

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
44 - 1.9 MI NNE - SHADY REST CLUB	2/ 9/98	1306.00000	TL-208	6.40E-002	2.17E-002	
	2/ 9/98	1306.00000	PB-212	9.71E-002	3.46E-002	
	2/ 9/98	1306.00000	BI-214	1.95E-001	5.88E-002	
	2/ 9/98	1306.00000	PB-214	1.82E-001	5.40E-002	
	2/ 9/98	1306.00000	RA-226	5.27E-001	4.27E-001	
57 - 0.9 MI NNW - ASH POND	2/ 9/98	942.30000	K-40	1.01E+001	1.34E+000	
	2/ 9/98	942.30000	TL-208	5.73E-001	9.14E-002	
	2/ 9/98	942.30000	PB-212	1.94E+000	1.49E-001	
	2/ 9/98	942.30000	BI-214	2.24E+000	2.28E-001	
	2/ 9/98	942.30000	PB-214	2.59E+000	2.50E-001	
	2/ 9/98	942.30000	RA-226	4.63E+000	1.70E+000	
	2/ 9/98	942.30000	AC-228	1.95E+000	3.76E-001	
Plant: RNP Analysis: GAMMA Media Type: SURFACE WATER Units: LITERS						
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WE	1/31/98	1.00000	NO-ACT			
	2/28/98	1.00000	NO-ACT			
	3/31/98	1.00000	NO-ACT			
	4/30/98	1.00000	NO-ACT			
	5/31/98	1.00000	NO-ACT			
	6/30/98	1.00000	NO-ACT			
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	1/31/98	1.00000	NO-ACT			
	2/28/98	1.00000	NO-ACT			
	3/31/98	1.00000	NO-ACT			
	4/30/98	1.00000	NO-ACT			
	5/31/98	1.00000	NO-ACT			
	6/30/98	1.00000	NO-ACT			
57 - 0.9 MI NNW - ASH POND	1/31/98	1.00000	NO-ACT			
	2/28/98	1.00000	NO-ACT			
	3/31/98	1.00000	NO-ACT			
	4/30/98	1.00000	NO-ACT			
	5/31/98	1.00000	NO-ACT			
	6/30/98	1.00000	NO-ACT			



CP&L
Radiological Environmental Monitoring
Analysis Report

2/11/99

Plant: RNP
Sample Point

TLD in mR/QTR

SampleDate

Dose

2 SigmaError

1 - 26 MI ESE - FLORENCE - CONTROL	8/15/98	1.37E+001	2.10E+000
1	11/15/98	1.38E+001	9.00E-001
2 - 0.2 MI S - INFORMATION CENTER	8/15/98	1.30E+001	2.10E+000
2	11/15/98	1.21E+001	1.90E+000
3 - 0.7 MI N - MICROWAVE TOWER	8/15/98	1.49E+001	2.40E+000
3	11/15/98	1.44E+001	8.00E-001
4 - 0.4 MI ESE - SPILLWAY	8/15/98	1.20E+001	2.00E+000
4	11/15/98	1.21E+001	1.60E+000
5 - 0.9 MI ENE - JOHNSONS LANDING	8/15/98	1.69E+001	2.50E+000
5	11/15/98	1.22E+001	1.60E+000
6 - 0.3 MI SW - INFORMATION CENTER	8/15/98	1.56E+001	3.70E+000
6	11/15/98	1.32E+001	2.10E+000
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	8/15/98	1.48E+001	2.70E+000
7	11/15/98	1.17E+001	9.00E-001
8 - 0.8 MI SSE - POWER POLES FROM HBR	8/15/98	1.12E+001	2.20E+000
8	11/15/98	1.07E+001	1.30E+000
9 - 1.0 MI S - POWER POLE NEAR HWY 151	8/15/98	1.96E+001	2.50E+000
9	11/15/98	1.89E+001	1.20E+000
10 - 1.0 MI WSW - CHURCH OF GOD CEMETERY	8/15/98	1.13E+001	2.10E+000
10	11/15/98	1.18E+001	1.20E+000
11 - 1.0 MI SW - POWER POLE AT OLD CAMDEN RD	8/15/98	1.05E+001	2.20E+000
11	11/15/98	1.04E+001	9.00E-001
12 - 1.2 MI SSW-PINE TREE AT 2ND INT DIRT RD	8/15/98	1.50E+001	2.50E+000
13 - 1.0 MI W-PINE TREE WHERE DIRT RD SPLITS	8/15/98	1.27E+001	2.00E+000
13	11/15/98	1.14E+001	1.90E+000
14 - 0.9 MI WNW - HWY 151 AT PINE RIDGE CH	8/15/98	1.68E+001	3.20E+000
14	11/15/98	1.62E+001	9.00E-001
15 - 1.0 MI NW -DIRT RD NEAR ASH POND	8/15/98	1.13E+001	2.00E+000
15	11/15/98	1.03E+001	9.00E-001
16 - 1.0 MI NNW - DARLINGTON IC TURBINE PLANT	8/15/98	1.29E+001	3.00E+000
16	11/15/98	1.22E+001	1.60E+000
17 - 1.1 MI N - DIS CANAL RD AT UNIT 1 WEIR	8/15/98	1.44E+001	2.20E+000
17	11/15/98	1.27E+001	1.20E+000
18 - 0.7 MI SE - TRAIN TRESTLE OVER BLACK CR	8/15/98	1.16E+001	3.20E+000
18	11/15/98	1.16E+001	1.20E+000
19 - 1.0 MI E - RD S-16-23	8/15/98	1.25E+001	2.10E+000
19	11/15/98	1.17E+001	1.20E+000
20 - 1.3 MI ENE - RD S-16-39 NORTH	8/15/98	1.64E+001	2.60E+000
20	11/15/98	1.40E+001	1.10E+000
21 - ATKINSONS BOAT LANDING	8/15/98	1.24E+001	2.60E+000

Plant: RNP

TLD in mR/QTR

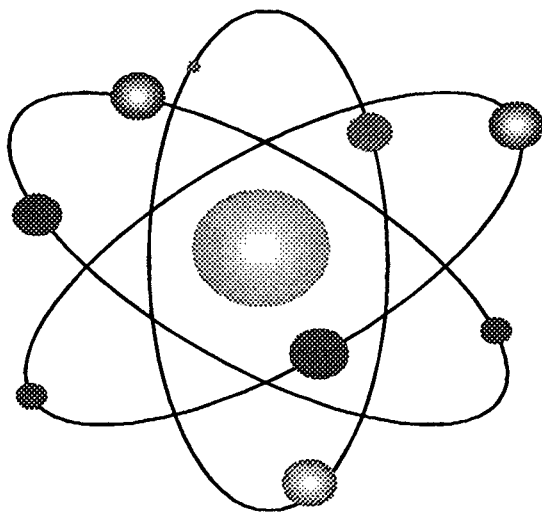
Sample Point

SampleDate

Dose

2 SigmaError

21 - ATKINSONS BOAT LANDING	11/15/98	1.28E+001	1.40E+000
22 - 1.9 MI NNE - SHADY REST NEAR DOCK	8/15/98	1.59E+001	2.30E+000
22	11/15/98	1.27E+001	1.00E+000
23 - 1.2 MI ESE - INT RD 41E-5 AND S-16-39	8/15/98	1.71E+001	2.60E+000
24 - 5.0 MI NW - S-13-711 PAST PEACH FARM	8/15/98	1.64E+001	2.00E+000
25 - 4.6 MI NNW - RD S-13-346 OFF 151 NORTH	8/15/98	1.47E+001	2.60E+000
25	11/15/98	1.31E+001	9.00E-001
26 - 5.0 MI N - RD S-13-346	8/15/98	1.72E+001	2.10E+000
26	11/15/98	1.39E+001	8.00E-001
27 - 5.0 MI NNE - RD S-13-763 NEAR INTER	8/15/98	1.10E+001	2.20E+000
27	11/15/98	1.10E+001	1.30E+000
28 - 4.8 MI NE - NEAR DUMPSTER RD S-13-39	8/15/98	2.12E+001	3.20E+000
28	11/15/98	1.75E+001	1.70E+000
29 - RD S-16-20 SOUTH OF LOOKOUT TOWER	8/15/98	1.65E+001	2.20E+000
29	11/15/98	1.48E+001	1.70E+000
30 - 4.6 MI E - RD S-16-20 JOHNSON FENCE CO	8/15/98	1.81E+001	2.90E+000
30	11/15/98	1.42E+001	8.00E-001
31 - 4.6 MI ESE - LAKESHORE DRIVE	8/15/98	1.83E+001	2.50E+000
31	11/15/98	1.39E+001	9.00E-001
32 - 4.5 MI SE - END OF KALBER DRIVE	8/15/98	1.41E+001	2.00E+000
32	11/15/98	1.30E+001	1.90E+000
33 - 4.6 MI SSE-RD S16-493 NEAR SEGARS ENTR	8/15/98	1.45E+001	2.20E+000
33	11/15/98	1.52E+001	1.80E+000
34 - 4.6 MI S - RD S-16-772	8/15/98	1.03E+001	2.40E+000
34	11/15/98	9.40E+000	8.00E-001
35 - 4.4 MI SSW - INT RD S-31-51 & S-16-12	8/15/98	2.11E+001	2.40E+000
35	11/15/98	2.03E+001	9.00E-001
36 - 4.7 MI SW - PAVED RD OFF RD S-16-85	8/15/98	2.14E+001	2.40E+000
36	11/15/98	1.88E+001	1.70E+000
37 - 5.0 MI WSW - TRANS TOWER NEAR CLAY RD	8/15/98	2.30E+001	2.80E+000
37	11/15/98	1.92E+001	1.80E+000
39 - 5.0 MI WNW - POWER POLE IN FIELD	8/15/98	1.49E+001	3.20E+000
39	11/15/98	1.40E+001	1.20E+000
55 - 0.3 MI SSE - SITE BOUNDARY	8/15/98	1.48E+001	2.00E+000
55	11/15/98	1.46E+001	1.20E+000
56 - 300 FT N OF ISFSI	8/15/98	1.73E+001	2.30E+000
56	11/15/98	1.39E+001	1.30E+000



