FERMI 2 NUCLEAR POWER PLANT

DETROIT EDISON COMPANY

OPERATING LICENSE NO. NPF - 43

Fermi 2 - 1997Annual
Radioactive Effluent Release and
Radiological Environmental Operating Report

for the period of
January 1, 1997 through December 31, 1997

Prepared by:

Fermi 2
Radiological Health

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Introduction

This report is published to provide the public and regulatory officials with information regarding radiological environmental monitoring at the Fermi 2 Nuclear Power Plant. This information is intended for members of the general public who may be interested in obtaining information on specific radiological environmental sampling and effluent monitoring performed at Fermi 2. It also contains information for the Nuclear Regulatory Commission (NRC) to demonstrate regulatory compliance.

Safety is our top priority at Fermi 2. We want to assure all of our neighbors that our staff is dedicated to protecting the environment. This dedication has been demonstrated in the fact there has not been a liquid radioactive effluent discharge from Fermi 2 since 1994. Fermi 2 is dedicated to being a liquid effluent zero discharge facility.

The Radioactive Effluent Release and Radiological Environmental Operating Report is produced annually, as required by the Nuclear Regulatory Commission, to present detailed results of careful monitoring and measuring of radiation in the environment around the plant. This report also includes details of the independent oversight incorporated into the Radiological Effluent and Environmental Monitoring Programs to ensure program accuracy.

We at Detroit Edison are proud of the findings of this report, which demonstrate that the operation of Fermi 2 does not produce measurable levels of radiation in the environment. In addition, nuclear energy's successful record of reducing overall U.S. fossil fuel emissions of sulfur dioxide and nitrogen oxides by over 1.9 billion metric tons continues to support the view that nuclear energy is environmentally friendly.

This report describes both the continual environmental radiation and effluent monitoring of plant systems. Both types of monitoring indicate that the operation of Fermi 2 does not result in exposure of people or the environment surrounding Fermi 2 to measurable amounts of radiation and therefore is well below the levels set by the Nuclear Regulatory Commission and the Environmental Protection Agency.

This report also contains detailed technical data that are included in the Appendices for review. But first, because we get a lot of questions, here is some basic information about nuclear energy and how nuclear power plants work.

Nuclear Energy Basics

The Atom

An atom is the smallest unit of matter that is recognizable as a chemical element. Atoms of different elements may also combine into systems called molecules, which are the smallest units of chemical compounds. In all these ordinary processes, atoms may be considered as the ancient Greeks imagined them to be: the ultimate building blocks of matter.

When strong forces are applied to atoms, however, the atoms may break up into smaller parts. Thus atoms are actually composites and not units, and have a complex inner structure of their own. By studying the processes in which atoms break up, scientists in the 20th century have come to understand many details of the inner structure of atoms.

Simply described, atoms are made up of positively and negatively charged particles and particles that have no charge. These particles are called protons, electrons, and neutrons, respectively. The relatively large protons and neutrons are packed tightly together in a cluster at the center of the atom called the nucleus. Orbiting around this nucleus are one or more smaller electrons. In an electrically neutral atom the negative charges of the electrons are balanced by the positive charges of the protons. Due to their dissimilar charges, the protons and electrons have a strong attraction for each other, which helps hold the atom together. Other attractive forces between the protons and neutrons keep the densely packed protons from repelling each other, thus preventing the nucleus from breaking apart.

Fission

As discussed above, in the nucleus of an atom, attractive forces between the protons and neutrons keep the protons from repelling each other which prevents the nucleus from breaking apart. These attractive forces are known as the **binding energy**. If the binding energy is weak enough, the nucleus can be split when bombarded by a free neutron. When the nucleus splits or fissions, two or more smaller

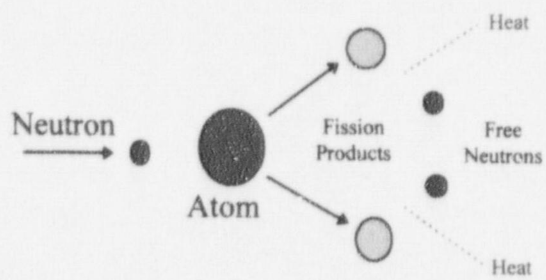


Figure 1 - ***Fission Reaction***

atoms called **fission products**, form along with the release of more neutrons and energy in the form of heat. The neutrons that are released during the first fission are then available to fission other atoms producing a **chain reaction**. Enrico Fermi is credited with achieving the first sustained nuclear chain reaction on December 2, 1942. He and 42 other scientists constructed an "atomic pile" or nuclear reactor beneath the University of Chicago's athletic stadium.

Nuclear Reactor

A nuclear reactor is a device in which a controlled nuclear fission chain reaction takes place. The fission reaction is initiated by the absorption of a neutron in a heavy nucleus such as uranium-235. The process produces additional neutrons that can be used to induce further fissions, thereby propagating the chain reaction. When the reactor components are appropriately adjusted, it is possible for the chain reaction to be self-sustaining.

Nuclear reactors are most commonly used to produce electric energy, although they are occasionally used as sources of thermal energy for heating. They are also designed as sources of neutrons used in research or for the production of radiopharmaceuticals.

The typical U.S. power reactor is termed a light-water reactor (LWR) because it uses water in the form of H_20 as a moderator and coolant. Another type of power reactor uses an isotope of hydrogen know as deuterium D_20 as a moderator; it is called a heavy-water reactor. As the name suggests, deuterium has twice the mass of hydrogen.

The engineering aspects of the design seek to convert the fission energy into a useful form of heat, usually high-pressure steam, to drive a turbine which is connected to an electric generator. The economic aspects of the design seek to optimize the physical and engineering design so as to minimize the cost of energy from the plant.

The core of a reactor is the region that contains the nuclear fuel. Neutrons from the fission process are released with relatively high energy. However, the probability of a neutron causing a fission in the fuel nuclei is much larger for low energy neutrons than for high energy neutrons. In order to slow neutrons down, it is common to surround the fuel with a moderator. Neutrons can interact with nuclei much like collisions between hard spheres. The neutron will lose energy most efficiently, i.e., in the fewest collisions, if the moderator nuclei are close to the mass of the neutron. Thus, moderators are made from light materials such as hydrogen in water, deuterium in heavy water, or carbon in graphite. The physical arrangement of the fuel and moderator is a major element of reactor physics.

The LWR uses H_20 as the moderator and uranium dioxide, $U0_2$, as the fuel. The fissionable isotope of uranium is U-235, which makes up only 0.7% of natural uranium. It is not possible to design an LWR that uses natural uranium. In order to increase neutron production, the U-235 concentration in the fuel is increased. Such fuel is called "enriched."

Fuel for an LWR has a relatively simple structure. Uranium is pressed into small cylindrical pellets that are stacked in zirconium alloy tubes, referred to as "cladding", that are about 3.05 m (10 ft) in length. The tubes are arranged in a square array called a "fuel assembly". A modern light-water reactor has hundreds of fuel assemblies in its core.

Reactor control is achieved by carefully balancing the neutron production rate from fission with the neutron loss rate. The common process for obtaining control is to adjust the amount of neutron absorber in the core. Control materials are placed in rods with the same dimensions as fuel rods and the set of control rods are inserted in the middle of a fuel assembly. The control rods are attached to a drive mechanism that moves the control rods into or out of the core region. A typical set of control rods contains materials that are highly absorbent to neutrons such as silver, indium, boron carbide, and cadmium. The control rods are inserted into the core when reactor shutdown is desired. The rods are also inserted automatically in the event that unexpected conditions are detected.

The core, including fuel assemblies, control rods, and moderator, is a very large system. The entire assemblage fits into a thick-walled steel pressure vessel, designed to withstand very high pressures, up to 2,500 psi. For LWRs, water is both the moderator and the coolant, that is, the agent used to remove fission energy from the core and transfer it to the electric generating segment of the system.

In the U.S. there are two types of light-water reactors used for the generation of electric power. The most common type of reactor in use is the pressurized water reactor (PWR). In a PWR plant, the coolant is heated by fission under pressure and then sent via the primary loop to a steam generator. In the steam generator, the hot water from the reactor transfers its heat to the secondary loop. The secondary loop is under low pressure and the water is transformed into steam, which in turn is fed to turbines to drive a generator. The second most common reactor is a boiling water reactor (BWR). In this type of reactor the coolant is permitted to boil within the reactor core. The steam emerging from the core is sent directly to a turbine rather than through a steam generator. Fermi 2 is a boiling water reactor.

Fermi 2 is a General Electric class 4 BWR with a pressure suppression Mark I containment. Fermi 2 has a generating capacity of approximately 1,100 megawatts at 22,000 volts of electricity. The reactor contains 185 control rods and 764 fuel assemblies. In the Fermi 2 BWR system, water is boiled within the reactor pressure vessel, producing saturated steam that passes through internal steam separators and dryers before continuing directly to the turbine. As the steam strikes the turbine blades, it spins both the turbine shaft and the generator rotor. As the rotor turns, it passes through a magnetic field which transforms the mechanical energy into electrical energy. The steam is then transformed back into water in the condenser and pumped back to the reactor vessel to start the heating process all over again. The cooling water has a separate cycle of its own. It is pumped from a 30-million gallon water reservoir to the condenser. The cool water passes through the condenser which removes the heat from the steam and is then pumped to the cooling towers.

The cooling towers use natural convection to return the water to its original temperature. The water is then pumped into the reservoir to repeat the cycle. Since the cooling water does not come in direct contact with the steam from the reactor, the water in the reservoir and cooling towers is not radioactive. Figure 2 illustrates the basic plant schematic for Fermi 2.

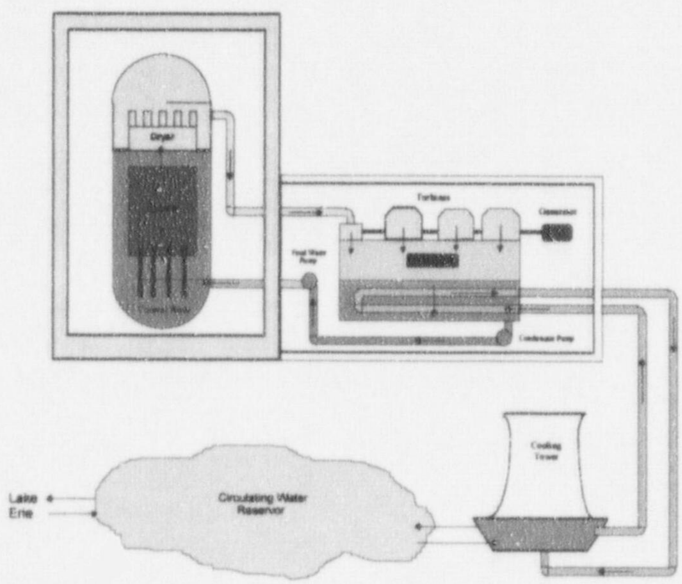


Figure 2 - Fermi 2 Nuclear Power Plant Basic Plant Schematic

Reactor Safety Equipment

As the reactor operates, a large inventory of radioactive fission products accumulates in plant systems and represents a potential hazard. A fundamental objective of nuclear reactor design is to prevent accidents that could allow the escape of radioactivity. In order for fission products to reach the environment several barriers must be overcome. For an LWR, the first barrier is the fuel cladding that contains the fuel as well as the fission fragments. The cladding material is a high-strength alloy of zirconium capable of withstanding high pressures and high temperatures, well beyond normal reactor conditions. The second barrier is the pressure vessel, which is exceedingly strong. The third barrier is the containment building, which is a large, reinforced concrete building designed to withstand substantial pressure.

In order for any barrier to be breached, the system must first become overheated. There are two possible ways for this to occur. The first is for the fission rate to grow too rapidly for the coolant to remove all of the energy being created. The second is for the coolant system to fail and lose the ability to cool the fuel. Excessive fission energy production is monitored by numerous sensors throughout the core region; if they detect a rapid rate of increase in the fission process, the control rods are automatically inserted into the core to absorb the neutrons and this shuts down the reactor.

There is another important design element that protects against the possibility of an uncontrolled chain reaction. The heating up of a local region of the reactor would cause the nearby cooling water to boil, thereby reducing the water density through the creation of bubbles, or voids. It is a safety requirement of U.S. reactors that creation of coolant voids must, by itself, reduce the fission rate. The water space that surrounds a fuel rod is carefully designed so that a void reduces neutron moderation and hence reduces the fission rate. This property is not required in the Soviet Union and is a fundamental reason for the Chernobyl accident. The basic design of LWRs makes them safe against an uncontrolled chain reaction. Reactor design inherently limits positive reactivity, but an increase in reactivity is possible if multiple failures occur.

The design of safety systems begins by hypothesizing a number of different failures and then developing systems to mitigate the consequences of these failures. Such failures are known as design basis accidents. In order to obtain a license, a plant must show it is protected against the class of design basis accidents. The broad areas of concern include accidents within the plant as well as accidents involving the handling of radioactive spent fuel. Initiating events must include hardware failures, operator failures, and external events such as tornadoes.

One of the more important design basis accidents is the loss of coolant accident, or LOCA. The fission process itself ceases if a reactor loses its cooling water because the reactor goes subcritical. However, the fuel continues to heat up due to the stored thermal energy as well as from the decay heat of radioactive fission products. Without any coolant the cladding heats up and ultimately melts. Multiple safety systems have been designed and installed in all U.S. plants to prevent the clad from overheating by providing emergency cooling water. Such systems are collectively known as emergency core cooling systems, or ECCS. All such systems have multiple pathways for introducing water into the vessel under high-pressure or low-pressure conditions.

Radiation

Radiation is energy emitted in the form of waves or particles. The term is used in a variety of ways, and sometimes refers to light and radio waves. But most often it refers to "ionizing" radiation, which is radiation that can produce charged particles, called ions, in materials it hits. In the ionizing process, electrons break away from atoms, giving the atom an electrical charge.

When an atom breaks down - either naturally or in a controlled situation like a nuclear-power plant - and it releases waves or particles of energy, it is said to be radioactive.

Radioactive elements release five main types of energy:

Alpha radiation: positively charged particles that are barely able to penetrate the surface of the skin. It is the least-penetrating kind of radiation, and can be stopped completely by a single sheet of paper.

Beta radiation: More penetrating than alpha radiation, beta particles can be stopped by a thin sheet of aluminum.

Gamma radiation: A penetrating radiation that can pass through the human body, but can be stopped by dense materials such as lead or concrete.

Neutron radiation: Produced during the fission process in a nuclear-power plant, but does not occur when the reactor is shut down.

X-ray radiation: Widely used in medical applications, it accounts for the major part of the public's man-made radiation exposure and corresponds to about 20 percent of the average annual exposure to man.

Sources of Radiation

We are always in the presence of radiation. Cosmic radiation from space covers the earth. Many rocks and minerals give off small amounts of radiation, including radon gas. Small amounts of radioactive materials are in the air we breathe, and in the food and liquids we eat and drink. The materials we use to build our homes, schools and businesses also contain radioactive materials. Even our bodies are mildly radioactive. Lumped together, these things are called background radiation.

Radiation is invisible, but it can be measured with special instruments. The amount of radiation a person receives is calculated in millirems (mrem). One mrem is quite small. It's the equivalent of viewing color television one hour a day for one year, or spending five days in the mountains.

Typical Radiation Exposures
Millirem annually per individual average per activity

Nuclear Energy	
Less than	1
Consumer Products	
Television	1
Others	< 1
Social Activities	
Mining and farming	2
Burning fuels	2
Water supply	3
Building materials	7
Medical Procedures	
Nuclear medicine	14
Diagnostic x-rays	40
Natural Background	
Food and water	40
Cosmic rays	27
Soil, rocks	28
Radon in the air	200

Figure 3 - Typical Radiation Exposures; Source: National Council on Radiation Protection and Measurements

On average, a person living in the U.S. receives about 300 to 360 mrem per year from all radiation sources. On the other hand, because of the low elevation and the absence of radioactive geologic formations, a person living within 10 miles of Fermi 2 receives an average of only about 125 mrem per year of background radiation as measured by thermoluminescent dosimeters (TLDs).

Natural exposure might come from cosmic radiation, 25-30 mrem per year; food and water, 40 mrem; the earth, 28 mrem; the air, 200 mrem; and building materials, 7-10 mrem. Man-made radiation sources include chest x-rays, 40 mrem; a coast-to-coast airplane flight, 5 mrem; watching color television, 1 mrem; or living next to a nuclear power plant, less than 1 mrem.

Biological Effects of Radiation

When living tissue is exposed to large amounts of radiation, the tissue's molecular structure may be disrupted, triggering a chain of events that can destroy living cells, produce chromosomal damage or other injury which will overwhelm the natural repair processes. On the other hand, small amounts of radiation, such as natural background levels, can be repaired via the same natural repair processes. The amount of radiation absorbed per gram of body tissue is expressed in **rad** (radiation absorbed dose). The unit of measurement used to quantify the expected biological effect from radiation exposure in human soft tissue is **rem**, or roentgen equivalent man.

The effects of radiation on humans can be divided into two categories, somatic and genetic. Somatic effects are those which develop in exposed individuals, including a developing fetus. Genetic effects are those which may be observed in, or passed on to, offspring of the exposed individual.

Somatic effects can be divided further into acute and chronic effects. Acute effects are those that result from high radiation exposures in a short period of time. Chronic effects are those that result from radiation exposure over an extended period of time.

Much of our current knowledge of the biological effects of radiation comes from extensive laboratory animal experiments. Under laboratory conditions many crucial variables can be accurately controlled. These include, for example, the total dose, time interval and quality of radiation and characteristics such as age, sex and health status.

While laboratory animal experiments serve as valuable models for human studies, there are limitations in drawing conclusions from biological effects observed in irradiated animals to potential health effects in humans. Thus, the most relevant studies are the epidemiological surveys that have focused on human populations who received radiation exposure under a variety of conditions. Most of these epidemiological studies involved population groups ranging from several hundred to more than 100,000 individuals. The most important studies have involved the following groups:

Survivors of the Atomic Bomb and Nuclear Weapons Tests - The most intensely studied human populations are the Japanese survivors of the atomic bombs in Hiroshima and Nagasaki. These people were exposed to radiation from the bombs. Studies have also been made of natives of the Marshall Islands who were accidentally exposed to fallout from nuclear weapons testing in 1954.

Medical Radiation - Large doses of radiation were given to treat various health problems, such as ankylosing spondylitis (spinal impairment), thymus enlargement, ringworm of the scalp, postpartum mastitis (breast inflammation) and cancer of the cervix. Routine chest fluoroscopic examination of women being treated for tuberculosis resulted in significant doses to the breast. Children whose mothers were irradiated during pregnancy have also been studied.

Radium Dial Painters - Workers early in this century ingested radium-containing paint during the manufacture of luminous watches, clocks and aircraft instruments through a practice of "tipping" paint brushes with their lips.

Uranium Miners - Early in this century, certain large mines in Europe were worked for pitchblende, a uranium ore.

Radiologists - Pioneer medical scientists and physicians using x-rays, unaware of the potential hazards, accumulated large radiation doses principally to their hands.

These and other populations, many of whom continue to be studied, add to our current understanding and provide reliable data on health effects resulting from large doses of radiation. Among radiation scientists, there is strong agreement on the health effects and risks associated with large radiation doses (>100 rads). What remains uncertain and controversial is the assessment of potential health effects that may result from chronic doses of radiation. Since we cannot, at the present time, detect health effects in human populations exposed to low doses of radiation, it is conservative and appropriate to assume that there are risks associated with low level radiation exposure. However, it is known that even a large dose given in small amounts over a prolonged period of time allows the body's natural mechanisms to replace or repair damaged cells, as it would following many injuries.

Acute effects require radiation doses some thousands of times greater than those received from natural sources. An acute whole-body dose of more than 450 rads, in the absence of medical treatment, may be fatal in about half the individuals exposed. These effects may appear within days or weeks of the exposure. Generally, a dose of at least 100 rads to the whole body within a short time is required to cause even the mildest symptoms. The small amount of radioactivity routinely released from Fermi 2 is only a tiny fraction of what is needed to produce even the mildest health effects.

Genetic changes in the sperm or egg cells can result in health effects appearing in future generations. The fertilized egg contains all the genetic information necessary to produce the organs and tissues of a new individual. This information is carried in the cell's nucleus in small chromosomes, of which equal numbers are contributed by both parents. The chromosomes transmit the genetic information from one generation to the next.

The genetic material contained in the cell nucleus can be altered by a large variety of agents, including heat, chemicals, and both natural and man-made radiation. Genetic mutations occur randomly in all plant, animal and human populations and are considered to be the primary mechanism for evolutionary changes in all species. Epidemiological studies have shown that about five percent of all people are affected by a genetically transmitted or spontaneous disease at some time in their lives.

Although laboratory studies of mice exposed to large doses of radiation for many generations have shown genetic effects, studies of humans have not yet produced reliable evidence of effects on man. It is difficult to measure most mutations because they are difficult to observe and are randomly distributed within a population group. Of the 35,000 children born to parents irradiated at Hiroshima and Nagasaki, at an assumed average parental dose of 25,000 to 35,000 millirads (25 to 35 rads), there has been no observable increase in genetic defects. Using all the information available, scientists have estimated that about 100,000 millirads (100 rads) to each person in a large population would be required to double the genetic mutations occurring naturally in a non-irradiated population.

Benefits of Nuclear Power

Nuclear power plays an important part in meeting today's electricity needs, and will continue to serve as an important source of electric energy well into the future. Nuclear power entered the 1980s as an alternative energy source and emerged from the decade as the second largest source of U.S. electricity, meeting over 20 percent of national demand.

Nuclear power plants reduce U.S. dependence on foreign oil. Currently, the U.S. imports almost half of the oil it uses - at a cost of nearly $1 billion per week. However, nuclear power cuts the demand for foreign oil by more than 300 million barrels annually.

Studies show that U.S. economic growth has been fueled largely by electric power. There is a close and continuing connection between the growth of the economy and the supply of electricity. Nuclear energy is an important contributor to maintaining the US's economic and industrial strength.

As the population grows, the demand for electricity increases. Since 1973, the U.S. population grew from 212 million to 250 million and electricity demand rose 61 percent. The U.S. Department of Energy (DOE) projects that our need for electricity will increase 24 percent between 1989 and the year 2000, and 51 percent by 2010. Nuclear power plants will be an important part of meeting that need.

Because nuclear power plants do not burn fossil fuels, they do not emit combustion by-products. By substituting for other fuels in electricity production, nuclear power has significantly reduced U.S. and global emissions of carbon dioxide, the chief "greenhouse" gas. Since 1973, U.S. nuclear power plants have reduced the cumulative amount of carbon dioxide emissions by 1.6 billion metric tons. In 1993 alone, U.S. nuclear power plants prevented the discharge of 133 million metric tons of carbon into the atmosphere.

All methods of producing electricity affect the environment to some degree, but the impact of nuclear power is minimal.

Sources of Radioactivity Released from Nuclear Power Plants

During the normal operation of a nuclear power plant, most of the fission products are retained within the fuel and fuel cladding. However, small amounts of radioactive fission products and trace amounts of the component and structure surfaces which have been activated are present in the primary coolant water. The four types of radioactive material released are noble gases, iodine, particulates, and tritium.

Noble Gases

Some of the fission products released in airborne effluents are radioactive isotopes of noble gases, such as xenon and krypton. These noble gases are released continuously at low levels while the reactor is operating, and releases may be increased when the reactor is depressurized or when there are leaks in the fuel cladding. Noble gas releases to the environment are reduced by plant systems which delay release of these gases from the plant, which allows a portion of the noble gas activity to decay within plant systems after it is released from the fuel.

Noble gases are biologically and chemically nonreactive. They do not concentrate in humans or other organisms. They contribute to human radiation dose by being an external source of radiation exposure to the body. They are readily dispersed in the atmosphere. In 1997, krypton-85m, krypton-87, krypton-88, xenon-129m, xenon-133, xenon-133m, xenon-135, xenon-135m, xenon-137, and xenon-138 were detected in gaseous effluent samples. The half lives of these noble gases range from 4 minutes (xenon-137) to 9 days (xenon-129m).

Iodines and Particulates

Fermi 2 is required to calculate offsite dose due to releases of iodine-131 and iodine-133, which are radioisotopes of iodine with half lives of 8 days and 1 day, respectively, and particulates with half-lives greater than 8 days in gaseous and liquid effluents. The principal radioactive particulates released are fission products (e.g., cesium-134 and cesium-137) and activation products (e.g., cobalt-58 and cobalt-60). Annual releases of these isotopes are small. Factors such as their high chemical reactivity and solubility in water, combined with the high efficiency of gaseous and liquid processing and radwaste systems, minimize their discharge.

The main contribution of radioactive iodine to human dose is dose to the thyroid gland, where the body concentrates iodine, resulting from inhalation or ingestion of these iodines. Radioactive cesiums and cobalts, when ingested or inhaled, contribute to radiation exposure of tissues such as the muscle, liver, and intestines. These iodines and particulates are also a source of external radiation exposure if deposited on the ground.

Tritium

Tritium, a radioactive isotope of hydrogen, is the predominant radionuclide in liquid effluents. It may also be present in gaseous effluents, but it has usually been at such low levels that it has been below detection limits in gaseous effluent samples at Fermi 2. Tritium is produced in the reactor coolant as a result of neutron interaction with deuterium (also a hydrogen isotope) present in the water, and it is also a fission product.

Plant Effluent Monitoring

Effluents are strictly controlled to ensure that radioactivity released to the environment is as low as reasonably achievable and does not exceed regulatory limits. Effluent control includes the operation of monitoring systems, in-plant and environmental sampling and analyses programs, quality assurance programs for effluent and environmental programs, and procedures covering all aspects of effluent and environmental monitoring.

The radioactive waste treatment systems at Fermi 2 are designed to collect, process, and/or delay the release of liquid and gaseous wastes which contain radioactivity. For example, the 2.0 and 2.2 minute holdup pipes delay the release of radioactive gases so that radioactive decay can occur prior to release. The offgas system provides additional delay for such gases.

Radioactivity monitoring systems are used to ensure that all releases are below regulatory limits. These instruments provide a continuous indication of the radioactivity present at the release points. Each instrument is equipped with alarms and indicators in the control room. The alarm setpoints are low enough to ensure that applicable limits will not be exceeded. In some cases these alarms restrict the release. For example, if the liquid radwaste effluent monitor alarms, a release in progress is automatically stopped. Also, several alarms cause building ventilation systems to be shut down and/or gaseous releases to be diverted to the standby gas treatment system.

All wastes are evaluated to identify the specific concentrations of radionuclides being released. Sampling and analysis provide a more sensitive and precise method of determining effluent composition than monitoring instruments.

A meteorological tower is located on the Fermi 2 site. It is linked to computers which record the meteorological data. These data are used in calculating dispersion and deposition factors, which are essentially dilution factors between plant release points and points offsite. Coupled with the effluent release data, these factors are used to calculate dose to the public.

Beyond the plant, devices maintained in conjunction with the Radiological Environmental Monitoring Program constantly sample the air in the surrounding environment. Frequent samples of other environmental media, such as water and vegetation, are also taken to determine if buildup of deposited radioactive material has occurred in the area.

Exposure Pathways to People

Radiological exposure pathways define the methods by which people may become exposed to radioactive material. The major pathways of concern are those which could cause the highest calculated radiation dose. These projected pathways are determined from the type and amount of radioactive material released, the environmental transport mechanism, and the use of the environment. The environmental transport mechanism includes consideration of physical factors, such as the hydrological (water) and meteorological (weather) characteristics of the area.

An important factor in evaluating the exposure pathways is the use of the environment. This is evaluated in the annual Land Use Census. Many factors are considered, such as the locations of homes, gardens, and milk or meat animals in the area.

The release of radioactive gaseous effluents involves pathways such as external whole body exposure, deposition of radioactive material on plants, deposition on soil, inhalation by animals raised for human consumption, and inhalation by humans. The release of radioactive material in liquid effluents involves pathways such as drinking water and fish consumption.

Although radionuclides can reach humans by many different pathways, some result in greater dose than others. The most significant pathway is the exposure pathway which will provide the greatest dose to a population, or to a specific individual. Identification of the most significant pathway depends on the radionuclides involved, the age and diet of the individual, and the location of the individual's residence. The doses calculated may be delivered to the whole body or to a specific organ. The organ receiving the greatest fraction of the dose is important in determining compliance with dose limits.

Dose Assessment

Dose is energy deposited by radiation in an exposed individual. Whole body exposure to radiation involves the exposure of all organs. Most exposures due to external sources of radiation are of this type. Both non-radioactive and radioactive elements can enter the body through inhalation or ingestion. When they do, they are usually not distributed evenly. For example, iodine concentrates in the thyroid gland, cesium collects in muscle and liver tissue, and strontium collects in bone tissue.

The total dose to organs from a given radionuclide depends on the amount of radioactive material present in the organ and the amount of time that the radionuclide remains in the organ. Some radionuclides remain for very short times due to their rapid radioactive decay and/or elimination rate from the body, while other radionuclides may remain in the body for longer periods of time. Also the form of the radionuclide (soluble vs. insoluble) and the method of uptake influence residence times in the body.

The dose to the general public in the area surrounding Fermi 2 is calculated for periods of gaseous release and for each liquid release. The dose due to radioactive material released in gaseous effluents is calculated using factors such as the amount of radioactive material released, the concentration beyond the site boundary, the locations of exposure pathways (cow milk, goat milk, vegetable gardens and residences), and usage factors (inhalation, food consumption). The dose due to radioactive material released in liquid effluents is calculated using factors such as the total volume of liquid, the total volume of dilution water, near field dilution, and usage factors (water and fish consumption). These calculations produce a conservative estimation of the dose.

The **Radiological Environmental Monitoring Program (REMP)** was established at Fermi 2 for several reasons: to provide a supplementary check on the effluent controls, to assess the radiological impact of the plant's operation on the surrounding area, and to determine compliance with applicable radiation protection guides and standards. The REMP was established in 1978, seven years before the plant became operational. This **preoperational surveillance program** was established to describe and quantify the radioactivity, and its variability, in the area prior to the operation of Fermi 2. After Fermi 2 became operational in 1985, the **operational surveillance program** continued to measure radiation and radioactivity in the surrounding areas.

A variety of environmental samples are collected as part of the REMP at Fermi 2. The selection of sample types is based on the established pathways for the transfer of radionuclides through the environment to humans. The selection of sampling locations is based on sample availability, local meteorological and hydrological characteristics, local population characteristics, and land usage in the area of interest. The selection of sampling frequencies for the various environmental media is based on the radionuclides of interest, their respective half-lives, and their behavior in both the biological and physical environment.

Preoperational Surveillance Program

The federal government requires nuclear facilities to conduct radiological environmental monitoring prior to constructing the facility. This preoperational surveillance program is aimed at collecting the data needed to identify pathways, including selection of the radioisotope and sample media combinations to be included in the surveillance program conducted after facility operation begins. Radiochemical analyses performed on the environmental samples should include not only those nuclides expected to be released during facility operation, but should also include typical fallout radionuclides and natural background radioactivity. All environmental media with a potential to be affected by facility operation, as well as those media directly in the major pathways, should be sampled on at least an annual basis during the preoperational phase of the environmental surveillance program.

The preoperational surveillance design, including nuclide/media combinations, sampling frequencies and locations, collection techniques, and radioanalyses performed, should be carefully considered and incorporated in the design of the operational surveillance program. In this manner, data can be compared in a variety of ways (for example: from year to year, location to location, etc.) in order to detect any radiological impact the facility has on the surrounding environment. Data collection during the preoperational phase should be planned to provide a comprehensive database for evaluating any future changes in the environment surrounding the nuclear facility.

Fermi 2 began its preoperational environmental surveillance program seven years before the plant began operating in 1985. Data accumulated during those early years provide an extensive database from which environmental monitoring personnel are able to identify trends in the radiological characteristics of the local environment. The environmental surveillance program at Fermi 2 will continue after the plant has reached the end of its economically useful life and decommissioning has begun.

Operational Surveillance Program Objectives

The operational phase of the environmental surveillance program at Fermi 2 was designed with the following objectives in mind:

- to determine whether any significant increase occurs in the concentration of radionuclides in major pathways;
- to identify and evaluate the buildup, if any, of radionuclides in the local environment, or any changes in normal background radiation levels;
- to verify the adequacy of the plant's controls for the release of radioactive materials;
- to fulfill the obligations of the radiological surveillance sections of Fermi 2's Offsite Dose Calculation Manual.

Program Overview

The Radiological Environmental Monitoring Program (REMP) at Fermi 2 is conducted in accordance with Title 10, Code of Federal Regulations, Part 50; Regulatory Guide 4.8; the Fermi 2 Offsite Dose Calculation Manual (ODCM) and plant operating procedures. Samples are collected either weekly, monthly, quarterly, semiannually, or annually, depending upon the sample type and nature of the radionuclides of interest. Environmental samples collected by Fermi 2 personnel are divided into four general types:

- **direct radiation** -- measured by thermoluminescent dosimeters (TLDs).
- **atmospheric** -- including samples of airborne particulates and airborne radioiodine.
- **terrestrial** -- including samples of milk, groundwater, and broad leaf vegetation.
- **aquatic** -- including samples of drinking water, surface water, fish, and shoreline and bottom sediments.

REMP samples are collected onsite and offsite up to 20 miles away from the plant. Sampling locations are divided into two general categories: **indicator** and **control**. Indicator locations are those which would be most likely to display the effects caused by the operation of Fermi 2. Generally, they are located within ten miles of the plant. Control locations are those which should be unaffected by plant operations. Typically, these are more than ten miles away from the plant. Data obtained from the indicator locations are compared with data from the control locations. This comparison allows REMP personnel to take into account naturally occurring background radiation or fallout from weapons testing in evaluating any radiological impact Fermi 2 has on the surrounding environment. Data from indicator and control locations are also compared with preoperational data to determine whether significant variations or trends exist.

Sample Analysis

When environmental samples are analyzed, several types of measurements may be performed to provide information about the radionuclides present. The major analyses that are performed on environmental samples collected for the Fermi 2 REMP include:

Gross beta analysis measures the total amount of beta emitting radioactive material present in a sample. Beta radiation may be released by many different radionuclides. Since beta decay gives a continuous energy spectrum rather than the discrete lines or "peaks" associated with gamma radiation, identification of specific beta emitting nuclides is much more difficult. Therefore, gross beta analysis only indicates whether the sample contains normal or abnormal concentrations of beta emitting radionuclides; it does not identify specific radionuclides. Gross beta analysis merely acts as a tool to identify samples that may require further analysis.

Gamma spectral analysis provides more specific information than does gross beta analysis. Gamma spectral analysis identifies each gamma emitting radionuclide present in the sample, and the amount of each nuclide present. Each radionuclide has a very specific "fingerprint" that allows for swift and accurate identification. For example, gamma spectral analysis can be used to identify the presence and amount of iodine-131 in a sample. Iodine-131 is a man-made radioactive isotope of iodine that may be present in the environment as a result of fallout from nuclear weapons testing, routine medical, or routine releases from nuclear power stations.

Tritium analysis indicates whether a sample contains the radionuclide tritium (H-3) and the amount present. Tritium is an isotope of hydrogen that emits low energy beta particles.

Strontium analysis identifies the presence and amount of strontium-89 and strontium-90 in a sample. These man-made radionuclides are found in the environment mainly as a result of fallout from nuclear weapons testing. Strontium is usually incorporated into the calcium pool of the biosphere. In other words, strontium tends to replace calcium in living organisms and becomes incorporated in bone tissue. The principal strontium exposure pathway is via milk produced by cattle grazed on pastures exposed to deposition from airborne releases.

Gamma Doses measured by thermoluminescent dosimeters while in the field are determined by a special laboratory procedure.

Often samples will contain little radioactivity, and may be below the lower limit of detection for the particular type of analysis used. The lower limit of detection (LLD) is the smallest amount of sample activity which can be detected with a reasonable degree of confidence, at a predetermined level. When a measurement of radioactivity is reported as less than LLD (<LLD), it means that the radioactivity is so low that it cannot be accurately measured with any degree of confidence by that particular method for an individual analysis.

Many radionuclides are present in the environment due to sources such as cosmic radiation and fallout from nuclear weapons testing. Some of the radionuclides present are:

- **tritium,** present as a result of the interaction of cosmic radiation with the upper atmosphere and as a result of routine release from nuclear facilities.

- **beryllium-7,** present as a result of the interaction of cosmic radiation with the upper atmosphere.

- **cesium-137,** a man-made radionuclide which has been deposited in the environment, (for example, in surface soils) as a result of fallout from nuclear weapons testing and routine releases from nuclear facilities.

- **potassium-40,** a naturally occurring radionuclide normally found throughout the environment (including humans)

- **fallout radionuclides** from nuclear weapons testing, including strontium-89, strontium-90, cesium-137, cerium-141, cerium-144, and ruthenium-106. These radionuclides may also be released in minute amounts from nuclear facilities

The radionuclides listed above are expected to be present in many of the environmental samples collected in the vicinity of the Fermi 2. The contribution of radionuclides from the operation of Fermi 2 is assessed by comparing sample results with preoperational data, operational data from previous years, control location data, and the types and amounts of radioactivity normally released from the Fermi 2 in liquid and gaseous effluents.

Quality Assurance

An important part of the environmental monitoring program at Fermi 2 is the **Quality Assurance Program (QA).** It is conducted in accordance with the guidelines specified in NRC Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs." The QA program is designed to identify possible deficiencies in the REMP so that corrective actions can be initiated promptly. Fermi 2's Quality Assurance program also provides confidence in the results of the REMP through:

- performing regular audits (investigations) of the REMP, including a careful examination of sample collection techniques and record keeping;

- performing audits of the vendor laboratory which analyzes the environmental samples;

- requiring the analytical vendor laboratory to participate in an approved Cross-Check Program;

- splitting samples prior to analysis by an independent laboratory, and then comparing the results for agreement, and, finally;

- requiring the analytical laboratory to perform in-house spiked sample analyses.

QA audits and inspections of the Fermi 2 REMP are performed by Fermi 2's QA department and the NRC, respectively. In addition, the NRC also performs independent environmental monitoring in the vicinity of Fermi 2. The types of samples collected and the sampling locations used by the NRC were incorporated into Fermi 2's REMP. Hence, the analytical results from the different programs can be compared. This practice of comparing results from identical samples, collected and analyzed by different parties, provides a valuable tool to verify the quality of the laboratory's analytical procedures and the data generated.

Radioactive Effluent Monitoring Results

This section summarizes the results of effluent monitoring and offsite dose calculation for the year 1997, as well as a listing of radioactivity contained in Fermi 2 waste shipped for burial. Calculations of offsite doses are compared with Nuclear Regulatory Commission limits, and these limits are summarized in Appendix E. Appendix E also contains a detailed discussion of the methods used to determine quantities of radioactivity released in effluents, the types of solid radwaste, as well as tables of individual radionuclides released in effluents and shipped as solid radwaste.

There were no releases of liquid radioactive effluents from Fermi 2 in 1997. In fact, there has not been a liquid radioactive discharge from Fermi 2 since 1994. The 1997 gaseous effluent releases are summarized in the following tables. There were no abnormal releases of radioactive material, i.e. releases not performed in accordance with the Fermi 2 license and implementing procedures, in 1997.

The data in the following tables represent continuous releases; batch gaseous releases (containment purges) did not contribute significantly to the totals. In 1997, there were 3 containment purges in which radioactivity was detected. Of these, one purge of the torus lasted 228 minutes, another lasted 3095 minutes, and a drywell purge lasted 1693 minutes. The total duration of these purges was 5016 minutes, and the average duration was 1672 minutes.

Note that values in the tritium summary table are preceded by the "less than" symbol. These values represent the lower limit of detection (LLD) in units of microcuries per cubic centimeter (uCi/cc) for individual samples, and indicate that tritium was not detected in gaseous effluent samples in 1997.

Table 1 - Fission and Activation Gases (Noble Gases) Summary

	Quarter 1	**Quarter 2**	**Quarter 3**	**Quarter 4**
Total Release (curies)	0.00E+00	3.16E+01	3.35E+02	4.48E+02
Average Release Rate for Period (µCi/sec)	0.00E+00	4.02E+00	4.21E+01	5.64E+01

Table 2 - Radioiodines Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total I-131 (curies)	7.83E-06	2.12E-03	4.72E-03	5.59E-03
Average Release Rate for Period (μCi/sec)	1.01E-06	2.70E-04	5.94E-04	7.03E-04

Table 3 - Particulates Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Particulates with half lives > 8 days (curies)	1.98E-05	1.58E-04	1.77E-03	1.40E-03
Average Release Rate for Period (μCi/sec)	2.54E-06	2.01E-05	2.23E-04	1.76E-04
Gross Alpha Radioactivity (curies)	1.63E-06	1.75E-06	1.90E-06	1.81E-06

Table 4 - Tritium Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release (LLD in uCi/cc)	<3.2E-08	<3.2E-08	<3.2E-08	<3.2E-08

The offsite dose impact of the above releases was evaluated by calculating organ doses to the most highly exposed individual living near the plant due to I-131, I-133, tritium, and particulates with half lives greater than 8 days. This exposure is assumed to be occurring via the pathways of inhalation, vegetation ingestion, and direct radiation from material deposited on the ground. The results of this calculation are shown in the following table:

Table 5

Organ	1997 Gaseous Effluent Dose to Receptor with Highest Single Organ Dose
Bone	0.01 mrem
Liver	0.0009 mrem
Thyroid	0.15 mrem
Kidney	0.001 mrem
Lung	0.0006 mrem
GI-LLI	0.001 mrem
Total body	0.002 mrem

The highest single organ dose is 0.15 mrem to the thyroid. This is 1% of the federal limit of 15 mrem specified in 10CFR50, Appendix I.

Another dose calculation performed on the above release data is that for gamma and beta air dose at the site boundary due to noble gases. In 1997, gamma air dose was 0.2 mrad and beta air dose was 0.3 mrad. These doses represent 2% and 1.5% of the 10CFR50 gamma and beta annual air dose limits, respectively. (The gamma dose limit is 10 mrad and the beta dose limit is 20 mrad.)

Title 40, Part 190 of the Code of Federal Regulations requires that dose to an individual in the unrestricted area from the uranium fuel cycle, including direct radiation dose, be limited to 25 mrem/year to the total body and 75 mrem/year to the thyroid. During 1997, there was no measurable direct radiation dose beyond the site boundary as shown by offsite TLD readings. Also, offsite dose due to effluents is an extremely small fraction of the 40 CFR 190 limits. Therefore, Fermi 2 was in compliance with 40 CFR 190 in 1997.

Potential dose to visitors at Fermi 2 due to all radioactive effluents, including noble gases, was also calculated. The ODCM considers persons visiting the Fermi 2 Visitors Center (4 hours/year), and persons ice fishing on Lake Erie near the plant (240 hours/year), to be visitors. Using ODCM assumptions about these categories of visitors, the maximum potential dose to a visitor to Fermi 2 in 1997 was 0.02 mrem to the maximally exposed organ (thyroid) and 0.01 mrem to the total body.

Also, the dose to the entire population within a fifty mile radius of Fermi 2 (about 6 million people) was calculated. This dose was estimated to be 1.6 person-rem for 1997. This dose is insignificant compared to the background radiation dose to this population of approximately 1.8 million person-rem.

The radioactivity and volume of Fermi 2 solid waste received at the Barnwell, SC, burial facility in 1997 is summarized in the following table.

Table 6 - Solid Waste Received At Barnwell, SC

Type of waste	Unit	12 month period	Est. total activity error, %
Spent resins, sludges, etc.	m^3 curies	1.13E+02 6.29E+02	 ± 25
Dry compressible waste, contaminated equipment, etc.	m^3 curies	4.39E+01 2.82E+00	 ± 25

Radioactive solid waste shipments from Fermi 2 in 1997 are summarized in the following table.

Table 7 - Solid Waste Shipments

Type of shipment/ solidification process	Number of shipments	Mode of transportation	Destination
Spent resin, sludges, etc.	22	tractor trailer, tractor trailer with cask	Barnwell, SC, GTS Duratek (SEG), and Molten Metal Technologies
Dry compressible waste, etc.	20	tractor trailer	GTS Duratek (SEG), Hake, Manufacturing Sciences, Chem Nuclear Consolidation Facility, and ALARON

In 1997, no radiation instrumentation was out of service longer than the time limits specified in the ODCM. Also, there were no major changes to radioactive waste systems in 1997, and no outside temporary tank exceeded the 10 curie content limit. There was one revision to the ODCM in 1997, and the entire revised ODCM is being submitted to the NRC concurrently with this report. The only change made in this revision was to extend the allowable date for submittal of the Annual Radioactive Effluent Release Report to the end of April.

Radiological Environmental Monitoring Program Results

Direct Radiation Monitoring

Radiation is a normal component of the environment resulting primarily from natural sources, such as cosmic radiation and naturally occurring radionuclides; and to a lesser extent, from manmade sources such as fallout from past nuclear weapons testing. The earth is constantly bombarded by cosmic radiation in the form of high energy gamma rays and particulates. The earth's crust also contains natural radioactive material, such as uranium and potassium-40, which contributes to the background radiation. Direct radiation monitoring primarily measures ionizing radiation from cosmic and terrestrial sources.

Thermoluminescent Dosimeters

Detroit Edison uses thermoluminescent dosimeters (TLDs) to measure direct gamma radiation in the environs of Fermi 2. Thermoluminescence is a process by which ionizing radiation interacts with a phosphor which is the sensitive material in the TLD. Energy is trapped in the TLD material and can be stored for several months or years. This provides an excellent method to measure the dose received over long periods of time. The energy that was stored in the TLD as a result of interaction with radiation is released and measured by a controlled heating process in a calibrated reading system. As the TLD is heated, the phosphor releases the stored energy in the form of light. The amount of light detected is directly proportional to the amount of radiation to which the TLD was exposed. This reading process then rezeros the TLD and prepares it for reuse.

Fermi 2 has 67 TLD locations within a 15 mile radius of the plant. The TLDs are thoroughly tested to comply with NRC Regulatory Guide 4.13 and American National Standards Institute's (ANSI) publication N545-1975, which assure accurate measurements under varying environmental conditions before being placed in the field. Indicator TLDs are located within a ten mile radius of the plant and control TLDs are located at a distance that is outside the influence of the plant. While in the field, TLDs are exposed to background radiation and, if measurable, gaseous effluents and direct radiation from Fermi 2. Environmental TLDs are exchanged and processed on a quarterly basis. The TLDs' data are reported in terms of milliroentgen per standard quarter (mR/std qtr), a standard quarter being 91 days. Regardless of the duration of TLD exposure in the field, the data have been normalized to a standard quarter to allow convenient intercomparisons with the net value.

In 1997, the average exposure for TLDs at all indicator locations was 15.8 mR/std qtr and for all control locations was 14.3 mR/std qtr. These exposures are consistent with preoperational and past operational measurements as show in Figure 4.

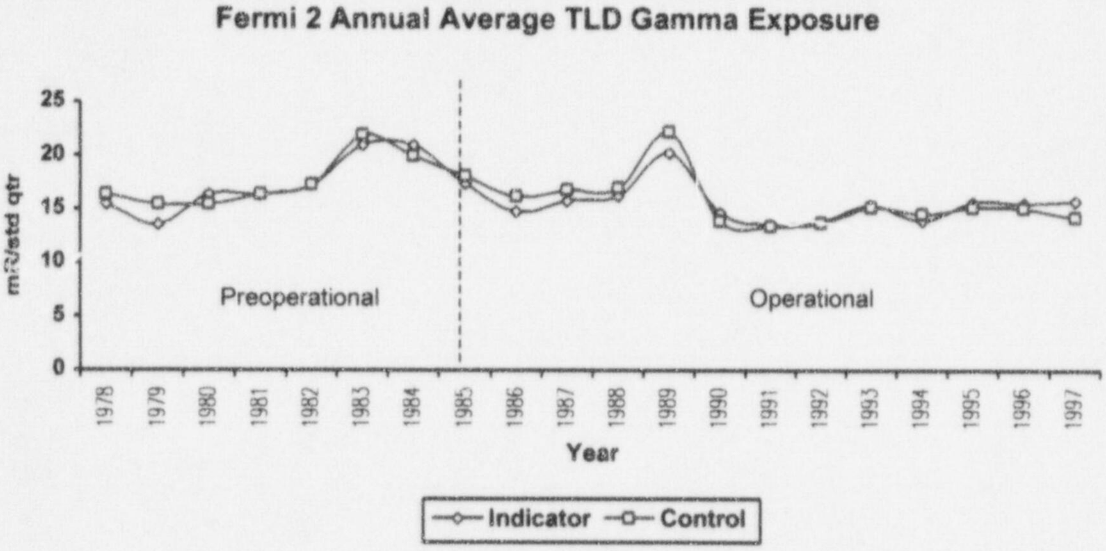


Figure 4 - Fermi 2 Annual Average TLD Gamma Exposure; The similarity between indicator and control results demonstrates that the operation of Fermi 2 has not caused any abnormal gamma exposure.

Atmospheric Monitoring

A potential exposure pathway to people is inhalation of airborne radioactive materials. Detroit Edison continuously samples the ambient air surrounding Fermi 2 for radioactivity. Air sampling began in 1979, during the preoperational program. At each sampling location, a mechanical air sampler is used to draw a continuous volume of air through two filters designed to collect particulates and radioiodines. Air samples are collected weekly and analyzed for gross beta radiation and iodine-131 gamma radiation. The particulate filters for each sampling location are combined on a quarterly basis to form a "composite sample" and are analyzed for strontium-89/90 beta radiation and gamma emitting isotopes. There are four indicator sampling locations which were selected based on an evaluation of the predominant wind directions. A fifth sampling location is approximately 14 miles west of the plant and is considered to be in a location unaffected by the operation of the plant.

Air Sampling

On October 16, 1980, the Peoples Republic of China conducted an atmospheric nuclear weapon test. The fallout from this test was detected in Fermi 2 preoperational environmental air samples in 1981 (see Figure 2). The average gross beta for 1981 was 1.60E-1 pCi/cubic meter for indicator samples and 2.40E-1 pCi/cubic meter for control samples which was a factor of ten times greater than background gross beta. Gamma spectroscopic analyses of the particulate filters indicated cesium-137, cerium-141, cerium-144, ruthenium-103, ruthenium-106, zirconium-95, niobium-95, manganese-54, and antimony-125 in the atmosphere as a result of this test. In 1986, as shown in Figure 5, there was a slight increase in gross beta activity and a 2.70E-1 pCi/cubic meter "spike" in the iodine-131 activity. These elevated levels in 1986 are attributed to the nuclear accident at Chernobyl on April 26, 1986. For all other years, the iodine-131 activity was below the lower limit of detection (LLD) of 7.0E-2 pCi/cubic meter.

During 1997, two hundred and fifty-seven (257) particulate air filters were collected and analyzed for gross beta activity and two hundred and fifty-seven (257) charcoal filters were collected and analyzed for iodine-131. The average gross beta for indicator samples was 2.54E-2 pCi/cubic meter and 2.49E-2 pCi/cubic meter for control samples. None of the charcoal filters collected showed detectable levels of iodine-131. The following table contains the annual average gross beta results of all five sample locations for 1997.

1997 Average Gross Beta Concentrations in Air Particulates
(pCi/m^3)

Table 8

Station	Description (sector/distance)	Annual Average
API-1 (I)	Estral Beach (NE/1.4 mi.)	2.55E-2
API-2 (I)	Site Boundary (NNW/0.6 mi.)	2.58E-2
API-3 (I)	Site Boundary (NW/0.6 mi.)	2.41E-2
API-4 (C)	North Custer Rd. (W/14 mi.)	2.49E-2
API-5 (I)	Erie St. (S/1.2 mi.)	2.60E-2

(I) = Indicator Station (C) = Control Station

Twenty (20) quarterly particulate filter composites were prepared and analyzed for strontium-89/90 and gamma emitting isotopes. Only naturally occurring potassium-40 and beryllium-7 were detected in both indicator and control samples.

In conclusion, the atmospheric monitoring data is consistent with preoperational and prior operational data and shows no adverse long-term trends in the environment attributable to Fermi 2 as illustrated in Figures 5 and 6.

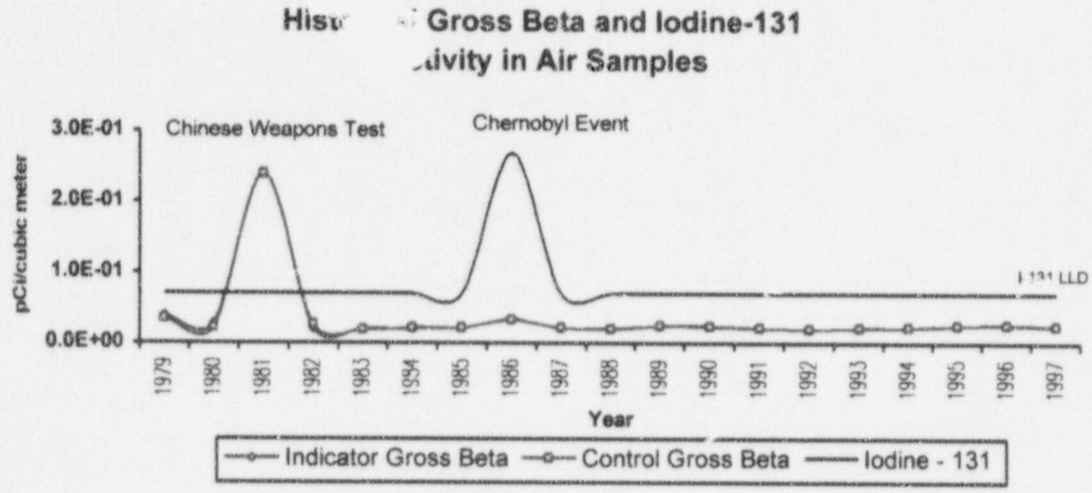


Figure 5 - Historical Gross Beta and Iodine-131 Activity in Air Samples; The similarity between indicator and control gross beta results demonstrates that the operation of Fermi 2 has had no adverse long-term trends in the environment. The lower limit of detection (LLD) for iodine-131 is 0.07 pCi/cubic meter.

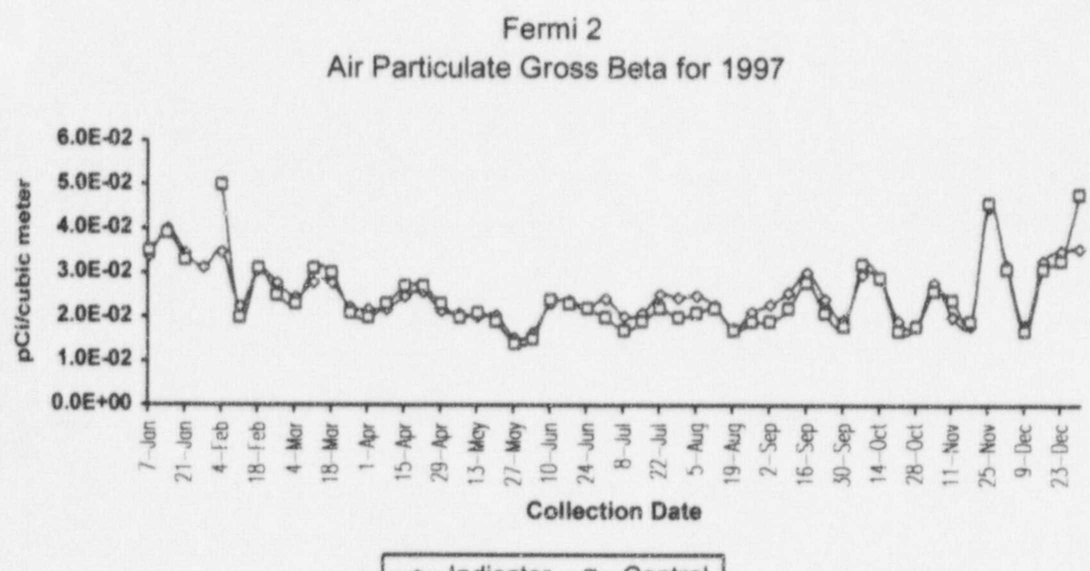


Figure 6 - Fermi 2 Air Particulate Gross Beta for 1997; The concentration of beta emitting radionuclides in airborne particulates samples was essentially identical at indicator and control locations. Gross beta activity varies throughout the year and is primarily an effect of seasonal precipitation.

Terrestrial Monitoring

Radionuclides released to the atmosphere may deposit on soil and vegetation, and therefore, may eventually be incorporated into the human food chain. To assess the impact of Fermi 2 operations to humans from the ingestion pathway samples of milk, green leafy vegetables, and groundwater are collected and analyzed for radioactivity. The following sections discuss the type and frequency of terrestrial sampling, analyses performed, and a comparison of 1997 data to previous operational and preoperational data.

Milk Sampling

The milk sampling portion of the REMP is perhaps one of the most important aspects of the program. This is because a major pathway in the human food chain is the consumption of milk from grazing animals (dairy cows or goats) due to biological concentration and the short turn around time in this pathway. Milk is collected from one indicator location and one control location semimonthly when animals are in the pasture, and monthly when the animals are on stored feed. The milk is analyzed for iodine-131, gamma emitting isotopes, and strontium-89/90. At times when milk samples are not available, grass samples are collected at both the control milk sample location and the location where milk is not available. Grass samples are analyzed for iodine-131 and other gamma emitting isotopes.

Milk sampling began in 1979 during the preoperational program. During this time period, milk samples were analyzed for iodine-131 and other gamma emitting isotopes. Cesium-137 and naturally occurring potassium-40 were the only isotopes detected in milk samples during the preoperational program. The cesium-137 concentration averaged 3.60E+0 pCi/liter and is due to past atmospheric nuclear weapons testing. In 1986, after the nuclear accident at Chernobyl iodine-131 and cesium-137 were detected in both indicator and control milk samples. The average concentration for iodine-131 was 3.70E+0 pCi/liter and 6.60E+0 pCi/liter for cesium-137.

The analysis for strontium-89/90 began in 1988, and strontium-90 is routinely detected in both indicator and control milk samples because of past atmospheric nuclear weapons testing. Since 1988, the average concentration for strontium-90 has been 1.90E+0 pCi/liter.

During 1997, thirty six (36) milk samples were collected and analyzed for iodine-131, gamma emitting isotopes, and strontium-89/90. No iodine-131 was detected in any of the samples. Strontium-90 was detected in both indicator and control milk samples and is due to fallout from past atmospheric weapons testing (see Figure 7). The indicator samples had an average strontium-90 concentration of 1.21E+0 pCi/liter and the control samples had an average concentration of 1.54E+0 pCi/liter. During 1997, no grass samples were scheduled or collected for the REMP program.

In 1970, the concentration of strontium-90 in Monroe County milk was 6.00E+0 pCi/liter according to the Michigan Department of Health's "Milk Surveillance", Radiation Data and Reports, Vol. 11-15, 1970-1974. Figure 4 shows the calculated radiological decay curve for the 1970 concentration of strontium-90 and the average concentrations since 1988. Figure 7 illustrates that the inventory of strontium-90 in the local environment is decreasing with time and closely follows the calculated decay curve. This supports the fact that the inventory of strontium-90 in the environment is due to fallout from past atmospheric nuclear weapons testing and not the operation of Fermi 2.

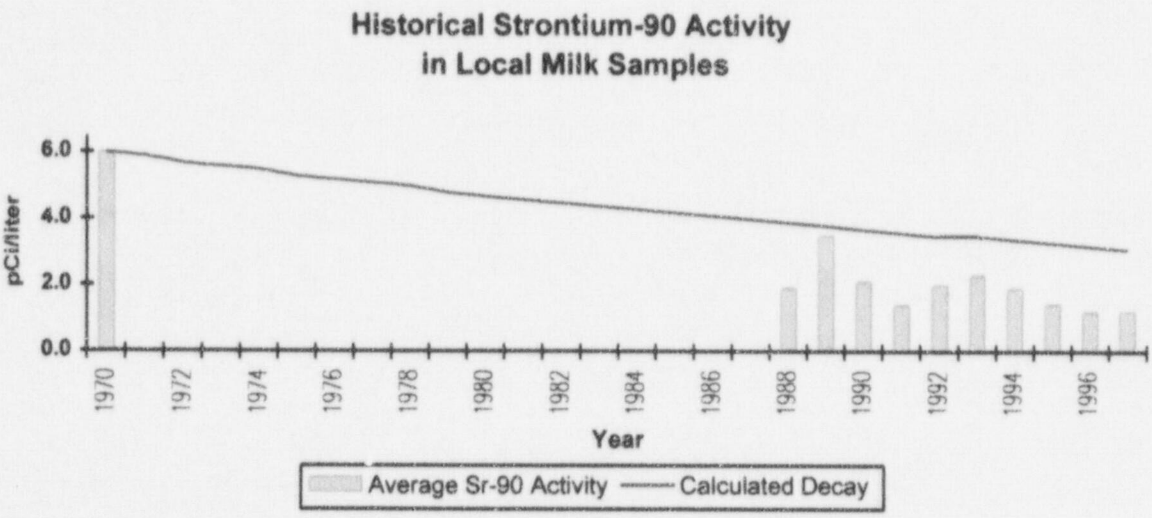


Figure 7 - Historical Strontium-90 Activity in Local Milk Samples; The concentration of strontium-90 in local milk samples is decreasing with time and is below the calculated decay curve. This supports the fact that strontium-90 in local milk is due to fallout from past atmospheric nuclear weapons testing and not the operation of Fermi 2.

Groundwater Sampling

In areas not served by municipal water systems, water supplies for domestic use are generally obtained from private wells. The network of private wells presently in use forms the source of water for domestic and livestock purposes in farms and homes west and north of the site. However, with the construction of new water plants and distribution systems, the water use trend in the area is from groundwater to surface water.

Groundwater is collected on a quarterly basis from four wells surrounding Fermi 2. The groundwater is analyzed for gamma emitting isotopes and tritium. Sampling location GW-4 which is located approximately 0.6 miles west north west is designated as the control location because it is up-gradient and is least likely to be affected by the operation of the plant. The other three sampling locations are down-gradient from Fermi 2 and designated as indicator locations.

Groundwater sampling began in 1987, during the operational period of the REMP program. From 1987 to 1996 naturally occurring potassium-40, cesium-137, and tritium were detected in both indicator and control samples. The average concentration was 7.71E+0 pCi/liter for cesium-137 and 1.50E+2 pCi/liter for tritium. The presence of cesium-137 and tritium in groundwater samples is due to fallout from past atmospheric nuclear weapons testing leaching into the soil and becoming incorporated into the groundwater.

In 1997, sixteen (16) groundwater samples were collected and analyzed for gamma emitting isotopes and tritium. No activity was detected in any of these groundwater samples.

Garden Sampling

Fermi 2 collects samples of broad leaf vegetables from indicator locations identified by the Annual Land Use Census. Samples are also collected at a control location that is at a distance and direction which is considered to be unaffected by plant operations. Samples are collected once a month during the growing season (June through September) and are analyzed for iodine-131 and other gamma emitting isotopes.

Vegetable sampling started in 1982. During the preoperational period from 1982 to 1985, only naturally occurring potassium-40 was detected in both indicator and control vegetable samples. During the operational period from 1985 to 1990 and 1994 to 1995, only naturally occurring potassium-40 was detected in both indicator and control vegetable samples. However, in 1991, 1992, and 1993 cesium-137 was detected in one indicator sample each year and had an average concentration of 1.2E+1 pCi/kilogram.

Cesium-137 may become incorporated into plants by either uptake from the soil or direct deposition on foliar surfaces. Since cesium-137 is normally not detected in gaseous effluent samples from Fermi 2, and there have been no recent atmospheric weapons testing or nuclear accidents, the incorporation of cesium-137 by direct deposition is highly unlikely. The most probable source of cesium-137 in vegetable samples is the uptake of previously deposited cesium-137, which has leached into the soil. This cesium activity is attributed to fallout from past atmospheric weapons testing and to the nuclear accident at Chernobyl.

During 1997, twenty-three (23) vegetable samples were collected and analyzed for iodine-131 and other gamma emitting isotopes. No iodine-131 was detected in vegetable samples during 1997. The only gamma emitting isotopes detected were naturally occurring potassium-40 and beryllium-7 in both indicator and control vegetable samples.

Terrestrial monitoring results for 1997 of milk, groundwater and leafy garden vegetable samples, showed only naturally occurring radioactivity, and radioactivity associated with fallout from past atmospheric nuclear weapons testing. The radioactivity levels detected were consistent with levels measured prior to the operation of Fermi 2 and no radioactivity attributable to activities at Fermi 2 was detected in any terrestrial samples. In conclusion, the terrestrial monitoring data show no adverse long-term trends in the terrestrial environment.

Aquatic Monitoring

Lake Erie, on which Fermi 2 borders, is used as a source for drinking water, as well as for recreational activities such as fishing, swimming, sunbathing, and boating. For this reason, Lake Erie and its tributaries are routinely monitored for radioactivity.

The aquatic monitoring portion of the REMP consists of sampling raw municipal drinking water, surface water, lake sediments, and fish for the presence of radioactivity. The following sections discuss the type and frequency of aquatic sampling, analyses performed, a comparison of 1997 data to previous operational and preoperational data.

Drinking Water Sampling

Detroit Edison monitors drinking water at one control location and one indicator location using automatic samplers. The automatic samplers collect samples, known as aliquots, at time intervals that are very short (hourly) relative to the sample collection period (monthly) in order to assure that a representative sample is obtained. Indicator water samples are obtained at the Monroe water intake located approximately 1.1 miles south of the plant. Detroit municipal water is used for the control samples and is obtained at the Allen Park water intake located approximately 18.6 miles north of the plant. Drinking water samples are collected on a monthly basis and analyzed for gross beta, strontium-89/90, and gamma emitting isotopes. The monthly samples for each location are combined on a quarterly basis and analyzed for tritium activity.

In late 1980, as shown in Figure 8, an atmospheric nuclear weapon test was conducted by the Peoples Republic of China. As a result of this test, the average gross beta for 1981 was 9.80E+0 pCi/liter for water samples. Figure 8 also shows that, except for the Chinese weapons testing, the historic drinking water sample data is below the lower limit of detection (4.00E+0 pCi/liter) required by US Environmental Protection Agency's National Interim Primary Drinking Water regulations. Even during the Chinese weapons testing, the drinking water samples did not exceed the USEPA's maximum allowable criteria of 5.00E+1 pCi/liter gross beta. In 1980 and 1983, cesium-137 was detected in drinking water samples at levels ranging from 5.40E+0 pCi/liter to 1.90E+1 pCi/liter. Tritium was also detected during the preoperational program and had an average of 3.25E+2 pCi/liter. The presence of cesium-137 and detectable levels of tritium in these water samples is due to fallout from past atmospheric nuclear weapons testing and naturally occurring tritium.

From 1985 to 1996, the average annual gross beta activity for indicator samples was 3.13E+0 pCi/liter and 2.59E+0 pCi/liter for control samples. The analysis for strontium-89/90 began in 1988 and strontium-90 has been detected in both indicator and control samples. The average strontium-90 activity for indicator samples was 7.25E-1 pCi/liter and 7.56E-1 pCi/liter for control samples during this time period. Tritium was also detected in both indicator and control drinking water samples during this time period. The average tritium activity for indicator samples was 2.70E+2 pCi/liter and 3.00E+2 pCi/liter for control samples. The presence of strontium-90 and detectable levels of tritium in these water samples is due to fallout from past atmospheric nuclear weapons testing and naturally occurring tritium.

In 1997, twenty-six (26) drinking water samples were collected and analyzed for gross beta, gamma emitting isotopes, strontium-89/90, and tritium. The average gross beta for indicator samples was 2.98E+0 and 2.45E+0 pCi/liter for control samples. No gamma emitting isotopes or strontium-89/90 activity was detected in drinking water samples during 1997. Eight (8) quarterly composite drinking water samples were prepared and analyzed for tritium. Two indicator samples showed an average activity for tritium at 3.25E+2 pCi/liter and one control sample showed detectable activity of 2.60E+2 pCi/liter. This tritium activity is consistent with background levels measured during the preoperational program.

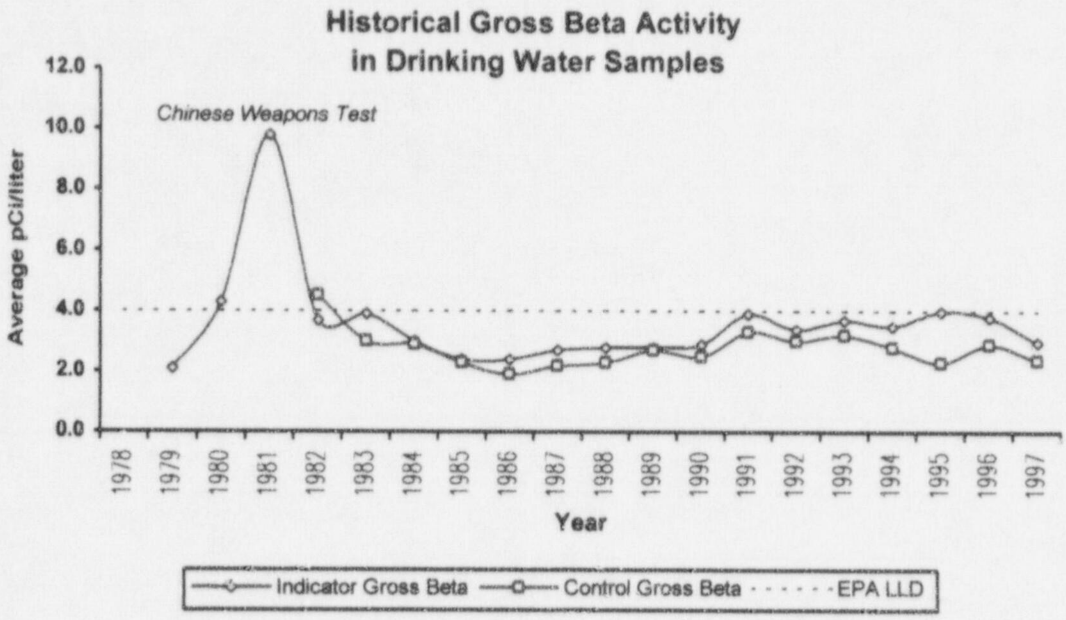


Figure 8 - Historical Gross Beta Activity in Drinking Water Samples; Since !982, the annual concentrations of beta emitting radionuclides in drinking water samples collected from indicator locations have been consistent with those from con'rol locations. This shows that Fermi 2 has had no measurable radiological impact on local drinking water and that the water meets the US Environmental Protection Agency's lower limit of detection (LLD) of 4.0 pCi/liter.

Surface Water Sampling

Detroit Edison monitors surface water at two locations using automatic samplers. As with drinking water, surface water samples are collected at time intervals that are very short (hourly) relative to the sample collection period (monthly) in order to assure obtaining a representative sample. Indicator surface water samples are obtained at the Fermi 2 General Service Water building, located approximately 0.3 miles south southeast from Fermi 2. The control surface water samples are obtained from Trenton Channel Power Plant's cooling water intake on the Detroit River which is approximately 11.7 miles north north east of Fermi 2. Surface water samples are collected on a monthly basis and analyzed for strontium-89/90 and gamma emitting isotopes. The monthly samples for each location are combined on a quarterly basis to form a quarterly composite sample and are analyzed for tritium.

Surface water sampling began in 1979 and the samples were analyzed for gamma emitting isotopes, and tritium. During this preoperational program no gamma emitting isotopes, except for naturally occurring potassium-40, were detected. Tritium was detected in both indicator and control samples during this time period and had an average concentration of 3.15E+2 pCi/liter. This tritium activity represents the background concentration due to naturally occurring tritium and tritium produced during past atmospheric nuclear weapons testing.

From 1985 to 1996, as part of the operational program, surface water samples were analyzed for gamma emitting isotopes and tritium. The analysis for strontium-89/90 did not begin until 1988, and strontium-90 was detected in both indicator and control samples. The average strontium-90 concentration for this time period was 1.13E+0 pCi/liter. In 1990, two indicator samples showed detectable activity for cesium-137 at an average concentration of 1.20E+1 pCi/liter. The presence of cesium-137 and strontium-90 in these water samples is due to fallout from past atmospheric nuclear weapons testing. Tritium was detected in both indicator and control surface water samples during this time period at a concentration of 2.34E+2 pCi/liter. This tritium activity is consistent with background levels measured during the preoperational program.

In 1997, thirty-one (31) surface water samples were collected and analyzed for gamma emitting isotopes and strontium-89/90. From these samples, eight (8) quarterly composite samples were prepared and analyzed for tritium. During 1997, no gamma emitting isotopes were detected. Tritium was detected in one indicator sample at a concentration of 3.50E+2 pCi/liter and one control sample at a concentration of 2.20E+2 pCi/liter. This tritium activity is consistent with background levels measured during the preoperational program.

Sediment Sampling

Sediments often act as a sink (temporary or permanent) for radionuclides, but they may also become a source, as when they are resuspended during periods of increased turbulence or are dredged and deposited elsewhere. Sediment, in the vicinity of the liquid discharge point, represents the most likely site for accumulation of radionuclides in the aquatic environment and, with long-lived radionuclides, a gradual increase in radioactivity concentration would be expected over time if discharges occur. Sediment, therefore, provides a long-term indication of change that may appear in other sample media (i.e., water and fish samples).

Lake Erie shoreline and bottom sediments from five locations are collected on a semiannual basis (Spring and Fall) and are analyzed for gamma emitting isotopes and strontium-89/90. There is one control location and four indicator locations. The control sample is collected near the Trenton Channel Power Plant's cooling water intake. The indicator samples are collected at Estral Beach, near the Fermi 2 liquid discharge area, the shoreline at the end of Pointe Aux Peaux, and Indian Trails Community Beach.