CP&L
Radiological Environmental Monitoring
Analysis Report

4/ 9/99

Semiannual Analysis Report

4/ 9/99

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
Plant: RNP Analysis: BETA MediaType: AIR PARTICULATE CUBIC METERS						
1 - 26 MI ESE - FLORENCE - CONTROL	7/ 6/98	566.40000	3.77E-001	2.67E-002	2.38E-003	1.77E-003
	7/13/98	584.20000	3.77E-001	2.72E-002	2.35E-003	1.70E-003
	7/20/98	584.00000	3.77E-001	1.76E-002	1.95E-003	1.60E-003
	7/27/98	583.00000	3.77E-001	2.20E-002	2.18E-003	1.75E-003
	8/ 3/98	608.30000	3.77E-001	2.31E-002	2.14E-003	1.60E-003
	8/10/98	564.50000	3.77E-001	1.56E-002	1.96E-003	1.82E-003
	8/17/98	584.50000	3.77E-001	2.18E-002	2.18E-003	1.79E-003
	8/24/98	583.50000	3.77E-001	1.86E-002	2.07E-003	1.82E-003
	8/31/98	582.20000	3.77E-001	2.51E-002	2.34E-003	1.92E-003
	9/14/98	542.80000	3.77E-001	2.25E-002	2.34E-003	2.03E-003
	9/21/98	595.90000	3.77E-001	2.90E-002	2.39E-003	1.69E-003
	9/ 8/98	666.80000	3.77E-001	3.17E-002	2.32E-003	1.52E-003
	9/28/98	564.70000	3.77E-001	2.28E-002	2.25E-003	1.82E-003
	10/12/98	579.80000	3.77E-001	1.95E-002	2.07E-003	1.71E-003
	10/19/98	570.90000	3.77E-001	3.35E-002	2.59E-003	1.74E-003
	10/26/98	546.50000	3.77E-001	2.44E-002	2.35E-003	1.85E-003
	11/ 2/98	557.90000	3.77E-001	3.54E-002	2.70E-003	1.84E-003
	10/ 5/98	562.30000	3.77E-001	2.07E-002	2.15E-003	1.75E-003
	11/ 9/98	569.00000	3.77E-001	2.53E-002	2.29E-003	1.64E-003
	11/16/98	564.70000	3.77E-001	3.27E-002	2.61E-003	1.85E-003
	11/30/98	564.70000	3.77E-001	2.76E-002	2.38E-003	1.63E-003
	11/23/98	568.30000	3.77E-001	4.01E-002	2.79E-003	1.70E-003
	12/ 7/98	579.80000	3.77E-001	2.46E-002	2.26E-003	1.71E-003
	12/14/98	546.80000	3.77E-001	2.08E-002	2.20E-003	1.80E-003
	12/21/98	571.60000	3.77E-001	2.20E-002	2.19E-003	1.72E-003
	12/28/98	572.70000	3.77E-001	2.57E-002	2.36E-003	1.89E-003
2 - 0.2 MI S - INFORMATION CENTER	7/ 6/98	689.50000	3.77E-001	2.33E-002	2.00E-003	1.45E-003
	7/13/98	695.40000	3.77E-001	2.60E-002	2.08E-003	1.43E-003
	7/20/98	690.60000	3.77E-001	1.96E-002	1.84E-003	1.35E-003
	7/27/98	818.40000	3.77E-001	1.75E-002	1.62E-003	1.25E-003
	8/ 3/98	684.00000	3.77E-001	2.29E-002	1.99E-003	1.42E-003
	8/10/98	701.10000	3.77E-001	1.49E-002	1.68E-003	1.46E-003
	8/17/98	688.60000	3.77E-001	1.85E-002	1.85E-003	1.52E-003
	8/24/98	706.60000	3.77E-001	2.49E-002	2.05E-003	1.50E-003
	8/31/98	680.20000	3.77E-001	3.19E-002	2.34E-003	1.65E-003
	9/14/98	805.40000	3.77E-001	2.12E-002	1.79E-003	1.37E-003
	9/21/98	695.80000	3.77E-001	2.88E-002	2.17E-003	1.45E-003
	9/ 8/98	791.80000	3.77E-001	3.36E-002	2.16E-003	1.28E-003
	9/28/98	763.80000	3.77E-001	2.06E-002	1.80E-003	1.34E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
2 - 0.2 MI S - INFORMATION CENTER	10/12/98	770.00000	3.77E-001	1.96E-002	1.74E-003	1.29E-003
	10/19/98	777.10000	3.77E-001	3.04E-002	2.08E-003	1.28E-003
	10/26/98	779.40000	3.77E-001	2.05E-002	1.77E-003	1.29E-003
	11/ 2/98	761.00000	3.77E-001	3.01E-002	2.11E-003	1.35E-003
	10/ 5/98	772.00000	3.77E-001	2.03E-002	1.76E-003	1.27E-003
	11/ 9/98	780.40000	3.77E-001	2.12E-002	1.77E-003	1.19E-003
	11/16/98	779.00000	3.77E-001	2.84E-002	2.04E-003	1.34E-003
	11/30/98	787.70000	3.77E-001	2.24E-002	1.80E-003	1.17E-003
	11/23/98	779.00000	3.77E-001	3.25E-002	2.13E-003	1.24E-003
	12/ 7/98	752.70000	3.77E-001	2.15E-002	1.84E-003	1.31E-003
	12/14/98	784.40000	3.77E-001	1.84E-002	1.68E-003	1.25E-003
	12/21/98	784.50000	3.77E-001	1.82E-002	1.67E-003	1.25E-003
	12/28/98	794.60000	3.77E-001	2.39E-002	1.89E-003	1.36E-003
3 - 0.7 MI N - MICROWAVE TOWER	7/ 6/98	728.80000	3.77E-001	2.28E-002	1.92E-003	1.38E-003
	7/13/98	678.30000	3.77E-001	2.96E-002	2.23E-003	1.47E-003
	7/20/98	728.60000	3.77E-001	1.74E-002	1.70E-003	1.28E-003
	7/27/98	740.00000	3.77E-001	1.98E-002	1.81E-003	1.38E-003
	8/ 3/98	733.00000	3.77E-001	2.16E-002	1.86E-003	1.32E-003
	8/10/98	730.40000	3.77E-001	1.35E-002	1.58E-003	1.41E-003
	8/17/98	734.80000	3.77E-001	2.09E-002	1.86E-003	1.42E-003
	8/24/98	738.00000	3.77E-001	2.00E-002	1.83E-003	1.44E-003
	8/31/98	725.40000	3.77E-001	2.88E-002	2.16E-003	1.54E-003
	9/14/98	724.90000	3.77E-001	2.10E-002	1.90E-003	1.52E-003
	9/21/98	750.00000	3.77E-001	2.84E-002	2.07E-003	1.34E-003
	9/ 8/98	837.70000	3.77E-001	3.12E-002	2.02E-003	1.21E-003
	9/28/98	712.50000	3.77E-001	1.91E-002	1.82E-003	1.44E-003
	10/12/98	730.90000	3.77E-001	1.87E-002	1.77E-003	1.35E-003
	10/19/98	731.50000	3.77E-001	2.92E-002	2.12E-003	1.36E-003
	10/26/98	714.20000	3.77E-001	2.28E-002	1.95E-003	1.41E-003
	11/ 2/98	743.50000	3.77E-001	3.19E-002	2.19E-003	1.38E-003
	10/ 5/98	720.30000	3.77E-001	2.31E-002	1.94E-003	1.37E-003
	11/ 9/98	735.50000	3.77E-001	2.37E-002	1.91E-003	1.27E-003
	11/16/98	721.10000	3.77E-001	3.13E-002	2.22E-003	1.45E-003
	11/30/98	741.90000	3.77E-001	2.40E-002	1.91E-003	1.24E-003
	11/23/98	736.70000	3.77E-001	3.08E-002	2.15E-003	1.31E-003
	12/ 7/98	716.20000	3.77E-001	2.20E-002	1.91E-003	1.38E-003
	12/14/98	738.60000	3.77E-001	1.85E-002	1.74E-003	1.33E-003
	12/21/98	737.30000	3.77E-001	1.99E-002	1.80E-003	1.33E-003
	12/28/98	746.70000	3.77E-001	2.43E-002	1.97E-003	1.45E-003
4 - 0.4 MI ESE - SPILLWAY	7/ 6/98	669.30000	3.77E-001	2.65E-002	2.15E-003	1.50E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
4 - 0.4 MI ESE - SPILLWAY	7/13/98	675.40000	3.77E-001	3.03E-002	2.25E-003	1.47E-003
	7/20/98	669.50000	3.77E-001	2.12E-002	1.93E-003	1.39E-003
	7/27/98	689.70000	3.77E-001	2.18E-002	1.96E-003	1.48E-003
	8/ 3/98	668.20000	3.77E-001	2.46E-002	2.07E-003	1.45E-003
	8/10/98	688.40000	3.77E-001	1.72E-002	1.79E-003	1.49E-003
	8/17/98	666.10000	3.77E-001	2.55E-002	2.14E-003	1.57E-003
	8/24/98	685.70000	3.77E-001	2.77E-002	2.18E-003	1.55E-003
	8/31/98	664.80000	3.77E-001	3.54E-002	2.48E-003	1.68E-003
	9/14/98	825.10000	3.77E-001	2.26E-002	1.81E-003	1.34E-003
	9/21/98	675.00000	3.77E-001	3.37E-002	2.37E-003	1.49E-003
	9/ 8/98	767.70000	3.77E-001	4.04E-002	2.38E-003	1.32E-003
	9/28/98	722.60000	3.77E-001	2.24E-002	1.93E-003	1.42E-003
	10/12/98	711.80000	3.77E-001	2.24E-002	1.93E-003	1.39E-003
	10/19/98	736.70000	3.77E-001	3.22E-002	2.20E-003	1.35E-003
	10/26/98	739.20000	3.77E-001	2.20E-002	1.88E-003	1.36E-003
	11/ 2/98	735.30000	3.77E-001	3.82E-002	2.38E-003	1.40E-003
	10/ 5/98	741.70000	3.77E-001	2.57E-002	1.99E-003	1.33E-003
	11/ 9/98	743.70000	3.77E-001	2.53E-002	1.96E-003	1.25E-003
	11/16/98	730.20000	3.77E-001	3.12E-002	2.20E-003	1.43E-003
	11/30/98	747.10000	3.77E-001	2.77E-002	2.02E-003	1.23E-003
	11/23/98	740.90000	3.77E-001	3.70E-002	2.32E-003	1.30E-003
	12/ 7/98	716.20000	3.77E-001	2.46E-002	2.00E-003	1.38E-003
	12/14/98	747.10000	3.77E-001	1.95E-002	1.77E-003	1.32E-003
	12/21/98	749.10000	3.77E-001	2.25E-002	1.87E-003	1.31E-003
	12/28/98	746.30000	3.77E-001	2.54E-002	2.01E-003	1.45E-003
5 - 0.9 MI ENE - JOHNSONS LANDING	7/ 6/98	700.40000	3.77E-001	2.33E-002	1.98E-003	1.43E-003
	7/13/98	718.30000	3.77E-001	2.49E-002	2.00E-003	1.39E-003
	7/20/98	710.40000	3.77E-001	1.86E-002	1.77E-003	1.31E-003
	7/27/98	727.80000	3.77E-001	1.98E-002	1.82E-003	1.40E-003
	8/ 3/98	713.90000	3.77E-001	2.19E-002	1.90E-003	1.36E-003
	8/10/98	720.90000	3.77E-001	1.47E-002	1.64E-003	1.42E-003
	8/17/98	712.40000	3.77E-001	1.95E-002	1.84E-003	1.47E-003
	8/24/98	725.00000	3.77E-001	2.35E-002	1.97E-003	1.47E-003
	8/31/98	709.90000	3.77E-001	2.84E-002	2.18E-003	1.58E-003
	9/14/98	728.60000	3.77E-001	2.04E-002	1.88E-003	1.51E-003
	9/21/98	731.30000	3.77E-001	2.89E-002	2.11E-003	1.38E-003
	9/ 8/98	807.70000	3.77E-001	3.38E-002	2.14E-003	1.26E-003
	9/28/98	807.90000	3.77E-001	1.79E-002	1.65E-003	1.27E-003
	10/12/98	822.40000	3.77E-001	1.68E-002	1.58E-003	1.20E-003
	10/19/98	822.60000	3.77E-001	2.72E-002	1.93E-003	1.21E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
5 - 0.9 MI ENE - JOHNSONS LANDING	10/26/98	810.70000	3.77E-001	1.86E-002	1.66E-003	1.24E-003
	11/ 2/98	811.80000	3.77E-001	3.02E-002	2.04E-003	1.26E-003
	10/ 5/98	821.10000	3.77E-001	2.01E-002	1.69E-003	1.20E-003