During the preoperational program there was not a control location, and indicator samples were analyzed for gamma emitting isotopes. During the preoperational program, except for naturally occurring isotopes, only cesium-137 was detected in sediment samples. For this time period the average cesium-137 concentration was 3.27E+2 pCi/kilogram. The presence of cesium-137 in these sediment samples is due to fallout from past atmospheric nuclear weapons testing.

From 1985 to 1996, cesium-137, strontium-90, and naturally occurring isotopes were detected in sediment samples. The average cesium-137 concentration for indicator samples was 1.77E+2 pCi/kilogram and 1.27E+2 pCi/kilogram for control samples. The analysis for strontium-89/90 began in 1988, and strontium-90 has been routinely detected at similar concentrations in both indicator and control samples. The average strontium-90 activity for indicator samples was 7.56E+1 pCi/kilogram and 1.98E+2 pCi/kilogram for control samples. The presence of cesium-137 and strontium-90 in these sediment samples is due to fallout from past atmospheric nuclear weapons testing.

In 1990 and 1991, the Spring samples taken at the Fermi 2 liquid discharge line (Location S-2) showed activity for plant related isotopes (manganese-54, cobalt-58, cobalt-60, and zinc-65) and was determined to be a result of liquid effluent from Fermi 2. The sample results were well below any regulatory reporting limits and were consistent with the activity released from the plant in liquid effluents and the dose impact was negligible.

In 1997, ten (10) sediment samples were collected and analyzed for gamma emitting isotopes and strontium 89/90. Strontium-90 was detected in two indicators samples with an average concentration of 3.40E+2 pCi/kilogram. Also cesium-137 was detected in two control samples with an average concentration of 1.07E+2 pCi/kilogram. The presence of cesium-137 and strontium-90 in sediment samples is due to fallout from past atmospheric nuclear weapons testing. Naturally occurring isotopes of potassium, beryllium, radium, and thorium were also detected in both indicator and control sediment samples for this sampling period.

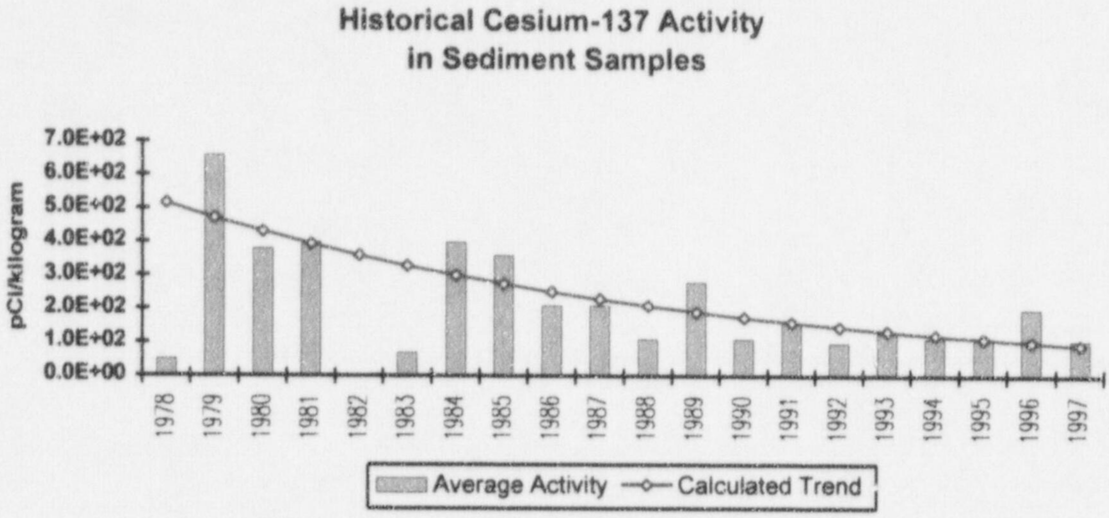


Figure 9 - Historical Cesium-137 Activity in Sediment Samples; As the calculated trend shows, the concentration of cesium-137 in Lake Erie sediments is decreasing with time. This supports the fact that cesium-137 in Lake Erie sediments is due to fallout from past atmospheric nuclear weapons testing and not the operation of Fermi 2.

Figure 9 shows the historical concentration of cesium-137 in sediment samples from 1978 to 1997. Using the data from these years, and the statistical method of least squares, an exponential curve can be calculated that represents the cesium-137 concentration in sediment. This curve has a negative slope which indicates the overall concentration of cesium-137 in the environment is decreasing with time. This supports the fact that the inventory of cesium-137 in the environment is due to fallout from past atmospheric nuclear weapons testing and not from the operation of Fermi 2.

Fish Sampling

Samples of fish are collected from Lake Erie at three locations on a semiannual basis. There are two control locations and one indicator location. The two control locations are offshore of Celeron Island and in Brest Bay. The indicator location is approximately 1200 feet offshore of the Fermi 2 liquid effluent discharge. Edible portions of the fish are analyzed for gamma emitting isotopes and strontium-89/90.

During the preoperational program fish samples were analyzed for gamma emitting isotopes. Only cesium-137 and naturally occurring potassium-40 were detected during this time period. The average concentration of cesium-137 for indicator samples was 3.53E+1 pCi/kilogram and 4.20E+1 pCi/kilogram for control samples. The presence of cesium-137 in these fish samples is due to fallout from past atmospheric nuclear weapons testing.

From 1985 to 1996, cesium-137 and naturally occurring potassium-40 were detected in fish samples. The average cesium-137 concentration for indicator samples was 4.51E+1 pCi/kilogram and 4.54E+1 pCi/kilogram for control samples. Figure 10 shows a graphical representation of cesium-137 comparing preoperational and operational average concentrations. The analysis for strontium-89/90 began in 1990, and strontium-90 has been routinely detected at similar concentrations in both indicator and control samples. The average strontium-90 concentration for indicator samples was 3.84E+1 pCi/kilogram and 3.39E+1 pCi/kilogram for control samples. The presence of cesium-137 and strontium-90 in these fish samples is due to fallout from past atmospheric nuclear weapons testing.

In 1997, twenty-three (23) fish samples were collected and analyzed for gamma emitting isotopes and strontium-89/90. Cesium-137 and naturally occurring potassium-40 were detected in fish samples. Both indicator and control samples showed detectable activity for cesium-137. One control sample showed detectable activity at a concentration of 1.98E+1 pCi/kilogram and two indicator samples showed an average activity of 2.24E+1 pCi/kilogram. Figure 10 shows a graphical comparison of cesium-137 average concentrations between preoperational, operational, and 1997 data. The presence of cesium-137 in the 1997 fish samples is due to fallout from past atmospheric nuclear weapons testing.

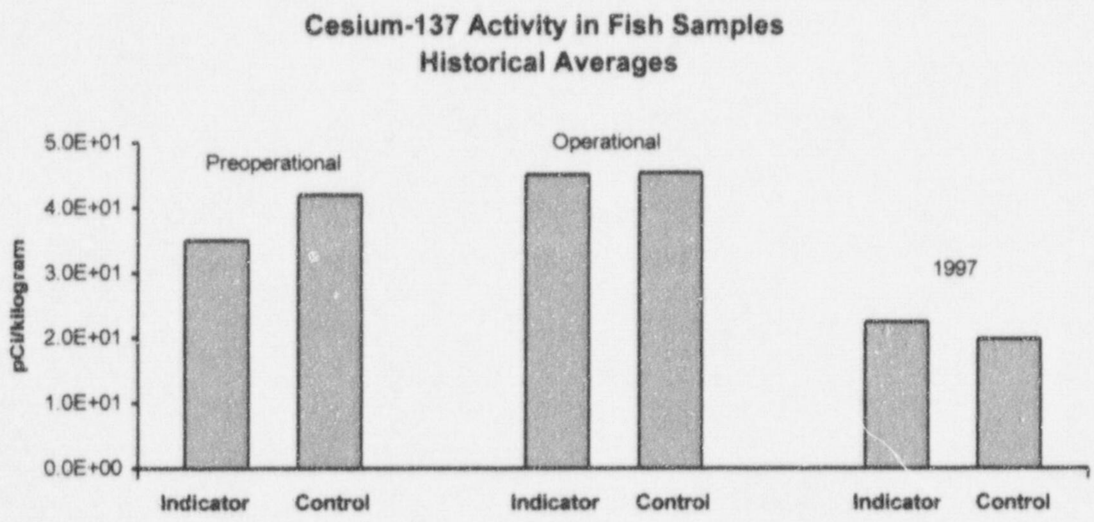


Figure 10 - Cesium-137 Activity in Fish Samples Historical Averages; Average concentrations of cesium-137 in fish samples were similar at indicator and control locations and were within the expected range of results of previous years.

Aquatic monitoring results for 1997 of water, sediment, and fish, showed only naturally occurring radioactivity and radioactivity associated with fallout from past atmospheric nuclear weapons testing and were consistent with levels measured prior to the operation of Fermi 2. In conclusion, no radioactivity attributable to activities at Fermi 2 was detected in any aquatic samples during 1997 and no adverse long-term trends are shown in the aquatic monitoring data.

Land Use Census

The Land Use Census is conducted in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM), control 3.12.2, and satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. This census identifies changes in the use of unrestricted areas to permit modifications to monitoring programs for evaluating doses to individuals from principal pathways of exposure. The pathways of concern are listed below:

- **Inhalation Pathway** - Internal exposure as a result of breathing radionuclides carried in the air.
- **Ground Exposure Pathway** - External exposure from radionuclides deposited on the ground.
- **Plume Exposure Pathway** - External exposure directly from a plume or cloud of radioactive material.
- **Vegetation Pathway** - Internal exposure as a result of eating vegetables which have absorbed deposited radioactive material or which have absorbed radionuclides through the soil.
- **Milk Pathway** - Internal exposure as a result of drinking milk which may contain radioactive material as a result of dairy animals grazing on a pasture contaminated by radionuclides.

The Land Use Census is conducted during the growing season and is used to identify, within a radius of 5 miles, the location of the nearest residences, milk animals, meat animals, and gardens (greater than 50 square meters and containing broad leaf vegetation) in each of 16 meteorological sectors surrounding Fermi 2. Gardens greater than 50 square meters are the minimum size required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden is used for growing broad leaf vegetation (i.e., lettuce and cabbage); and (2) a vegetation yield of 2 kg/square meter.

1997 Land Use Census Results

The Land Use Census is conducted in accordance with ODCM control 3.12.2 and satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. This census identifies changes in the use of unrestricted areas to permit modifications to monitoring programs for evaluating doses to individuals from principal pathways of exposure. The annual Land Use Census is conducted during the growing season and is used to identify, within a radius of 5 miles, the location of the closest residences, milk animals, meat animals, and gardens in each of the 16 meteorological sectors surrounding Fermi 2. While this evaluation is designed to qualify the "critical receptor" with potential dose calculations, it does not represent the individuals actual annual dose due to effluent releases.

The 1997 Land Use Census was performed during the months of August and September. The 1997 census data was obtained with the use of a hand-held Global Positioning System (GPS). This data was compared to the 1996 data to determine any significant changes in the use of the land. This information is tabulated in Tables 1-4 of this report. There were slight changes in the category of closest residences due to the increased accuracy associated with the use of the GPS unit. All but the North-East and North sectors had changes to garden locations. Two milk locations were identified in 1997 as opposed to one location in 1996. Three beef cattle locations were identified with a distance change in the West-North-West sector of 4,576 meters. In 1996 four beef locations were identified. This census also identified new residential housing construction in the North-West sector at 3,962 meters from Fermi 2.

The potential dose for each 1997 location from Tables 9-12 were calculated using equation 7-14, of section 7.8.1 of the ODCM. The effluent data and the meteorology data for 1997 were used to perform the calculations. Two locations with different pathways were calculated as having the highest potential dose and are as follows:

Pathway	Sector	Azimuth (degrees)	Distance (meters)	Age Group	Organ
Ingestion (goat milk)	WNW	301.1	3669	Infant	thyroid
Ingestion (vegetation)	WNW	304.6	1110	Child	thyroid

After further investigation, it was determined that no infant resides at the milk location. However, there is a child residing at the garden location which becomes the new "critical receptor". The exposure pathways to this receptor include inhalation, ingestion (vegetation), and ground plane with the maximum exposed organ being the thyroid.

1997 LAND USE CENSUS

Closest Residences

Table 9

Year	Sector	Azimuth (degrees)	Distance (meters)	Change (meters)
1996	NE	34.9	1825	
1997	NE	34.8	1770	55
1996	NNE	16.9	1723	
1997	NNE	11.2	1658	65
1996	N	10.4	1762	
1997	N	7.7	1770	8
1996	NNW	333.5	1760	
1997	NNW	332.9	1738	22
1996	NW	314.2	1679	
1997	NW	311.4	1706	27
1996	WNW	302.7	1074	
1997 (a)	WNW	304.6	1110	36
1996	W	259.2	1787	
1997	W	259.2	1787	0.0
1996	WSW	236.5	2241	
1997	WSW	238.3	2543	302
1996	SW	236.5	2056	
1997	SW	230.3	2028	28
1996	SSW	201.0	1803	
1997	SSW	201.0	1803	0.0
1996	S	170.7	1671	
1997	S	170.1	1641	30
	ESE-SSE	Lake Erie		

(a) = Calculated Critical Receptor and participant in REMP program

Appendix A

Sampling Locations

Direct Radiation Sample Locations

Table A-1

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T1	NE/38°	1.3 mi.	Estral Beach, Pole on Lakeshore 23 Poles S of Lakeview (Special Area)	Q	I
T2	NNE/22°	1.2 mi.	East of termination of Brancheau St. on post (Special Area)	Q	I
T3	N/9°	1.1 mi.	Pole, NW corner of Swan Boat Club fence (Special Area)	Q	I
T4	NNW/337°	0.6 mi.	Site boundary and Toll Rd. on Site fence by API #2	Q	I
T5	NW/313°	0.6 mi.	Site boundary and Toll Rd. on Site fence by API #3	Q	I
T6	WNW/293°	0.6 mi.	Pole, NE corner of Bridge over Toll Rd.	Q	I
T7	W/270°	14.0 mi.	Pole, at Michigan Gas substation on N. Custer Rd., 0.66 miles west of Doty Rd.	Q	C
T8	NW/305°	1.9 mi.	Pole on Post Rd. near NE corner of Dixie Hwy. and Post Rd.	Q	I
T9	NNW/334°	1.5 mi.	Pole, NW corner of Trombley and Swan View Rd.	Q	I
T10	N/6°	2.1 mi.	Pole, S side of Massarant-2 poles W of Chinavare.	Q	I

I = Indicator *C = Control* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T11	NNE/23°	6.2 mi.	Pole, NE corner of Milliman and Jefferson	Q	I
T12	NNE/29°	6.3 mi.	Pointe Mouille Game Area Field Office, Pole near tree, N area of parking lot	Q	I
T13	N/356°	4.1 mi.	Labo and Dixie Hwy. Pole on SW corner with light	Q	I
T14	NNW/337°	4.4 mi.	Labo and Brandon Pole on SE corner near RR	Q	I
T15	NW/315°	3.9 mi.	Pole, behind Newport Post Office.	Q	I
T16	WNW/283°	4.9 mi.	Pole, SE corner of War and Post Rd.	Q	I
T17	W/271°	4.9 mi.	Pole, NE corner of Nadeau and Laprad near mobile home park.	Q	I
T18	WSW/247°	4.8 mi.	Pole, NE corner of Mentel and Hurd Rd.	Q	I
T19	SW/236°	5.2 mi.	1st pole E of Fermi siren on Waterworks Rd. NE corner of intersection - Sterling State Park Rd. Entrance Drive/Waterworks (in Sterling State Park)	Q	I
T20	WSW/257°	2.7 mi.	Pole, S side of Williams Rd, 8 poles W of Dixie Hwy. (Special Area)	Q	I
T21	WSW/239°	2.7 mi.	Pole, N side of Pearl at Parkview Woodland Beach (Special Area)	Q	I

I = Indicator *C = Control* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T22	S/172°	1.2 mi.	Pole, N side of Pointe Aux Peaux 2 poles W of Long - Site Boundary	Q	I
T23	SSW/195°	1.1 mi.	Pole, S side of Pointe Aux Peaux 1 pole W of Huron next to Vent Pipe - Site Boundary	Q	I
T24	SW/225°	1.2 mi.	Fermi Gate along Pointe Aux Peaux Rd. on fence wire W of gate Site Boundary	Q	I
T25	WSW/251°	1.5 mi.	Pole, Toll Rd. - 13 poles S of Fermi Drive	Q	I
T26	WSW/259°	1.1 mi.	Pole, Toll Rd. - 6 poles S of Fermi Drive	Q	I
T27	SW/225°	6.8 mi.	Pole, NE corner of McMillan and East Front St. (Special Area)	Q	I
T28	SW/229°	10.7 mi.	Pole, SE corner of Mortar Creek and LaPlaisance.	Q	C
T29	WSW/237°	10.3 mi.	Pole, E side of S Dixie, 1 pole S of Albain.	Q	C
T30	WSW/247°	7.8 mi.	Pole, St. Mary's Park corner of Elm and Monroe St., S side of parking lot next to river (Special Area)	Q	I
T31	WSW/255°	9.6 mi.	1st pole W of entrance drive Milton "Pat" Munson Recreational Reserve on North Custer Rd.	Q	C

I = Indicator *C = Control* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T32	WNW/295°	10.3 mi.	Pole, corner of Stony Creek and Finzel Rd.	Q	I
T33	NW/317°	9.2 mi.	Pole, W side of Grafton Rd. 1 pole N of Ash and Grafton intersection.	Q	I
T34	NNW/338°	9.7 mi.	Pole, W side of Port Creek, 1 pole S of Will-Carleton Rd.	Q	I
T35	N/359°	6.9 mi.	Pole, S Side of S Huron River Dr. across from Race St. (Special Area)	Q	I
T36	N/358°	9.1 mi.	Pole, NE corner of Gibraltar and Cahill Rd.	Q	I
T37	NNE/21°	9.8 mi.	Pole, S corner of Adams and Gibraltar across from Humbug Marina.	Q	I
T38	WNW/294°	1.7 mi.	Residence - 6594 N. Dixie Hwy.	Q	I
T39	S/176°	0.3 mi.	SE corner of Protected Area Fence (PAF).	Q	I
T40	S/170°	0.3 mi.	Midway along OBA - (PAF)	Q	I
T41	SSE/161°	0.2 mi.	Midway between OBA and Shield Wall on PAF.	Q	I
T42	SSE/149°	0.2 mi.	Midway along Shield Wall on PAF.	Q	I
T43	SE/131°	0.1 mi.	Midway between Shield Wall and Aux Boilers on PAF.	Q	I
T44	ESE/109°	0.1 mi.	Opposite OSSF door on PAF.	Q	I

I = Indicator *C = Control* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T45	E/86°	0.1 mi.	NE Corner of PAF.	Q	I
T46	ENE/67°	0.2 mi.	NE side of barge slip on fence.	Q	I
T47	S/185°	0.1 mi.	South of Turbine Bldg. rollup door on PAF.	Q	I
T48	SW/235°	0.2 mi.	30 ft. from corner of AAP on PAF.	Q	I
T49	WSW/251°	1.1 mi.	Corner of Site Boundary fence north of NOC along Critical Path Rd.	Q	I
T50	W/270°	0.9 mi.	Site Boundary fence near main gate by the south Bullit Street sign.	Q	I
T51	N/3°	0.4 mi.	Site Boundary fence north of north Cooling Tower.	Q	I
T52	NNE/20°	0.4 mi.	Site Boundary fence at the corner of Arson and Tower.	Q	I
T53	NE/55°	0.2 mi.	Site Boundary fence east of South Cooling Tower.	Q	I
T54	S/189°	0.3 mi.	Pole next to Fermi 2 Visitors Center.	Q	I
T55	WSW/251°	3.3 mi.	Pole, north side of Nadeau Rd. across from Sodt Elementary School Marquee	Q	I
T56	WSW/256°	2.9 mi.	Pole, entrance to Jefferson Middle School on Stony Creek Rd.	Q	I

I = Indicator *C = Control* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T57	W/260°	2.7 mi.	Pole, north side of Williams Rd. across from Jefferson High School entrance.	Q	I
T58	WSW/249°	4.9 mi.	Pole west of Hurd Elementary School Marquee	Q	I
T59	NW/325°	2.6 mi.	Pole north of St. Charles Church entrance on Dixie Hwy.	Q	I
T60	NNW/341°	2.5 mi.	1st pole north of North Elementary School entrance on Dixie Hwy.	Q	I
T61	W/268°	10.1 mi.	Pole, SW corner of Stewart and Raisinville Rd.	Q	I
T62	SW/232°	9.7 mi.	Pole, NE corner of Albain and Huli Rd.	Q	I
T63	WSW/245°	9.6 mi.	Pole, NE corner of Dunbar and Telegraph Rd.	Q	I
T64	WNW/286°	0.2 mi.	West of switchgear yard on PAF	Q	I
T65	NW/322°	0.1 mi.	PAF switchgear yard area NW of RHR complex.	Q	I
T66	NE/50°	0.1 mi.	Behind Bldg. 42 on PAF	Q	I
T67	NNW/338°	0.2 mi.	Site Boundary fence West of South Cooling Tower	Q	I

I = Indicator *C = Control* *Q = Quarterly*

Air Particulate and Air Iodine Sample Locations

Table A-2

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
API-1	NE/39°	1.4 mi.	Estral Beach Pole on Lakeshore, 18 Poles S of Lakeview (Nearest Community with highest X/Q)	W	I
API-2	NNW/337°	0.6 mi.	Site Boundary and Toll Road, on Site Fence by T-4	W	I
API-3	NW/313°	0.6 mi.	Site Boundary and Toll Road, on Site Fence by T-5	W	I
API-4	W/270°	14.0 mi.	Pole, at Michigan Gas substation on N. Custer Rd., 0.66 miles west of Doty Rd.	W	C
API-5	S/191°	1.2 mi.	One pole south of Pointe Aux Peaux Rd.on Erie St.	W	I

I = Indicator *C = Control* *W = Weekly*

Milk Sample Locations

Table A-3

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
M-2	NW/319°	5.4 mi.	Reaume Farm - 2705 E Labo	M-SM	I
M-8	WNW/289°	9.9 mi.	Calder Dairy - 9334 Finzel Rd	M-SM	C

I = Indicator *C = Control* *M = Monthly* *SM = Semimonthly*

Garden Sample Locations

Table A-4

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
FP-1	NNE/21°	3.8 mi.	9501 Turnpike Highway	M	I
FP-3	NNE/12°	1.1 mi.	6441 Brancheau	M	I
FP-7	WNW/302°	0.7 mi.	6200 Langton	M	I
FP-9	W/261°	10.9 mi.	4074 North Custer Road	M	C

I = Indicator *C = Control* *M = Monthly (when available)*

Drinking Water Sample Locations

Table A-5

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
DW-1	S/174°	1.1 mi.	Monroe Water Station N Side of Pointe Aux Peaux 1/2 Block W of Long Rd	M	I
DW-2	N/8°	18.5 mi.	Detroit Water Station 14700 Moran Rd, Allen Park	M	C

I = Indicator *C = Control* *M = Monthly*

Surface Water Sample Locations

Table A-6

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
SW-2	NNE/20°	11.7 mi.	DECo's Trenton Channel Power Plant Intake Structure (Screenhouse #1)	M	C
SW-3	SSE/160°	0.2 mi.	DECO's Fermi 2 General Service Water Intake Structure	M	I

I = Indicator *C = Control* *M = Monthly*

Groundwater Sample Locations

Table A-7

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
GW-1	S/175°	0.4 mi.	Approx. 100 ft W of Lake Erie, EF-1 Parking lot near gas fired peakers	Q	I
GW-2	SSW/208°	1.0 mi.	4 ft S of Pointe Aux Peaux (PAP) Rd. Fence 427 ft W of where PAP crosses over Stoney Point's Western Dike	Q	I
GW-3	SW/226°	1.0 mi.	143 ft W of PAP Rd. Gate, 62 ft N of PAP Rd. Fence	Q	I
GW-4	WNW/299°	0.6 mi.	42 ft S of Langton Rd, 8 ft E of Toll Rd. Fence	Q	C

I = Indicator *C = Control* *Q = Quarterly*

Sediment Sample Locations

Table A-8

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
S-1	SSE/165°	0.9 mi.	Pointe Aux Peaux, Shoreline to 500 ft offshore sighting directly to Land Base Water Tower	SA	I
S-2	E/81°	0.2 mi.	Fermi 2 Discharge, approx. 200 ft offshore	SA	I
S-3	NE/39°	1.1 mi.	Estral Beach, approx. 200 ft offshore, off North shoreline where Swan Creek and Lake Erie meet	SA	I
S-4	WSW/241°	3.0 mi.	Indian Trails Community Beach	SA	I
S-5	NNE/20°	11.7 mi.	DECo's Trenton Channel Power Plant intake area.	SA	C

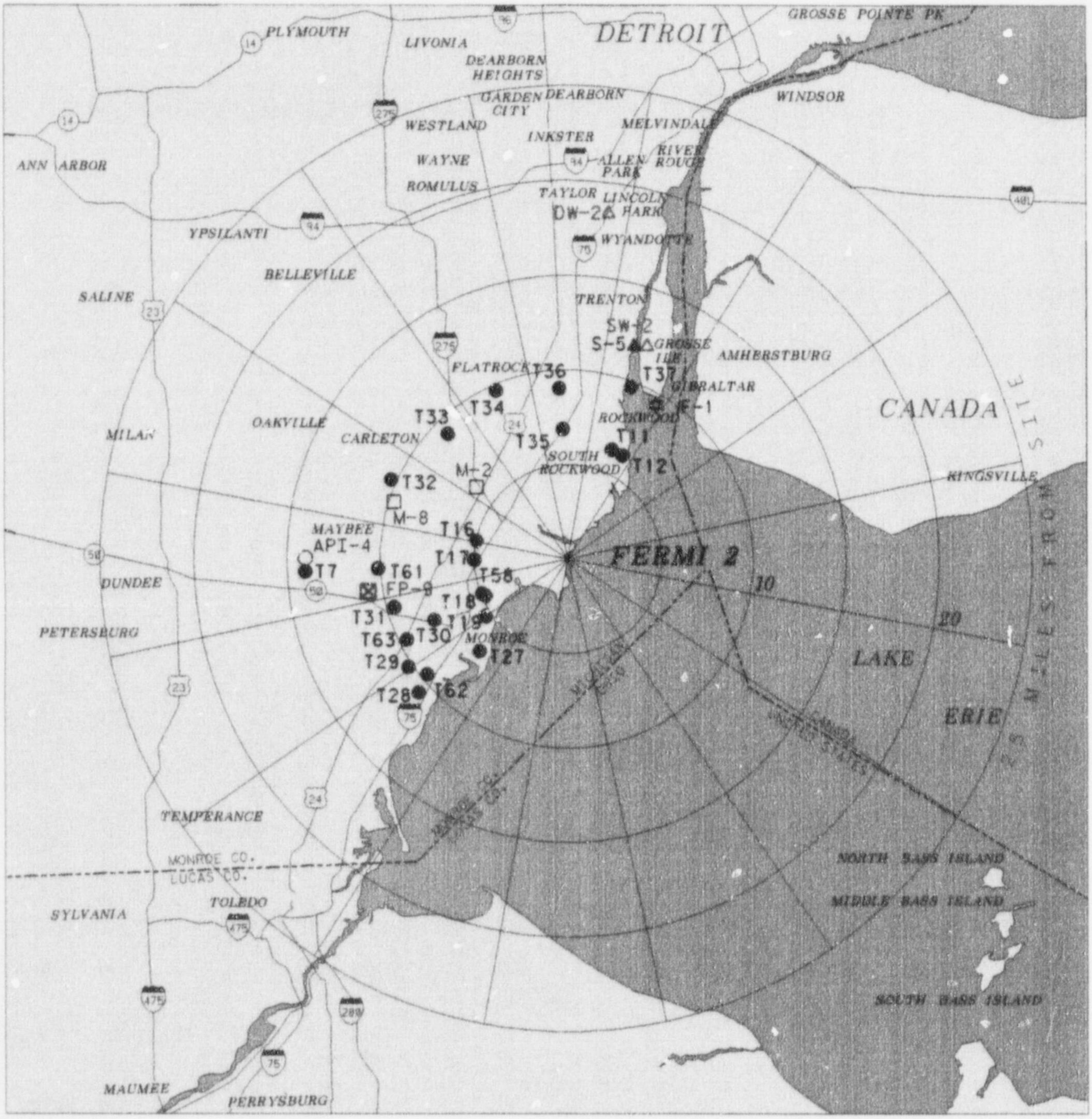
I = Indicator *C = Control* *SA = Semiannually*

Fish Sample Locations

Table A-9

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
F-1	NNE/31°	9.5 mi.	Celeron Island	SA	C
F-2	E/86°	0.4 mi.	Fermi 2 Discharge (approx. 1200 ft offshore)	SA	I
F-3	SW/227°	3.5 mi.	Brest Bay	SA	C

I = Indicator *C = Control* *SA = Semiannually*



MAP 3
SAMPLING LOCATIONS
BY STATION NUMBER
(GREATER THAN 5 MILES)

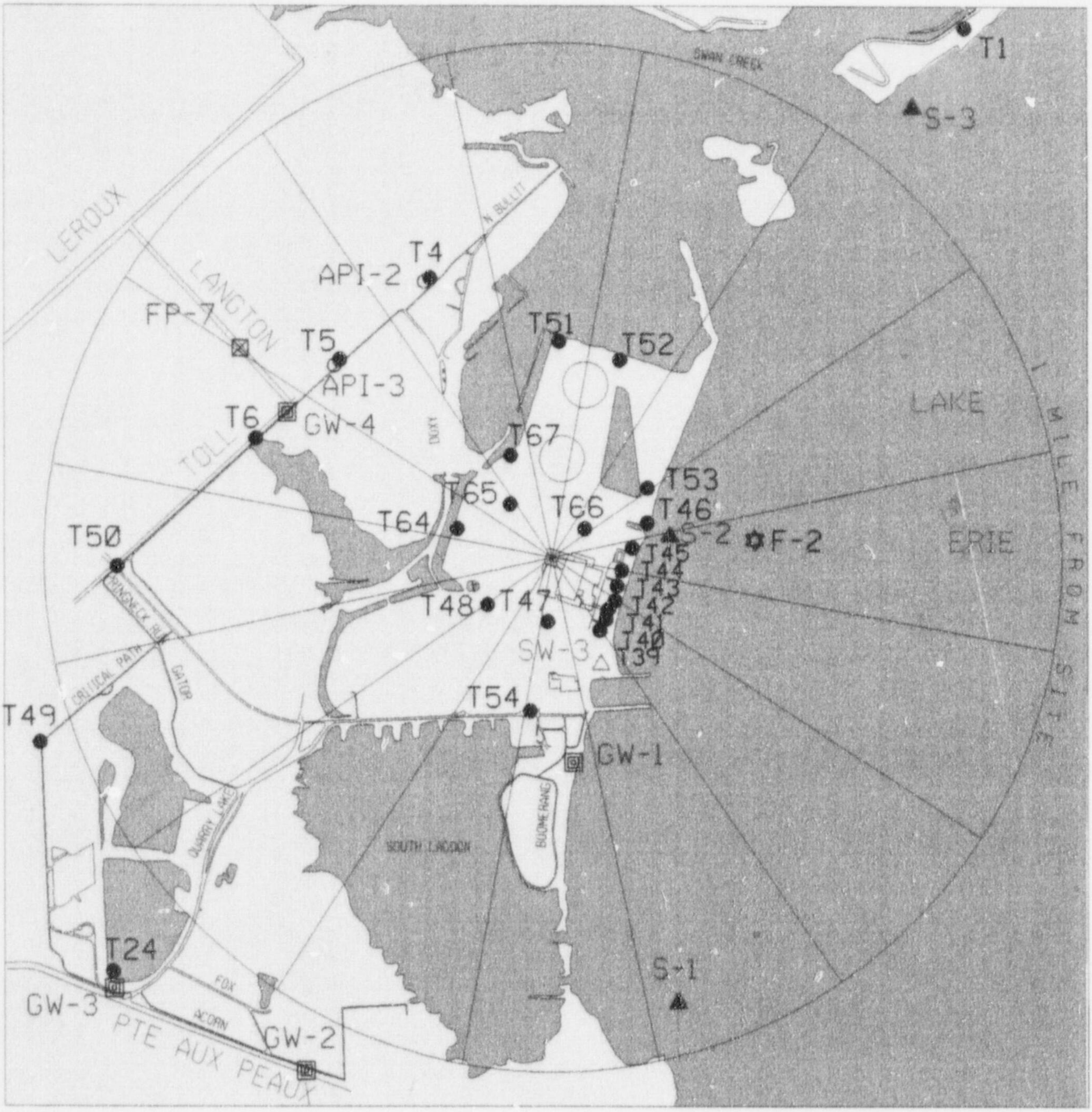
LEGEND

- ● T- DIRECT RADIATION
- ○ API- AIR PARTICULATES OR AIR IODINE
- ▲ S- SEDIMENTS
- △ DW/SW- DRINKING WATER/SURFACE WATER
- ▣ GW- GROUND WATER
- □ M- MILK
- ⊠ FP- FOOD PRODUCTS
- ✡ F- FISH

N

5 0 5 10

SCALE IN MILES



MAP 1
SAMPLING LOCATIONS
BY STATION NUMBER
WITHIN 1 MILE

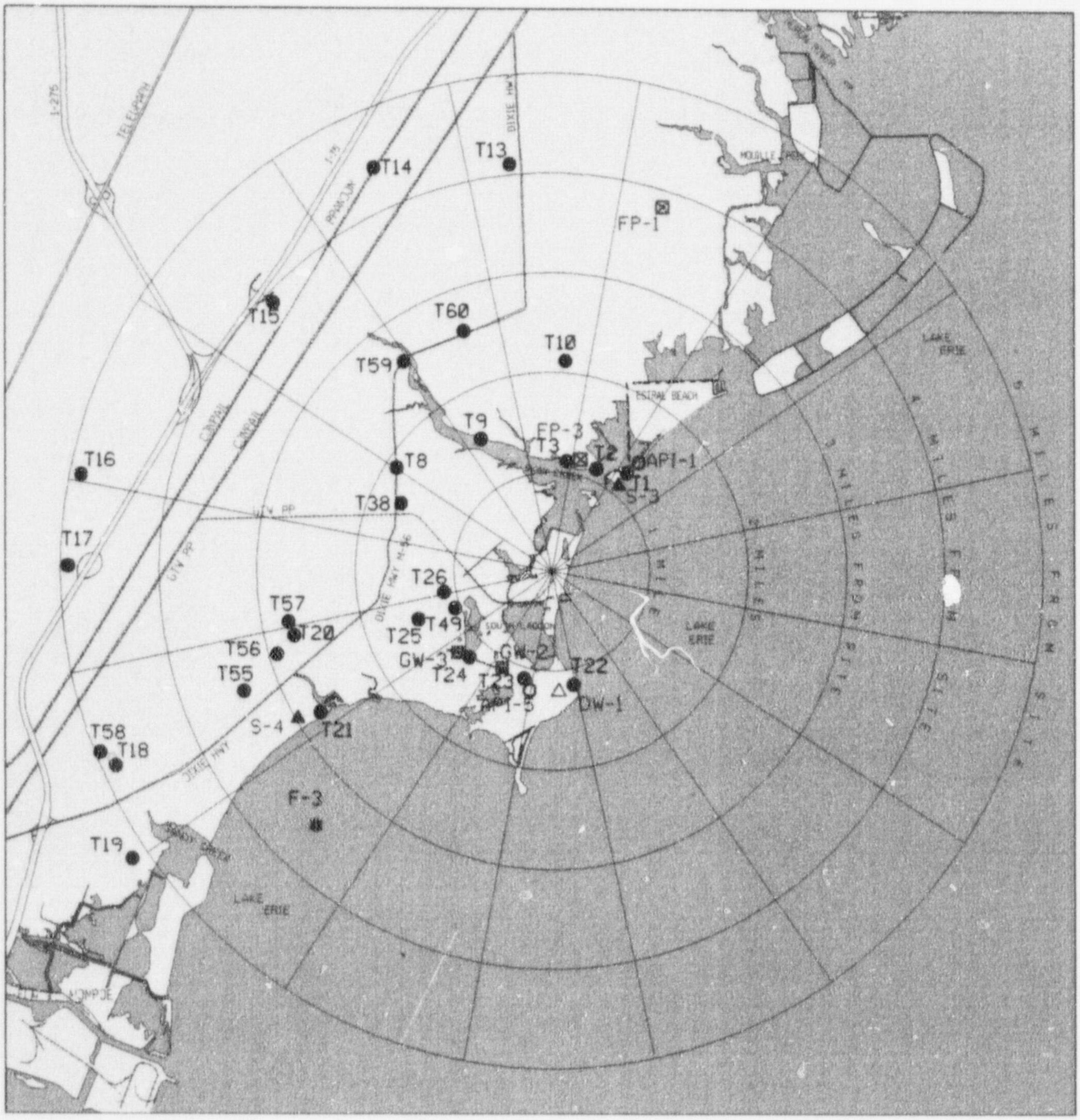
LEGEND

- ● T- DIRECT RADIATION
- ○ API- AIR PARTICULATES/AIR IODINE
- ▲ S- SEDIMENTS
- △ DW/SW- DRINKING WATER/SURFACE WATER
- ◙ GW- GROUND WATER
- □ M- MILK
- ⊠ FP- FOOD PRODUCTS
- ✡ F- FISH