	11/ 9/98	837.40000	3.77E-001	2.05E-002	1.67E-003	1.11E-003
	11/16/98	800.30000	3.77E-001	2.83E-002	2.00E-003	1.31E-003
	11/30/98	814.80000	3.77E-001	2.15E-002	1.73E-003	1.13E-003
	11/23/98	804.80000	3.77E-001	2.92E-002	2.00E-003	1.20E-003
	12/ 7/98	786.60000	3.77E-001	2.11E-002	1.77E-003	1.26E-003
	12/14/98	799.10000	3.77E-001	1.78E-002	1.64E-003	1.23E-003
	12/21/98	790.20000	3.77E-001	1.88E-002	1.69E-003	1.24E-003
	12/28/98	792.40000	3.77E-001	2.38E-002	1.89E-003	1.36E-003
6 - 0.3 MI SW - INFORMATION CENTER	7/ 6/98	740.90000	3.77E-001	2.38E-002	1.94E-003	1.35E-003
	7/13/98	744.80000	3.77E-001	2.54E-002	1.98E-003	1.34E-003
	7/20/98	736.60000	3.77E-001	1.93E-002	1.76E-003	1.26E-003
	7/27/98	761.40000	3.77E-001	2.00E-002	1.78E-003	1.34E-003
	8/ 3/98	722.20000	3.77E-001	2.21E-002	1.89E-003	1.34E-003
	8/10/98	745.80000	3.77E-001	1.27E-002	1.52E-003	1.38E-003
	8/17/98	723.90000	3.77E-001	2.25E-002	1.93E-003	1.44E-003
	8/24/98	746.80000	3.77E-001	2.40E-002	1.95E-003	1.42E-003
	8/31/98	721.40000	3.77E-001	2.78E-002	2.14E-003	1.55E-003
	9/14/98	668.70000	3.77E-001	2.18E-002	2.03E-003	1.65E-003
	9/21/98	728.50000	3.77E-001	2.99E-002	2.15E-003	1.38E-003
	9/ 8/98	841.40000	3.77E-001	3.42E-002	2.10E-003	1.21E-003
	9/28/98	764.20000	3.77E-001	1.90E-002	1.75E-003	1.34E-003
	10/12/98	752.60000	3.77E-001	2.09E-002	1.82E-003	1.32E-003
	10/19/98	754.30000	3.77E-001	3.03E-002	2.12E-003	1.32E-003
	10/26/98	751.00000	3.77E-001	2.25E-002	1.88E-003	1.34E-003
	11/ 2/98	696.50000	3.77E-001	3.05E-002	2.23E-003	1.47E-003
	10/ 5/98	769.60000	3.77E-001	2.23E-002	1.84E-003	1.28E-003
	11/ 9/98	747.50000	3.77E-001	2.18E-002	1.83E-003	1.25E-003
	11/16/98	753.70000	3.77E-001	3.16E-002	2.17E-003	1.39E-003
	11/30/98	763.90000	3.77E-001	2.54E-002	1.93E-003	1.20E-003
	11/23/98	753.40000	3.77E-001	3.34E-002	2.20E-003	1.28E-003
	12/ 7/98	733.90000	3.77E-001	2.32E-002	1.92E-003	1.35E-003
	12/14/98	753.50000	3.77E-001	1.99E-002	1.77E-003	1.31E-003
	12/21/98	748.10000	3.77E-001	1.91E-002	1.75E-003	1.31E-003
	12/28/98	749.40000	3.77E-001	2.45E-002	1.97E-003	1.44E-003
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	7/ 6/98	739.50000	3.77E-001	2.09E-002	1.84E-003	1.36E-003
	7/13/98	727.30000	3.77E-001	2.24E-002	1.91E-003	1.37E-003
	7/20/98	733.80000	3.77E-001	1.61E-002	1.64E-003	1.27E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	7/27/98	745.30000	3.77E-001	1.76E-002	1.72E-003	1.37E-003
	8/ 3/98	727.90000	3.77E-001	1.82E-002	1.74E-003	1.33E-003
	8/10/98	737.10000	3.77E-001	1.23E-002	1.52E-003	1.39E-003
	8/17/98	726.60000	3.77E-001	1.84E-002	1.78E-003	1.44E-003
	8/24/98	731.60000	3.77E-001	2.07E-002	1.86E-003	1.45E-003
	8/31/98	723.00000	3.77E-001	2.27E-002	1.97E-003	1.55E-003
	9/14/98	716.90000	3.77E-001	1.96E-002	1.87E-003	1.54E-003
	9/21/98	745.50000	3.77E-001	2.42E-002	1.94E-003	1.35E-003
	9/ 8/98	820.50000	3.77E-001	2.83E-002	1.97E-003	1.24E-003
	9/28/98	869.80000	3.77E-001	1.45E-002	1.45E-003	1.18E-003
	10/12/98	350.80000	3.77E-001	2.23E-002	3.00E-003	2.82E-003
	10/19/98	345.30000	3.77E-001	3.10E-002	3.41E-003	2.88E-003
	10/26/98	572.00000	3.77E-001	2.75E-002	2.40E-003	1.76E-003
	11/ 2/98	614.40000	3.77E-001	3.41E-002	2.52E-003	1.67E-003
	10/ 5/98	569.20000	3.77E-001	1.77E-002	2.02E-003	1.73E-003
	11/ 9/98	651.00000	3.77E-001	2.37E-002	2.06E-003	1.43E-003
	11/16/98	653.40000	3.77E-001	3.11E-002	2.34E-003	1.60E-003
	11/30/98	690.60000	3.77E-001	2.55E-002	2.04E-003	1.33E-003
	11/23/98	671.10000	3.77E-001	3.41E-002	2.37E-003	1.44E-003
	12/ 7/98	654.40000	3.77E-001	2.29E-002	2.05E-003	1.51E-003
	12/14/98	687.50000	3.77E-001	2.02E-002	1.89E-003	1.43E-003
	12/21/98	679.70000	3.77E-001	2.13E-002	1.94E-003	1.45E-003
	12/28/98	687.90000	3.77E-001	2.66E-002	2.14E-003	1.57E-003
55 - 0.3 MI SSE - SITE BOUNDARY	7/ 6/98	660.60000	3.77E-001	2.51E-002	2.12E-003	1.52E-003
	7/13/98	663.30000	3.77E-001	2.71E-002	2.18E-003	1.50E-003
	7/20/98	658.00000	3.77E-001	2.12E-002	1.95E-003	1.42E-003
	7/27/98	669.70000	3.77E-001	2.10E-002	1.96E-003	1.52E-003
	8/ 3/98	655.30000	3.77E-001	2.29E-002	2.04E-003	1.48E-003
	8/10/98	659.40000	3.77E-001	1.60E-002	1.79E-003	1.56E-003
	8/17/98	653.00000	3.77E-001	2.34E-002	2.09E-003	1.60E-003
	8/24/98	662.10000	3.77E-001	2.71E-002	2.20E-003	1.60E-003
	8/31/98	652.30000	3.77E-001	3.21E-002	2.40E-003	1.72E-003
	9/14/98	625.00000	3.77E-001	2.47E-002	2.22E-003	1.76E-003
	9/21/98	664.50000	3.77E-001	3.11E-002	2.31E-003	1.52E-003
	9/ 8/98	754.10000	3.77E-001	3.72E-002	2.32E-003	1.35E-003
	9/28/98	806.60000	3.77E-001	1.96E-002	1.71E-003	1.27E-003
	10/12/98	698.50000	3.77E-001	2.00E-002	1.86E-003	1.42E-003
	10/19/98	888.90000	3.77E-001	2.68E-002	1.83E-003	1.12E-003
	10/26/98	706.00000	3.77E-001	2.35E-002	1.98E-003	1.43E-003
	11/ 2/98	659.20000	3.77E-001	3.30E-002	2.38E-003	1.56E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
55 - 0.3 MI SSE - SITE BOUNDARY	10/ 5/98	710.00000	3.77E-001	2.09E-002	1.88E-003	1.39E-003
	11/ 9/98	787.90000	3.77E-001	2.41E-002	1.86E-003	1.18E-003
	11/16/98	783.30000	3.77E-001	3.25E-002	2.15E-003	1.33E-003
	11/30/98	806.80000	3.77E-001	2.47E-002	1.84E-003	1.14E-003
	11/23/98	795.10000	3.77E-001	3.23E-002	2.10E-003	1.21E-003
	12/ 7/98	789.70000	3.77E-001	2.22E-002	1.81E-003	1.25E-003
	12/14/98	793.00000	3.77E-001	2.01E-002	1.73E-003	1.24E-003
	12/21/98	784.40000	3.77E-001	1.97E-002	1.73E-003	1.25E-003
	12/28/98	788.50000	3.77E-001	2.72E-002	2.00E-003	1.37E-003
Plant: RNP Analysis: IODINE MediaType: AIR CARTRIDGE CUBIC METERS						
1 - 26 MI ESE - FLORENCE - CONTROL	9/ 8/98	666.80000				1.30E-002
	7/ 6/98	566.40000				1.55E-002
	10/ 5/98	562.30000				2.64E-002
	9/14/98	542.80000				1.80E-002
	7/13/98	584.20000				2.25E-002
	7/20/98	584.00000				2.73E-002
	7/27/98	583.00000				3.00E-002
	10/12/98	579.80000				1.63E-002
	10/19/98	570.90000				3.13E-002
	10/26/98	546.50000				2.47E-002
	11/ 2/98	557.90000				1.09E-002
	11/ 9/98	569.00000				1.89E-002
	11/16/98	564.70000				1.47E-002
	11/23/98	568.30000				1.50E-002
	11/30/98	564.70000				3.13E-002
	12/ 7/98	579.80000				2.52E-002
	8/31/98	582.20000				1.86E-002
	12/28/98	572.70000				2.34E-002
	12/14/98	546.80000				1.40E-002
	12/21/98	571.60000				2.21E-002
	8/ 3/98	608.30000				2.31E-002
	8/10/98	564.50000				3.78E-002
	8/17/98	584.50000				2.41E-002
	8/24/98	583.50000				1.37E-002
	9/21/98	595.90000				3.44E-002
	9/28/98	564.70000				1.24E-002
2 - 0.2 MI S - INFORMATION CENTER	7/ 6/98	689.50000				2.39E-002
	10/ 5/98	772.00000				2.00E-002
	9/14/98	805.40000				1.69E-002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
2 - 0.2 MI S - INFORMATION CENTER	7/13/98	695.40000				1.13E-002
	7/20/98	690.60000				3.19E-002
	7/27/98	818.40000				1.74E-002
	10/12/98	770.00000				2.18E-002
	10/19/98	777.10000				2.16E-002
	10/26/98	779.40000				1.62E-002
	11/ 2/98	761.00000				1.50E-002
	11/ 9/98	780.40000				1.87E-002
	11/16/98	779.00000				2.29E-002
	11/23/98	779.00000				1.78E-002
	11/30/98	787.70000				2.04E-002
	12/ 7/98	752.70000				1.66E-002
	8/31/98	680.20000				2.66E-002
	12/28/98	794.60000				1.47E-002
	12/14/98	784.40000				1.38E-002
	12/21/98	784.50000				2.08E-002
	8/ 3/98	684.00000				2.39E-002
	8/10/98	701.10000				1.56E-002
	8/17/98	688.60000				2.31E-002
	8/24/98	706.60000				2.08E-002
	9/ 8/98	791.80000				2.74E-002
	9/21/98	695.80000				2.86E-002
	9/28/98	763.80000				1.75E-002
3 - 0.7 MI N - MICROWAVE TOWER	7/ 6/98	728.80000				1.63E-002
	10/ 5/98	720.30000				3.31E-002
	9/14/98	724.90000				1.97E-002
	7/13/98	678.30000				2.58E-002
	7/20/98	728.60000				1.61E-002
	7/27/98	740.00000				2.72E-002
	10/12/98	730.90000				3.22E-002
	10/19/98	731.50000				2.71E-002
	10/26/98	714.20000				1.83E-002
	11/ 2/98	743.50000				2.19E-002
	11/ 9/98	735.50000				2.71E-002
	11/16/98	721.10000				2.79E-002
	11/23/98	736.70000				1.68E-002
	11/30/98	741.90000				2.19E-002
	12/ 7/98	716.20000				1.30E-002
	8/31/98	725.40000				2.43E-002
	12/14/98	738.60000				2.08E-002

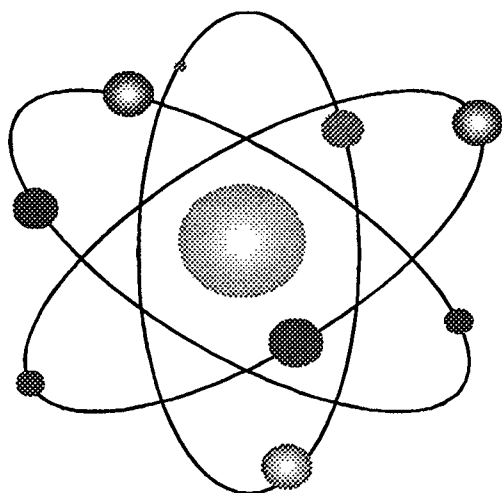
Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
3 - 0.7 MI N - MICROWAVE TOWER	12/21/98	737.30000				1.85E-002
	12/28/98	746.70000				1.90E-002
	8/ 3/98	733.00000				3.76E-002
	8/10/98	730.40000				1.97E-002
	8/17/98	734.80000				2.74E-002
	8/24/98	738.00000				1.80E-002
	9/ 8/98	837.70000				1.63E-002
	9/21/98	750.00000				1.92E-002
	9/28/98	712.50000				2.10E-002
4 - 0.4 MI ESE - SPILLWAY	7/ 6/98	669.30000				3.96E-002
	10/ 5/98	741.70000				1.36E-002
	9/14/98	825.10000				1.88E-002
	7/13/98	675.40000				3.11E-002
	7/20/98	669.50000				2.64E-002
	7/27/98	689.70000				2.34E-002
	10/12/98	711.80000				2.62E-002
	10/19/98	736.70000				2.84E-002
	10/26/98	739.20000				1.77E-002
	11/ 2/98	735.30000				1.17E-002
	11/ 9/98	743.70000				1.70E-002
	11/16/98	730.20000				3.23E-002
	11/23/98	740.90000				2.32E-002
	11/30/98	747.10000				3.03E-002
	12/ 7/98	724.40000				1.80E-002
	8/31/98	664.80000				2.53E-002
	12/14/98	747.10000				2.57E-002
	12/21/98	749.10000				1.53E-002
	12/28/98	746.30000				2.55E-002
	8/ 3/98	668.20000				3.35E-002
	8/10/98	688.40000				2.91E-002
	8/17/98	666.10000				3.37E-002
	8/24/98	685.70000				3.06E-002
	9/ 8/98	767.70000				1.98E-002
	9/21/98	675.00000				2.96E-002
	9/28/98	722.60000				1.83E-002
5 - 0.9 MI ENE - JOHNSONS LANDING	7/ 6/98	700.40000				1.63E-002
	10/ 5/98	821.10000				2.11E-002
	9/14/98	728.60000				1.11E-002
	7/13/98	718.30000				1.78E-002
	7/20/98	710.40000				9.95E-003