N

0 0.5

SCALE IN MILES



MAP - 2
SAMPLING LOCATIONS
BY STATION NUMBER
(1 To 5 MILES)

LEGEND

- ● T- DIRECT RADIATION
- ○ API- AIR PARTICULATES/AIR IODINE
- ▲ S- SEDIMENTS
- △ DW/SW- DRINKING WATER/SURFACE WATER
- ▣ GW- GROUND WATER
- □ M- MILK
- ⊠ FP- FOOD PRODUCTS
- ✡ F- FISH

N

0 1

SCALE IN MILES

Appendix B

Environmental Data Summary

Table B-1 Radiological Environmental Monitoring Program Summary

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 1997
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Direct Radiation *mR/std qtr*	Gamma (TLD) 266	1.0	15.8 (250/250) 10.5 to 45.9	T-66 (Indicator)	29.7 (4/4) 13.5 to 45.9	14.3 (16/16) 12.8 to 17.4	None
Airborne Particulates	Gross Beta 257	1.00E-2	2.54E-2 (206/206) 1.10E-2 to 6.50E-2	API-5 (Indicator)	2.60E-2 (52/52) 1.60E-2 to 6.50E-2	2.49E-2 (51/51) 1.40E-2 to 5.00E-2	None
pCi/cu. m.	Gamma Spec. 20						
	BE-7	N/A	1.21E-1 (16/16) 8.22E-2 to 2.02E-1	API-2 (Indicator)	1.29E-1 (4/4) 8.57E-2 to 2.02E-1	1.21E-1 (4/4) 9.10E-2 to 1.58E-1	None
	K-40	N/A	9.21E-3 (9/16) 6.15E-3 to 1.25E-2	API-4 (Control)	1.13E-2 (2/4) 8.83E-3 to 1.38E-2	1.13E-2 (2/4) 8.83E-3 to 1.38E-2	None
	MN-54	N/A	<MDA			<MDA	None
	CO-58	N/A	<MDA			<MDA	None
	FE-59	N/A	<MDA			<MDA	None
	CO-60	N/A	<MDA			<MDA	None
	ZN-65	N/A	<MDA			<MDA	None
	ZR-95	N/A	<MDA			<MDA	None
	RU-103	N/A	<MDA			<MDA	None
	RU-106	N/A	<MDA			<MDA	None
	CS-134	5.00E-2	<MDA			<MDA	None
	CS-137	6.00E-2	<MDA			<MDA	None
	BA-140	N/A	<MDA			<MDA	None
	CE-141	N/A	<MDA			<MDA	None
	CE-144	N/A	<MDA			<MDA	None
	RA-226	N/A	<MDA			<MDA	None
	TH-228	N/A	<MDA			<MDA	None
	SR-89 20	N/A	<MDA			<MDA	None
	SR-90	N/A	<MDA			<MDA	None
Airborne Iodine *pCi/cu. m.*	I-131 256	7.00E-2	<MDA			<MDA	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 1997
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Milk	I-131 36	1.00E+0	<MDA			<MDA	None
pCi/l	SR-89 36	N/A	<MDA			<MDA	None
	SR-90	N/A	1.21E+0 (18/18) 6.10E-1 to 1.70E+0	M-8 (Control)	1.54E+0 (18/18) 5.70E-1 to 5.30E+0	1.54E+0 (18/18) 5.70E-1 to 5.30E+0	None
	Gamma Spec. 36						
	BE-7	N/A	<MDA			<MDA	None
	K-40	N/A	1.33E+3 (18/18) 1.06E+3 to 1.57E+3	M-8 (Control)	1.39E+3 (18/18) 1.23E+3 to 1.78E+3	1.39E+3 (18/18) 1.23E+3 to 1.78E+3	None
	MN-54	N/A	<MDA			<MDA	None
	CO-58	N/A	<MDA			<MDA	None
	FE-59	N/A	<MDA			<MDA	None
	CO-60	N/A	<MDA			<MDA	None
	ZN-65	N/A	<MDA			<MDA	None
	ZR-95	N/A	<MDA			<MDA	None
	RU-103	N/A	<MDA			<MDA	None
	RU-106	N/A	<MDA			<MDA	None
	CS-134	1.50E+1	<MDA			<MDA	None
	CS-137	1.80E+1	<MDA			<MDA	None
	BA-140	1.50E+1	<MDA			<MDA	None
	CE-141	N/A	<MDA			<MDA	None
	CE-144	N/A	<MDA			<MDA	None
	RA-226	N/A	<MDA			<MDA	None
	TH-228	N/A	<MDA			<MDA	None
Vegetation	I-131 23	6.00E+1	<MDA			<MDA	None
pCi/kg wet	Gamma Spec. 23						
	BE-7	N/A	2.01E+2 (17/17) 8.67E+1 to 4.13E+2	FP-9 (Control)	2.54E+2 (4/6) 1.80E+2 to 4.02E+2	2.54E+2 (4/6) 1.80E+2 to 4.02E+2	None
	K-40	N/A	2.92E+3 (17/17) 1.49E+3 to 5.29E+3	FP-9 (Control)	4.22E+3 (6/6) 1.87E+3 to 5.25E+3	4.22E+3 (6/6) 1.87E+3 to 5.25E+3	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 1997
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Vegetation (cont.) *pCi/kg wet*	MN-54	N/A	<MDA			<MDA	None
	CO-58	N/A	<MDA			<MDA	None
	FE-59	N/A	<MDA			<MDA	None
	CO-60	N/A	<MDA			<MDA	None
	ZN-65	N/A	<MDA			<MDA	None
	ZR-95	N/A	<MDA			<MDA	None
	RU-103	N/A	<MDA			<MDA	None
	RU-106	N/A	<MDA			<MDA	None
	CS-134	6.00E+1	<MDA			<MDA	None
	CS-137	8.00E+1	<MDA			<MDA	None
	BA-140	1.50E+1	<MDA			<MDA	None
	CE-141	N/A	<MDA			<MDA	None
	CE-144	N/A	<MDA			<MDA	None
	RA-226	N/A	<MDA			<MDA	None
	TH-228	N/A	<MDA			<MDA	None
Drinking Water *pCi/l*	Gross Beta 24	4.00E+0	2.98E+0 (12/12) 1.90E+0 to 5.50E+0	DW-1 (Indicator)	2.98E+0 (12/12) 1.90E+0 to 5.50E+0	2.45E+0 (10/12) 1.80E+0 to 4.80E+0	None
	SR-89 26	N/A	<MDA			<MDA	None
	SR-90	N/A	<MDA			<MDA	None
	Gamma Spec. 26						
	BE-7	N/A	<MDA			<MDA	None
	K-40	N/A	<MDA			<MDA	None
	CR-51	N/A	<MDA			<MDA	None
	MN-54	1.50E+1	<MDA			<MDA	None
	CO-58	1.50E+1	<MDA			<MDA	None
	FE-59	3.00E+1	<MDA			<MDA	None
	CO-60	1.50E+1	<MDA			<MDA	None
	ZN-65	3.00E+1	<MDA			<MDA	None
	ZR-95	1.50E+1	<MDA			<MDA	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 1997
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Drinking Water (cont.) *pCi/l*	RU-103	N/A	<MDA			<MDA	None
	RU-106	N/A	<MDA			<MDA	None
	CS-134	1.50E+1	<MDA			<MDA	None
	CS-137	1.80E+1	<MDA			<MDA	None
	BA-140	1.50E+1	<MDA			<MDA	None
	CE-141	N/A	<MDA			<MDA	None
	CE-144	N/A	<MDA			<MDA	None
	RA-226	N/A	<MDA			<MDA	None
	TH-228	N/A	<MDA			<MDA	None
	H-3 8	2.00E+3	3.25E+2 (2/4) 3.10E+2 to 3.40E+2	DW-1 (Indicator)	3.25E+2 (2/4) 3.10E+2 to 3.40E+2	2.60E+2 (1/4)	None
Surface Water *pCi/l*	SR-89 31	N/A	<MDA			<MDA	None
	SR-90	N/A	<MDA			<MDA	None
	Gamma Spec. 31						
	BE-7	N/A	<MDA			<MDA	None
	K-40	N/A	<MDA			<MDA	None
	CR-51	N/A	<MDA			<MDA	None
	MN-54	1.50E+1	<MDA			<MDA	None
	CO-58	1.50E+1	<MDA			<MDA	None
	FE-59	3.00E+1	<MDA			<MDA	None
	CO-60	1.50E+1	<MDA			<MDA	None
	ZN-65	3.00E+1	<MDA			<MDA	None
	ZR-95	1.50E+1	<MDA			<MDA	None
	RU-103	N/A	<MDA			<MDA	None
	RU-106	N/A	<MDA			<MDA	None
	CS-134	1.50E+1	<MDA			<MDA	None
	CS-137	1.80E+1	<MDA			<MDA	None
	BA-140	1.50E+1	<MDA			<MDA	None
	CE-141	N/A	<MDA			<MDA	None
	CE-144	N/A	<MDA			<MDA	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 1997
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Surface Water (cont.) *pCi/l*	RA-226	N/A	<MDA			<MDA	None
	TH-228	N/A	<MDA			<MDA	None
	H-3 8	2.00E+3	3.50E+2 (1/4)	SW-3(Indicator)	3.50E+2 (1/4)	2.20E+2 (1/4)	None
Groundwater *pCi/l*	Gamma Spec. 16						
	BE-7	N/A	<MDA			<MDA	None
	K-40	N/A	<MDA			<MDA	None
	CR-51	N/A	<MDA			<MDA	None
	MN-54	1.50E+1	<MDA			<MDA	None
	CO-58	1.50E+1	<MDA			<MDA	None
	FE-59	3.00E+1	<MDA			<MDA	None
	CO-60	1.50E+1	<MDA			<MDA	None
	ZN-65	3.00E+1	<MDA			<MDA	None
	ZR-95	1.50E+1	<MDA			<MDA	None
	RU-103	N/A	<MDA			<MDA	None
	RU-106	N/A	<MDA			<MDA	None
	CS-134	1.50E+1	<MDA			<MDA	None
	CS-137	1.80E+1	<MDA			<MDA	None
	BA-140	1.50E+1	<MDA			<MDA	None
	CE-141	N/A	<MDA			<MDA	None
	CE-144	N/A	<MDA			<MDA	None
	RA-226	N/A	<MDA			<MDA	None
	TH-228	N/A	<MDA			<MDA	None
	H-3 16	2.00E+3	<MDA			<MDA	None
Sediment *pCi/kg dry*	SR-89 10	N/A	<MDA				
	SR-90	N/A	3.40E+2 (2/8) 3.00E+2 to 3.80E+2	S-2 (Indicator)	3.80E+2 (1/2)	<MDA	None
	Gamma Spec. 10						
	BE-7	N/A	<MDA	S-5 (Control)	8.89E+2 (1/2)	8.89E+2 (1/2)	None
	K-40	N/A	1.45E+4 (7/8) 9.15E+3 to 1.96E+4	S-2 (Indicator)	1.88E+4 (2/2) 1.79E+4 to 1.96E+4	1.18E+4 (2/2) 1.11E+4 to 1.24E+4	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 1997
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Sediment (cont.)	MN-54	N/A	<MDA			<MDA	None
pCi/kg dry	CO-58	N/A	<MDA			<MDA	None
	FE-59	N/A	<MDA			<MDA	None
	CO-60	N/A	<MDA			<MDA	None
	ZN-65	N/A	<MDA			<MDA	None
	ZR-95	N/A	<MDA			<MDA	None
	RU-103	N/A	<MDA			<MDA	None
	RU-106	N/A	<MDA			<MDA	None
	CS-134	1.50E+2	<MDA			<MDA	None
	CS-137	1.80E+2	<MDA	S-5 (Control)	1.07E+2 (2/2) 9.25E+1 to 1.21E+2	1.07E+2 (2/2) 9.25E+1 to 1.21E+2	None
	BA-140	N/A	<MDA			<MDA	None
	CE-141	N/A	<MDA			<MDA	None
	CE-144	N/A	<MDA			<MDA	None
	RA-226	N/A	1.21E+3 (6/8) 5.32E+2 to 1.95E+3	S-3 (Indicator)	1.95E+3 (1/2)	9.67E+2 (2/2) 8.53E+2 to 1.08E+3	None
	TH-228	N/A	5.18E+2 (8/8) 1.48E+2 to 1.20E+3	S-2 (Indicator)	1.06E+3 (2/2) 9.16E+2 to 1.20E+3	4.78E+2 (2/2) 4.29E+2 to 5.27E+2	None
Fish	SR-89 23	N/A	<MDA			<MDA	None
pCi/kg wet	SR-90	N/A	<MDA			<MDA	None
	Gamma Spec. 23						
	BE-7	N/A	<MDA			<MDA	None
	K-40	N/A	3.01E+3 (10/10) 2.42E+3 to 3.71E+3	F-2 (Indicator)	3.01E+3 (10/10) 2.42E+3 to 3.71E+3	2.74E+3 (13/13) 1.90E+3 to 3.59E+3	None
	MN-54	1.30E+2	<MDA			<MDA	None
	CO-58	1.30E+2	<MDA			<MDA	None
	FE-59	2.60E+2	<MDA			<MDA	None
	CO-60	1.30E+2	<MDA			<MDA	None
	ZN-65	2.60E+2	<MDA			<MDA	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 1997
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Fish (cont.)	ZR-95	N/A	<MDA			<MDA	None
pCi/kg wet	RU-103	N/A	<MDA			<MDA	None
	RU-106	N/A	<MDA			<MDA	None
	CS-134	1.30E+2	<MDA			<MDA	None
	CS-137	1.50E+2	2.24E+1 (2/10) 2.01E+1 to 2.47E+1	F-2 (Indicator)	2.24E+1 (2/10) 2.01E+1 to 2.47E+1	1.98E+1 (1/13)	None
	BA-140	N/A	<MDA			<MDA	None
	CE-141	N/A	<MDA			<MDA	None
	CE-144	N/A	<MDA			<MDA	None
	RA-226	N/A	<MDA			<MDA	None
	TH-228	N/A	<MDA			<MDA	None

LLD = Fermi 2 ODCM LLD: nominal lower limit of detection based on 4.66 sigma error for background sample.
<MDA = Less than the lab's minimum detectable activity which is less than the LLD.
Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).
Locations are specified by Fermi 2 code and are described in section 8.0 Sampling Locations.
Non-routine results are those which are reportable according to Fermi 2 ODCM control 3.12.1.

Note: Other nuclides were considered in analysis results, but only those identifiable were reported in addition to ODCM listed nuclides.

1997 LAND USE CENSUS

Closest Gardens

Table 10

Year	Sector	Azimuth (degrees)	Distance (meters)	Change (meters)
1996	NE	38.9	3157	
1997	NE	38.9	3157	0.0
1996	NNE	33.0	3227	
1997	NNE	16.0	1754	1473
1996	N	0.3	2736	
1997	N	0.3	2736	0.0
1996	NNW	329.3	2170	
1997	NNW	332.4	4088	1918
1996	NW	309.9	1706	
1997	NW	309.9	1706	0.0
1996	WNW	301.2	3661	
1997 (a)	WNW	304.6	1110	2551
1996	W	258.0	1854	
1997	W	270.4	1963	109
1996	WSW	248.8	3154	
1997	WSW	256.9	1854	1300
1996	SW	224.0	2350	
1997	SW	233.9	7033	4683
1996	SSW	198.0	2136	
1997	SSW	197.0	2430	294
1996	S	170.7	1671	
1997	S	170.1	1641	30
	ESE - SSE	Lake Erie		

) = 1997 Calculated Critical Receptor and participant in REMP program

1997 LAND USE CENSUS

Milk Locations

Table 11

Year	Sector	Azimuth (degrees)	Distance (meters)	Change (meters)
1996	NE	None		
1997	NE	None		N/A
1996	NNE	None		
1997	NNE	None		N/A
1996	N	6.5	6663	
1997 (a)	N	6.5	6663	0.0
1996	NNW	None		
1997	NNW	None		N/A
1996	NW	None		
1997	NW	None		N/A
1996	WNW	None		
1997	WNW	301.1	3669	N/A
1996	W	None		
1997	W	None		N/A
1996	WSW	None		
1997	WSW	None		N/A
1996	SW	None		
1997	SW	None		N/A
1996	SSW	None		
1997	SSW	None		N/A
1996	S	None		
1997	S	None		N/A
	ESE - SSE	Lake Erie		

(a) = Participated in REMP sampling program in 1995 and part of 1996

1997 LAND USE CENSUS

Closest Beef Cattle Locations

Table 12

Year	Sector	Azimuth (degrees)	Distance (meters)	Change (meters)
1996	NE	None		
1997	NE	None		N/A
1996	NNE	18.8	6164	
1997	NNE	None		N/A
1996	N	1.2	2897	
1997	N	1.2	2897	0.0
1996	NNW	None		
1997	NNW	None		N/A
1996	NW	None		
1997	NW	None		N/A
1996	WNW	289.9	7183	
1997	WNW	285.7	2607	4576
1996	W	None		
1997	W			N/A
1996	WSW	248.6	4602	
1997	WSW	248.6	4602	0.0
1996	SW	None		
1997	SW	None		N/A
1996	SSW	None		
1997	SSW	None		N/A
1996	S	None		
1997	S	None		N/A
	ESE - SSE	Lake Erie		

Appendix C

Environmental Data Tables

FERMI 2
TLD ANALYSIS
(mR/Std Qtr)

STATION NUMBER	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
T-1	14.0	14.8	13.3	12.2
T-2	16.5	17.1	17.0	15.1
T-3	13.6	12.4	13.2	11.0
T-4	14.9	13.4	15.2	12.7
T-5	15.5	15.7	15.9	14.3
T-6	14.3	10.5	12.9	13.2
T-7	14.2	12.8	14.3	12.8
	15.8	14.7	17.0	14.5
	14.6	13.3	15.6	12.9
	15.1	14.6	16.3	13.2
	14.6	12.8	15.0	12.4
T-12	14.0	12.4	14.2	12.2
T-13	15.7	14.3	16.3	13.8
T-14	14.8	14.5	16.4	14.0
T-15	14.9	12.6	14.6	12.3
T-16	15.2	14.6	16.0	13.4
T-17	14.1	12.5	13.7	12.0
T-18	14.6	13.2	16.4	13.6
T-19	16.2	14.7	18.5	14.3
T-20	17.7	15.8	19.3	16.3
T-21	14.5	12.6	15.5	12.4
T-22	15.2	13.2	15.2	13.2
T-23	15.5	13.4	16.1	13.5
T-24	14.5	15.8	15.3	12.8
T-25	17.0	15.8	18.1	16.5
T-26	17.4	17.0	18.8	15.8
T-27	(a)	11.6	13.4	11.5
T-28	14.4	13.0	14.5	13.5
T-29	15.5	14.1	17.4	13.9
T-30	15.0	14.3	(a)	13.5
T-31	15.5	13.8	16.1	13.7
T-32	15.3	14.7	16.6	13.7
T-33	14.9	14.6	14.6	13.0
T-34	14.3	12.8	15.3	12.4
T-35	14.3	13.6	15.1	12.4
T-36	15.2	14.3	16.0	13.9
T-37	14.6	13.8	14.7	14.0
T-38	15.5	14.8	17.3	14.6
T-39	12.2	13.9	21.7	23.5
T-40	12.7	12.4	19.9	19.3
T-41	12.8	16.0	30.2	32.2
T-42	14.8	16.7	30.5	32.4
T-43	13.1	15.7	31.3	35.7
T-44	12.0	15.4	27.6	31.0
T-45	12.2	13.3	21.7	23.2
T-46	13.3	12.8	19.4	19.9
T-47	13.1	16.5	26.6	31.1

FERMI 2
TLD ANALYSIS (CONT.)
(mR/Std Qtr)

STATION NUMBER	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
T-48	13.4	13.9	20.1	20.6
T-49	18.6	18.8	21.4	19.8
T-50	15.6	16.6	17.1	15.3
T-51	12.3	11.5	13.1	11.4
T-52	13.8	12.6	15.4	14.5
T-53	13.7	13.5	16.7	16.9
T-54	13.9	12.4	14.6	13.5
T-55	15.9	14.4	16.1	14.9
T-56	15.1	13.8	15.1	13.9
T-57	16.9	16.7	18.7	16.5
T-58	15.0	12.5	15.2	13.5
T-59	14.1	13.2	15.5	13.0
T-60	16.2	14.6	15.8	14.9
T-61	15.1	14.0	16.5	15.1
T-62	16.5	15.0	16.8	15.0
T-63	14.9	13.3	14.5	13.1
T-64	13.9	12.3	16.0	14.4
T-65	13.3	12.3	15.5	15.3
T-66	13.5	20.2	39.3	45.9
T-67	14.5	13.9	16.2	14.9

(a) Sample not collected, see Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-1 FIRST QUARTER

Start Date	End Date	Activity		
12/30/96	01/07/97	3.10E-02	+/-	3.00E-03
01/07/97	01/14/97	3.70E-02	+/-	4.00E-03
01/14/97	01/21/97	3.30E-02	+/-	4.00E-03
01/21/97	01/28/97	2.80E-02	+/-	3.00E-03
01/28/97	02/04/97	3.40E-02	+/-	3.00E-03
02/04/97	02/11/97	2.20E-02	+/-	3.00E-03
02/11/97	02/18/97	3.10E-02	+/-	3.00E-03
02/18/97	02/25/97	4.10E-02	+/-	6.00E-03
02/25/97	03/04/97	2.70E-02	+/-	4.00E-03
03/04/97	03/11/97	2.70E-02	+/-	3.00E-03
03/11/97	03/18/97	2.60E-02	+/-	3.00E-03
03/18/97	03/25/97	1.90E-02	+/-	3.00E-03
03/25/97	04/01/97	2.00E-02	+/-	3.00E-03

API-1 SECOND QUARTER

Start Date	End Date	Activity		
04/01/97	04/08/97	2.20E-02	+/-	3.00E-03
04/08/97	04/15/97	2.50E-02	+/-	3.00E-03
04/15/97	04/22/97	2.50E-02	+/-	3.00E-03
04/22/97	04/29/97	2.20E-02	+/-	3.00E-03
04/29/97	05/06/97	2.10E-02	+/-	3.00E-03
05/06/97	05/13/97	1.90E-02	+/-	3.00E-03
05/13/97	05/20/97	2.00E-02	+/-	3.00E-03
05/20/97	05/27/97	1.30E-02	+/-	2.00E-03
05/27/97	06/03/97	1.50E-02	+/-	2.00E-03
06/03/97	06/10/97	2.00E-02	+/-	3.00E-03
06/10/97	06/17/97	2.30E-02	+/-	3.00E-03
06/17/97	06/24/97	2.00E-02	+/-	3.00E-03
06/24/97	07/01/97	2.40E-02	+/-	3.00E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-1 THIRD QUARTER

Start Date	End Date	Activity		
07/01/97	07/08/97	1.90E-02	+/-	3.00E-03
07/08/97	07/15/97	2.40E-02	+/-	3.00E-03
07/15/97	07/22/97	3.40E-02	+/-	5.00E-03
07/24/97	07/29/97	2.50E-02	+/-	3.00E-03
07/29/97	08/05/97	2.40E-02	+/-	3.00E-03
08/05/97	08/12/97	(a)		
08/12/97	08/19/97	1.40E-02	+/-	2.00E-03
08/19/97	08/26/97	2.40E-02	+/-	3.00E-03
08/26/97	09/02/97	2.40E-02	+/-	3.00E-03
09/02/97	09/06/97	3.10E-02	+/-	5.00E-03
09/09/97	09/16/97	4.40E-02	+/-	8.00E-03
09/16/97	09/23/97	1.70E-02	+/-	2.00E-03
09/23/97	09/30/97	1.10E-02	+/-	2.00E-03

API-1 FOURTH QUARTER

Start Date	End Date	Activity		
09/30/97	10/07/97	2.10E-02	+/-	2.00E-03
10/07/97	10/14/97	3.20E-02	+/-	3.00E-03
10/14/97	10/21/97	2.10E-02	+/-	3.00E-03
10/21/97	10/28/97	1.90E-02	+/-	3.00E-03
10/28/97	11/04/97	3.00E-02	+/-	3.00E-03
11/04/97	11/11/97	2.10E-02	+/-	3.00E-03
11/11/97	11/18/97	1.90E-02	+/-	3.00E-03
11/18/97	11/25/97	4.70E-02	+/-	4.00E-03
11/25/97	12/02/97	3.30E-02	+/-	3.00E-03
12/02/97	12/09/97	2.10E-02	+/-	3.00E-03
12/09/97	12/16/97	3.40E-02	+/-	3.00E-03
12/16/97	12/23/97	3.80E-02	+/-	4.00E-03
12/23/97	12/30/97	2.70E-02	+/-	3.00E-03

(a) Sample not collected, see Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-2 FIRST QUARTER

Start Date	End Date	Activity		
12/30/96	01/07/97	3.60E-02	+/-	4.00E-03
01/07/97	01/14/97	4.10E-02	+/-	4.00E-03
01/14/97	01/21/97	3.70E-02	+/-	4.00E-03
01/21/97	01/28/97	3.00E-02	+/-	4.00E-03
01/28/97	02/04/97	3.40E-02	+/-	4.00E-03
02/04/97	02/11/97	2.50E-02	+/-	3.00E-03
02/11/97	02/18/97	3.10E-02	+/-	4.00E-03
02/18/97	02/25/97	2.20E-02	+/-	3.00E-03
02/25/97	03/04/97	2.60E-02	+/-	3.00E-03
03/04/97	03/11/97	3.20E-02	+/-	3.00E-03
03/11/97	03/18/97	2.90E-02	+/-	4.00E-03
03/18/97	03/25/97	2.30E-02	+/-	3.00E-03
03/25/97	04/01/97	2.30E-02	+/-	3.00E-03

API-2 SECOND QUARTER

Start Date	End Date	Activity		
04/01/97	04/08/97	2.50E-02	+/-	3.00E-03
04/08/97	04/15/97	2.50E-02	+/-	3.00E-03
04/15/97	04/22/97	2.80E-02	+/-	3.00E-03
04/22/97	04/29/97	2.10E-02	+/-	3.00E-03
04/29/97	05/06/97	2.10E-02	+/-	3.00E-03
05/06/97	05/13/97	2.20E-02	+/-	3.00E-03
05/13/97	05/20/97	2.20E-02	+/-	3.00E-03
05/20/97	05/27/97	1.70E-02	+/-	3.00E-03
05/27/97	06/03/97	1.70E-02	+/-	3.00E-03
06/03/97	06/10/97	3.00E-02	+/-	4.00E-03
06/10/97	06/17/97	2.60E-02	+/-	3.00E-03
06/17/97	06/24/97	2.40E-02	+/-	3.00E-03
06/24/97	07/01/97	2.70E-02	+/-	3.00E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-2 THIRD QUARTER

Start Date	End Date	Activity		
07/01/97	07/08/97	2.20E-02	+/-	3.00E-03
07/08/97	07/15/97	2.30E-02	+/-	3.00E-03
07/15/97	07/22/97	2.30E-02	+/-	3.00E-03
07/22/97	07/29/97	2.30E-02	+/-	3.00E-03
07/29/97	08/05/97	2.80E-02	+/-	3.00E-03
08/05/97	08/12/97	2.20E-02	+/-	3.00E-03
08/12/97	08/19/97	1.80E-02	+/-	3.00E-03
08/19/97	08/26/97	2.00E-02	+/-	3.00E-03
08/26/97	09/02/97	2.40E-02	+/-	3.00E-03
09/02/97	09/09/97	2.50E-02	+/-	3.00E-03
09/09/97	09/16/97	2.60E-02	+/-	3.00E-03
09/16/97	09/23/97	3.10E-02	+/-	3.00E-03
09/23/97	09/30/97	2.20E-02	+/-	3.00E-03

API-2 FOURTH QUARTER

Start Date	End Date	Activity		
09/30/97	10/07/97	3.30E-02	+/-	3.00E-03
10/07/97	10/14/97	2.90E-02	+/-	3.00E-03
10/14/97	10/21/97	1.90E-02	+/-	3.00E-03
10/21/97	10/28/97	1.60E-02	+/-	3.00E-03
10/28/97	11/04/97	2.80E-02	+/-	3.00E-03
11/04/97	11/11/97	2.00E-02	+/-	3.00E-03
11/11/97	11/18/97	1.50E-02	+/-	3.00E-03
11/18/97	11/25/97	4.50E-02	+/-	4.00E-03
11/25/97	12/02/97	3.20E-02	+/-	3.00E-03
12/02/97	12/09/97	1.70E-02	+/-	3.00E-03
12/09/97	12/16/97	3.30E-02	+/-	3.00E-03
12/16/97	12/23/97	3.20E-02	+/-	3.00E-03
12/23/97	12/30/97	2.40E-02	+/-	3.00E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-3 FIRST QUARTER

Start Date	End Date	Activity		
12/30/96	1/7/97	3.60E-02	+/-	4.00E-03
1/7/97	1/14/97	3.40E-02	+/-	4.00E-03
1/14/97	1/21/97	3.40E-02	+/-	4.00E-03
1/21/97	1/28/97	3.70E-02	+/-	6.00E-03
1/28/97	2/4/97	3.50E-02	+/-	4.00E-03
2/4/97	2/11/97	2.20E-02	+/-	3.00E-03
2/11/97	2/18/97	3.10E-02	+/-	3.00E-03
2/18/97	2/25/97	2.20E-02	+/-	3.00E-03
2/25/97	3/4/97	2.30E-02	+/-	3.00E-03
3/4/97	3/11/97	2.70E-02	+/-	3.00E-03
3/11/97	3/18/97	2.80E-02	+/-	4.00E-03
3/18/97	3/25/97	2.40E-02	+/-	3.00E-03
3/25/97	4/1/97	2.20E-02	+/-	3.00E-03

API-3 SECOND QUARTER

Start Date	End Date	Activity		
4/1/97	4/8/97	2.00E-02	+/-	3.00E-03
4/8/97	4/15/97	2.60E-02	+/-	3.00E-03
4/15/97	4/22/97	2.40E-02	+/-	3.00E-03
4/22/97	4/29/97	2.10E-02	+/-	3.00E-03
4/29/97	5/6/97	2.00E-02	+/-	3.00E-03
5/6/97	5/13/97	1.90E-02	+/-	3.00E-03
5/13/97	5/20/97	2.00E-02	+/-	3.00E-03
5/20/97	5/27/97	1.50E-02	+/-	3.00E-03
5/27/97	6/3/97	1.80E-02	+/-	3.00E-03
6/3/97	6/10/97	1.90E-02	+/-	3.00E-03
6/10/97	6/17/97	2.20E-02	+/-	3.00E-03
6/17/97	6/24/97	2.40E-02	+/-	4.00E-03
6/24/97	7/1/97	2.30E-02	+/-	3.00E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(ρCi/cubic meter)

API-3 THIRD QUARTER

Start Date	End Date	Activity		
7/1/97	7/8/97	1.90E-02	+/-	3.00E-03
7/8/97	7/15/97	1.30E-02	+/-	2.00E-03
7/15/97	7/22/97	2.20E-02	+/-	3.00E-03
7/22/97	7/29/97	2.40E-02	+/-	3.00E-03
7/29/97	8/5/97	2.50E-02	+/-	3.00E-03
8/5/97	8/12/97	2.10E-02	+/-	3.00E-03
8/12/97	8/19/97	1.90E-02	+/-	3.00E-03
8/19/97	8/26/97	1.90E-02	+/-	3.00E-03
8/26/97	9/2/97	2.20E-02	+/-	3.00E-03
9/2/97	9/9/97	2.50E-02	+/-	3.00E-03
9/9/97	9/16/97	2.40E-02	+/-	3.00E-03
9/16/97	9/23/97	2.60E-02	+/-	3.00E-03
9/23/97	9/30/97	2.30E-02	+/-	3.00E-03

API-3 FOURTH QUARTER

Start Date	End Date	Activity		
9/30/97	10/7/97	2.90E-02	+/-	3.00E-03
10/7/97	10/14/97	2.70E-02	+/-	3.00E-03
10/14/97	10/21/97	1.90E-02	+/-	3.00E-03
10/21/97	10/28/97	2.00E-02	+/-	3.00E-03
10/28/97	11/4/97	2.70E-02	+/-	3.00E-03
11/4/97	11/11/97	1.90E-02	+/-	3.00E-03
11/11/97	11/18/97	1.80E-02	+/-	3.00E-03
11/18/97	11/25/97	(a)		
11/25/97	12/2/97	3.10E-02	+/-	3.00E-03
12/2/97	12/9/97	1.70E-02	+/-	3.00E-03
12/9/97	12/16/97	3.20E-02	+/-	3.00E-03
12/16/97	12/23/97	3.70E-02	+/-	4.00E-03
12/23/97	12/30/97	2.70E-02	+/-	3.00E-03

(a) Sample not collected, see Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-4 FIRST QUARTER

Start Date	End Date	Activity		
12/30/96	1/7/97	3.50E-02	+/-	4.00E-03
1/7/97	1/14/97	3.90E-02	+/-	4.00E-03
1/14/97	1/21/97	3.30E-02	+/-	4.00E-03
1/21/97	1/28/97	(a)		
1/28/97	2/4/97	5.00E-02	+/-	6.00E-03
2/4/97	2/11/97	2.00E-02	+/-	3.00E-03
2/11/97	2/18/97	3.10E-02	+/-	4.00E-03
2/18/97	2/25/97	2.50E-02	+/-	3.00E-03
2/25/97	3/4/97	2.30E-02	+/-	3.00E-03
3/4/97	3/11/97	3.10E-02	+/-	3.00E-03
3/11/97	3/18/97	3.00E-02	+/-	4.00E-03
3/18/97	3/25/97	2.10E-02	+/-	3.00E-03
3/25/97	4/1/97	2.00E-02	+/-	3.00E-03

API-4 SECOND QUARTER

Start Date	End Date	Activity		
4/1/97	4/8/97	2.30E-02	+/-	3.00E-03
4/8/97	4/15/97	2.70E-02	+/-	3.00E-03
4/15/97	4/22/97	2.70E-02	+/-	3.00E-03
4/22/97	4/29/97	2.30E-02	+/-	3.00E-03
4/29/97	5/6/97	2.00E-02	+/-	3.00E-03
5/6/97	5/13/97	2.10E-02	+/-	3.00E-03
5/13/97	5/20/97	1.90E-02	+/-	3.00E-03
5/20/97	5/27/97	1.40E-02	+/-	3.00E-03
5/27/97	6/3/97	1.50E-02	+/-	3.00E-03
6/3/97	6/10/97	2.40E-02	+/-	4.00E-03
6/10/97	6/17/97	2.30E-02	+/-	3.00E-03
6/17/97	6/24/97	2.20E-02	+/-	3.00E-03
6/24/97	7/1/97	2.00E-02	+/-	3.00E-03

(a) Sample not collected, see Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-4 THIRD QUARTER

Start Date	End Date	Activity		
7/1/97	7/8/97	1.70E-02	+/-	3.00E-03
7/8/97	7/15/97	1.90E-02	+/-	2.00E-03
7/15/97	7/22/97	2.20E-02	+/-	3.00E-03
7/22/97	7/29/97	2.00E-02	+/-	3.00E-03
7/29/97	8/5/97	2.10E-02	+/-	3.00E-03
8/5/97	8/12/97	2.20E-02	+/-	3.00E-03
8/12/97	8/19/97	1.70E-02	+/-	3.00E-03
8/19/97	8/26/97	1.90E-02	+/-	3.00E-03
8/26/97	9/2/97	1.90E-02	+/-	3.00E-03
9/2/97	9/9/97	2.20E-02	+/-	3.00E-03
9/9/97	9/16/97	2.80E-02	+/-	3.00E-03
9/16/97	9/23/97	2.10E-02	+/-	3.00E-03
9/23/97	9/30/97	1.80E-02	+/-	3.00E-03

API-4 FOURTH QUARTER

Start Date	End Date	Activity		
9/30/97	10/7/97	3.20E-02	+/-	3.00E-03
10/7/97	10/14/97	2.90E-02	+/-	3.00E-03
10/14/97	10/21/97	1.70E-02	+/-	3.00E-03
10/21/97	10/28/97	1.80E-02	+/-	3.00E-03
10/28/97	11/4/97	2.60E-02	+/-	3.00E-03
11/4/97	11/11/97	2.40E-02	+/-	3.00E-03
11/11/97	11/18/97	1.90E-02	+/-	3.00E-03
11/18/97	11/25/97	4.60E-02	+/-	4.00E-03
11/25/97	12/2/97	3.10E-02	+/-	3.00E-03
12/2/97	12/9/97	1.70E-02	+/-	3.00E-03
12/9/97	12/16/97	3.10E-02	+/-	3.00E-03
12/16/97	12/23/97	3.30E-02	+/-	3.00E-03
12/23/97	12/30/97	4.80E-02	+/-	4.00E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-5 FIRST QUARTER

Start Date	End Date	Activity		
12/30/96	1/7/97	3.20E-02	+/-	3.00E-03
1/7/97	1/14/97	4.80E-02	+/-	4.00E-03
1/14/97	1/21/97	3.40E-02	+/-	4.00E-03
1/21/97	1/28/97	3.00E-02	+/-	4.00E-03
1/28/97	2/4/97	3.60E-02	+/-	4.00E-03
2/4/97	2/11/97	2.10E-02	+/-	3.00E-03
2/11/97	2/18/97	3.00E-02	+/-	3.00E-03
2/18/97	2/25/97	2.60E-02	+/-	3.00E-03
2/25/97	3/4/97	2.20E-02	+/-	3.00E-03
3/4/97	3/11/97	2.60E-02	+/-	3.00E-03
3/11/97	3/18/97	2.80E-02	+/-	4.00E-03
3/18/97	3/25/97	2.30E-02	+/-	3.00E-03
3/25/97	4/1/97	2.20E-02	+/-	3.00E-03

API-5 SECOND QUARTER

Start Date	End Date	Activity		
4/1/97	4/8/97	2.00E-02	+/-	3.00E-03
4/8/97	4/15/97	2.30E-02	+/-	3.00E-03
4/15/97	4/22/97	2.60E-02	+/-	3.00E-03
4/22/97	4/29/97	2.20E-02	+/-	3.00E-03
4/29/97	5/6/97	2.10E-02	+/-	3.00E-03
5/6/97	5/13/97	2.10E-02	+/-	3.00E-03
5/13/97	5/20/97	2.00E-02	+/-	3.00E-03
5/20/97	5/27/97	1.60E-02	+/-	3.00E-03
5/27/97	6/3/97	1.60E-02	+/-	3.00E-03
6/3/97	6/10/97	2.40E-02	+/-	3.00E-03
6/10/97	6/17/97	2.40E-02	+/-	3.00E-03
6/17/97	6/24/97	2.10E-02	+/-	3.00E-03
6/24/97	7/1/97	2.30E-02	+/-	3.00E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-5 THIRD QUARTER

Start Date	End Date	Activity		
7/1/97	7/8/97	2.10E-02	+/-	3.00E-03
7/8/97	7/15/97	2.40E-02	+/-	3.00E-03
7/15/97	7/22/97	2.20E-02	+/-	3.00E-03
7/22/97	7/29/97	2.60E-02	+/-	3.00E-03
7/29/97	8/5/97	2.30E-02	+/-	3.00E-03
8/5/97	8/12/97	2.50E-02	+/-	3.00E-03
8/12/97	8/19/97	1.90E-02	+/-	3.00E-03
8/19/97	8/26/97	2.20E-02	+/-	3.00E-03
8/26/97	9/2/97	2.20E-02	+/-	3.00E-03
9/2/97	9/9/97	2.70E-02	+/-	3.00E-03
9/9/97	9/16/97	2.70E-02	+/-	3.00E-03
9/16/97	9/23/97	2.30E-02	+/-	3.00E-03
9/23/97	9/30/97	2.20E-02	+/-	3.00E-03

API-5 FOURTH QUARTER

Start Date	End Date	Activity		
9/30/97	10/7/97	3.60E-02	+/-	4.00E-03
10/7/97	10/14/97	2.80E-02	+/-	3.00E-03
10/14/97	10/21/97	1.80E-02	+/-	3.00E-03
10/21/97	10/28/97	1.80E-02	+/-	3.00E-03
10/28/97	11/4/97	2.70E-02	+/-	3.00E-03
11/4/97	11/11/97	2.10E-02	+/-	3.00E-03
11/11/97	11/18/97	2.10E-02	+/-	3.00E-03
11/18/97	11/25/97	4.40E-02	+/-	4.00E-03
11/25/97	12/2/97	3.20E-02	+/-	3.00E-03
12/2/97	12/9/97	1.80E-02	+/-	3.00E-03
12/9/97	12/16/97	3.30E-02	+/-	3.00E-03
12/16/97	12/23/97	3.40E-02	+/-	3.00E-03
12/23/97	12/30/97	6.50E-02	+/-	5.00E-03

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-1 FIRST QUARTER

Start Date	End Date	Activity	
12/30/96	1/7/97	<	2.00E-02
1/7/97	1/14/97	<	3.00E-02
1/14/97	1/21/97	<	1.00E-02
1/21/97	1/28/97	<	1.00E-02
1/28/97	2/4/97	<	1.00E-02
2/4/97	2/11/97	<	2.00E-02
2/11/97	2/18/97	<	2.00E-02
2/18/97	2/25/97	<	5.00E-02
2/25/97	3/4/97	<	4.00E-02
3/4/97	3/11/97	<	2.00E-02
3/11/97	3/18/97	<	3.00E-02
3/18/97	3/25/97	<	2.00E-02
3/25/97	4/1/97	<	1.00E-02

API-1 SECOND QUARTER

Start Date	End Date	Activity	
4/1/97	4/8/97	<	2.00E-02
4/8/97	4/15/97	<	3.00E-02
4/15/97	4/22/97	<	2.00E-02
4/22/97	4/29/97	<	2.00E-02
4/29/97	5/6/97	<	2.00E-02
5/6/97	5/13/97	<	2.00E-02
5/13/97	5/20/97	<	2.00E-02
5/20/97	5/27/97	<	2.00E-02
5/27/97	6/3/97	<	3.00E-02
6/3/97	6/10/97	<	2.00E-02
6/10/97	6/17/97	<	3.00E-02
6/17/97	6/24/97	<	1.00E-02
6/24/97	7/1/97	<	3.00E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-1 THIRD QUARTER

Start Date	End Date	Activity	
7/1/97	7/8/97	<	2.00E-02
7/8/97	7/15/97	<	3.00E-02
7/15/97	7/22/97	<	6.00E-02
7/24/97	7/29/97	<	2.00E-02
7/29/97	8/5/97	<	2.00E-02
8/5/97	8/12/97		(a)
8/12/97	8/19/97	<	1.00E-02
8/19/97	8/26/97	<	2.00E-02
8/26/97	9/2/97	<	3.00E-02
9/2/97	9/6/97	<	3.00E-02
9/9/97	9/16/97	<	4.00E-02
9/16/97	9/23/97	<	2.00E-02
9/23/97	9/30/97	<	2.00E-02

API-1 FOURTH QUARTER

Start Date	End Date	Activity	
9/30/97	10/7/97	<	1.00E-02
10/7/97	10/14/97	<	2.00E-02
10/14/97	10/21/97	<	2.00E-02
10/21/97	10/28/97	<	2.00E-02
10/28/97	11/4/97	<	2.00E-02
11/4/97	11/11/97	<	2.00E-02
11/11/97	11/18/97	<	1.00E-02
11/18/97	11/25/97	<	2.00E-02
11/25/97	12/2/97	<	3.00E-02
12/2/97	12/9/97	<	2.00E-02
12/9/97	12/16/97	<	3.00E-02
12/16/97	12/23/97	<	1.00E-02
12/23/97	12/30/97	<	1.00E-02

(a) Sample not collected, see Appendix D - Program Execution.

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-2 FIRST QUARTER

Start Date	End Date	Activity	
12/30/96	1/7/97	<	2.00E-02
1/7/97	1/14/97	<	3.00E-02
1/14/97	1/21/97	<	1.00E-02
1/21/97	1/28/97	<	2.00E-02
1/28/97	2/4/97	<	2.00E-02
2/4/97	2/11/97	<	2.00E-02
2/11/97	2/18/97	<	2.00E-02
2/18/97	2/25/97	<	3.00E-02
2/25/97	3/4/97	<	3.00E-02
3/4/97	3/11/97	<	3.00E-02
3/11/97	3/18/97	<	3.00E-02
3/18/97	3/25/97	<	2.00E-02
3/25/97	4/1/97	<	2.00E-02

API-2 SECOND QUARTER

Start Date	End Date	Activity	
4/1/97	4/8/97	<	3.00E-02
4/8/97	4/15/97	<	3.00E-02
4/15/97	4/22/97	<	3.00E-02
4/22/97	4/29/97	<	3.00E-02
4/29/97	5/6/97	<	3.00E-02
5/6/97	5/13/97	<	2.00E-02
5/13/97	5/20/97	<	3.00E-02
5/20/97	5/27/97	<	3.00E-02
5/27/97	6/3/97	<	3.00E-02
6/3/97	6/10/97	<	2.00E-02
6/10/97	6/17/97	<	3.00E-02
6/17/97	6/24/97	<	1.00E-02
6/24/97	7/1/97	<	3.00E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-2 THIRD QUARTER

Start Date	End Date	Activity	
7/1/97	7/8/97	<	2.00E-02
7/8/97	7/15/97	<	3.00E-02
7/15/97	7/22/97	<	3.00E-02
7/22/97	7/29/97	<	2.00E-02
7/29/97	8/5/97	<	2.00E-02
8/5/97	8/12/97	<	2.00E-02
8/12/97	8/19/97	<	2.00E-02
8/19/97	8/26/97	<	1.00E-02
8/26/97	9/2/97	<	2.00E-02
9/2/97	9/9/97	<	1.00E-02
9/9/97	9/16/97	<	1.00E-02
9/16/97	9/23/97	<	2.00E-02
9/23/97	9/30/97	<	2.00E-02

API-2 FOURTH QUARTER

Start Date	End Date	Activity	
9/30/97	10/7/97	<	2.00E-02
10/7/97	10/14/97	<	2.00E-02
10/14/97	10/21/97	<	2.00E-02
10/21/97	10/28/97	<	1.00E-02
10/28/97	11/4/97	<	2.00E-02
11/4/97	11/11/97	<	2.00E-02
11/11/97	11/18/97	<	1.00E-02
11/18/97	11/25/97	<	2.00E-02
11/25/97	12/2/97	<	3.00E-02
12/2/97	12/9/97	<	2.00E-02
12/9/97	12/16/97	<	3.00E-02
12/16/97	12/23/97	<	1.00E-02
12/23/97	12/30/97	<	1.00E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-3 FIRST QUARTER

Start Date	End Date	Activity	
12/30/96	1/7/97	<	2.00E-02
1/7/97	1/14/97	<	3.00E-02
1/14/97	1/21/97	<	1.00E-02
1/21/97	1/28/97	<	2.00E-02
1/28/97	2/4/97	<	2.00E-02
2/4/97	2/11/97	<	2.00E-02
2/11/97	2/18/97	<	2.00E-02
2/18/97	2/25/97	<	2.00E-02
2/25/97	3/4/97	<	2.00E-02
3/4/97	3/11/97	<	2.00E-02
3/11/97	3/18/97	<	3.00E-02
3/18/97	3/25/97	<	2.00E-02
3/25/97	4/1/97	<	1.00E-02

API-3 SECOND QUARTER

Start Date	End Date	Activity	
4/1/97	4/8/97	<	2.00E-02
4/8/97	4/15/97	<	3.00E-02
4/15/97	4/22/97	<	2.00E-02
4/22/97	4/29/97	<	2.00E-02
4/29/97	5/6/97	<	2.00E-02
5/6/97	5/13/97	<	2.00E-02
5/13/97	5/20/97	<	2.00E-02
5/20/97	5/27/97	<	2.00E-02
5/27/97	6/3/97	<	3.00E-02
6/3/97	6/10/97	<	2.00E-02
6/10/97	6/17/97	<	3.00E-02
6/17/97	6/24/97	<	2.00E-02
6/24/97	7/1/97	<	2.00E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-3 THIRD QUARTER

Start Date	End Date	Activity	
7/1/97			(a)
	7/15/97	<	1.00E-02
7/15/97	7/22/97	<	3.00E-02
7/22/97	7/29/97	<	2.00E-02
7/29/97	8/5/97	<	2.00E-02
8/5/97	8/12/97	<	3.00E-02
8/12/97	8/19/97	<	2.00E-02
8/19/97	8/26/97	<	1.00E-02
8/26/97	9/2/97	<	2.00E-02
9/2/97	9/9/97	<	1.00E-02
9/9/97	9/16/97	<	1.00E-02
9/16/97	9/23/97	<	2.00E-02
9/23/97	9/30/97	<	2.00E-02

API-3 FOURTH QUARTER

Start Date	End Date	Activity	
9/30/97	10/7/97	<	2.00E-02
10/7/97	10/14/97	<	2.00E-02
10/14/97	10/21/97	<	2.00E-02
10/21/97	10/28/97	<	1.00E-02
10/28/97	11/4/97	<	2.00E-02
11/4/97	11/11/97	<	2.00E-02
11/11/97	11/18/97	<	1.00E-02
11/18/97	11/25/97		(a)
11/25/97	12/2/97	<	3.00E-02
12/2/97	12/9/97	<	2.00E-02
12/9/97	12/16/97	<	3.00E-02
12/16/97	12/23/97	<	1.00E-02
12/23/97	12/30/97	<	1.00E-02

(a) Sample not collected, see Appendix D - Program Execution.

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-4 FIRST QUARTER

Start Date	End Date	Activity	
12/30/96	1/7/97	<	2.00E-02
1/7/97	1/14/97	<	3.00E-02
1/14/97	1/21/97	<	1.00E-02
1/21/97	1/28/97		(a)
1/28/97	2/4/97	<	3.00E-02
2/4/97	2/11/97	<	2.00E-02
2/11/97	2/18/97	<	2.00E-02
2/18/97	2/25/97	<	3.00E-02
2/25/97	3/4/97	<	3.00E-02
3/4/97	3/11/97	<	3.00E-02
3/11/97	3/18/97	<	3.00E-02
3/18/97	3/25/97	<	2.00E-02
3/25/97	4/1/97	<	2.00E-02

API-4 SECOND QUARTER

Start Date	End Date	Activity	
4/1/97	4/8/97	<	3.00E-02
4/8/97	4/15/97	<	3.00E-02
4/15/97	4/22/97	<	3.00E-02
4/22/97	4/29/97	<	2.00E-02
4/29/97	5/6/97	<	3.00E-02
5/6/97	5/13/97	<	2.00E-02
5/13/97	5/20/97	<	2.00E-02
5/20/97	5/27/97	<	2.00E-02
5/27/97	6/3/97	<	3.00E-02
6/3/97	6/10/97	<	2.00E-02
6/10/97	6/17/97	<	3.00E-02
6/17/97	6/24/97	<	1.00E-02
6/24/97	7/1/97	<	2.00E-02

(a) Sample not collected, see Appendix D - Program Execution.

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-4 THIRD QUARTER

Start Date	End Date	Activity	
7/1/97	7/8/97	<	2.00E-02
7/8/97	7/15/97	<	2.00E-02
7/15/97	7/22/97	<	3.00E-02
7/22/97	7/29/97	<	2.00E-02
7/29/97	8/5/97	<	2.00E-02
8/5/97	8/12/97	<	2.00E-02
8/12/97	8/19/97	<	2.00E-02
8/19/97	8/26/97	<	1.00E-02
8/26/97	9/2/97	<	2.00E-02
9/2/97	9/9/97	<	1.00E-02
9/9/97	9/16/97	<	1.00E-02
9/16/97	9/23/97	<	2.00E-02
9/23/97	9/30/97	<	2.00E-02

API-4 FOURTH QUARTER

Start Date	End Date	Activity	
9/30/97	10/7/97	<	2.00E-02
10/7/97	10/14/97	<	2.00E-02
10/14/97	10/21/97	<	2.00E-02
10/21/97	10/28/97	<	1.00E-02
10/28/97	11/4/97	<	2.00E-02
11/4/97	11/11/97	<	2.00E-02
11/11/97	11/18/97	<	1.00E-02
11/18/97	11/25/97	<	2.00E-02
11/25/97	12/2/97	<	3.00E-02
12/2/97	12/9/97	<	2.00E-02
12/9/97	12/16/97	<	3.00E-02
12/16/97	12/23/97	<	1.00E-02
12/23/97	12/30/97	<	1.00E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-5 FIRST QUARTER

Start Date	End Date	Activity	
12/30/96	1/7/97	<	1.00E-02
1/7/97	1/14/97	<	1.00E-02
1/14/97	1/21/97	<	1.00E-02
1/21/97	1/28/97	<	2.00E-02
1/28/97	2/4/97	<	1.00E-02
2/4/97	2/11/97	<	1.00E-02
2/11/97	2/18/97	<	1.00E-02
2/18/97	2/25/97	<	1.00E-02
2/25/97	3/4/97	<	2.00E-02
3/4/97	3/11/97	<	2.00E-02
3/11/97	3/18/97	<	2.00E-02
3/18/97	3/25/97	<	1.00E-02
3/25/97	4/1/97	<	1.00E-02

API-5 SECOND QUARTER

Start Date	End Date	Activity	
4/1/97	4/8/97	<	2.00E-02
4/8/97	4/15/97	<	2.00E-02
4/15/97	4/22/97	<	2.00E-02
4/22/97	4/29/97	<	1.00E-02
4/29/97	5/6/97	<	2.00E-02
5/6/97	5/13/97	<	1.00E-02
5/13/97	5/20/97	<	2.00E-02
5/20/97	5/27/97	<	1.00E-02
5/27/97	6/3/97	<	1.00E-02
6/3/97	6/10/97	<	1.00E-02
6/10/97	6/17/97	<	1.00E-02
6/17/97	6/24/97	<	1.00E-02
6/24/97	7/1/97	<	1.00E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-5 THIRD QUARTER

Start Date	End Date	Activity	
7/1/97	7/8/97	<	2.00E-02
7/8/97	7/15/97	<	1.00E-02
7/15/97	7/22/97	<	2.00E-02
7/22/97	7/29/97	<	1.00E-02
7/29/97	8/5/97	<	1.00E-02
8/5/97	8/12/97	<	1.00E-02
8/12/97	8/19/97	<	1.00E-02
8/19/97	8/26/97	<	1.00E-02
8/26/97	9/2/97	<	1.00E-02
9/2/97	9/9/97	<	9.00E-03
9/9/97	9/16/97	<	9.00E-03
9/16/97	9/23/97	<	1.00E-02
9/23/97	9/30/97	<	2.00E-02

API-5 FOURTH QUARTER

Start Date	End Date	Activity	
9/30/97	10/7/97	<	1.00E-02
10/7/97	10/14/97	<	1.00E-02
10/14/97	10/21/97	<	1.00E-02
10/21/97	10/28/97	<	1.00E-02
10/28/97	11/4/97	<	1.00E-02
11/4/97	11/11/97	<	1.00E-02
11/11/97	11/18/97	<	1.00E-02
11/18/97	11/25/97	<	1.00E-02
11/25/97	12/2/97	<	1.00E-02
12/2/97	12/9/97	<	1.00E-02
12/9/97	12/16/97	<	1.00E-02
12/16/97	12/23/97	<	8.00E-03
12/23/97	12/30/97	<	8.00E-03

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-1 (indicator)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
SR-89	<	2.00E-03			<	3.00E-03		
SR-90	<	3.00E-04			<	5.00E-04		
BE-7		1.12E-01	+/-	1.10E-02		1.66E-01	+/-	1.70E-02
K-40		9.92E-03	+/-	4.15E-03	<	1.00E-02		
MN-54	<	5.00E-04			<	6.00E-04		
CO-58	<	8.00E-04			<	.00E-03		
FE-59	<	2.00E-03			<	2.00E-03		
CO-60	<	6.00E-04			<	6.00E-04		
ZN-65	<	1.00E-03			<	1.00E-03		
ZR-95	<	8.00E-04			<	8.00E-04		
RU-103	<	1.00E-03			<	2.00E-03		
RU-106	<	5.00E-03			<	5.00E-03		
CS-134	<	6.00E-04			<	6.00E-04		
CS-137	<	5.00E-04			<	6.00E-04		
BA-140	<	1.00E-02			<	4.00E-02		
CE-141	<	2.00E-03			<	3.00E-03		
CE-144	<	2.00E-03			<	3.00E-03		
RA-226	<	7.00E-03			<	9.00E-03		
TH-228	<	7.00E-04			<	9.00E-04		

API-1 (indicator)
(pCi/cubic meter)

Nuclide	Third Quarter (a)				Fourth Quarter			
SR-89	<	2.00E-03			<	2.00E-03		
SR-90	<	4.00E-04			<	4.00E-04		
BE-7		9.58E-02	+/-	1.08E-02		1.03E-01	+/-	1.10E-05
K-40	<	9.00E-03				8.67E-03	+/-	3.69E-03
MN-54	<	5.00E-04			<	4.00E-04		
CO-58	<	7.00E-04			<	7.00E-04		
FE-59	<	2.00E-03			<	2.00E-03		
CO-60	<	6.00E-04			<	4.00E-04		
ZN-65	<	1.00E-03			<	1.00E-03		
ZR-95	<	8.00E-04			<	7.00E-04		
RU-103	<	1.00E-03			<	1.00E-03		
RU-106	<	4.00E-03			<	4.00E-03		
CS-134	<	5.00E-04			<	4.00E-04		
CS-137	<	5.00E-04			<	4.00E-04		
BA-140	<	1.00E-02			<	2.00E-02		
CE-141	<	2.00E-03			<	2.00E-03		
CE-144	<	3.00E-03			<	3.00E-03		
RA-226	<	9.00E-03			<	8.00E-03		
TH-228	<	8.00E-04			<	7.00E-04		

(a) Sample less than representative, see Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-2 (indicator)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
SR-89	<	2.00E-03			<	3.00E-03		
SR-90	<	2.00E-04			<	3.00E-04		
BE-7		1.12E-01	+/-	1.30E-02		2.02E-01	+/-	2.00E-02
K-40		1.17E-02	+/-	4.40E-03	<	1.00E-02		
MN-54	<	7.00E-04			<	6.00E-04		
CO-58	<	1.00E-03			<	9.00E-04		
FE-59	<	3.00E-03			<	3.00E-03		
CO-60	<	7.00E-04			<	6.00E-04		
ZN-65	<	2.00E-03			<	2.00E-03		
ZR-95	<	1.00E-03			<	1.00E-03		
RU-103	<	2.00E-03			<	2.00E-03		
RU-106	<	6.00E-03			<	5.00E-03		
CS-134	<	7.00E-04			<	6.00E-04		
CS-137	<	7.00E-04			<	5.00E-04		
BA-140	<	1.00E-02			<	3.00E-02		
CE-141	<	2.00E-03			<	3.00E-03		
CE-144	<	3.00E-03			<	3.00E-03		
RA-226	<	8.00E-03			<	9.00E-03		
TH-228	<	9.00E-04			<	1.00E-03		

API-2 (indicator)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter			
SR-89	<	2.00E-03			<	2.00E-03		
SR-90	<	4.00E-04			<	5.00E-04		
BE-7		1.17E-01	+/-	1.20E-02		8.57E-02	+/-	1.02E-02
K-40		6.15E-03	+/-	3.14E-03		7.68E-03	+/-	3.62E-03
MN-54	<	4.00E-04			<	4.00E-04		
CO-58	<	6.00E-04			<	5.00E-04		
FE-59	<	2.00E-03			<	2.00E-03		
CO-60	<	5.00E-04			<	6.00E-04		
ZN-65	<	9.00E-04			<	1.00E-03		
ZR-95	<	7.00E-04			<	8.00E-04		
RU-103	<	9.00E-04			<	1.00E-03		
RU-106	<	3.00E-03			<	4.00E-03		
CS-134	<	4.00E-04			<	5.00E-04		
CS-137	<	4.00E-04			<	4.00E-04		
BA-140	<	1.00E-02			<	1.00E-02		
CE-141	<	2.00E-03			<	3.00E-03		
CE-144	<	2.00E-03			<	3.00E-03		
RA-226	<	7.00E-03			<	1.00E-02		
TH-228	<	7.00E-04			<	8.00E-04		

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-3 (indicator)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
SR-89	<	2.00E-03			<	5.00E-03		
SR-90	<	3.00E-04			<	7.00E-04		
BE-7		1.12E-01	+/-	1.10E-02		1.48E-01	+/-	1.50E-02
K-40		9.18E-03	+/-	4.19E-03	<	1.00E-02		
MN-54	<	5.00E-04			<	5.00E-04		
CO-58	<	7.00E-04			<	8.00E-04		
FE-59	<	2.00E-03			<	3.00E-03		
CO-60	<	4.00E-04			<	5.00E-04		
ZN-65	<	1.00E-03			<	1.00E-03		
ZR-95	<	7.00E-04			<	1.00E-03		
RU-103	<	1.00E-03			<	2.00E-03		
RU-106	<	4.00E-03			<	5.00E-03		
CS-134	<	5.00E-04			<	5.00E-04		
CS-137	<	5.00E-04			<	5.00E-04		
BA-140	<	1.00E-02			<	3.00E-02		
CE-141	<	1.00E-03			<	2.00E-03		
CE-144	<	2.00E-03			<	2.00E-03		
RA-226	<	6.00E-03			<	7.00E-03		
TH-228	<	7.00E-04			<	7.00E-04		

API-3 (indicator)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter (a)			
SR-89	<	2.00E-03			<	3.00E-03		
SR-90	<	3.00E-04			<	6.00E-04		
BE-7		9.19E-02	+/-	9.20E-03		8.22E-02	+/-	9.20E-03
K-40	<	1.00E-02			<	1.00E-02		
MN-54	<	4.00E-04			<	5.00E-04		
CO-58	<	6.00E-04			<	8.00E-04		
FE-59	<	2.00E-03			<	2.00E-03		
CO-60	<	3.00E-04			<	5.00E-04		
ZN-65	<	9.00E-04			<	1.00E-03		
ZR-95	<	7.00E-04			<	8.00E-04		
RU-103	<	1.00E-03			<	1.00E-03		
RU-106	<	4.00E-03			<	4.00E-03		
CS-134	<	4.00E-04			<	5.00E-04		
CS-137	<	4.00E-04			<	5.00E-04		
BA-140	<	1.00E-02			<	2.00E-02		
CE-141	<	1.00E-03			<	2.00E-03		
CE-144	<	2.00E-03			<	2.00E-03		
RA-226	<	5.00E-03			<	6.00E-03		
TH-228	<	5.00E-04			<	7.00E-04		

(a) Sample less than representative, see Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-4 (control)
(pCi/cubic meter)

Nuclide	First Quarter (a)				Second Quarter			
SR-89	<	2.00E-03			<	3.00E-03		
SR-90	<	3.00E-04			<	4.00E-04		
BE-7		1.22E-01	+/-	1.20E-02		1.58E-01	+/-	1.60E-02
K-40		8.83E-03	+/-	3.98E-03	<	2.00E-02		
MN-54	<	4.00E-04			<	7.00E-04		
CO-58	<	6.00E-04			<	1.00E-03		
FE-59	<	2.00E-03			<	3.00E-03		
CO-60	<	4.00E-04			<	6.00E-04		
ZN-65	<	1.00E-03			<	2.00E-03		
ZR-95	<	7.00E-04			<	1.00E-03		
RU-103	<	1.00E-03			<	2.00E-03		
RU-106	<	4.00E-03			<	5.00E-03		
CS-134	<	4.00E-04			<	6.00E-04		
CS-137	<	4.00E-04			<	5.00E-04		
BA-140	<	1.00E-02			<	4.00E-02		
CE-141	<	2.00E-03			<	3.00E-03		
CE-144	<	3.00E-03			<	3.00E-03		
RA-226	<	7.00E-03			<	8.00E-03		
TH-228	<	7.00E-04			<	7.00E-04		

API-4 (control)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter			
SR-89	<	2.00E-03			<	2.00E-03		
SR-90	<	4.00E-04			<	5.00E-04		
BE-7		1.14E-01	+/-	1.10E-02		9.10E-02	+/-	1.06E-02
K-40	<	2.00E-02				1.38E-02	+/-	4.70E-03
MN-54	<	6.00E-04			<	6.00E-04		
CO-58	<	9.00E-04			<	8.00E-04		
FE-59	<	3.00E-03			<	3.00E-03		
CO-60	<	6.00E-04			<	6.00E-04		
ZN-65	<	2.00E-03			<	1.00E-03		
ZR-95	<	1.00E-03			<	9.00E-04		
RU-103	<	1.00E-03			<	1.00E-03		
RU-106	<	5.00E-03			<	5.00E-03		
CS-134	<	6.00E-04			<	5.00E-04		
CS-137	<	5.00E-04			<	6.00E-04		
BA-140	<	2.00E-02			<	2.00E-02		
CE-141	<	2.00E-03			<	2.00E-03		
CE-144	<	3.00E-03			<	3.00E-03		
RA-226	<	8.00E-03			<	8.00E-03		
TH-228	<	7.00E-04			<	8.00E-04		

(a) Sample less than representative, see Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-5 (Indicator)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
SR-89	<	2.00E-03			<	4.00E-03		
SR-90	<	3.00E-04			<	4.00E-04		
BE-7		1.07E-01	+/-	1.10E-02		1.89E-01	+/-	1.90E-02
K-40		1.09E-02	+/-	4.40E-03		1.25E-02	+/-	4.50E-03
MN-54	<	6.00E-04			<	4.00E-04		
CO-58	<	9.00E-04			<	7.00E-04		
FE-59	<	2.00E-03			<	2.00E-03		
CO-60	<	5.00E-04			<	4.00E-04		
ZN-65	<	1.00E-03			<	1.00E-03		
ZR-95	<	8.00E-04			<	9.00E-04		
RU-103	<	1.00E-03			<	1.00E-03		
RU-106	<	5.00E-03			<	4.00E-03		
CS-134	<	5.00E-04			<	5.00E-04		
CS-137	<	5.00E-04			<	4.00E-04		
BA-140	<	8.00E-03			<	3.00E-02		
CE-141	<	2.00E-03			<	2.00E-03		
CE-144	<	2.00E-03			<	3.00E-03		
RA-226	<	7.00E-03			<	8.00E-03		
TH-228	<	7.00E-04			<	8.00E-04		

API-5 (Indicator)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter			
SR-89	<	2.00E-03			<	6.00E-03		
SR-90	<	3.00E-04			<	1.00E-03		
BE-7		1.22E-01	+/-	1.20E-02		8.45E-02	+/-	8.90E-03
K-40		6.20E-03	+/-	3.26E-03	<	9.00E-03		
MN-54	<	4.00E-04			<	4.00E-04		
CO-58	<	5.00E-04			<	6.00E-04		
FE-59	<	2.00E-03			<	2.00E-03		
CO-60	<	4.00E-04			<	4.00E-04		
ZN-65	<	1.00E-03			<	1.00E-03		
ZR-95	<	6.00E-04			<	8.00E-04		
RU-103	<	9.00E-04			<	1.00E-03		
RU-106	<	3.00E-03			<	4.00E-03		
CS-134	<	3.00E-04			<	5.00E-04		
CS-137	<	4.00E-04			<	4.00E-04		
BA-140	<	1.00E-02			<	2.00E-02		
CE-141	<	2.00E-03			<	2.00E-03		
CE-144	<	2.00E-03			<	2.00E-03		
RA-226	<	7.00E-03			<	5.00E-03		
TH-228	<	7.00E-04			<	5.00E-04		

FERMI 2
MILK ANALYSIS

M-2 (Indicator)
(pCi/liter)

Nuclide	16-JAN				13-FEB				20-MAR			
I-131	<	2.00E-01			<	2.00E-01			<	1.00E-01		
SR-89	<	2.00E+00			<	2.00E+00			<	2.00E+00		
SR-90		1.20E+00	+/-	1.00E-01		1.60E+00	+/-	2.00E-01		9.50E-01	+/-	2.10E-01
BE-7	<	3.00E+01			<	3.00E+01			<	3.00E+01		
K-40		1.37E+03	+/-	1.40E+02		1.34E+03	+/-	1.30E+02		1.35E+03	+/-	1.30E+02
MN-54	<	4.00E+00			<	4.00E+00			<	4.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	4.00E+00		
FE-59	<	9.00E+00			<	8.00E+00			<	8.00E+00		
CO-60	<	4.00E+00			<	4.00E+00			<	4.00E+00		
ZN-65	<	1.00E+01			<	9.00E+00			<	1.00E+01		
ZR-95	<	4.00E+00			<	4.00E+00			<	4.00E+00		
RU-103	<	4.00E+00			<	4.00E+00			<	4.00E+00		
RU-106	<	3.00E+01			<	3.00E+01			<	3.00E+01		
CS-134	<	4.00E+00			<	4.00E+00			<	4.00E+00		
CS-137	<	4.00E+00			<	4.00E+00			<	4.00E+00		
BA-140	<	5.00E+00			<	4.00E+00			<	4.00E+00		
CE-141	<	6.00E+00			<	6.00E+00			<	7.00E+00		
CE-144	<	2.00E+01			<	2.00E+01			<	3.00E+01		
RA-226	<	7.00E+01			<	7.00E+01			<	8.00E+01		
TH-228	<	7.00E+00			<	6.00E+00			<	7.00E+00		

Nuclide	17-APR				8-MAY				22-MAY			
I-131	<	2.00E-01			<	2.00E-01			<	2.00E-01		
SR-89	<	4.00E+00			<	3.00E+00			<	2.00E+00		
SR-90		1.50E+00	+/-	3.00E-01		1.00E+00	+/-	1.00E-01		1.00E+00	+/-	2.00E-01
BE-7	<	3.00E+01			<	3.00E+01			<	3.00E+01		
K-40		1.35E+03	+/-	1.40E+02		1.30E+03	+/-	1.30E+02		1.26E+03	+/-	1.30E+02
MN-54	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	3.00E+00		
FE-59	<	7.00E+00			<	8.00E+00			<	7.00E+00		
CO-60	<	3.00E+00			<	4.00E+00			<	4.00E+00		
ZN-65	<	7.00E+00			<	8.00E+00			<	8.00E+00		
ZR-95	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-103	<	3.00E+00			<	3.00E+00			<	4.00E+00		
RU-106	<	3.00E+01			<	3.00E+01			<	3.00E+01		
CS-134	<	3.00E+00			<	3.00E+00			<	4.00E+00		
CS-137	<	4.00E+00			<	4.00E+00			<	4.00E+00		
BA-140	<	3.00E+00			<	5.00E+00			<	4.00E+00		
CE-141	<	5.00E+00			<	6.00E+00			<	6.00E+00		
CE-144	<	2.00E+01			<	3.00E+01			<	2.00E+01		
RA-226	<	6.00E+01			<	7.00E+01			<	7.00E+01		
TH-228	<	5.00E+00			<	6.00E+00			<	6.00E+00		

FERMI 2
MILK ANALYSIS

M-2 (Indicator)
(pCi/liter)

Nuclide	12-JUN				27-JUN				10-JUL			
I-131	<	2.00E-01			<	3.00E-01			<	2.00E-01		
SR-89	<	2.00E+00			<	2.00E+00			<	2.00E+00		
SR-90		1.30E+00	+/-	5.00E-01		9.70E-01	+/-	1.80E-01		1.50E+00	+/-	2.00E-01
BE-7	<	4.00E+01			<	3.00E+01			<	3.00E+01		
K-40		1.43E+03	+/-	1.40E+02		1.32E+03	+/-	1.30E+02		1.06E+03	+/-	1.10E+02
MN-54	<	5.00E+00			<	4.00E+00			<	3.00E+00		
CO-58	<	4.00E+00			<	4.00E+00			<	3.00E+00		
FE-59	<	1.00E+01			<	8.00E+00			<	7.00E+00		
CO-60	<	5.00E+00			<	4.00E+00			<	3.00E+00		
ZN-65	<	1.00E+01			<	9.00E+00			<	8.00E+00		
ZR-95	<	5.00E+00			<	4.00E+00			<	3.00E+00		
RU-103	<	5.00E+00			<	4.00E+00			<	3.00E+00		
RU-106	<	4.00E+01			<	3.00E+01			<	3.00E+01		
CS-134	<	5.00E+00			<	4.00E+00			<	4.00E+00		
CS-137	<	5.00E+00			<	4.00E+00			<	4.00E+00		
BA-140	<	5.00E+00			<	5.00E+00			<	3.00E+00		
CE-141	<	8.00E+00			<	6.00E+00			<	5.00E+00		
CE-144	<	3.00E+01			<	2.00E+01			<	2.00E+01		
RA-226	<	9.00E+01			<	7.00E+01			<	6.00E+01		
TH-228	<	8.00E+00			<	7.00E+00			<	5.00E+00		