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
5 - 0.9 MI ENE - JOHNSONS LANDING	7/27/98	727.80000				1.99E-002
	10/12/98	822.40000				1.30E-002
	10/19/98	822.60000				2.01E-002
	10/26/98	810.70000				1.14E-002
	11/ 2/98	811.80000				1.17E-002
	11/ 9/98	837.40000				1.75E-002
	11/16/98	800.30000				1.53E-002
	11/23/98	804.80000				1.50E-002
	11/30/98	814.80000				1.07E-002
	12/ 7/98	786.60000				2.19E-002
	8/31/98	709.90000				1.63E-002
	12/14/98	799.10000				9.62E-003
	12/21/98	790.20000				1.41E-002
	12/28/98	792.40000				1.07E-002
	8/ 3/98	713.90000				1.74E-002
	8/10/98	720.90000				2.79E-002
	8/17/98	712.40000				1.98E-002
	8/24/98	725.00000				1.18E-002
	9/ 8/98	807.70000				2.63E-002
	9/21/98	731.30000				2.47E-002
	9/28/98	807.90000				1.62E-002
6 - 0.3 MI SW - INFORMATION CENTER	7/ 6/98	740.90000				2.29E-002
	10/ 5/98	769.60000				2.72E-002
	9/14/98	668.70000				2.69E-002
	7/13/98	744.80000				1.13E-002
	7/20/98	736.60000				1.73E-002
	7/27/98	761.40000				2.55E-002
	10/12/98	752.60000				2.24E-002
	10/19/98	754.30000				2.27E-002
	10/26/98	751.00000				1.60E-002
	11/ 2/98	696.50000				2.73E-002
	11/ 9/98	747.50000				3.21E-002
	11/16/98	753.70000				1.53E-002
	11/23/98	753.40000				2.29E-002
	11/30/98	763.90000				1.96E-002
	12/ 7/98	733.90000				1.79E-002
	8/31/98	721.40000				2.77E-002
	12/14/98	753.50000				1.18E-002
	12/21/98	748.10000				2.06E-002
	12/28/98	749.40000				1.85E-002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
6 - 0.3 MI SW - INFORMATION CENTER	8/ 3/98	722.20000				1.52E-002
	8/10/98	745.80000				3.16E-002
	8/17/98	723.90000				1.89E-002
	8/24/98	746.80000				2.05E-002
	9/ 8/98	841.40000				1.63E-002
	9/21/98	728.50000				2.93E-002
	9/28/98	764.20000				1.79E-002
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	7/ 6/98	739.50000				3.13E-002
	10/ 5/98	569.20000				2.75E-002
	9/14/98	716.90000				1.76E-002
	7/13/98	727.30000				2.59E-002
	7/20/98	733.80000				2.11E-002
	7/27/98	745.30000				2.96E-002
	10/12/98	350.80000				2.68E-002
	10/19/98	345.30000				3.44E-002
	10/26/98	572.00000				2.52E-002
	11/ 2/98	614.40000				1.71E-002
	11/ 9/98	651.00000				2.39E-002
	11/16/98	653.40000				2.39E-002
	11/23/98	671.10000				1.28E-002
	11/30/98	690.60000				2.94E-002
	12/ 7/98	654.40000				2.85E-002
	8/31/98	723.00000				1.76E-002
	12/14/98	687.50000				3.41E-002
	12/21/98	679.70000				2.26E-002
	12/28/98	687.90000				1.83E-002
	8/ 3/98	727.90000				3.37E-002
	8/10/98	737.10000				1.35E-002
	8/17/98	726.60000				2.89E-002
	8/24/98	731.60000				2.10E-002
	9/ 8/98	820.50000				1.46E-002
	9/21/98	745.50000				2.14E-002
	9/28/98	869.80000				7.33E-003
55 - 0.3 MI SSE - SITE BOUNDARY	7/ 6/98	660.60000				2.84E-002
	10/ 5/98	710.00000				3.18E-002
	9/14/98	625.00000				2.89E-002
	7/13/98	663.30000				2.93E-002
	7/20/98	658.00000				1.94E-002
	7/27/98	669.70000				2.85E-002
	10/12/98	698.50000				2.98E-002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
55 - 0.3 MI SSE - SITE BOUNDARY	10/19/98	888.90000				1.48E-002
	10/26/98	706.00000				2.08E-002
	11/ 2/98	659.20000				1.60E-002
	11/ 9/98	787.90000				1.72E-002
	11/16/98	783.30000				2.87E-002
	11/23/98	795.10000				1.52E-002
	11/30/98	806.80000				1.99E-002
	12/ 7/98	789.70000				1.85E-002
	8/31/98	652.30000				1.78E-002
	12/14/98	793.00000				2.93E-002
	12/21/98	784.40000				2.43E-002
	12/28/98	788.50000				2.17E-002
	8/ 3/98	655.30000				2.43E-002
	8/10/98	659.40000				1.95E-002
	8/17/98	653.00000				3.44E-002
	8/24/98	662.10000				3.18E-002
	9/ 8/98	754.10000				2.04E-002
	9/21/98	664.50000				1.36E-002
	9/28/98	806.60000				2.02E-002
Plant: RNP Analysis: IODINE MediaType: MILK LITERS						
54 - 10.1 MI E - AUBURNDALE PLANTATION	7/ 6/98	4.00000				3.64E-001
Plant: RNP Analysis: TRITIUM MediaType: GROUNDWATER LITERS						
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	10/ 5/98	.00500	2.81E-001	0.00E+000	0.00E+000	3.03E+002
	7/ 6/98	.00500	4.14E-001	0.00E+000	0.00E+000	3.23E+002
42 - UNIT 1 DEEP WELL NEAR SITE ENTRANCE	10/ 5/98	.00500	2.81E-001	0.00E+000	0.00E+000	3.03E+002
	7/ 6/98	.00500	4.14E-001	0.00E+000	0.00E+000	3.23E+002
Plant: RNP Analysis: TRITIUM MediaType: SURFACE WATER LITERS						
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WELL	7/31/98	.00500	4.12E-001	6.06E+002	1.71E+002	2.69E+002
	8/31/98	.00500	2.82E-001	9.76E+002	1.89E+002	3.01E+002
	9/30/98	.00500	2.80E-001	0.00E+000	0.00E+000	8.71E+002
	11/30/98	.00500	4.33E-001	2.41E+003	2.18E+002	3.04E+002
	12/31/98	.00500	4.32E-001	1.29E+003	2.09E+002	3.16E+002
	10/31/98	.00500	4.36E-001	1.06E+003	2.06E+002	3.15E+002
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	7/31/98	.00500	2.82E-001	0.00E+000	0.00E+000	3.01E+002
	8/31/98	.00500	2.82E-001	0.00E+000	0.00E+000	3.01E+002
	9/30/98	.00500	2.80E-001	0.00E+000	0.00E+000	2.94E+002
	11/30/98	.00500	4.34E-001	0.00E+000	0.00E+000	3.03E+002

Sample Point	SampleDate	Quantity	Efficiency	Activity	2 SigmaError	LLD
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	12/31/98	.00500	4.32E-001	0.00E+000	0.00E+000	3.16E+002
	10/31/98	.00500	4.36E-001	0.00E+000	0.00E+000	3.15E+002
57 - 0.9 MI NNW - ASH POND	7/31/98	.00500	4.17E-001	6.09E+002	1.69E+002	2.66E+002
	8/31/98	.00500	2.82E-001	5.58E+002	1.86E+002	3.01E+002
	9/30/98	.00500	2.80E-001	0.00E+000	0.00E+000	8.71E+002
	11/30/98	.00500	4.34E-001	2.52E+003	2.19E+002	3.03E+002
	12/31/98	.00500	4.32E-001	1.46E+003	2.12E+002	3.16E+002
	10/31/98	.00500	4.36E-001	4.61E+002	1.98E+002	3.15E+002