Nuclide	24-JUL				18-AUG				28-AUG			
I-131	<	2.00E-01			<	2.00E-01			<	2.00E-01		
SR-89	<	3.00E+00			<	2.00E+00			<	2.00E+00		
SR-90		1.70E+00	+/-	3.00E-01		8.70E-01	+/-	1.50E-01		1.30E+00	+/-	2.00E-01
BE-7	<	3.00E+01			<	3.00E+01			<	3.00E+01		
K-40		1.41E+03	+/-	1.40E+02		1.19E+03	+/-	1.20E+02		1.28E+03	+/-	1.30E+02
MN-54	<	3.00E+00			<	3.00E+00			<	4.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	4.00E+00		
FE-59	<	8.00E+00			<	8.00E+00			<	8.00E+00		
CO-60	<	4.00E+00			<	4.00E+00			<	4.00E+00		
ZN-65	<	9.00E+00			<	9.00E+00			<	9.00E+00		
ZR-95	<	3.00E+00			<	4.00E+00			<	4.00E+00		
RU-103	<	3.00E+00			<	4.00E+00			<	4.00E+00		
RU-106	<	3.00E+01			<	3.00E+01			<	3.00E+01		
CS-134	<	3.00E+00			<	4.00E+00			<	4.00E+00		
CS-137	<	4.00E+00			<	4.00E+00			<	4.00E+00		
BA-140	<	4.00E+00			<	4.00E+00			<	4.00E+00		
CE-141	<	5.00E+00			<	8.00E+00			<	7.00E+00		
CE-144	<	2.00E+01			<	3.00E+01			<	3.00E+01		
RA-226	<	7.00E+01			<	9.00E+01			<	8.00E+01		
TH-228	<	6.00E+00			<	7.00E+00			<	7.00E+00		

FERMI 2
MILK ANALYSIS

M-2 (Indicator)
(pCi/liter)

Nuclide	11-SEP				25-SEP				9-OCT			
I-131	<	2.00E-01			<	2.00E-01			<	5.00E-01		
SR-89	<	1.00E+00			<	5.00E-01			<	8.00E-01		
SR-90		6.10E-01	+/-	2.60E-01		9.90E-01	+/-	4.00E-01		1.30E+00	+/-	2.00E-01
BE-7	<	3.00E+01			<	4.00E+01			<	3.00E+01		
K-40		1.19E+03	+/-	1.20E+02		1.42E+03	+/-	1.40E+02		1.37E+03	+/-	1.40E+02
MN-54	<	3.00E+00			<	4.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	4.00E+00			<	3.00E+00		
FE-59	<	8.00E+00			<	1.00E+01			<	6.00E+00		
CO-60	<	4.00E+00			<	5.00E+00			<	3.00E+00		
ZN-65	<	9.00E+00			<	1.00E+01			<	7.00E+00		
ZR-95	<	4.00E+00			<	5.00E+00			<	3.00E+00		
RU-103	<	4.00E+00			<	5.00E+00			<	3.00E+00		
RU-106	<	3.00E+01			<	4.00E+01			<	3.00E+01		
CS-134	<	4.00E+00			<	5.00E+00			<	3.00E+00		
CS-137	<	4.00E+00			<	5.00E+00			<	4.00E+00		
BA-140	<	5.00E+00			<	5.00E+00			<	4.00E+00		
CE-141	<	8.00E+00			<	7.00E+00			<	5.00E+00		
CE-144	<	3.00E+01			<	3.00E+01			<	2.00E+01		
RA-226	<	9.00E+01			<	8.00E+01			<	6.00E+01		
TH-228	<	7.00E+00			<	7.00E+00			<	5.00E+00		

Nuclide	23-OCT				13-NOV				11-DEC			
I-131	<	2.00E-01			<	2.00E-01			<	2.00E-01		
SR-89	<	3.00E+00			<	3.00E+00			<	7.00E-01		
SR-90		1.30E+00	+/-	6.00E-01		1.50E+00	+/-	3.00E-01		1.20E+00	+/-	2.00E-01
BE-7	<	4.00E+01			<	4.00E+01			<	3.00E+01		
K-40		1.32E+03	+/-	1.30E+02		1.57E+03	+/-	1.60E+02		1.36E+03	+/-	1.40E+02
MN-54	<	4.00E+00			<	4.00E+00			<	4.00E+00		
CO-58	<	4.00E+00			<	4.00E+00			<	3.00E+00		
FE-59	<	1.00E+01			<	9.00E+00			<	8.00E+00		
CO-60	<	4.00E+00			<	4.00E+00			<	4.00E+00		
ZN-65	<	9.00E+00			<	1.00E+01			<	8.00E+00		
ZR-95	<	4.00E+00			<	4.00E+00			<	4.00E+00		
RU-103	<	4.00E+00			<	5.00E+00			<	4.00E+00		
RU-106	<	4.00E+01			<	4.00E+01			<	3.00E+01		
CS-134	<	4.00E+00			<	4.00E+00			<	4.00E+00		
CS-137	<	5.00E+00			<	5.00E+00			<	4.00E+00		
BA-140	<	5.00E+00			<	5.00E+00			<	4.00E+00		
CE-141	<	8.00E+00			<	6.00E+00			<	5.00E+00		
CE-144	<	3.00E+01			<	3.00E+01			<	2.00E+01		
RA-226	<	9.00E+01			<	8.00E+01			<	7.00E+01		
TH-228	<	8.00E+00			<	7.00E+00			<	6.00E+00		

FERMI 2
MILK ANALYSIS

M-8 (Control)
(pCi/liter)

Nuclide	16-JAN				13-FEB				20-MAR			
I-131	<	2.00E-01			<	2.00E-01			<	2.00E-01		
SR-89	<	5.00E+00			<	2.00E+00			<	2.00E+00		
SR-90		1.20E+00	+/-	4.00E-01		1.40E+00	+/-	2.00E-01		1.40E+00	+/-	2.00E-01
BE-7	<	3.00E+01			<	2.00E+01			<	3.00E+01		
K-40		1.48E+03	+/-	1.50E+02		1.49E+03	+/-	1.50E+02		1.40E+03	+/-	1.40E+02
MN-54	<	4.00E+00			<	2.00E+00			<	4.00E+00		
CO-58	<	4.00E+00			<	2.00E+00			<	3.00E+00		
FE-59	<	9.00E+00			<	5.00E+00			<	8.00E+00		
CO-60	<	4.00E+00			<	3.00E+00			<	4.00E+00		
ZN-65	<	9.00E+00			<	6.00E+00			<	8.00E+00		
ZR-95	<	4.00E+00			<	2.00E+00			<	4.00E+00		
RU-103	<	4.00E+00			<	2.00E+00			<	4.00E+00		
RU-106	<	4.00E+01			<	2.00E+01			<	3.00E+01		
CS-134	<	4.00E+00			<	2.00E+00			<	4.00E+00		
CS-137	<	4.00E+00			<	2.00E+00			<	4.00E+00		
BA-140	<	5.00E+00			<	3.00E+00			<	4.00E+00		
CE-141	<	6.00E+00			<	3.00E+00			<	5.00E+00		
CE-144	<	3.00E+01			<	1.00E+01			<	2.00E+01		
RA-226	<	7.00E+01			<	4.00E+01			<	7.00E+01		
TH-228	<	6.00E+00			<	4.00E+00			<	6.00E+00		

Nuclide	17-APR				8-MAY				22-MAY			
I-131	<	2.00E-01			<	2.00E-01			<	2.00E-01		
SR-89	<	4.00E+00			<	2.00E+00			<	2.00E+00		
SR-90		1.30E+00	+/-	3.00E-01		7.30E-01	+/-	1.50E-01		8.50E-01	+/-	2.00E-01
BE-7	<	3.00E+01			<	3.00E+01			<	3.00E+01		
K-40		1.31E+03	+/-	1.30E+02		1.33E+03	+/-	1.30E+02		1.38E+03	+/-	1.40E+02
MN-54	<	4.00E+00			<	4.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	4.00E+00			<	3.00E+00		
FE-59	<	8.00E+00			<	1.00E+01			<	7.00E+00		
CO-60	<	4.00E+00			<	4.00E+00			<	3.00E+00		
ZN-65	<	9.00E+00			<	1.00E+01			<	7.00E+00		
ZR-95	<	4.00E+00			<	4.00E+00			<	3.00E+00		
RU-103	<	4.00E+00			<	4.00E+00			<	3.00E+00		
RU-106	<	3.00E+01			<	4.00E+01			<	3.00E+01		
CS-134	<	4.00E+00			<	4.00E+00			<	3.00E+00		
CS-137	<	4.00E+00			<	4.00E+00			<	4.00E+00		
BA-140	<	4.00E+00			<	5.00E+00			<	4.00E+00		
CE-141	<	7.00E+00			<	8.00E+00			<	5.00E+00		
CE-144	<	3.00E+01			<	4.00E+01			<	2.00E+01		
RA-226	<	9.00E+01			<	1.00E+02			<	6.00E+01		
TH-228	<	7.00E+00			<	9.00E+00			<	5.00E+00		

FERMI 2
MILK ANALYSIS

M-8 (Control)
(pCi/liter)

Nuclide	12-JUN			27-JUN			10-JUL		
I-131	< 2.00E-01			< 2.00E-01			< 2.00E-01		
SR-89	< 4.00E+00			< 3.00E+00			< 4.00E+00		
SR-90	5.30E+00	+/-	1.30E+00	8.80E-01	+/-	1.90E-01	1.40E+00	+/-	4.00E-01
BE-7	< 3.00E+01			< 3.00E+01			< 2.00E+01		
K-40	1.78E+03	+/-	1.80E+02	1.31E+03	+/-	1.30E+02	1.41E+03	+/-	1.40E+02
MN-54	< 4.00E+00			< 4.00E+00			< 2.00E+00		
CO-58	< 4.00E+00			< 4.00E+00			< 2.00E+00		
FE-59	< 9.00E+00			< 9.00E+00			< 5.00E+00		
CO-60	< 4.00E+00			< 4.00E+00			< 3.00E+00		
ZN-65	< 1.00E+01			< 1.00E+01			< 5.00E+00		
ZR-95	< 4.00E+00			< 4.00E+00			< 2.00E+00		
RU-103	< 4.00E+00			< 4.00E+00			< 2.00E+00		
RU-106	< 4.00E+01			< 3.00E+01			< 2.00E+01		
CS-134	< 5.00E+00			< 4.00E+00			< 2.00E+00		
CS-137	< 5.00E+00			< 4.00E+00			< 2.00E+00		
BA-140	< 4.00E+00			< 5.00E+00			< 2.00E+00		
CE-141	< 6.00E+00			< 6.00E+00			< 3.00E+00		
CE-144	< 3.00E+01			< 2.00E+01			< 1.00E+01		
RA-226	< 8.00E+01			< 7.00E+01			< 4.00E+01		
TH-228	< 7.00E+00			< 6.00E+00			< 4.00E+00		

Nuclide	24-JUL			14-AUG			28-AUG		
I-131	< 2.00E-01			< 1.00E-01			< 4.00E-01		
SR-89	< 3.00E+00			< 2.00E+00			< 2.00E+00		
SR-90	1.80E+00	+/-	3.00E-01	5.70E-01	+/-	2.10E-01	1.10E+00	+/-	2.00E-01
BE-7	< 3.00E+01			< 3.00E+01			< 3.00E+01		
K-40	1.37E+03	+/-	1.40E+02	1.27E+03	+/-	1.30E+02	1.26E+03	+/-	1.30E+02
MN-54	< 3.00E+00			< 3.00E+00			< 4.00E+00		
CO-58	< 3.00E+00			< 3.00E+00			< 3.00E+00		
FE-59	< 8.00E+00			< 7.00E+00			< 9.00E+00		
CO-60	< 4.00E+00			< 3.00E+00			< 4.00E+00		
ZN-65	< 9.00E+00			< 6.00E+00			< 8.00E+00		
ZR-95	< 3.00E+00			< 3.00E+00			< 4.00E+00		
RU-103	< 4.00E+00			< 3.00E+00			< 4.00E+00		
RU-106	< 3.00E+01			< 3.00E+01			< 3.00E+01		
CS-134	< 4.00E+00			< 3.00E+00			< 4.00E+00		
CS-137	< 4.00E+00			< 4.00E+00			< 4.00E+00		
BA-140	< 4.00E+00			< 4.00E+00			< 6.00E+00		
CE-141	< 6.00E+00			< 5.00E+00			< 8.00E+00		
CE-144	< 3.00E+01			< 2.00E+01			< 3.00E+01		
RA-226	< 7.00E+01			< 7.00E+01			< 9.00E+01		
TH-228	< 7.00E+00			< 6.00E+00			< 7.00E+00		

FERMI 2
MILK ANALYSIS

M-8 (Control)
(pCi/liter)

Nuclide	11-SEP				25-SEP				9-OCT			
I-131	<	2.00E-01			<	2.00E-01			<	4.00E-01		
SR-89	<	1.00E+00			<	2.00E+00			<	3.00E+00		
SR-90		1.10E+00	+/-	3.00E-01		1.10E+00	+/-	4.00E-01		7.40E-01	+/-	2.00E-01
BE-7	<	3.00E+01			<	3.00E+01			<	3.00E+01		
K-40		1.42E+03	+/-	1.40E+02		1.23E+03	+/-	1.20E+02		1.32E+03	+/-	1.30E+02
MN-54	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	3.00E+00		
FE-59	<	7.00E+00			<	8.00E+00			<	8.00E+00		
CO-60	<	4.00E+00			<	4.00E+00			<	3.00E+00		
ZN-65	<	7.00E+00			<	8.00E+00			<	8.00E+00		
ZR-95	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-103	<	3.00E+00			<	3.00E+00			<	4.00E+00		
RU-106	<	3.00E+01			<	3.00E+01			<	3.00E+01		
CS-134	<	3.00E+00			<	3.00E+00			<	4.00E+00		
CS-137	<	3.00E+00			<	4.00E+00			<	4.00E+00		
BA-140	<	4.00E+00			<	4.00E+00			<	4.00E+00		
CE-141	<	6.00E+00			<	6.00E+00			<	5.00E+00		
CE-144	<	2.00E+01			<	3.00E+01			<	2.00E+01		
RA-226	<	7.00E+01			<	7.00E+01			<	7.00E+01		
TH-228	<	6.00E+00			<	7.00E+00			<	6.00E+00		

Nuclide	23-OCT				13-NOV				11-DEC			
I-131	<	2.00E-01			<	2.00E-01			<	2.00E-01		
SR-89	<	2.00E+00			<	2.00E+00			<	2.00E+00		
SR-90		2.50E+00	+/-	5.00E-01		1.10E+00	+/-	4.00E-01		3.30E+00	+/-	4.00E-01
BE-7	<	3.00E+01			<	2.00E+01			<	2.00E+01		
K-40		1.33E+03	+/-	1.30E+02		1.47E+03	+/-	1.50E+02		1.47E+03	+/-	1.50F+02
MN-54	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	2.00E+00		
FE-59	<	7.00E+00			<	6.00E+00			<	6.00E+00		
CO-60	<	4.00E+00			<	3.00E+00			<	3.00E+00		
ZN-65	<	8.00E+00			<	7.00E+00			<	6.00E+00		
ZR-95	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-103	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-106	<	3.00E+01			<	2.00E+01			<	2.00E+01		
CS-134	<	4.00E+00			<	3.00E+00			<	3.00E+00		
CS-137	<	4.00E+00			<	3.00E+00			<	3.00E+00		
BA-140	<	4.00E+00			<	4.00E+00			<	3.00E+00		
CE-141	<	6.00E+00			<	4.00E+00			<	4.00E+00		
CE-144	<	3.00E+01			<	2.00E+01			<	2.00E+01		
RA-226	<	8.00E+01			<	5.00E+01			<	5.00E+01		
TH-228	<	7.00E+00			<	5.00E+00			<	4.00E+00		

FERMI 2
VEGETABLE ANALYSIS

FP-1 (Indicator)
(pCi/kg wet)

Nuclide	24-JUL Cabbage				24-JUL Lettuce				24-JUL Broccoli			
I-131	<	1.00E+01			<	1.00E+01			<	1.00E+01		
BE-7		1.37E+02	+/-	6.40E+01		2.53E+02	+/-	7.50E+01		1.49E+02	+/-	6.50E+01
K-40		2.96E+03	+/-	3.00E+02		4.36E+03	+/-	4.40E+02		3.21E+03	+/-	3.20E+02
MN-54	<	1.00E+01			<	1.00E+01			<	9.00E+00		
CO-58	<	9.00E+00			<	1.00E+01			<	8.00E+00		
FE-59	<	2.00E+01			<	2.00E+01			<	2.00E+01		
CO-60	<	1.00E+01			<	1.00E+01			<	9.00E+00		
ZN-65	<	2.00E+01			<	2.00E+01			<	2.00E+01		
ZR-95	<	1.00E+01			<	1.00E+01			<	9.00E+00		
RU-103	<	1.00E+01			<	1.00E+01			<	9.00E+00		
RU-106	<	9.00E+01			<	9.00E+01			<	8.00E+01		
CS-134	<	1.00E+01			<	1.00E+01			<	9.00E+00		
CS-137	<	1.00E+01			<	1.00E+01			<	9.00E+00		
BA-140	<	1.00E+01			<	1.00E+01			<	1.00E+01		
CE-141	<	1.00E+01			<	2.00E+01			<	1.00E+01		
CE-144	<	6.00E+01			<	7.00E+01			<	6.00E+01		
RA-226	<	2.00E+02			<	2.00E+02			<	2.00E+02		
TH-228	<	2.00E+01			<	2.00E+01			<	2.00E+01		

FP-1 (Indicator)
(pCi/kg wet)

Nuclide	28-AUG Cabbage				28-AUG Swiss Chard				23-AUG Lettuce			
I-131	<	1.00E+01			<	1.00E+01			<	2.00E+01		
BE-7		1.40E+02	+/-	5.40E+01		2.16E+02	+/-	6.90E+01		3.25E+02	+/-	8.30E+01
K-40		2.73E+03	+/-	2.70E+02		5.29E+03	+/-	5.30E+02		4.48E+03	+/-	4.50E+02
MN-54	<	9.00E+00			<	9.00E+00			<	1.00E+01		
CO-58	<	9.00E+00			<	1.00E+01			<	1.00E+01		
FE-59	<	2.00E+01			<	2.00E+01			<	2.00E+01		
CO-60	<	1.00E+01			<	9.00E+00			<	1.00E+01		
ZN-65	<	2.00E+01			<	2.00E+01			<	2.00E+01		
ZR-95	<	1.00E+01			<	1.00E+01			<	1.00E+01		
RU-103	<	1.00E+01			<	1.00E+01			<	1.00E+01		
RU-106	<	8.00E+01			<	9.00E+01			<	9.00E+01		
CS-134	<	1.00E+01			<	1.00E+01			<	1.00E+01		
CS-137	<	1.00E+01			<	1.00E+01			<	1.00E+01		
BA-140	<	1.00E+01			<	1.00E+01			<	1.00E+01		
CE-141	<	1.00E+01			<	2.00E+01			<	2.00E+01		
CE-144	<	6.00E+01			<	6.00E+01			<	6.00E+01		
RA-226	<	2.00E+02			<	2.00E+02			<	2.00E+02		
TH-228	<	2.00E+01			<	2.00E+01			<	2.00E+01		

FERMI 2
VEGETABLE ANALYSIS

FP-3 (Indicator)
(pCi/kg wet)

Nuclide	24-JUL Cabbage				24-JUL Collard Greens				28-AUG Cabbage			
I-131	<	1.00E+01			<	1.00E+01			<	2.00E+01		
BE-7		2.09E+02	+/-	7.20E+01		8.67E+01	+/-	4.03E+01		2.75E+02	+/-	7.90E+01
K-40		2.22E+03	+/-	2.20E+02		2.99E+03	+/-	3.00E+02		1.49E+03	+/-	1.50E+02
MN-54	<	1.00E+01			<	7.00E+00			<	9.00E+00		
CO-58	<	1.00E+01			<	6.00E+00			<	1.00E+01		
FE-59	<	2.00E+01			<	2.00E+01			<	2.00E+01		
CO-60	<	1.00E+01			<	7.00E+00			<	1.00E+01		
ZN-65	<	2.00E+01			<	2.00E+01			<	2.00E+01		
ZR-95	<	1.00E+01			<	7.00E+00			<	1.00E+01		
RU-103	<	1.00E+01			<	7.00E+00			<	1.00E+01		
RU-106	<	1.00E+02			<	6.00E+01			<	9.00E+01		
CS-134	<	1.00E+01			<	7.00E+00			<	1.00E+01		
CS-137	<	1.00E+01			<	8.00E+00			<	1.00E+01		
BA-140	<	1.00E+01			<	8.00E+00			<	1.00E+01		
CE-141	<	2.00E+01			<	1.00E+01			<	2.00E+01		
CE-144	<	6.00E+01			<	4.00E+01			<	7.00E+01		
RA-226	<	2.00E+02			<	1.00E+02			<	2.00E+02		
TH-228	<	2.00E+01			<	1.00E+01			<	2.00E+01		

FP-3 (Indicator)
(pCi/kg wet)

Nuclide	28-AUG Lettuce				28-AUG Collard Greens			
I-131	<	1.00E+01			<	9.00E+00		
BE-7		4.13E+02	+/-	6.90E+01		2.19E+02	+/-	4.30E+01
K-40		2.81E+03	+/-	2.80E+02		2.64E+03	+/-	2.60E+02
MN-54	<	9.00E+00			<	6.00E+00		
CO-58	<	8.00E+00			<	6.00E+00		
FE-59	<	2.00E+01			<	1.00E+01		
CO-60	<	8.00E+00			<	6.00E+00		
ZN-65	<	2.00E+01			<	1.00E+01		
ZR-95	<	9.00E+00			<	7.00E+00		
RU-103	<	9.00E+00			<	6.00E+00		
RU-106	<	8.00E+01			<	5.00E+01		
CS-134	<	9.00E+00			<	6.00E+00		
CS-137	<	9.00E+00			<	7.00E+00		
BA-140	<	1.00E+01			<	8.00E+00		
CE-141	<	1.00E+01			<	8.00E+00		
CE-144	<	5.00E+01			<	3.00E+01		
RA-226	<	2.00E+02			<	1.00E+02		
TH-228	<	2.00E+01			<	1.00E+01		

FERMI 2
VEGETABLE ANALYSIS

FP-7 (Indicator)
(pCi/kg wet)

Nuclide	24-JUL Swiss Chard				24-JUL Lettuce				24-JUL Collard Greens			
I-131	<	1.00E+01			<	5.00E+00			<	7.00E+00		
BE-7		1.67E+02	+/-	6.40E+01		2.29E+02	+/-	3.50E+01		1.51E+02	+/-	4.20E+01
K-40		1.96E+03	+/-	2.00E+02		3.76E+03	+/-	3.80E+02		2.68E+03	+/-	2.70E+02
MN-54	<	9.00E+00			<	5.00E+00			<	5.00E+00		
CO-58	<	9.00E+00			<	4.00E+00			<	5.00E+00		
FE-59	<	2.00E+01			<	1.00E+01			<	1.00E+01		
CO-60	<	9.00E+00			<	5.00E+00			<	6.00E+00		
ZN-65	<	2.00E+01			<	1.00E+01			<	1.00E+01		
ZR-95	<	9.00E+00			<	5.00E+00			<	5.00E+00		
RU-103	<	1.00E+01			<	4.00E+00			<	6.00E+00		
RU-106	<	8.00E+01			<	4.00E+01			<	5.00E+01		
CS-134	<	1.00E+01			<	5.00E+00			<	6.00E+00		
CS-137	<	1.00E+01			<	5.00E+00			<	6.00E+00		
BA-140	<	1.00E+01			<	5.00E+00			<	6.00E+00		
CE-141	<	2.00E+01			<	6.00E+00			<	1.00E+01		
CE-144	<	6.00E+01			<	3.00E+01			<	4.00E+01		
RA-226	<	2.00E+02			<	9.00E+01			<	1.00E+02		
TH-228	<	2.00E+01			<	9.00E+00			<	1.00E+01		

FP-7 (Indicator)
(pCi/kg wet)

Nuclide	28-AUG Cabbage				28-AUG Swiss Chard				28-AUG Collard Greens			
I-131	<	1.00E+01			<	1.00E+01			<	1.00E+01		
BE-7		1.06E+02	+/-	4.50E+01		1.09E+02	+/-	5.40E+01		2.27E+02	+/-	4.80E+01
K-40		1.89E+03	+/-	1.90E+02		1.95E+03	+/-	2.00E+02		2.25E+03	+/-	2.30E+02
MN-54	<	6.00E+00			<	7.00E+00			<	6.00E+00		
CO-58	<	6.00E+00			<	7.00E+00			<	6.00E+00		
FE-59	<	1.00E+01			<	2.00E+01			<	1.00E+01		
CO-60	<	6.00E+00			<	7.00E+00			<	7.00E+00		
ZN-65	<	1.00E+01			<	2.00E+01			<	1.00E+01		
ZR-95	<	6.00E+00			<	7.00E+00			<	6.00E+00		
RU-103	<	7.00E+00			<	7.00E+00			<	7.00E+00		
RU-106	<	5.00E+01			<	6.00E+01			<	5.00E+01		
CS-134	<	7.00E+00			<	8.00E+00			<	6.00E+00		
CS-137	<	7.00E+00			<	7.00E+00			<	7.00E+00		
BA-140	<	8.00E+00			<	9.00E+00			<	8.00E+00		
CE-141	<	1.00E+01			<	1.00E+01			<	9.00E+00		
CE-144	<	5.00E+01			<	4.00E+01			<	3.00E+01		
RA-226	<	1.00E+02			<	1.00E+02			<	1.00E+02		
TH-228	<	1.00E+01			<	1.00E+01			<	1.00E+01		

FERMI 2
VEGETABLE ANALYSIS

FP-9 (Control)
(pCi/kg wet)

Nuclide	24-JUL Swiss Chard				24-JUL Lettuce				24-JUL Cabbage			
I-131	<	8.00E+00			<	8.00E+00			<	1.00E+01		
BE-7		1.80E+02	+/-	5.60E+01		2.05E+02	+/-	4.40E+01	<	9.00E+01		
K-40		5.25E+03	+/-	5.30E+02		4.89E+03	+/-	4.90E+02		4.75E+03	+/-	4.80E+02
MN-54	<	7.00E+00			<	6.00E+00			<	1.00E+01		
CO-58	<	7.00E+00			<	6.00E+00			<	1.00E+01		
FE-59	<	2.00E+01			<	1.00E+01			<	2.00E+01		
CO-60	<	8.00E+00			<	7.00E+00			<	1.00E+01		
ZN-65	<	2.00E+01			<	2.00E+01			<	2.00E+01		
ZR-95	<	7.00E+00			<	7.00E+00			<	1.00E+01		
RU-103	<	7.00E+00			<	6.00E+00			<	1.00E+01		
RU-106	<	7.00E+01			<	6.00E+01			<	9.00E+01		
CS-134	<	8.00E+00			<	6.00E+00			<	1.00E+01		
CS-137	<	9.00E+00			<	7.00E+00			<	1.00E+01		
BA-140	<	7.00E+00			<	7.00E+00			<	1.00E+01		
CE-141	<	1.00E+01			<	8.00E+00			<	1.00E+01		
CE-144	<	5.00E+01			<	4.00E+01			<	6.00E+01		
RA-226	<	1.00E+02			<	1.00E+02			<	2.00E+02		
TH-228	<	1.00E+01			<	1.00E+01			<	2.00E+01		

FP-9 (Control)
(pCi/kg wet)

Nuclide	28-AUG Cabbage				28-AUG Swiss Chard				28-AUG Lettuce			
I-131	<	1.00E+01			<	1.00E+01			<	1.00E+01		
BE-7	<	8.00E+01				2.28E+02	+/-	6.00E+01		4.02E+02	+/-	5.90E+01
K-40		1.87E+03	+/-	1.90E+02		4.17E+03	+/-	4.20E+02		4.37E+03	+/-	4.40E+02
MN-54	<	8.00E+00			<	8.00E+00			<	8.00E+00		
CO-58	<	8.00E+00			<	7.00E+00			<	7.00E+00		
FE-59	<	2.00E+01			<	2.00E+01			<	2.00E+01		
CO-60	<	9.00E+00			<	9.00E+00			<	8.00E+00		
ZN-65	<	2.00E+01			<	2.00E+01			<	2.00E+01		
ZR-95	<	8.00E+00			<	9.00E+00			<	8.00E+00		
RU-103	<	1.00E+01			<	9.00E+00			<	8.00E+00		
RU-106	<	8.00E+01			<	7.00E+01			<	7.00E+01		
CS-134	<	9.00E+00			<	9.00E+00			<	8.00E+00		
CS-137	<	1.00E+01			<	9.00E+00			<	8.00E+00		
BA-140	<	1.00E+01			<	1.00E+01			<	9.00E+00		
CE-141	<	1.00E+01			<	1.00E+01			<	1.00E+01		
CE-144	<	5.00E+01			<	5.00E+01			<	4.00E+01		
RA-226	<	2.00E+02			<	1.00E+02			<	1.00E+02		
TH-228	<	1.00E+01			<	1.00E+01			<	1.00E+01		

FERMI 2
DRINKING WATER ANALYSIS

DW-1 (Indicator)
(pCi/liter)

Nuclide	27-JAN				24-FEB				31-MAR			
GR-B		3.30E+00	+/-	1.10E+00		2.70E+00	+/-	1.10E+00		5.50E+00	+/-	1.10E+00
SR-89	<	2.00E+00			<	2.00E+00			<	2.00E+00		
SR-90	<	9.00E-01			<	9.00E-01			<	8.00E-01		
BE-7	<	3.00E+01			<	3.00E+01			<	3.00E+01		
K-40	<	5.00E+01			<	6.00E+01			<	5.00E+01		
CR-51	<	3.00E+01			<	3.00E+01			<	3.00E+01		
MN-54	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	3.00E+00		
FE-59	<	6.00E+00			<	7.00E+00			<	6.00E+00		
CO-60	<	3.00E+00			<	3.00E+00			<	3.00E+00		
ZN-65	<	7.00E+00			<	7.00E+00			<	6.00E+00		
ZR-95	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-103	<	3.00E+00			<	3.00E+00			<	4.00E+00		
RU-106	<	3.00E+01			<	3.00E+01			<	3.00E+01		
CS-134	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CS-137	<	4.00E+00			<	4.00E+00			<	3.00E+00		
BA-140	<	4.00E+00			<	5.00E+00			<	6.00E+00		
CE-141	<	5.00E+00			<	7.00E+00			<	6.00E+00		
CE-144	<	2.00E+01			<	3.00E+01			<	3.00E+01		
RA-226	<	7.00E+01			<	8.00E+01			<	7.00E+01		
TH-228	<	7.00E+00			<	7.00E+00			<	6.00E+00		

Nuclide	28-APR				27-MAY				25-JUN			
GR-B		2.70E+00	+/-	9.00E-01		(a)				3.60E+00	+/-	1.00E+00
SR-89	<	2.00E+00			<	1.00E+00			<	2.00E+00		
SR-90	<	7.00E-01			<	6.00E-01			<	7.00E-01		
BE-7	<	3.00E+01			<	2.00E+01			<	3.00E+01		
K-40	<	7.00E+01			<	4.00E+01			<	5.00E+01		
CR-51	<	3.00E+01			<	2.00E+01			<	3.00E+01		
MN-54	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	3.00E+00		
FE-59	<	6.00E+00			<	6.00E+00			<	7.00E+00		
CO-60	<	3.00E+00			<	3.00E+00			<	4.00E+00		
ZN-65	<	7.00E+00			<	6.00E+00			<	7.00E+00		
ZR-95	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-103	<	3.00E+00			<	3.00E+00			<	4.00E+00		
RU-106	<	3.00E+01			<	3.00E+01			<	3.00E+01		
CS-134	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CS-137	<	3.00E+00			<	3.00E+00			<	3.00E+00		
BA-140	<	3.00E+00			<	4.00E+00			<	5.00E+00		
CE-141	<	5.00E+00			<	4.00E+00			<	8.00E+00		
CE-144	<	2.00E+01			<	2.00E+01			<	3.00E+01		
RA-226	<	6.00E+01			<	6.00E+01			<	9.00E+01		
TH-228	<	5.00E+00			<	5.00E+00			<	7.00E+00		

(a) See Appendix D - Program Execution

FERMI 2
DRINKING WATER ANALYSIS

DW-1 (Indicator)
(pCi/liter)

Nuclide	28-JUL				25-AUG				23-SEP			
GR-B		3.00E+00	+/-	9.00E-01		3.10E+00	+/-	9.00E-01		1.90E+00	+/-	9.00E-01
SR-89	<	1.00E+00			<	1.00E+00			<	2.00E+00		
SR-90	<	7.00E-01			<	7.00E-01			<	1.00E+00		
BE-7	<	3.00E+01			<	3.00E+01			<	3.00E+01		
K-40	<	5.00E+01			<	5.00E+01			<	5.00E+01		
CR-51	<	3.00E+01			<	3.00E+01			<	3.00E+01		
MN-54	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	3.00E+00		
FE-59	<	6.00E+00			<	6.00E+00			<	6.00E+00		
CO-60	<	3.00E+00			<	3.00E+00			<	3.00E+00		
ZN-65	<	7.00E+00			<	7.00E+00			<	6.00E+00		
ZR-95	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-103	<	3.00E+00			<	4.00E+00			<	3.00E+00		
RU-106	<	3.00E+01			<	3.00E+01			<	2.00E+01		
CS-134	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CS-137	<	4.00E+00			<	3.00E+00			<	4.00E+00		
BA-140	<	4.00E+00			<	4.00E+00			<	4.00E+00		
CE-141	<	6.00E+00			<	7.00E+00			<	5.00E+00		
CE-144	<	2.00E+01			<	3.00E+01			<	2.00E+01		
RA-226	<	7.00E+01			<	8.00E+01			<	6.00E+01		
TH-228	<	6.00E+00			<	7.00E+00			<	5.00E+00		

Nuclide	30-SEP				27-OCT				24-NOV			
GR-B		2.10E+00	+/-	9.00E-01		2.60E+00	+/-	8.00E-01		2.20E+00	+/-	8.00E-01
SR-89	<	3.00E+00			<	2.00E+00			<	2.00E+00		
SR-90	<	2.00E+00			<	1.00E+00			<	1.00E+00		
BE-7	<	5.00E+01			<	2.00E+01			<	3.00E+01		
K-40	<	2.00E+02			<	5.00E+01			<	5.00E+01		
CR-51	<	5.00E+01			<	3.00E+01			<	3.00E+01		
MN-54	<	5.00E+00			<	2.00E+00			<	3.00E+00		
CO-58	<	5.00E+00			<	3.00E+00			<	3.00E+00		
FE-59	<	1.00E+01			<	5.00E+00			<	7.00E+00		
CO-60	<	5.00E+00			<	3.00E+00			<	3.00E+00		
ZN-65	<	1.00E+01			<	5.00E+00			<	6.00E+00		
ZR-95	<	5.00E+00			<	3.00E+00			<	3.00E+00		
RU-103	<	6.00E+00			<	3.00E+00			<	3.00E+00		
RU-106	<	5.00E+01			<	2.00E+01			<	3.00E+01		
CS-134	<	6.00E+00			<	3.00E+00			<	3.00E+00		
CS-137	<	6.00E+00			<	3.00E+00			<	4.00E+00		
BA-140	<	8.00E+00			<	3.00E+00			<	5.00E+00		
CE-141	<	9.00E+00			<	5.00E+00			<	7.00E+00		
CE-144	<	3.00E+01			<	2.00E+01			<	3.00E+01		
RA-226	<	1.00E+02			<	7.00E+01			<	7.00E+01		
TH-228	<	9.00E+00			<	6.00E+00			<	6.00E+00		

FERMI 2
DRINKING WATER ANALYSIS

DW-1 (Indicator)
(pCi/liter)

Nuclide	24-DEC			
GR-B		3.00E+00	+/-	1.00E+00
SR-89	<	2.00E+00		
SR-90	<	6.00E-01		
BE-7	<	2.00E+01		
K-40	<	4.00E+01		
CR-51	<	2.00E+01		
MN-54	<	2.00E+00		
CO-58	<	2.00E+00		
FE-59	<	4.00E+00		
CO-60	<	3.00E+00		
ZN-65	<	4.00E+00		
ZR-95	<	2.00E+00		
RU-103	<	3.00E+00		
RU-106	<	2.00E+01		
CS-134	<	2.00E+00		
CS-137	<	3.00E+00		
BA-140	<	3.00E+00		
CE-141	<	4.00E+00		
CE-144	<	2.00E+01		
RA-226	<	6.00E+01		
TH-228	<	5.00E+00		

FERMI 2
DRINKING WATER ANALYSIS

DW-2 (Control)
(pCi/liter)

Nuclide	27-JAN				24-FEB				31-MAR			
GR-B		2.20E+00	+/-	1.00E+00		2.40E+00	+/-	1.00E+00		4.80E+00	+/-	1.00E+00
SR-89	<	2.00E+00			<	4.00E+00			<	3.00E+00		
SR-90	<	1.00E+00			<	1.00E+00			<	1.00E+00		
BE-7	<	3.00E+01			<	3.00E+01			<	3.00E+01		
K-40	<	9.00E+01			<	7.00E+01			<	7.00E+01		
CR-51	<	3.00E+01			<	3.00E+01			<	3.00E+01		
MN-54	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	3.00E+00			<	3.00E+00		
FE-59	<	7.00E+00			<	6.00E+00			<	6.00E+00		
CO-60	<	4.00E+00			<	4.00E+00			<	3.00E+00		
ZN-65	<	8.00E+00			<	7.00E+00			<	6.00E+00		
ZR-95	<	4.00E+00			<	4.00E+00			<	3.00E+00		
RU-103	<	4.00E+00			<	4.00E+00			<	3.00E+00		
RU-106	<	3.00E+01			<	3.00E+01			<	3.00E+01		
CS-134	<	4.00E+00			<	4.00E+00			<	3.00E+00		
CS-137	<	4.00E+00			<	4.00E+00			<	3.00E+00		
BA-140	<	4.00E+00			<	5.00E+00			<	5.00E+00		
CE-141	<	5.00E+00			<	8.00E+00			<	5.00E+00		
CE-144	<	2.00E+01			<	3.00E+01			<	2.00E+01		
RA-226	<	6.00E+01			<	1.00E+02			<	6.00E+01		
TH-228	<	6.00E+00			<	8.00E+00			<	6.00E+00		

Nuclide	21-APR (a)				28-APR				27-MAY			
GR-B		2.40E+00	+/-	8.00E-01		2.60E+00	+/-	9.00E-01		(a)		
SR-89	<	2.00E+00			<	2.00E+00			<	1.00E+00		
SR-90	<	4.00E-01			<	7.00E-01			<	1.00E+00		
BE-7	<	3.00E+01			<	2.00E+01			<	3.00E+01		
K-40	<	5.00E+01			<	4.00E+01			<	6.00E+01		
CR-51	<	3.00E+01			<	2.00E+01			<	3.00E+01		
MN-54	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CO-58	<	3.00E+00			<	2.00E+00			<	3.00E+00		
FE-59	<	6.00E+00			<	5.00E+00			<	6.00E+00		
CO-60	<	3.00E+00			<	3.00E+00			<	3.00E+00		
ZN-65	<	6.00E+00			<	5.00E+00			<	6.00E+00		
ZR-95	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-103	<	3.00E+00			<	3.00E+00			<	3.00E+00		
RU-106	<	3.00E+01			<	2.00E+01			<	3.00E+01		
CS-134	<	3.00E+00			<	3.00E+00			<	3.00E+00		
CS-137	<	4.00E+00			<	3.00E+00			<	3.00E+00		
BA-140	<	4.00E+00			<	3.00E+00			<	3.00E+00		
CE-141	<	5.00E+00			<	4.00E+00			<	6.00E+00		
CE-144	<	2.00E+01			<	2.00E+01			<	3.00E+01		
RA-226	<	7.00E+01			<	5.00E+01			<	8.00E+01		
TH-228	<	6.00E+00			<	4.00E+00			<	7.00E+00		

(a) See Appendix D - Program Execution.

FERMI 2
DRINKING WATER ANALYSIS

DW-2 (Control)
(pCi/liter)

Nuclide	25-JUN		28-JUL		25-AUG	
GR-B	2.50E+00 +/-	8.00E-01	2.10E+00 +/-	8.00E-01	1.80E+00 +/-	8.00E-01
SR-89	< 2.00E+00		< 2.00E+00		< 2.00E+00	
SR-90	< 2.00E+00		< 8.00E-01		< 7.00E-01	
BE-7	< 3.00E+01		< 3.00E+01		< 3.00E+01	
K-40	< 5.00E+01		< 9.00E+01		< 5.00E+01	
CR-51	< 3.00E+01		< 3.00E+01		< 3.00E+01	
MN-54	< 3.00E+00		< 4.00E+00		< 3.00E+00	
CO-58	< 3.00E+00		< 4.00E+00		< 3.00E+00	
FE-59	< 6.00E+00		< 7.00E+00		< 6.00E+00	
CO-60	< 3.00E+00		< 4.00E+00		< 3.00E+00	
ZN-65	< 6.00E+00		< 8.00E+00		< 6.00E+00	
ZR-95	< 3.00E+00		< 4.00E+00		< 3.00E+00	
RU-103	< 3.00E+00		< 4.00E+00		< 3.00E+00	
RU-106	< 3.00E+01		< 3.00E+01		< 3.00E+01	
CS-134	< 3.00E+00		< 4.00E+00		< 3.00E+00	
CS-137	< 4.00E+00		< 4.00E+00		< 4.00E+00	
BA-140	< 4.00E+00		< 4.00E+00		< 4.00E+00	
CE-141	< 6.00E+00		< 6.00E+00		< 5.00E+00	
CE-144	< 2.00E+01		< 2.00E+01		< 2.00E+01	
RA-226	< 7.00E+01		< 7.00E+01		< 7.00E+01	
TH-228	< 6.00E+00		< 6.00E+00		< 6.00E+00	

Nuclide	23-SEP		27-OCT		24-NOV	
GR-B	< 1.00E+00		1.90E+00 +/-	8.00E-01	1.80E+00 +/-	8.00E-01
SR-89	< 2.00E+00		< 2.00E+00		< 2.00E+00	
SR-90	< 9.00E-01		< 1.00E+00		< 2.00E+00	
BE-7	< 4.00E+01		< 3.00E+01		< 3.00E+01	
K-40	< 1.00E+02		< 9.00E+01		< 7.00E+01	
CR-51	< 4.00E+01		< 3.00E+01		< 3.00E+01	
MN-54	< 4.00E+00		< 3.00E+00		< 3.00E+00	
CO-58	< 4.00E+00		< 3.00E+00		< 3.00E+00	
FE-59	< 1.00E+01		< 7.00E+00		< 7.00E+00	
CO-60	< 4.00E+00		< 3.00E+00		< 4.00E+00	
ZN-65	< 9.00E+00		< 7.00E+00		< 7.00E+00	
ZR-95	< 5.00E+00		< 4.00E+00		< 4.00E+00	
RU-103	< 5.00E+00		< 4.00E+00		< 4.00E+00	
RU-106	< 4.00E+01		< 3.00E+01		< 3.00E+01	
CS-134	< 5.00E+00		< 4.00E+00		< 4.00E+00	
CS-137	< 5.00E+00		< 4.00E+00		< 4.00E+00	
BA-140	< 7.00E+00		< 4.00E+00		< 5.00E+00	
CE-141	< 7.00E+00		< 5.00E+00		< 5.00E+00	
CE-144	< 3.00E+01		< 2.00E+01		< 2.00E+01	
RA-226	< 9.00E+01		< 7.00E+01		< 6.00E+01	
TH-228	< 8.00E+00		< 6.00E+00		< 5.00E+00	

FERMI 2
DRINKING WATER ANALYSIS

DW-2 (Control)
(pCi/liter)

Nuclide	24-DEC			
GR-B	<	1.00E+00		
SR-89	<	1.00E+00		
SR-90	<	2.00E+00		
BE-7	<	3.00E+01		
K-40	<	8.00E+01		
CR-51	<	2.00E+01		
MN-54	<	3.00E+00		
CO-58	<	3.00E+00		
FE-59	<	6.00E+00		
CO-60	<	3.00E+00		
ZN-65	<	6.00E+00		
ZR-95	<	3.00E+00		
RU-103	<	3.00E+00		
RU-106	<	3.00E+01		
CS-134	<	3.00E+00		
CS-137	<	3.00E+00		
BA-140	<	3.00E+00		
CE-141	<	4.00E+00		
CE-144	<	2.00E+01		
RA-226	<	6.00E+01		
TH-228	<	5.00E+00		

FERMI 2
SURFACE WATER ANALYSIS

SW-2 (Control)
(pCi/liter)

Nuclide	13-JAN (a)		27-JAN		3-FEB (a)	
SR-89	<	2.00E+00	<	2.00E+00	<	2.00E+00
SR-90	<	1.00E+00	<	9.00E-01	<	3.00E+00
BE-7	<	3.00E+01	<	3.00E+01	<	3.00E+01
K-40	<	9.00E+01	<	5.00E+01	<	9.00E+01
CR-51	<	3.00E+01	<	3.00E+01	<	3.00E+01
MN-54	<	3.00E+00	<	3.00E+00	<	3.00E+00
CO-58	<	3.00E+00	<	3.00E+00	<	3.00E+00
FE-59	<	8.00E+00	<	6.00E+00	<	7.00E+00
CO-60	<	4.00E+00	<	3.00E+00	<	3.00E+00
ZN-65	<	8.00E+00	<	6.00E+00	<	7.00E+00
ZR-95	<	4.00E+00	<	3.00E+00	<	3.00E+00
RU-103	<	4.00E+00	<	3.00E+00	<	3.00E+00
RU-106	<	3.00E+01	<	3.00E+01	<	3.00E+01
CS-134	<	4.00E+00	<	3.00E+00	<	4.00E+00
CS-137	<	4.00E+00	<	3.00E+00	<	4.00E+00
BA-140	<	4.00E+00	<	3.00E+00	<	4.00E+00
CE-141	<	6.00E+00	<	6.00E+00	<	5.00E+00
CE-144	<	2.00E+01	<	2.00E+01	<	2.00E+01
RA-226	<	7.00E+01	<	7.00E+01	<	7.00E+01
TH-228	<	6.00E+00	<	6.00E+00	<	6.00E+00

Nuclide	17-FEB (a)		24-FEB		31-MAR	
SR-89	<	2.00E+00	<	2.00E+00	<	2.00E+00
SR-90	<	8.00E-01	<	2.00E+00	<	8.00E-01
BE-7	<	2.00E+01	<	4.00E+01	<	3.00E+01
K-40	<	4.00E+01	<	1.00E+02	<	5.00E+01
CR-51	<	2.00E+01	<	4.00E+01	<	3.00E+01
MN-54	<	3.00E+00	<	4.00E+00	<	3.00E+00
CO-58	<	2.00E+00	<	4.00E+00	<	3.00E+00
FE-59	<	5.00E+00	<	9.00E+00	<	7.00E+00
CO-60	<	3.00E+00	<	4.00E+00	<	4.00E+00
ZN-65	<	6.00E+00	<	9.00E+00	<	7.00E+00
ZR-95	<	3.00E+00	<	4.00E+00	<	4.00E+00
RU-103	<	3.00E+00	<	5.00E+00	<	4.00E+00
RU-106	<	2.00E+01	<	4.00E+01	<	3.00E+01
CS-134	<	3.00E+00	<	5.00E+00	<	4.00E+00
CS-137	<	3.00E+00	<	5.00E+00	<	4.00E+00
BA-140	<	3.00E+00	<	5.00E+00	<	6.00E+00
CE-141	<	4.00E+00	<	7.00E+00	<	6.00E+00
CE-144	<	2.00E+01	<	3.00E+01	<	2.00E+01
RA-226	<	5.00E+01	<	8.00E+01	<	7.00E+01
TH-228	<	4.00E+00	<	7.00E+00	<	6.00E+00

(a) See Appendix D - Program Execution.

FERMI 2
SURFACE WATER ANALYSIS

SW-2 (Control)
(pCi/liter)

Nuclide	28-APR	27-MAY	25-JUN
SR-89	< 2.00E+00	< 2.00E+00	< 2.00E+00
SR-90	< 8.00E-01	< 1.00E+00	< 8.00E-01
BE-7	< 3.00E+01	< 3.00E+01	< 3.00E+01
K-40	< 9.00E+01	< 6.00E+01	< 5.00E+01
CR-51	< 3.00E+01	< 3.00E+01	< 3.00E+01
MN-54	< 3.00E+00	< 3.00E+00	< 3.00E+00
CO-58	< 3.00E+00	< 3.00E+00	< 3.00E+00
FE-59	< 7.00E+00	< 7.00E+00	< 6.00E+00
CO-60	< 4.00E+00	< 3.00E+00	< 3.00E+00
ZN-65	< 8.00E+00	< 8.00E+00	< 5.00E+00
ZR-95	< 4.00E+00	< 4.00E+00	< 3.00E+00
RU-103	< 4.00E+00	< 4.00E+00	< 3.00E+00
RU-106	< 3.00E+01	< 3.00E+01	< 2.00E+01
CS-134	< 4.00E+00	< 4.00E+00	< 3.00E+00
CS-137	< 4.00E+00	< 4.00E+00	< 4.00E+00
BA-140	< 4.00E+00	< 4.00E+00	< 4.00E+00
CE-141	< 5.00E+00	< 7.00E+00	< 5.00E+00
CE-144	< 2.00E+01	< 3.00E+01	< 2.00E+01
RA-226	< 7.00E+01	< 9.00E+01	< 6.00E+01
TH-228	< 6.00E+00	< 8.00E+00	< 5.00E+00

Nuclide	28-JUL	25-AUG	23-SEP
SR-89	< 1.00E+00	< 1.00E+00	< 2.00E+00
SR-90	< 4.00E-01	< 7.00E-01	< 1.00E+00
BE-7	< 3.00E+01	< 2.00E+01	< 3.00E+01
K-40	< 5.00E+01	< 4.00E+01	< 1.00E+02
CR-51	< 3.00E+01	< 2.00E+01	< 3.00E+01
MN-54	< 3.00E+00	< 2.00E+00	< 4.00E+00
CO-58	< 3.00E+00	< 2.00E+00	< 4.00E+00
FE-59	< 6.00E+00	< 5.00E+00	< 8.00E+00
CO-60	< 4.00E+00	< 3.00E+00	< 4.00E+00
ZN-65	< 7.00E+00	< 5.00E+00	< 8.00E+00
ZR-95	< 3.00E+00	< 3.00E+00	< 4.00E+00
RU-103	< 4.00E+00	< 3.00E+00	< 4.00E+00
RU-106	< 3.00E+01	< 2.00E+01	< 3.00E+01
CS-134	< 3.00E+00	< 2.00E+00	< 4.00E+00
CS-137	< 4.00E+00	< 3.00E+00	< 4.00E+00
BA-140	< 4.00E+00	< 3.00E+00	< 5.00E+00
CE-141	< 6.00E+00	< 4.00E+00	< 6.00E+00
CE-144	< 3.00E+01	< 2.00E+01	< 2.00E+01
RA-226	< 8.00E+01	< 5.00E+01	< 7.00E+01
TH-228	< 7.00E+00	< 4.00E+00	< 6.00E+00

FERMI 2
SURFACE WATER ANALYSIS

SW-2 (Control)
(pCi/liter)

Nuclide	27-OCT	24-NOV	24-DEC
SR-89	< 3.00E+00	< 2.00E+00	< 2.00E+00
SR-90	< 1.00E+00	< 6.00E-01	< 7.00E-01
BE-7	< 3.00E+01	< 3.00E+01	< 2.00E+01
K-40	< 6.00E+01	< 1.00E+02	< 3.00E+01
CR-51	< 2.00E+01	< 3.00E+01	< 2.00E+01
MN-54	< 3.00E+00	< 3.00E+00	< 2.00E+00
CO-58	< 3.00E+00	< 4.00E+00	< 2.00E+00
FE-59	< 6.00E+00	< 7.00E+00	< 4.00E+00
CO-60	< 3.00E+00	< 3.00E+00	< 2.00E+00
ZN-65	< 6.00E+00	< 8.00E+00	< 4.00E+00
ZR-95	< 3.00E+00	< 4.00E+00	< 2.00E+00
RU-103	< 3.00E+00	< 4.00E+00	< 2.00E+00
RU-106	< 3.00E+01	< 3.00E+01	< 2.00E+01
CS-134	< 3.00E+00	< 4.00E+00	< 2.00E+00
CS-137	< 3.00E+00	< 4.00E+00	< 2.00E+00
BA-140	< 4.00E+00	< 5.00E+00	< 2.00E+00
CE-141	< 5.00E+00	< 6.00E+00	< 3.00E+00
CE-144	< 2.00E+01	< 2.00E+01	< 1.00E+01
RA-226	< 6.00E+01	< 7.00E+01	< 4.00E+01
TH-228	< 5.00E+00	< 6.00E+00	< 4.00E+00

FERMI 2
SURFACE WATER ANALYSIS

SW-3 (Indicator)
(pCi/liter)

Nuclide	27-JAN	24-FEB	31-MAR
SR-89	< 2.00E+00	< 2.00E+00	< 2.00E+00
SR-90	< 8.00E-01	< 1.00E+00	< 8.00E-01
BE-7	< 3.00E+01	< 3.00E+01	< 4.00E+01
K-40	< 7.00E+01	< 7.00E+01	< 7.00E+01
CR-51	< 2.00E+01	< 2.00E+01	< 4.00E+01
MN-54	< 3.00E+00	< 3.00E+00	< 5.00E+00
CO-58	< 3.00E+00	< 3.00E+00	< 4.00E+00
FE-59	< 6.00E+00	< 6.00E+00	< 9.00E+00
CO-60	< 3.00E+00	< 3.00E+00	< 4.00E+00
ZN-65	< 6.00E+00	< 6.00E+00	< 9.00E+00
ZR-95	< 3.00E+00	< 3.00E+00	< 4.00E+00
RU-103	< 3.00E+00	< 3.00E+00	< 5.00E+00
RU-106	< 3.00E+01	< 3.00E+01	< 4.00E+01
CS-134	< 3.00E+00	< 3.00E+00	< 5.00E+00
CS-137	< 3.00E+00	< 3.00E+00	< 5.00E+00
BA-140	< 3.00E+00	< 3.00E+00	< 7.00E+00
CE-141	< 4.00E+00	< 5.00E+00	< 1.00E+01
CE-144	< 2.00E+01	< 2.00E+01	< 4.00E+01
RA-226	< 6.00E+01	< 6.00E+01	< 1.00E+02
TH-228	< 5.00E+00	< 6.00E+00	< 1.00E+01

Nuclide	7-APR (a)	28-APR	27-MAY
SR-89	< 2.00E+00	< 3.00E+00	< 2.00E+00
SR-90	< 7.00E-01	< 1.00E+00	< 1.00E+00
BE-7	< 4.00E+01	< 3.00E+01	< 3.00E+01
K-40	< 1.00E+02	< 5.00E+01	< 8.00E+01
CR-51	< 4.00E+01	< 3.00E+01	< 3.00E+01
MN-54	< 4.00E+00	< 3.00E+00	< 3.00E+00
CO-58	< 4.00E+00	< 3.00E+00	< 3.00E+00
FE-59	< 9.00E+00	< 7.00E+00	< 7.00E+00
CO-60	< 5.00E+00	< 4.00E+00	< 3.00E+00
ZN-65	< 1.00E+01	< 7.00E+00	< 7.00E+00
ZR-95	< 4.00E+00	< 3.00E+00	< 3.00E+00
RU-103	< 5.00E+00	< 4.00E+00	< 4.00E+00
RU-106	< 4.00E+01	< 3.00E+01	< 3.00E+01
CS-134	< 5.00E+00	< 4.00E+00	< 4.00E+00
CS-137	< 5.00E+00	< 4.00E+00	< 4.00E+00
BA-140	< 5.00E+00	< 5.00E+00	< 3.00E+00
CE-141	< 7.00E+00	< 6.00E+00	< 6.00E+00
CE-144	< 3.00E+01	< 2.00E+01	< 2.00E+01
RA-226	< 9.00E+01	< 7.00E+01	< 7.00E+01
TH-228	< 8.00E+00	< 7.00E+00	< 6.00E+00

(a) See Appendix D - Program Execution.

FERMI 2
SURFACE WATER ANALYSIS

SW-3 (Indicator)
(pCi/liter)

Nuclide	2-JUN (a)		9-JUN (a)		25-JUN	
SR-89	<	2.00E+00	<	2.00E+00	<	2.00E+00
SR-90	<	6.00E-01	<	1.00E+00	<	8.00E-01
BE-7	<	3.00E+01	<	3.00E+01	<	4.00E+01
K-40	<	5.00E+01	<	5.00E+01	<	1.00E+02
CR-51	<	3.00E+01	<	3.00E+01	<	4.00E+01
MN-54	<	3.00E+00	<	3.00E+00	<	4.00E+00
CO-58	<	3.00E+00	<	3.00E+00	<	4.00E+00
FE-59	<	7.00E+00	<	6.00E+00	<	9.00E+00
CO-60	<	4.00E+00	<	3.00E+00	<	5.00E+00
ZN-65	<	7.00E+00	<	7.00E+00	<	1.00E+01
ZR-95	<	3.00E+00	<	3.00E+00	<	5.00E+00
RU-103	<	4.00E+00	<	3.00E+00	<	5.00E+00
RU-106	<	3.00E+01	<	3.00E+01	<	4.00E+01
CS-134	<	4.00E+00	<	3.00E+00	<	5.00E+00
CS-137	<	4.00E+00	<	4.00E+00	<	5.00E+00
BA-140	<	4.00E+00	<	4.00E+00	<	6.00E+00
CE-141	<	6.00E+00	<	6.00E+00	<	8.00E+00
CE-144	<	2.00E+01	<	3.00E+01	<	3.00E+01
RA-226	<	7.00E+01	<	8.00E+01	<	9.00E+01
TH-228	<	6.00E+00	<	6.00E+00	<	8.00E+00

Nuclide	28-JUL		25-AUG		23-SEP	
SR-89	<	1.00E+00	<	1.00E+00	<	2.00E+00
SR-90	<	8.00E-01	<	7.00E-01	<	1.00E+00
BE-7	<	3.00E+01	<	3.00E+01	<	3.00E+01
K-40	<	5.00E+01	<	5.00E+01	<	5.00E+01
CR-51	<	3.00E+01	<	2.00E+01	<	3.00E+01
MN-54	<	3.00E+00	<	2.00E+00	<	3.00E+00
CO-58	<	3.00E+00	<	3.00E+00	<	3.00E+00
FE-59	<	7.00E+00	<	5.00E+00	<	7.00E+00
CO-60	<	3.00E+00	<	3.00E+00	<	3.00E+00
ZN-65	<	6.00E+00	<	5.00E+00	<	6.00E+00
ZR-95	<	3.00E+00	<	3.00E+00	<	3.00E+00
RU-103	<	4.00E+00	<	3.00E+00	<	4.00E+00
RU-106	<	3.00E+01	<	3.00E+01	<	3.00E+01
CS-134	<	4.00E+00	<	3.00E+00	<	3.00E+00
CS-137	<	3.00E+00	<	3.00E+00	<	4.00E+00
BA-140	<	5.00E+00	<	3.00E+00	<	5.00E+00
CE-141	<	7.00E+00	<	5.00E+00	<	6.00E+00
CE-144	<	3.00E+01	<	2.00E+01	<	2.00E+01
RA-226	<	8.00E+01	<	7.00E+01	<	7.00E+01
TH-228	<	7.00E+00	<	6.00E+00	<	6.00E+00

(a) See Appendix D - Program Execution.

FERMI 2
SURFACE WATER ANALYSIS

SW-3 (Indicator)
(pCi/liter)

Nuclide	27-OCT	24-NOV	17-DEC
SR-89	< 2.00E+00	< 1.00E+00	< 2.00E+00
SR-90	< 1.00E+00	< 8.00E-01	< 6.00E-01
BE-7	< 2.00E+01	< 3.00E+01	< 3.00E+01
K-40	< 4.00E+01	< 5.00E+01	< 6.00E+01
CR-51	< 2.00E+01	< 3.00E+01	< 3.00E+01
MN-54	< 3.00E+00	< 3.00E+00	< 3.00E+00
CO-58	< 2.00E+00	< 3.00E+00	< 3.00E+00
FE-59	< 5.00E+00	< 7.00E+00	< 7.00E+00
CO-60	< 2.00E+00	< 3.00E+00	< 4.00E+00
ZN-65	< 6.00E+00	< 6.00E+00	< 7.00E+00
ZR-95	< 3.00E+00	< 3.00E+00	< 3.00E+00
RU-103	< 3.00E+00	< 4.00E+00	< 4.00E+00
RU-106	< 2.00E+01	< 3.00E+01	< 3.00E+01
CS-134	< 3.00E+00	< 4.00E+00	< 4.00E+00
CS-137	< 4.00E+00	< 4.00E+00	< 4.00E+00
BA-140	< 3.00E+00	< 7.00E+00	< 4.00E+00
CE-141	< 5.00E+00	< 8.00E+00	< 6.00E+00
CE-144	< 2.00E+01	< 3.00E+01	< 2.00E+01
RA-226	< 6.00E+01	< 9.00E+01	< 7.00E+01
TH-228	< 5.00E+00	< 7.00E+00	< 6.00E+00

Nuclide	24-DEC
SR-89	< 2.00E+00
SR-90	< 8.00E-01
BE-7	< 2.00E+01
K-40	< 4.00E+01
CR-51	< 2.00E+01
MN-54	< 2.00E+00
CO-58	< 2.00E+00
FE-59	< 4.00E+00
CO-60	< 2.00E+00
ZN-65	< 4.00E+00
ZR-95	< 2.00E+00
RU-103	< 2.00E+00
RU-106	< 2.00E+01
CS-134	< 2.00E+00
CS-137	< 2.00E+00
BA-140	< 3.00E+00
CE-141	< 5.00E+00
CE-144	< 2.00E+01
RA-226	< 6.00E+01
TH-228	< 5.00E+00

FERMI 2
DRINKING AND SURFACE WATER QUARTERLY COMPOSITE SAMPLES

Tritium
(pCi/liter)

Station	First Quarter				Second Quarter			
DW-1		3.10E+02	+/-	1.40E+02	<	2.00E+02		
DW-2	<	2.00E+02			<	2.00E+02	(a)	
SW-2	<	2.00E+02	(a)		<	2.00E+02		
SW-3	<	2.00E+02			<	2.00E+02	(a)	

Station	Third Quarter				Fourth Quarter			
DW-1	<	3.00E+02				3.40E+02	+/-	1.50E+02
DW-2		2.60E+02	+/-	1.70E+02	<	2.00E+02		
SW-2	<	3.00E+02				2.20E+02	+/-	1.50E+02
SW-3	<	3.00E+02			(a)	3.50E+02	+/-	1.50E+02

(a) See Appendix D - Program Execution.

FERMI 2
GROUNDWATER ANALYSIS

GW-1 (Indicator)
(pCi/liter)

Nuclide	First Quarter			Second Quarter		
BE-7	<	3.00E+01		<	3.00E+01	
K-40	<	5.00E+01		<	6.00E+01	
CR-51	<	3.00E+01		<	3.00E+01	
MN-54	<	3.00E+00		<	3.00E+00	
CO-58	<	3.00E+00		<	3.00E+00	
FE-59	<	6.00E+00		<	6.00E+00	
CO-60	<	3.00E+00		<	4.00E+00	
ZN-65	<	6.00E+00		<	6.00E+00	
ZR-95	<	3.00E+00		<	3.00E+00	
RU-103	<	4.00E+00		<	4.00E+00	
RU-106	<	3.00E+01		<	3.00E+01	
CS-134	<	3.00E+00		<	3.00E+00	
CS-137	<	4.00E+00		<	4.00E+00	
BA-140	<	6.00E+00		<	5.00E+00	
CE-141	<	7.00E+00		<	7.00E+00	
CE-144	<	3.00E+01		<	3.00E+01	
RA-226	<	7.00E+01		<	9.00E+01	
TH-228	<	7.00E+00		<	7.00E+00	
H-3	<	3.00E+02		<	2.00E+02	

Nuclide	Third Quarter			Fourth Quarter		
BE-7	<	3.00E+01		<	3.00E+01	
K-40	<	5.00E+01		<	5.00E+01	
CR-51	<	3.00E+01		<	3.00E+01	
MN-54	<	3.00E+00		<	3.00E+00	
CO-58	<	3.00E+00		<	3.00E+00	
FE-59	<	7.00E+00		<	7.00E+00	
CO-60	<	3.00E+00		<	3.00E+00	
ZN-65	<	6.00E+00		<	7.00E+00	
ZR-95	<	3.00E+00		<	3.00E+00	
RU-103	<	4.00E+00		<	4.00E+00	
RU-106	<	3.00E+01		<	3.00E+01	
CS-134	<	3.00E+00		<	3.00E+00	
CS-137	<	3.00E+00		<	3.00E+00	
BA-140	<	7.00E+00		<	4.00E+00	
CE-141	<	8.00E+00		<	7.00E+00	
CE-144	<	3.00E+01		<	3.00E+01	
RA-226	<	8.00E+01		<	8.00E+01	
TH-228	<	7.00E+00		<	7.00E+00	
H-3	<	2.00E+02		<	3.00E+02	

FERMI 2
GROUNDWATER ANALYSIS

GW-2 (Indicator)
(pCi/liter)

Nuclide	First Quarter		Second Quarter	
BE-7	<	4.00E+01	<	3.00E+01
K-40	<	1.00E+02	<	5.00E+01
CR-51	<	4.00E+01	<	3.00E+01
MN-54	<	4.00E+00	<	3.00E+00
CO-58	<	4.00E+00	<	3.00E+00
FE-59	<	9.00E+00	<	7.00E+00
CO-60	<	4.00E+00	<	4.00E+00
ZN-65	<	9.00E+00	<	8.00E+00
ZR-95	<	4.00E+00	<	4.00E+00
RU-103	<	5.00E+00	<	4.00E+00
RU-106	<	4.00E+01	<	3.00E+01
CS-134	<	4.00E+00	<	3.00E+00
CS-137	<	4.00E+00	<	4.00E+00
BA-140	<	6.00E+00	<	5.00E+00
CE-141	<	6.00E+00	<	6.00E+00
CE-144	<	2.00E+01	<	2.00E+01
RA-226	<	7.00E+01	<	7.00E+01
TH-228	<	7.00E+00	<	7.00E+00
H-3	<	2.00E+02	<	2.00E+02

Nuclide	Third Quarter		Fourth Quarter	
BE-7	<	3.00E+01	<	3.00E+01
K-40	<	5.00E+01	<	5.00E+01
CR-51	<	3.00E+01	<	2.00E+01
MN-54	<	3.00E+00	<	3.00E+00
CO-58	<	3.00E+00	<	2.00E+00
FE-59	<	6.00E+00	<	5.00E+00
CO-60	<	3.00E+00	<	3.00E+00
ZN-65	<	6.00E+00	<	5.00E+00
ZR-95	<	3.00E+00	<	3.00E+00
RU-103	<	4.00E+00	<	3.00E+00
RU-106	<	3.00E+01	<	3.00E+01
CS-134	<	3.00E+00	<	3.00E+00
CS-137	<	4.00E+00	<	3.00E+00
BA-140	<	5.00E+00	<	4.00E+00
CE-141	<	6.00E+00	<	6.00E+00
CE-144	<	2.00E+01	<	2.00E+01
RA-226	<	7.00E+01	<	7.00E+01
TH-228	<	6.00E+00	<	6.00E+00
H-3	<	2.00E+02	<	3.00E+02

FERMI 2
GROUNDWATER ANALYSIS

GW-3 (Indicator)
(pCi/liter)

Nuclide	First Quarter		Second Quarter	
BE-7	<	2.00E+01	<	3.00E+01
K-40	<	4.00E+01	<	6.00E+01
CR-51	<	2.00E+01	<	2.00E+01
MN-54	<	2.00E+00	<	3.00E+00
CO-58	<	2.00E+00	<	3.00E+00
FE-59	<	6.00E+00	<	5.00E+00
CO-60	<	3.00E+00	<	3.00E+00
ZN-65	<	5.00E+00	<	7.00E+00
ZR-95	<	3.00E+00	<	3.00E+00
RU-103	<	3.00E+00	<	3.00E+00
RU-106	<	2.00E+01	<	3.00E+01
CS-134	<	3.00E+00	<	3.00E+00
CS-137	<	3.00E+00	<	3.00E+00
BA-140	<	4.00E+00	<	4.00E+00
CE-141	<	4.00E+00	<	5.00E+00
CE-144	<	2.00E+01	<	2.00E+01
RA-226	<	5.00E+01	<	6.00E+01
TH-228	<	5.00E+00	<	5.00E+00
H-3	<	3.00E+02	<	2.00E+02

Nuclide	Third Quarter		Fourth Quarter	
BE-7	<	2.00E+01	<	3.00E+01
K-40	<	3.00E+01	<	8.00E+01
CR-51	<	2.00E+01	<	3.00E+01
MN-54	<	2.00E+00	<	3.00E+00
CO-58	<	2.00E+00	<	3.00E+00
FE-59	<	5.00E+00	<	6.00E+00
CO-60	<	2.00E+00	<	3.00E+00
ZN-65	<	5.00E+00	<	6.00E+00
ZR-95	<	2.00E+00	<	3.00E+00
RU-103	<	3.00E+00	<	3.00E+00
RU-106	<	2.00E+01	<	3.00E+01
CS-134	<	2.00E+00	<	3.00E+00
CS-137	<	2.00E+00	<	3.00E+00
BA-140	<	4.00E+00	<	4.00E+00
CE-141	<	4.00E+00	<	5.00E+00
CE-144	<	1.00E+01	<	2.00E+01
RA-226	<	4.00E+01	<	6.00E+01
TH-228	<	4.00E+00	<	5.00E+00
H-3	<	2.00E+02	<	3.00E+02

FERMI 2
GROUNDWATER ANALYSIS

GW-4 (Control)
(pCi/liter)

Nuclide	First Quarter	Second Quarter
BE-7	< 3.00E+01	< 2.00E+01
K-40	< 5.00E+01	< 5.00E+01
CR-51	< 3.00E+01	< 2.00E+01
MN-54	< 3.00E+00	< 3.00E+00
CO-58	< 3.00E+00	< 3.00E+00
FE-59	< 6.00E+00	< 5.00E+00
CO-60	< 3.00E+00	< 3.00E+00
ZN-65	< 6.00E+00	< 5.00E+00
ZR-95	< 3.00E+00	< 3.00E+00
RU-103	< 3.00E+00	< 3.00E+00
RU-106	< 3.00E+01	< 3.00E+01
CS-134	< 3.00E+00	< 3.00E+00
CS-137	< 3.00E+00	< 4.00E+00
BA-140	< 4.00E+00	< 4.00E+00
CE-141	< 6.00E+00	< 5.00E+00
CE-144	< 2.00E+01	< 2.00E+01
RA-226	< 7.00E+01	< 7.00E+01
TH-228	< 6.00E+00	< 6.00E+00
H-3	< 2.00E+02	< 2.00E+02

Nuclide	Third Quarter	Fourth Quarter
BE-7	< 2.00E+01	< 3.00E+01
K-40	< 5.00E+01	< 6.00E+01
CR-51	< 2.00E+01	< 3.00E+01
MN-54	< 2.00E+00	< 4.00E+00
CO-58	< 2.00E+00	< 4.00E+00
FE-59	< 5.00E+00	< 8.00E+00
CO-60	< 2.00E+00	< 4.00E+00
ZN-65	< 5.00E+00	< 1.00E+01
ZR-95	< 3.00E+00	< 4.00E+00
RU-103	< 3.00E+00	< 4.00E+00
RU-106	< 2.00E+01	< 3.00E+01
CS-134	< 2.00E+00	< 4.00E+00
CS-137	< 3.00E+00	< 4.00E+00
BA-140	< 4.00E+00	< 5.00E+00
CE-141	< 5.00E+00	< 6.00E+00
CE-144	< 2.00E+01	< 3.00E+01
RA-226	< 6.00E+01	< 8.00E+01
TH-228	< 5.00E+00	< 7.00E+00
H-3	< 2.00E+02	< 3.00E+02

FERMI 2
SEDIMENT ANALYSIS

S-1 (Indicator)
(pCi/kg dry)

Nuclide	13-MAY				15-SEP			
SR-89	<	5.00E-01			<	1.00E+03		
SR-90	<	2.00E-01			<	4.00E+02		
BE-7	<	3.00E+02			<	2.00E+02		
K-40		1.21E+04	+/-	1.20E+03		1.26E+04	+/-	1.30E+03
MN-54	<	2.00E+01			<	2.00E+01		
CO-58	<	3.00E+01			<	2.00E+01		
FE-59	<	8.00E+01			<	6.00E+01		
CO-60	<	3.00E+01			<	2.00E+01		
ZN-65	<	6.00E+01			<	6.00E+01		
ZR-95	<	3.00E+01			<	3.00E+01		
RU-103	<	3.00E+01			<	3.00E+01		
RU-106	<	2.00E+02			<	2.00E+02		
CS-134	<	3.00E+01			<	2.00E+01		
CS-137	<	2.00E+01			<	2.00E+01		
BA-140	<	9.00E+01			<	5.00E+01		
CE-141	<	6.00E+01			<	4.00E+01		
CE-144	<	1.00E+02			<	1.00E+02		
RA-226		9.81E+02	+/-	3.85E+02	<	3.00E+02		
TH-228		3.52E+02	+/-	4.00E+01		2.07E+02	+/-	2.40E+01

S-2 (Indicator)
(pCi/kg dry)