CP&L
Radiological Environmental Monitoring
Isotopic Analysis Report

4/ 9/99

Semiannual Analysis Report

4/ 9/99

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
Plant: RNP Analysis: GAMMA MediaType: AIR PARTICULATE Units: CUBIC METERS						
1 - 26 MI ESE - FLORENCE - CONTROL	8/15/98	7610.80000	BE-7	1.45E-001	2.16E-002	
	11/15/98	7355.00000	BE-7	1.33E-001	2.14E-002	
2 - 0.2 MI S - INFORMATION CENTER	8/15/98	9411.20000	BE-7	1.53E-001	2.03E-002	
	11/15/98	10101.80000	BE-7	1.16E-001	1.97E-002	
3 - 0.7 MI N - MICROWAVE TOWER	8/15/98	9561.80000	BE-7	1.56E-001	1.97E-002	
	11/15/98	9514.40000	BE-7	1.33E-001	2.35E-002	
4 - 0.4 MI ESE - SPILLWAY	8/15/98	9067.50000	BE-7	1.74E-001	2.13E-002	
	11/15/98	9593.70000	BE-7	1.52E-001	2.22E-002	
5 - 0.9 MI ENE - JOHNSONS LANDING	8/15/98	9514.50000	BE-7	1.33E-001	2.19E-002	
	11/15/98	10514.20000	BE-7	1.10E-001	1.73E-002	
6 - 0.3 MI SW - INFORMATION CENTER	8/15/98	9646.60000	BE-7	1.60E-001	1.89E-002	
	11/15/98	9727.40000	BE-7	1.37E-001	2.28E-002	
7 - 6.3 MI ESE - HARTSVILLE CP&L SUBSTATION	8/15/98	9744.80000	BE-7	1.27E-001	1.82E-002	
	11/15/98	7827.30000	BE-7	1.47E-001	2.46E-002	
55 - 0.3 MI SSE - SITE BOUNDARY	8/15/98	8783.90000	BE-7	1.62E-001	2.11E-002	
	11/15/98	9991.30000	BE-7	1.45E-001	2.31E-002	
Plant: RNP Analysis: GAMMA MediaType: BOTTOM FEEDER Units: GRAMS						
45 - SITE VARIES WITHIN LAKE ROBINSON	11/17/98	543.30000	K-40	2.56E+000	7.50E-001	
	11/17/98	543.30000	CS-137	5.11E-002	3.46E-002	
46 - 4.9 MI ESE - PRESTWOOD LAKE	11/17/98	516.30000	K-40	3.36E+000	1.16E+000	
47 - 13 MI NNW - LAKE BEE - CONTROL	11/17/98	506.60000	K-40	4.41E+000	1.11E+000	
	11/17/98	506.60000	PB-214	2.93E-001	1.61E-001	
	11/17/98	506.60000	CS-137	1.24E-001	4.44E-002	
Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: CHERRY						
50 - SSE - CP&L PROPERTY	9/14/98	566.40000	BE-7	6.56E-001	1.77E-001	
	9/14/98	566.40000	K-40	3.91E+000	4.46E-001	
	9/14/98	566.40000	TL-208	3.42E-002	1.67E-002	
	9/14/98	566.40000	BI-214	1.10E-001	4.65E-002	
	9/14/98	566.40000	PB-214	9.22E-002	4.98E-002	
	9/14/98	566.40000	RA-226	5.12E-001	4.35E-001	
	9/14/98	566.40000	I-131			2.41E-002
	9/14/98	566.40000	CS-134			3.19E-002
	9/14/98	566.40000	CS-137			2.85E-002
	7/13/98	521.30000	BE-7	2.15E-001	1.47E-001	
	7/13/98	521.30000	K-40	2.79E+000	5.24E-001	
	7/13/98	521.30000	PB-214	9.35E-002	3.74E-002	
	7/13/98	521.30000	I-131			2.52E-002
	7/13/98	521.30000	CS-134			3.23E-002

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
50 - SSE - CP&L PROPERTY	7/13/98	521.30000	CS-137			3.04E-002
	8/14/98	501.20000	BE-7	3.93E-001	1.40E-001	
	8/14/98	501.20000	K-40	3.38E+000	3.79E-001	
	8/14/98	501.20000	RA-226	4.60E-001	3.30E-001	
	8/14/98	501.20000	I-131			2.55E-002
	8/14/98	501.20000	CS-134			1.90E-002
	8/14/98	501.20000	CS-137			2.25E-002
	10/15/98	527.50000	BE-7	2.47E-001	2.00E-001	
	10/15/98	527.50000	K-40	3.32E+000	4.67E-001	
	10/15/98	527.50000	I-131			3.40E-002
	10/15/98	527.50000	CS-134			2.93E-002
	10/15/98	527.50000	CS-137			3.10E-002
51 - SSW - CP&L PROPERTY	9/14/98	478.20000	BE-7	8.27E-001	2.57E-001	
	9/14/98	478.20000	K-40	1.99E+000	4.89E-001	
	9/14/98	478.20000	PB-212	5.96E-002	3.53E-002	
	9/14/98	478.20000	AC-228	3.75E-001	9.81E-002	
	9/14/98	478.20000	I-131			2.87E-002
	9/14/98	478.20000	CS-134			3.73E-002
	9/14/98	478.20000	CS-137			3.35E-002
	7/13/98	539.10000	BE-7	4.01E-001	1.67E-001	
	7/13/98	539.10000	K-40	2.89E+000	4.73E-001	
	7/13/98	539.10000	BI-214	3.92E-001	7.40E-002	
	7/13/98	539.10000	PB-214	1.66E-001	6.23E-002	
	7/13/98	539.10000	I-131			2.65E-002
	7/13/98	539.10000	CS-134			3.33E-002
	7/13/98	539.10000	CS-137			3.03E-002
	8/14/98	401.70000	BE-7	4.92E-001	2.42E-001	
	8/14/98	401.70000	K-40	3.62E+000	6.65E-001	
	8/14/98	401.70000	I-131			4.31E-002
	8/14/98	401.70000	CS-134			3.99E-002
	8/14/98	401.70000	CS-137			3.94E-002
	10/15/98	505.90000	BE-7	7.68E-001	2.25E-001	
	10/15/98	505.90000	K-40	3.64E+000	5.31E-001	
	10/15/98	505.90000	I-131			3.38E-002
	10/15/98	505.90000	CS-134			3.24E-002
	10/15/98	505.90000	CS-137			2.71E-002
52 - 10 MI W - BETHUNE - CONTROL	9/14/98	497.50000	BE-7	1.05E+000	2.37E-001	
	9/14/98	497.50000	K-40	1.93E+000	4.33E-001	
	9/14/98	497.50000	I-131			2.37E-002
	9/14/98	497.50000	CS-134			2.94E-002
	9/14/98	497.50000	CS-137			2.70E-002

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
52 - 10 MI W - BETHUNE - CONTROL	7/13/98	434.40000	BE-7	8.71E-001	2.00E-001	
	7/13/98	434.40000	K-40	3.63E+000	4.37E-001	
	7/13/98	434.40000	I-131			2.68E-002
	7/13/98	434.40000	CS-134			2.43E-002
	7/13/98	434.40000	CS-137			3.44E-002
	8/14/98	440.10000	BE-7	1.44E+000	2.21E-001	
	8/14/98	440.10000	K-40	1.31E+000	3.34E-001	
	8/14/98	440.10000	AC-228	1.80E-001	9.00E-002	
	8/14/98	440.10000	I-131			2.88E-002
	8/14/98	440.10000	CS-134			2.50E-002
	8/14/98	440.10000	CS-137			2.64E-002
	10/15/98	520.90000	BE-7	7.69E-001	1.78E-001	
	10/15/98	520.90000	K-40	2.65E+000	4.35E-001	
	10/15/98	520.90000	PB-214	8.73E-002	4.62E-002	
	10/15/98	520.90000	I-131			3.42E-002
	10/15/98	520.90000	CS-134			3.20E-002
	10/15/98	520.90000	CS-137			2.76E-002
Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: MAPLE						
50 - SSE - CP&L PROPERTY	10/15/98	520.80000	BE-7	1.46E+000	2.30E-001	
	10/15/98	520.80000	K-40	1.71E+000	3.74E-001	
	10/15/98	520.80000	TL-208	2.45E-002	1.98E-002	
	10/15/98	520.80000	BI-214	1.08E-001	5.12E-001	
	10/15/98	520.80000	PB-214	7.79E-002	6.10E-002	
	10/15/98	520.80000	AC-228	2.91E-001	1.15E-001	
	10/15/98	520.80000	CS-137	9.08E-002	2.48E-002	
	10/15/98	520.80000	I-131			3.03E-002
51 - SSW - CP&L PROPERTY	10/15/98	520.80000	CS-134			3.27E-002
	10/15/98	515.40000	BE-7	1.09E+000	1.87E-001	
	10/15/98	515.40000	K-40	2.55E+000	3.85E-001	
	10/15/98	515.40000	PB-212	5.58E-002	2.07E-002	
	10/15/98	515.40000	BI-214	1.66E-001	4.37E-002	
	10/15/98	515.40000	PB-214	1.25E-001	4.48E-002	
	10/15/98	515.40000	AC-228	2.00E-001	7.16E-002	
	10/15/98	515.40000	I-131			2.74E-002
52 - 10 MI W - BETHUNE - CONTROL	10/15/98	515.40000	CS-134			2.74E-002
	10/15/98	515.40000	CS-137			2.30E-002
	10/15/98	455.60000	BE-7	7.22E-001	1.91E-001	
	10/15/98	455.60000	K-40	1.43E+000	3.80E-001	
	10/15/98	455.60000	TL-208	2.86E-002	1.78E-002	
	10/15/98	455.60000	BI-214	2.28E-001	4.48E-002	

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
52 - 10 MI W - BETHUNE - CONTROL	10/15/98	455.60000	PB-214	1.62E-001	4.72E-002	
	10/15/98	455.60000	I-131			3.25E-002
	10/15/98	455.60000	CS-134			2.48E-002
	10/15/98	455.60000	CS-137			2.46E-002
Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: PERSIMMOMS						
50 - SSE - CP&L PROPERTY	9/14/98	384.00000	BE-7	2.32E+000	3.17E-001	
	9/14/98	384.00000	K-40	6.01E+000	7.31E-001	
	9/14/98	384.00000	I-131			3.31E-002
	9/14/98	384.00000	CS-134			3.98E-002
	9/14/98	384.00000	CS-137			2.47E-002
	7/13/98	447.20000	BE-7	6.06E-001	1.87E-001	
	7/13/98	447.20000	K-40	6.34E+000	5.52E-001	
	7/13/98	447.20000	PB-214	8.29E-002	3.86E-002	
	7/13/98	447.20000	I-131			2.11E-002
	7/13/98	447.20000	CS-134			3.13E-002
	7/13/98	447.20000	CS-137			2.78E-002
	8/14/98	497.90000	BE-7	8.56E-001	2.00E-001	
	8/14/98	497.90000	K-40	3.65E+000	4.41E-001	
	8/14/98	497.90000	AC-228	1.66E-001	8.02E-002	
	8/14/98	497.90000	CS-137	3.22E-002	1.70E-002	
	8/14/98	497.90000	I-131			2.80E-002
51 - SSW - CP&L PROPERTY	8/14/98	497.90000	CS-134			2.62E-002
	9/14/98	460.00000	BE-7	1.20E+000	2.17E-001	
	9/14/98	460.00000	K-40	2.44E+000	4.75E-001	
	9/14/98	460.00000	AC-228	1.90E-001	9.90E-002	
	9/14/98	460.00000	CS-137	5.63E-002	2.23E-002	
	9/14/98	460.00000	I-131			3.39E-002
	9/14/98	460.00000	CS-134			3.42E-002
	7/13/98	682.70000	BE-7	2.07E-001	1.35E-001	
	7/13/98	682.70000	K-40	4.36E+000	4.85E-001	
	7/13/98	682.70000	BI-214	1.22E-001	4.14E-002	
	7/13/98	682.70000	PB-214	8.42E-002	4.16E-002	
	7/13/98	682.70000	I-131			2.21E-002
	7/13/98	682.70000	CS-134			2.61E-002
	7/13/98	682.70000	CS-137			2.39E-002
	8/14/98	564.80000	BE-7	7.41E-001	2.26E-001	
	8/14/98	564.80000	K-40	2.27E+000	4.31E-001	
	8/14/98	564.80000	PB-212	4.05E-002	2.96E-002	
	8/14/98	564.80000	BI-214	1.05E-001	5.56E-002	
	8/14/98	564.80000	PB-214	7.98E-002	4.17E-002	

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
51 - SSW - CP&L PROPERTY	8/14/98	564.80000	AC-228	1.34E-001	8.93E-002	
	8/14/98	564.80000	CS-137	4.57E-002	2.23E-002	
	8/14/98	564.80000	I-131			3.11E-002
	8/14/98	564.80000	CS-134			2.83E-002
52 - 10 MI W - BETHUNE - CONTROL	9/14/98	559.40000	BE-7	1.29E+000	2.23E-001	
	9/14/98	559.40000	K-40	2.12E+000	3.87E-001	
	9/14/98	559.40000	CS-137	7.23E-002	2.65E-002	
	9/14/98	559.40000	I-131			2.58E-002
	9/14/98	559.40000	CS-134			2.61E-002
	7/13/98	581.40000	BE-7	6.27E-001	1.50E-001	
	7/13/98	581.40000	K-40	3.82E+000	3.80E-001	
	7/13/98	581.40000	CS-137	1.94E-001	2.47E-002	
	7/13/98	581.40000	I-131			1.91E-002
	7/13/98	581.40000	CS-134			1.66E-002
	8/14/98	568.00000	BE-7	1.25E+000	2.16E-001	
	8/14/98	568.00000	K-40	2.09E+000	3.95E-001	
	8/14/98	568.00000	BI-214	2.05E-001	6.19E-002	
	8/14/98	568.00000	PB-214	1.04E-001	3.78E-002	
	8/14/98	568.00000	CS-137	8.11E-002	2.99E-002	
	8/14/98	568.00000	I-131			3.03E-002
	8/14/98	568.00000	CS-134			2.26E-002
Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: SASSAFRAS						
50 - SSE - CP&L PROPERTY	9/14/98	440.60000	BE-7	3.11E+000	2.78E-001	
	9/14/98	440.60000	K-40	2.89E+000	3.87E-001	
	9/14/98	440.60000	PB-214	9.41E-002	3.74E-002	
	9/14/98	440.60000	RA-226	7.26E-001	3.48E-001	
	9/14/98	440.60000	I-131			2.04E-002
	9/14/98	440.60000	CS-134			2.65E-002
	9/14/98	440.60000	CS-137			2.60E-002
	7/13/98	492.10000	BE-7	1.47E+000	2.55E-001	
	7/13/98	492.10000	K-40	2.31E+000	4.52E-001	
	7/13/98	492.10000	CS-137	5.10E-002	3.52E-002	
	7/13/98	492.10000	I-131			2.82E-002
	7/13/98	492.10000	CS-134			2.78E-002
	8/14/98	385.20000	BE-7	2.38E+000	3.31E-001	
	8/14/98	385.20000	K-40	2.02E+000	4.73E-001	
	8/14/98	385.20000	BI-214	2.60E-001	7.37E-002	
	8/14/98	385.20000	PB-214	1.75E-001	7.12E-002	
	8/14/98	385.20000	RA-226	8.18E-001	5.63E-001	
	8/14/98	385.20000	I-131			4.98E-002

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
50 - SSE - CP&L PROPERTY	8/14/98	385.20000	CS-134			3.71E-002
	8/14/98	385.20000	CS-137			3.89E-002
51 - SSW - CP&L PROPERTY	9/14/98	508.90000	BE-7	1.26E+000	1.92E-001	
	9/14/98	508.90000	K-40	3.48E+000	3.68E-001	
	9/14/98	508.90000	I-131			1.77E-002
	9/14/98	508.90000	CS-134			1.78E-002
	9/14/98	508.90000	CS-137			2.35E-002
	7/13/98	484.10000	K-40	3.73E+000	1.71E-001	
	7/13/98	484.10000	BE-7	4.95E-001	1.71E-001	
	7/13/98	484.10000	CS-137	7.86E-002	2.32E-002	
	7/13/98	484.10000	I-131			2.10E-002
	7/13/98	484.10000	CS-134			2.47E-002
	8/14/98	471.40000	BE-7	8.71E-001	2.25E-001	
	8/14/98	471.40000	K-40	3.14E+000	5.01E-001	
	8/14/98	471.40000	I-131			3.50E-002
	8/14/98	471.40000	CS-134			3.28E-002
	8/14/98	471.40000	CS-137			3.63E-002
	9/14/98	479.90000	BE-7	1.81E+000	2.62E-001	
	9/14/98	479.90000	K-40	1.25E+000	4.47E-001	
	9/14/98	479.90000	I-131			2.85E-002
52 - 10 MI W - BETHUNE - CONTROL	9/14/98	479.90000	CS-134			2.63E-002
	9/14/98	479.90000	CS-137			2.57E-002
	7/13/98	513.80000	BE-7	1.07E+000	2.19E-001	
	7/13/98	513.80000	K-40	2.20E+000	3.96E-001	
	7/13/98	513.80000	I-131			2.75E-002
	7/13/98	513.80000	CS-134			2.60E-002
	7/13/98	513.80000	CS-137			2.51E-002
	8/14/98	501.60000	K-40	1.66E+000	4.35E-001	
	8/14/98	501.60000	BE-7	1.55E+000	2.84E-001	
	8/14/98	501.60000	I-131			3.97E-002
	8/14/98	501.60000	CS-134			2.95E-002
	8/14/98	501.60000	CS-137			2.78E-002
Plant: RNP Analysis: GAMMA MediaType: BROADLEAF VEGETATION Units: GRAMS Media: WAX MYRTLE						
50 - SSE - CP&L PROPERTY	10/15/98	501.50000	BE-7	8.78E-001	1.68E-001	
	10/15/98	501.50000	K-40	1.19E+000	3.10E-001	
	10/15/98	501.50000	PB-214	1.53E-001	4.23E-002	
	10/15/98	501.50000	AC-228	9.56E-002	7.22E-002	
	10/15/98	501.50000	I-131			2.55E-002
	10/15/98	501.50000	CS-134			1.79E-002
	10/15/98	501.50000	CS-137			2.05E-002

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
51 - SSW - CP&L PROPERTY	10/15/98	507.50000	BE-7	1.04E+000	2.44E-001	
	10/15/98	507.50000	K-40	2.00E+000	4.02E-001	
	10/15/98	507.50000	PB-214	1.07E-001	5.83E-002	
	10/15/98	507.50000	AC-228	2.80E-001	8.81E-002	
	10/15/98	507.50000	I-131			3.43E-002
	10/15/98	507.50000	CS-134			3.39E-002
	10/15/98	507.50000	CS-137			2.96E-002
52 - 10 MI W - BETHUNE - CONTROL	10/15/98	506.70000	BE-7	5.79E-001	2.11E-001	
	10/15/98	506.70000	K-40	1.21E+000	4.18E-001	
	10/15/98	506.70000	BI-214	9.35E-002	5.57E-002	
	10/15/98	506.70000	AC-228	1.42E-001	7.44E-002	
	10/15/98	506.70000	CS-137	5.29E-002	2.46E-002	
	10/15/98	506.70000	I-131			3.36E-002
	10/15/98	506.70000	CS-134			3.20E-002
Plant: RNP Analysis: GAMMA MediaType: FOOD CROP Units: GRAMS Media: COLLARDS						
49 - GREATER THAN 5 MI FROM SITE - CONTROL	11/23/98	554.00000	K-40	1.71E+000	3.88E-001	
	11/23/98	554.00000	I-131			1.97E-002
	11/23/98	554.00000	CS-134			2.01E-002
	11/23/98	554.00000	CS-137			2.23E-002
58 - SITE VARIES FROM PLANT	11/23/98	562.60000	K-40	5.63E+000	5.27E-001	
	11/23/98	562.60000	I-131			2.20E-002
	11/23/98	562.60000	CS-134			2.51E-002
	11/23/98	562.60000	CS-137			2.76E-002
Plant: RNP Analysis: GAMMA MediaType: FOOD CROP Units: GRAMS Media: CORN						
49 - GREATER THAN 5 MI FROM SITE - CONTROL	8/20/98	533.90000	K-40	2.33E+000	3.47E-001	
	8/20/98	533.90000	I-131			2.30E-002
	8/20/98	533.90000	CS-134			2.15E-002
	8/20/98	533.90000	CS-137			1.81E-002
54 - 10.1 MI E - AUBURNDALE PLANTATION	8/10/98	598.30000	K-40	3.04E+000	2.19E-001	
	8/10/98	598.30000	I-131			2.05E-002
	8/10/98	598.30000	CS-134			1.17E-002
	8/10/98	598.30000	CS-137			9.58E-003
Plant: RNP Analysis: GAMMA MediaType: FOOD CROP Units: GRAMS Media: CUCUMBERS						
58 - SITE VARIES FROM PLANT	8/24/98	597.60000	K-40	1.20E+000	3.80E-001	
	8/24/98	597.60000	I-131			2.02E-002
	8/24/98	597.60000	CS-134			2.18E-002
	8/24/98	597.60000	CS-137			1.99E-002
Plant: RNP Analysis: GAMMA MediaType: FOOD CROP Units: GRAMS Media: PEACHES						

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
49 - GREATER THAN 5 MI FROM SITE - CONTROL	7/ 6/98	594.50000	K-40	1.98E+000	3.48E-001	
	7/ 6/98	594.50000	I-131			3.18E-002
	7/ 6/98	594.50000	CS-134			2.12E-002
	7/ 6/98	594.50000	CS-137			1.97E-002
Plant: RNP Analysis: GAMMA MediaType: FOOD CROP Units: GRAMS Media: SOYBEANS						
54 - 10.1 MI E - AUBURNDALE PLANTATION	12/ 3/98	770.40000	K-40	1.49E+001	7.70E-001	
	12/ 3/98	770.40000	I-131			2.68E-002
	12/ 3/98	770.40000	CS-134			2.00E-002
	12/ 3/98	770.40000	CS-137			2.39E-002
Plant: RNP Analysis: GAMMA MediaType: FOOD CROP Units: GRAMS Media: TOMATOES						
58 - SITE VARIES FROM PLANT	7/13/98	536.80000	K-40	1.48E+000	3.94E-001	
	7/13/98	536.80000	I-131			2.58E-002
	7/13/98	536.80000	CS-134			2.83E-002
	7/13/98	536.80000	CS-137			2.41E-002
Plant: RNP Analysis: GAMMA MediaType: FOOD CROP Units: GRAMS Media: WATERMELLON						
58 - SITE VARIES FROM PLANT	8/17/98	530.50000	K-40	9.16E-001	3.15E-001	
	8/17/98	530.50000	I-131			2.16E-002
	8/17/98	530.50000	CS-134			2.16E-002
	8/17/98	530.50000	CS-137			2.32E-002
Plant: RNP Analysis: GAMMA MediaType: FREE SWIMMER Units: GRAMS						
45 - SITE VARIES WITHIN LAKE ROBINSON	11/17/98	504.00000	K-40	4.69E+000	1.23E+000	
46 - 4.9 MI ESE - PRESTWOOD LAKE	11/17/98	502.50000	K-40	2.77E+000	1.12E+000	
	11/17/98	502.50000	RA-226	8.99E-001	7.05E-001	
	11/17/98	502.50000	CS-137	1.19E-001	5.07E-002	
47 - 13 MI NNW - LAKE BEE - CONTROL	11/17/98	532.80000	K-40	3.35E+000	1.12E+000	
	11/17/98	532.80000	PB-214	2.69E-001	1.32E-001	
	11/17/98	532.80000	CS-137	1.70E-001	5.81E-001	
Plant: RNP Analysis: GAMMA MediaType: GROUNDWATER Units: LITERS						
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WE	7/ 6/98	1.00000	NO-ACT			
	10/ 5/98	1.00000	NO-ACT			
42 - UNIT 1 DEEP WELL NEAR SITE ENTRANCE	7/ 6/98	1.00000	NO-ACT			
	10/ 5/98	1.00000	NO-ACT			
Plant: RNP Analysis: GAMMA MediaType: MILK Units: LITERS						
54 - 10.1 MI E - AUBURNDALE PLANTATION	7/ 6/98	1.00000	K-40	1.41E+003	1.78E+002	
Plant: RNP Analysis: GAMMA MediaType: SHORELINE SEDIMENT Units: GRAMS						
44 - 1.9 MI NNE - SHADY REST CLUB	8/31/98	1498.60000	TL-208	3.37E-002	1.78E-002	

Sample Point	SampleDate	Quantity	Isotope	Activity	2 SigmaError	LLD
57 - 0.9 MI NNW - ASH POND	8/31/98	1498.60000	PB-214	8.66E-002	3.63E-002	
	8/31/98	1174.90000	K-40	6.05E+000	9.89E-001	
	8/31/98	1174.90000	TL-208	3.29E-001	7.94E-002	
	8/31/98	1174.90000	PB-212	9.62E-001	9.15E-002	
	8/31/98	1174.90000	BI-214	1.19E+000	1.48E-001	
	8/31/98	1174.90000	PB-214	1.17E+000	1.36E-001	
	8/31/98	1174.90000	RA-226	3.62E+000	1.14E+000	
Plant: RNP Analysis: GAMMA Media Type: SURFACE WATER Units: LITERS						
40 - 0.6 MI ESE-SC23 AT BLACK CR AND ART WE	9/30/98	1.00000	BI-214	5.54E+000	4.29E+000	
	7/31/98	1.00000	NO-ACT			
	10/31/98	1.00000	NO-ACT			
	11/30/98	1.00000	NO-ACT			
	8/31/98	1.00000	NO-ACT			
	12/31/98	1.00000	NO-ACT			
41 - 7.2 MI NNW - BLACK CREEK - CONTROL	8/31/98	1.00000	K-40	7.15E+001	6.13E+001	
	9/30/98	1.00000	K-40	5.46E+001	4.50E+001	
	7/31/98	1.00000	BI-214	8.20E+000	6.09E+000	
	10/31/98	1.00000	NO-ACT			
	11/30/98	1.00000	NO-ACT			
	12/31/98	1.00000	NO-ACT			
57 - 0.9 MI NNW - ASH POND	8/31/98	1.00000	K-40	2.08E+002	9.17E+001	
	9/30/98	1.00000	NO-ACT			
	7/31/98	1.00000	NO-ACT			
	10/31/98	1.00000	RA-226	8.71E+001	7.22E+001	
	11/30/98	1.00000	NO-ACT			
	12/31/98	1.00000	NO-ACT			