Nuclide	15-MAY				15-SEP			
SR-89	<	9.00E-01			<	8.00E+02		
SR-90	<	4.00E-01				3.80E+02	+/-	1.90E+02
BE-7	<	4.00E+02			<	3.00E+02		
K-40		1.96E+04	+/-	2.00E+03		1.79E+04	+/-	1.80E+03
MN-54	<	3.00E+01			<	3.00E+01		
CO-58	<	4.00E+01			<	3.00E+01		
FE-59	<	1.00E+02			<	1.00E+02		
CO-60	<	3.00E+01			<	3.00E+01		
ZN-65	<	8.00E+01			<	8.00E+01		
ZR-95	<	4.00E+01			<	4.00E+01		
RU-103	<	5.00E+01			<	4.00E+01		
RU-106	<	3.00E+02			<	3.00E+02		
CS-134	<	4.00E+01			<	4.00E+01		
CS-137	<	3.00E+01			<	3.00E+01		
BA-140	<	1.00E+02			<	1.00E+02		
CE-141	<	7.00E+01			<	6.00E+01		
CE-144	<	2.00E+02			<	2.00E+02		
RA-226		1.77E+03	+/-	4.20E+02		1.50E+03	+/-	4.60E+02
TH-228		1.20E+03	+/-	1.20E+02		9.16E+02	+/-	9.20E+01

FERMI 2
SEDIMENT ANALYSIS

S-3 (Indicator)
(pCi/kg dry)

Nuclide	15-MAY				15-SEP			
SR-89	<	9.00E-01			<	7.00E+02		
SR-90	<	2.00E-01				3.00E+02	+/-	1.60E+02
BE-7	<	4.00E+02			<	2.00E+02		
K-40		1.92E+04	+/-	1.90E+03		9.15E+03	+/-	9.10E+02
MN-54	<	3.00E+01			<	2.00E+01		
CO-58	<	4.00E+01			<	2.00E+01		
FE-59	<	1.00E+02			<	7.00E+01		
CO-60	<	3.00E+01			<	2.00E+01		
ZN-65	<	8.00E+01			<	6.00E+01		
ZR-95	<	5.00E+01			<	3.00E+01		
RU-103	<	5.00E+01			<	3.00E+01		
RU-106	<	3.00E+02			<	2.00E+02		
CS-134	<	4.00E+01			<	2.00E+01		
CS-137	<	4.00E+01			<	3.00E+01		
BA-140	<	1.00E+02			<	7.00E+01		
CE-141	<	9.00E+01			<	5.00E+01		
CE-144	<	2.00E+02			<	1.00E+02		
RA-226		1.95E+03	+/-	4.90E+02	<	4.00E+02		
TH-228		9.33E+02	+/-	9.30E+01		2.24E+02	+/-	3.40E+01

S-4 (Indicator)
(pCi/kg dry)

Nuclide	27-MAY				23-SEP			
SR-89	<	1.00E+00			<	7.00E+02		
SR-90	<	4.00E-01			<	3.00E+02		
BE-7	<	2.00E+02			<	2.00E+02		
K-40		1.07E+04	+/-	1.10E+03	<	1.00E+03		
MN-54	<	2.00E+01			<	2.00E+01		
CO-58	<	2.00E+01			<	2.00E+01		
FE-59	<	5.00E+01			<	5.00E+01		
CO-60	<	2.00E+01			<	2.00E+01		
ZN-65	<	5.00E+01			<	4.00E+01		
ZR-95	<	2.00E+01			<	2.00E+01		
RU-103	<	2.00E+01			<	2.00E+01		
RU-106	<	2.00E+02			<	1.00E+02		
CS-134	<	2.00E+01			<	2.00E+01		
CS-137	<	2.00E+01			<	2.00E+01		
BA-140	<	3.00E+01			<	4.00E+01		
CE-141	<	3.00E+01			<	3.00E+01		
CE-144	<	1.00E+02			<	1.00E+02		
RA-226		5.43E+02	+/-	2.59E+02		5.32E+02	+/-	2.63E+02
TH-228		1.63E+02	+/-	2.00E+01		1.48E+02	+/-	1.90E+01

FERMI 2
SEDIMENT ANALYSIS

S-5 (Control)
(pCi/kg dry)

Nuclide	7-MAY				9-SEP			
SR-89	<	1.00E+00			<	1.00E+03		
SR-90	<	3.00E-01			<	5.00E+02		
BE-7	<	3.00E+02				8.89E+02	+/-	3.12E+02
K-40		1.24E+04	+/-	1.20E+03		1.11E+04	+/-	1.10E+03
MN-54	<	3.00E+01			<	4.00E+01		
CO-58	<	3.00E+01			<	4.00E+01		
FE-59	<	8.00E+01			<	1.00E+02		
CO-60	<	3.00E+01			<	3.00E+01		
ZN-65	<	6.00E+01			<	9.00E+01		
ZR-95	<	4.00E+01			<	5.00E+01		
RU-103	<	4.00E+01			<	5.00E+01		
RU-106	<	2.00E+02			<	3.00E+02		
CS-134	<	3.00E+01			<	4.00E+01		
CS-137		1.21E+02	+/-	2.60E+01		9.25E+01	+/-	2.96E+01
BA-140	<	1.00E+02			<	2.00E+02		
CE-141	<	8.00E+01			<	8.00E+01		
CE-144	<	2.00E+02			<	2.00E+02		
RA-226		8.53E+02	+/-	3.62E+02		1.08E+03	+/-	4.60E+02
TH-228		4.29E+02	+/-	4.30E+01		5.27E+02	+/-	5.40E+01

FERMI 2
FISH ANALYSIS

F-1 (Control)
(pCi/kg wet)

Nuclide	5-MAY Crappie				5-MAY Walleye				21-MAY Rock Bass			
SR-89	<	2.00E+01			<	2.00E+01			<	3.00E+01		
SR-90	<	4.00E+00			<	5.00E+00			<	3.00E+01		
BE-7	<	2.00E+02			<	2.00E+02			<	3.00E+02		
K-40		2.30E+03	+/-	2.30E+02		2.39E+03	+/-	2.40E+02		2.54E+03	+/-	2.60E+02
MN-54	<	2.00E+01			<	1.00E+01			<	2.00E+01		
CO-58	<	2.00E+01			<	2.00E+01			<	3.00E+01		
FE-59	<	5.00E+01			<	4.00E+01			<	7.00E+01		
CO-60	<	1.00E+01			<	1.00E+01			<	2.00E+01		
ZN-65	<	3.00E+01			<	3.00E+01			<	5.00E+01		
ZR-95	<	2.00E+01			<	2.00E+01			<	3.00E+01		
RU-103	<	3.00E+01			<	3.00E+01			<	3.00E+01		
RU-106	<	1.00E+02			<	1.00E+02			<	2.00E+02		
CS-134	<	2.00E+01			<	1.00E+01			<	2.00E+01		
CS-137	<	2.00E+01			<	2.00E+01			<	3.00E+01		
BA-140	<	7.00E+01			<	1.00E+02			<	8.00E+01		
CE-141	<	4.00E+01			<	4.00E+01			<	4.00E+01		
CE-144	<	9.00E+01			<	8.00E+01			<	1.00E+02		
RA-226	<	3.00E+02			<	2.00E+02			<	4.00E+02		
TH-228	<	2.00E+01			<	2.00E+01			<	4.00E+01		

Nuclide	21-MAY Sucker				9-SEP Carp				9-SEP Rock Bass			
SR-89	<	2.00E+01			<	4.00E+01			<	6.00E+01		
SR-90	<	6.00E+00			<	9.00E+00			<	1.00E+01		
BE-7	<	2.00E+02			<	1.00E+02			<	3.00E+02		
K-40		3.38E+03	+/-	3.40E+02		2.36E+03	+/-	2.40E+02		2.24E+03	+/-	2.90E+02
MN-54	<	2.00E+01			<	1.00E+01			<	3.00E+01		
CO-58	<	2.00E+01			<	1.00E+01			<	3.00E+01		
FE-59	<	5.00E+01			<	3.00E+01			<	8.00E+01		
CO-60	<	2.00E+01			<	1.00E+01			<	3.00E+01		
ZN-65	<	5.00E+01			<	3.00E+01			<	6.00E+01		
ZR-95	<	2.00E+01			<	1.00E+01			<	3.00E+01		
RU-103	<	3.00E+01			<	2.00E+01			<	4.00E+01		
RU-106	<	2.00E+02			<	1.00E+02			<	3.00E+02		
CS-134	<	2.00E+01			<	1.00E+01			<	3.00E+01		
CS-137	<	2.00E+01			<	1.00E+01			<	3.00E+01		
BA-140	<	6.00E+01			<	4.00E+01			<	1.00E+02		
CE-141	<	4.00E+01			<	3.00E+01			<	5.00E+01		
CE-144	<	1.00E+02			<	9.00E+01			<	1.00E+02		
RA-226	<	3.00E+02			<	3.00E+02			<	4.00E+02		
TH-228	<	3.00E+01			<	2.00E+01			<	4.00E+01		

FERMI 2
FISH ANALYSIS

F-1 (Control)
(pCi/kg wet)

Nuclide	9-SEP Walleye			
SR-89	<	2.00E+01		
SR-90	<	4.00E+00		
BE-7	<	1.00E+02		
K-40		3.14E+03	+/-	3.10E+02
MN-54	<	1.00E+01		
CO-58	<	1.00E+01		
FE-59	<	3.00E+01		
CO-60	<	1.00E+01		
ZN-65	<	3.00E+01		
ZR-95	<	1.00E+01		
RU-103	<	1.00E+01		
RU-106	<	9.00E+01		
CS-134	<	1.00E+01		
CS-137		1.98E+01	+/-	9.00E+00
BA-140	<	4.00E+01		
CE-141	<	3.00E+01		
CE-144	<	1.00E+02		
RA-226	<	3.00E+02		
TH-228	<	2.00E+01		

FERMI 2
FISH ANALYSIS

F-2 (Indicator)
(pCi/kg wet)

Nuclide	13-MAY Catfish				13-MAY Carp				13-MAY Drum			
SR-89	<	3.00E+01			<	1.00E+01			<	8.00E+01		
SR-90	<	7.00E+00			<	2.00E+00			<	2.00E+01		
BE-7	<	2.00E+02			<	2.00E+02			<	4.00E+02		
K-40		2.75E+03	+/-	2.70E+02		2.55E+03	+/-	2.50E+02		2.46E+03	+/-	3.50E+02
MN-54	<	2.00E+01			<	2.00E+01			<	3.00E+01		
CO-58	<	2.00E+01			<	2.00E+01			<	4.00E+01		
FE-59	<	6.00E+01			<	5.00E+01			<	9.00E+01		
CO-60	<	2.00E+01			<	2.00E+01			<	3.00E+01		
ZN-65	<	4.00E+01			<	4.00E+01			<	8.00E+01		
ZR-95	<	2.00E+01			<	2.00E+01			<	4.00E+01		
RU-103	<	3.00E+01			<	3.00E+01			<	5.00E+01		
RU-106	<	2.00E+02			<	1.00E+02			<	3.00E+02		
CS-134	<	2.00E+01			<	2.00E+01			<	3.00E+01		
CS-137	<	2.00E+01			<	2.00E+01			<	3.00E+01		
BA-140	<	9.00E+01			<	7.00E+01			<	2.00E+02		
CE-141	<	5.00E+01			<	4.00E+01			<	6.00E+01		
CE-144	<	1.00E+02			<	1.00E+02			<	2.00E+02		
RA-226	<	4.00E+02			<	3.00E+02			<	5.00E+02		
TH-228	<	3.00E+01			<	2.00E+01			<	5.00E+01		

Nuclide	13-MAY Perch				13-MAY Silver Bass				13-May Walleye			
SR-89	<	2.00E+01			<	3.00E+01			<	2.00E+01		
SR-90	<	5.00E+00			<	5.00E+01			<	4.00E+00		
BE-7	<	2.00E+02			<	3.00E+02			<	2.00E+02		
K-40		2.97E+03	+/-	3.00E+02		3.64E+03	+/-	3.60E+02		3.71E+03	+/-	3.70E+02
MN-54	<	2.00E+01			<	2.00E+01			<	1.00E+01		
CO-58	<	2.00E+01			<	3.00E+01			<	2.00E+01		
FE-59	<	6.00E+01			<	6.00E+01			<	4.00E+01		
CO-60	<	2.00E+01			<	2.00E+01			<	1.00E+01		
ZN-65	<	4.00E+01			<	5.00E+01			<	3.00E+01		
ZR-95	<	2.00E+01			<	3.00E+01			<	2.00E+01		
RU-103	<	3.00E+01			<	3.00E+01			<	2.00E+01		
RU-106	<	2.00E+02			<	2.00E+02			<	1.00E+02		
CS-134	<	2.00E+01			<	2.00E+01			<	1.00E+01		
CS-137	<	2.00E+01			<	2.00E+01				2.01E+01	+/-	1.15E+01
BA-140	<	1.00E+02			<	9.00E+01			<	6.00E+01		
CE-141	<	6.00E+01			<	5.00E+01			<	4.00E+01		
CE-144	<	1.00E+02			<	1.00E+02			<	1.00E+02		
RA-226	<	4.00E+02			<	4.00E+02			<	3.00E+02		
TH-228	<	4.00E+01			<	3.00E+01			<	3.00E+01		

FERMI 2
FISH ANALYSIS

F-2 (Indicator)
(pCi/kg wet)

Nuclide	10-SEP Catfish				10-SEP Drum				10-SEP Walleye			
SR-89	<	3.00E+01			<	2.00E+01			<	2.00E+01		
SR-90	<	7.00E+00			<	5.00E+00			<	4.00E+00		
BE-7	<	1.00E+02			<	2.00E+02			<	1.00E+02		
K-40		2.64E+03	+/-	2.60E+02		2.42E+03	+/-	2.40E+02		3.28E+03	+/-	3.30E+02
MN-54	<	1.00E+01			<	2.00E+01			<	1.00E+01		
CO-58	<	1.00E+01			<	2.00E+01			<	1.00E+01		
FE-59	<	3.00E+01			<	5.00E+01			<	3.00E+01		
CO-60	<	1.00E+01			<	2.00E+01			<	1.00E+01		
ZN-65	<	2.00E+01			<	4.00E+01			<	3.00E+01		
ZR-95	<	1.00E+01			<	2.00E+01			<	1.00E+01		
RU-103	<	2.00E+01			<	3.00E+01			<	2.00E+01		
RU-106	<	1.00E+02			<	2.00E+02			<	1.00E+02		
CS-134	<	1.00E+01			<	2.00E+01			<	1.00E+01		
CS-137	<	2.00E+01			<	2.00E+01				2.47E+01	+/-	1.05E+01
BA-140	<	4.00E+01			<	6.00E+01			<	3.00E+01		
CE-141	<	3.00E+01			<	4.00E+01			<	3.00E+01		
CE-144	<	8.00E+01			<	1.00E+02			<	9.00E+01		
RA-226	<	2.00E+02			<	3.00E+02			<	3.00E+02		
TH-228	<	2.00E+01			<	3.00E+01			<	2.00E+01		

Nuclide	10-OCT White Bass			
SR-89	<	4.00E+01		
SR-90	<	1.00E+01		
BE-7	<	2.00E+02		
K-40		3.66E+03	+/-	3.70E+02
MN-54	<	2.00E+01		
CO-58	<	2.00E+01		
FE-59	<	5.00E+01		
CO-60	<	2.00E+01		
ZN-65	<	4.00E+01		
ZR-95	<	2.00E+01		
RU-103	<	2.00E+01		
RU-106	<	2.00E+02		
CS-134	<	2.00E+01		
CS-137	<	2.00E+01		
BA-140	<	6.00E+01		
CE-141	<	3.00E+01		
CE-144	<	9.00E+01		
RA-226	<	3.00E+02		
TH-228	<	2.00E+01		

FERMI 2
FISH ANALYSIS

F-3 (Control)
(pCi/kg wet)

Nuclide	14-MAY Drum				14-MAY Silver Bass				14-MAY Sucker			
SR-89	<	6.00E+01			<	2.00E+01			<	2.00E+01		
SR-90	<	1.00E+01			<	6.00E+00			<	8.00E+00		
BE-7	<	3.00E+02			<	2.00E+02			<	3.00E+02		
K-40		1.90E+03	+/-	2.90E+02		3.04E+03	+/-	3.00E+02		3.15E+03	+/-	3.10E+02
MN-54	<	3.00E+01			<	1.00E+01			<	2.00E+01		
CO-58	<	3.00E+01			<	2.00E+01			<	3.00E+01		
FE-59	<	9.00E+01			<	4.00E+01			<	8.00E+01		
CO-60	<	3.00E+01			<	1.00E+01			<	2.00E+01		
ZN-65	<	7.00E+01			<	3.00E+01			<	6.00E+01		
ZR-95	<	3.00E+01			<	2.00E+01			<	3.00E+01		
RU-103	<	4.00E+01			<	2.00E+01			<	4.00E+01		
RU-106	<	3.00E+02			<	1.00E+02			<	2.00E+02		
CS-134	<	3.00E+01			<	1.00E+01			<	2.00E+01		
CS-137	<	3.00E+01			<	2.00E+01			<	2.00E+01		
BA-140	<	1.00E+02			<	6.00E+01			<	1.00E+02		
CE-141	<	5.00E+01			<	3.00E+01			<	6.00E+01		
CE-144	<	1.00E+02			<	8.00E+01			<	1.00E+02		
RA-226	<	4.00E+02			<	2.00E+02			<	4.00E+02		
TH-228	<	4.00E+01			<	2.00E+01			<	4.00E+01		

Nuclide	14-MAY Walleye				11-SEP Walleye				11-SEP White Perch			
SR-89	<	1.00E+01			<	1.00E+01			<	2.00E+01		
SR-90	<	4.00E+00			<	3.00E+00			<	5.00E+00		
BE-7	<	2.00E+02			<	2.00E+02			<	3.00E+02		
K-40		3.59E+03	+/-	3.60E+02		2.64E+03	+/-	2.60E+02		3.00E+03	+/-	3.00E+02
MN-54	<	2.00E+01			<	2.00E+01			<	3.00E+01		
CO-58	<	2.00E+01			<	2.00E+01			<	3.00E+01		
FE-59	<	5.00E+01			<	5.00E+01			<	7.00E+01		
CO-60	<	2.00E+01			<	2.00E+01			<	2.00E+01		
ZN-65	<	4.00E+01			<	4.00E+01			<	6.00E+01		
ZR-95	<	2.00E+01			<	2.00E+01			<	3.00E+01		
RU-103	<	3.00E+01			<	3.00E+01			<	4.00E+01		
RU-106	<	2.00E+02			<	2.00E+02			<	3.00E+02		
CS-134	<	2.00E+01			<	2.00E+01			<	3.00E+01		
CS-137	<	2.00E+01			<	2.00E+01			<	3.00E+01		
BA-140	<	6.00E+01			<	5.00E+01			<	9.00E+01		
CE-141	<	4.00E+01			<	4.00E+01			<	6.00E+01		
CE-144	<	9.00E+01			<	1.00E+02			<	2.00E+02		
RA-226	<	3.00E+02			<	3.00E+02			<	5.00E+02		
TH-228	<	3.00E+01			<	3.00E+01			<	5.00E+01		

Appendix D

Environmental Program Execution

Environmental Program Execution

On occasions, samples cannot be collected. This can be due to a variety of events, such as equipment malfunction, loss of electrical power, severe weather conditions, or vandalism In 1997, missed samples were a result of missing field TLDs, air sampling equipment malfunction, loss of electrical power to air and water sampling equipment, and the freezing of surface water sample lines. The following sections list all missed samples, changes and corrective actions during 1997. These missed samples did not have a significant impact on the execution of the REMP.

Direct Radiation Monitoring

All TLDs are placed in the field in inconspicuous locations to minimize the loss of TLDs due to vandalism. During 1997, two hundred sixty-eight (268) TLDs were placed in the field for the REMP program and all but two TLDs were collected and processed. T-27 was found missing during the first quarter collection and T-30 was found missing during the third quarter collection. Both TLDs were missing as a result of vandalism.

Atmospheric Monitoring

In the Atmospheric Monitoring program, two hundred and sixty (260) particulate and charcoal cartridges were scheduled to be collected in 1997. All samples were collected and analyzed except for three (3) particulate filters and four (4) charcoal cartridges.

- On January 28, air sampler API-4 was found to have insufficient volume, due to loss of power, for analysis. For this reason the first quarter composite sample for this location is considered to be less than representative.

- On August 12, air sampler API-1 was found to have insufficient volume, due to equipment malfunction, for analysis. The sampler was replaced with a spare sampler. For this reason the third quarter composite sample for this location is considered to be less than representative.

- On November 25, air sampler API-3 was found to have insufficient volume, due to loss of power, for analysis. For this reason the fourth quarter composite sample for this location is considered to be less than representative.

- On July 8, the charcoal cartridge for API-3 was inadvertently not collected. The cartridge was collected on July 15 and represents a two week sampling period from July 1 to July 15.

- During the month of June all air sampling equipment was replaced with new electronic portable samplers.

Terrestrial Monitoring

During 1997, all scheduled Terrestrial Monitoring samples were collected. There were no changes to the Terrestrial Monitoring program during 1997.

Milk Sampling

All scheduled milk samples were collected in 1997.

Garden Sampling

All scheduled garden samples were collected in 1997.

Groundwater Sampling

All scheduled groundwater samples were collected in 1997.

Aquatic Monitoring

During 1997, twenty-four (24) drinking water samples, twenty-four (24) surface water samples, and ten (10) sediment samples were scheduled to be collected. In addition, twenty-three (23) fish samples were collected for the Aquatic Monitoring program. Due to loss of electrical power, ice and sediment blocking sample lines, and equipment malfunction, eight (8) grab samples were collected; one drinking water sample and seven surface water samples. There were no changes to the Aquatic Monitoring program during 1997.

Drinking Water Sampling

- On April 21, drinking water sampler DW-2 was found not operating due to loss of electrical power. A grab sample was taken and the sampler was reset and put back into service. For this reason the second quarter composite sample is considered less than representative.

- Both samples, DW-1 and DW-2, collected on May 27, were not analyzed for Gross Beta by the Laboratory. Instead the surface water samples were analyzed for Gross Beta.

Surface Water Sampling

- On January 13, February 3 and February 17, surface water sampler SW-2 was found not operating due to ice blockage inside the sample line. Grab samples were taken and the sampler was reset and put back into service each time. For this reason the first quarter composite sample is considered less than representative.

- On April 7, surface water sampler SW-3 was found not operating due to sediment blockage inside the sample line from dredging operations. A grab sample was taken and the sampler was reset and put back into service. For this reason the second quarter composite sample is considered less than representative.

- On June 2, June 9 and December 17, surface water sampler SW-3 was found not operating due to loss of electrical power to the equipment from maintenance activities in the building. Grab samples were taken, power was restored and sampling equipment was put back into service each time. For this reason the second and forth quarter composite samples are considered less than representative.

Sediment Sampling

All scheduled sediment samples were collected in 1997.

Fish Sampling

All scheduled fish samples were collected in 1997.

Appendix E

Effluent and Radwaste Data

Regulatory Limits for Radioactive Effluents

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated into the Fermi 2 Offsite Dose Calculation Manual. These limits prescribe the maximum doses and dose rates due to radioactive effluents resulting from normal operation of Fermi 2. These limits are described in the following sections.

A. Gaseous Effluents

I. Dose rate due to radioactivity released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following:

a) Noble gases

Less than or equal to 500 mrem/year to the total body
Less than or equal to 3000 mrem/year to the skin

b) Iodine-131, Iodine-133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

Less than or equal to 1500 mrem/year to any organ.

II. Air dose due to noble gases to areas at and beyond the site boundary shall be limited to the following:

a) Less than or equal to 5 mrad for gamma radiation
Less than or equal to 10 mrad for beta radiation
- During any calendar quarter

b) Less than or equal to 10 mrad for gamma radiation
Less than or equal to 20 mrad for beta radiation
- During any calendar year

III. Dose to a member of the public from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

a) Less than or equal to 7.5 mrem to any organ
- During any calendar quarter

b) Less than or equal to 15 mrem to any organ
- During any calendar year

Note: The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

B. Liquid Effluents

I. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to ten times the concentrations specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 20 (Standards for Protection Against Radiation), Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases, as required by the Fermi 2 Offsite Dose Calculation Manual. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity. This limit is based on the Xe-135 air submersion dose limit converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

II. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the following:

a) Less than or equal to 1.5 mrem to the total body
Less than or equal to 5 mrem to any organ
- During any calendar quarter

b) Less than or equal to 3 mrem to the total body
Less than or equal to 10 mrem to any organ
- During any calendar year

Measurements and Approximations of Total Activity in Radioactive Effluents

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

I. Fission and Activation Gases

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points. The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples.

The summary values reported are the sums of all fission and activation gases quantified at all monitored release points.

II. Radioiodines

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined.

The summary values reported are the sums of all radioiodines quantified at all continuously monitored release points.

III. Particulates

Samples are obtained from each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis.

For each sample, the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined.

Quarterly, the filters from each ventilation release point are composited and then radiochemically separated and analyzed for strontium (Sr)-89/90 using various analytical methods.

The summary values reported are the sums of all particulates quantified at all monitored release points.

IV. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The summary values reported are the sums of all tritium quantified at all monitored release points.

V. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The summary values reported are the sums of all alpha emitters quantified at all monitored release points.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi 2 UFSAR. Fermi 2 released no radioactive liquid effluents in 1997.

C. Statistical Measurement Uncertainties

The statistical uncertainty of the measurements in this section has been calculated and summarized in the following table:

Measurement Type	Sample Type	One Sigma Uncertainty
Fission and Activation Gases	Gaseous	30%
Radioiodines	Gaseous	17%
Particulates	Gaseous	16%
Tritium	Gaseous	30%
Gross Alpha	Gaseous	16%

Gaseous Release by Individual Nuclide

Values in the following tables which are preceded by the "less than" symbol represent the lower limit of detection (LLD) in units of microcuries per cubic centimeter (uCi/cc) for individual samples, and indicate that the nuclide in question was not detected in gaseous effluent samples in the indicated quarter of 1997.

A. Particulate Radionuclides (Curies)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	<1.7E-13	<1.7E-13	4.74E-05	2.17E-05
Mn-54	1.22E-06	<3.4E-14	<3.4E-14	2.37E-06
Co-58	<3.4E-14	<3.4E-14	1.06E-05	2.88E-06
Co-60	1.51E-05	9.45E-06	9.46E-06	7.57E-06
Na-24	<1.2E-13	<1.2E-13	1.09E-04	<1.2E-13
Tc-99m	<2.0E-13	<2.0E-13	2.62E-04	1.63E-04
Ba-139	3.30E-03	1.43E-01	1.46E+00	1.26E+00
La-140	<1.4E-13	1.33E-04	1.89E-03	1.64E-03
Ba-140	<7.9E-14	8.57E-05	1.04E-03	8.26E-04

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Y-91m	2.20E-04	2.32E-02	2.27E-01	1.76E-01
Sr-91	<4.8E-13	1.83E-03	2.12E-02	1.32E-02
Sr-92	<2.6E-12	4.09E-04	7.80E-03	1.47E-03
Np-239	<6.8E-14	<6.8E-14	5.94E-05	<6.8E-14
Rb-88	<2.6E-08	2.01E-02	<2.6E-08	<2.6E-08
Rb-89	8.51E-03	2.79E-01	2.56E+00	2.12E+00
Cs-138	6.22E-03	1.07E-01	9.07E-01	9.16E-01
Cs-139	<1.2E-08	<1.2E-08	1.10E+00	<1.2E-08
Br-82	<3.7E-14	3.60E-05	<3.7E-14	<3.7E-14
As-76	<2.3E-13	<2.3E-13	4.08E-04	6.96E-05
Mn-56	<4.3E-12	<4.3E-12	<4.3E-12	2.78E-04
Sr-89	3.43E-06	6.22E-05	6.63E-04	5.35E-04
Sr-90	<4.0E-16	3.85E-07	3.29E-06	3.12E-06
Cs-134	<2.7E-14	<2.7E-14	<2.7E-14	<2.7E-14
Cs-137	<2.8E-14	<2.8E-14	<2.8E-14	<2.8E-14
Ce-141	<2.0E-14	<2.0E-14	<2.0E-14	<2.0E-14
Ce-143	<1.7E-13	<1.7E-13	<1.7E-13	<1.7E-13
Ce-144	<1.0E-13	<1.0E-13	<1.0E-13	<1.0E-13
Total	**1.83E-02**	**5.75E-01**	**6.29E+00**	**4.49E+00**

B. Noble Gases

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Kr-85m	<2.0E-08	<2.0E-08	5.09E-01	4.35E-01
Kr-87	<4.3E-08	9.84E-01	7.04E+00	7.72E+00
Kr-88	<9.1E-08	<9.1E-08	3.75E+00	4.40E+00
Kr-89	<5.7E-05	5.23E+00	7.90E+01	7.89E+01
Xe-133	<5.4E-08	<5.4E-08	2.07E-01	3.82E+01
Xe-135	<2.8E-08	6.61E-01	9.23E+00	2.29E+01
Xe-135m	<1.1E-07	2.94E+00	2.77E+01	6.65E+01
Xe-137	<1.4E-05	1.53E+01	1.37E+02	1.46E+02
Xe-138	<2.3E-07	6.44E+00	7.01E+01	8.30E+01
Total	**N.A.**	**3.16E+01**	**3.35E+02**	**4.48E+02**

C. Radioiodines

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	7.83E-06	2.12E-03	4.72E-03	5.59E-03
I-132	<5.1E-13	5.23E-03	2.62E-02	2.97E-02
I-133	2.05E-05	7.47E-03	2.88E-02	3.78E-02
I-134	<1.3E-11	4.22E-03	7.16E-02	8.29E-02
I-135	<1.9E-12	6.60E-03	4.68E-02	6.08E-02
Total	**2.83E-05**	**2.56E-02**	**1.78E-01**	**2.17E-01**

Shipments of Solid Radwaste

Fermi 2 complies with the extensive federal regulations which govern radioactive waste shipments. Radioactive waste shipments from the Fermi 2 site consist of waste generated during water treatment, radioactive trash, irradiated components, and waste oil. Shipment destinations are either licensed burial sites or intermediate processing facilities. Waste shipped to intermediate processing facilities is shipped directly from these facilities to licensed burial sites after processing. The following tables contain estimates of major nuclide composition, by class of waste, of Fermi 2 solid radwaste received at the Barnwell, SC, burial facility in 1997.

a. **Spent resins, sludges, etc.** (Total of Class A and Class B waste: All spent resin waste in this category was shipped in High Integrity Containers. Ash from resin incinerated at an intermediate processing facility and solid residue from waste water processed at an intermediate processing facility is also included in this category. Some waste in this category was encapsulated in concrete. All quantities were determined by measurement.)

Nuclide	Percent of total activity	Curies
C-14	0.3	1.94E+00
Ce-144	0.5	3.28E+00
Co-57	<0.1	2.50E-03
Co-58	0.6	3.98E+00
Co-60	34.2	2.15E+02
Cr-51	<0.1	3.35E-01
Cs-134	0.8	4.96E+00
Cs-137	2.2	1.39E+01
Fe-55	40.9	2.57E+02
Fe-59	<0.1	2.18E-02
H-3	<0.1	2.36E-01

Nuclide	Percent of total activity	Curies
Hf-181	<0.1	3.21E-02
I-129	<0.1	2.05E-03
Mn-54	7.6	4.75E+01
Nb-95	<0.1	3.72E-03
Ni-59	<0.1	5.45E-04
Ni-63	2.8	1.76E+01
Sb-125	0.2	1.05E+00
Sr-90	<0.1	2.08E-02
Tc-99	<0.1	3.16E-03
Zn-65	9.9	6.20E+01
Zr-95	<0.1	1.27E-02

Note: The following is a breakdown of the above quantities into Class A and Class B waste as required by Fermi 2 Technical Specifications.

Class A quantities: Consists of dewatered resin, ash from resin incineration, solid residue from processing contaminated water, etc. (total volume: 101 m^3)

Nuclide	Percent of total activity	Curies
C-14	0.7	1.94E+00
Ce-144	0.6	1.55E+00
Co-57	<0.1	2.50E-03
Co-58	0.5	1.45E+00
Co-60	33.8	9.27E+01
Cr-51	0.1	3.35E-01
Cs-134	0.3	7.68E-01
Cs-137	1.5	4.24E+00
Fe-55	41.6	1.14E+02
Fe-59	<0.1	2.18E-02
H-3	<0.1	2.31E-01
Hf-181	<0.1	3.21E-02
I-129	<0.1	1.95E-03
Mn-54	6.9	1.88E+01
Nb-95	<0.1	3.72E-03
Ni-59	<0.1	5.45E-04
Ni-63	3.0	8.20E+00
Sb-125	0.4	1.05E+00
Sr-90	<0.1	7.87E-03
Tc-99	<0.1	2.54E-03
Zn-65	10.5	2.89E+01
Zr-95	<0.1	1.27E-02

Class B Quantities: Consists of dewatered resin (total volume: 11.8 m^3)

Nuclide	Percent of total activity	Curies
C-14	<0.1	2.83E-03
Ce-144	0.5	1.73E+00
Co-58	0.7	2.53E+00
Co-60	34.4	1.22E+02
Cs-134	1.2	4.19E+00
Cs-137	2.7	9.66E+00
Fe-55	40.4	1.43E+02
H-3	<0.1	5.13E-03
I-129	<0.1	1.02E-04
Mn-54	8.1	2.87E+01
Ni-63	2.6	9.35E+00
Sr-90	<0.1	1.29E-02
Tc-99	<0.1	6.23E-04
Zn-65	9.3	3.31E+01

b. Dry compressible waste, contaminated equipment, etc. (All waste in this category was Class A waste, was shipped in strong tight containers, and was classified as dry active waste (DAW). After incineration by an intermediate processor, some of the residue from this waste was solidified in concrete. All quantities were determined by measurement. Total volume: 43.9 m^3)

Nuclide	Percent of total activity	Curies
Ag-110m	<0.1	4.01E-04
C-14	0.5	1.50E-02
Ce-144	<0.1	1.35E-03
Co-57	<0.1	9.40E-06
Co-58	1.0	2.74E-02
Co-60	11.3	3.20E-01
Cr-51	37.8	1.07E+00
Cs-134	1.4	3.85E-02
Cs-137	1.8	4.98E-02
Fe-55	41.5	1.17E+00
Fe-59	0.5	1.30E-02
H-3	0.5	1.52E-02
I-129	<0.1	4.91E-04
Mn-54	1.4	3.96E-02
Nb-95	<0.1	3.45E-11
Ni-59	<0.1	1.57E-04
Ni-63	1.0	2.83E-02

Nuclide	Percent of total activity	Curies
Sb-124	<0.1	1.63E-03
Sb-125	0.1	3.98E-03
Sr-89	<0.1	9.02E-10
Sr-90	<0.1	2.28E-05
Tc-99	<0.1	5.89E-04
Zn-65	1.1	3.04E-02

c. Irradiated components, control rods, etc.: None in 1997.

Appendix F

Quality Assurance Data

Quality Assurance

An important part of the effluent and environmental monitoring programs at Fermi 2 is Quality Assurance (QA). QA is a program that provides a method to check the adequacy and validity of the monitoring programs. The QA program accomplishes this by independent annual audits by qualified personnel, strict adherence to written procedures, and good record keeping practices. The QA program is designed to identify possible deficiencies in the monitoring programs so that corrective actions can be initiated promptly.

The QA program at Fermi 2 is conducted in accordance with the guidelines specified in NRC Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs". At Fermi 2 the QA program contains three data comparison programs; (1) Interlaboratory Comparison Program, (2) NRC TLD comparison program, and (3) Independent blind spiked cross check program. The following sections describe and present the 1997 results of these programs.

Interlaboratory Comparison Programs for 1997

The Environmental Protection Agency (EPA) for many years has been administrating an Interlaboratory Comparison Program for NRC licensee environmental laboratories, free of charge. However, due to reductions in Federal funding and staffing, the EPA has reduced this service to supply only water samples as of December 31, 1995.

Section 10.3 of the Offsite Dose Calculation Manual (ODCM) and Chapter 2, Section 4.10.3 of the Radiation Protection Conduct Manual requires the environmental laboratory contracted by the Radiological Environmental Monitoring Program (REMP) to participate in a Commission approved interlaboratory comparison program.

Detroit Edison contracts Teledyne/Brown Engineering to perform the analysis of its environmental samples. Teledyne currently participates in the EPA's program and has contracted Analytics, Inc. to supply additional samples that are no longer supplied by the EPA.

In an interlaboratory comparison program, participant laboratories receive from the EPA or a commerce source, environmental samples of known activity concentration for analysis. After the samples have been analyzed by the laboratory, the manufacturer of the sample reports the known activity concentration of the samples to the laboratory. The laboratory compares its results to the reported concentrations to determine any significant deviations, investigates such deviations if found, and initiates corrective action if necessary. Participation in this program provides assurance that the contract laboratory is capable of meeting accepted criteria for radioactivity analysis.

In 1997, Teledyne/Brown Engineering performed forty-eight (48) analyses of environmental samples from the EPA and thirty-seven (37) analyses of samples prepared by Analytics Inc.. All but four of the EPA samples results were within ± 3 sigma control limits. All but one of the Analytics samples were within acceptable limits of the known values. The results are shown in the following tables and all deviations, investigations and corrective actions taken by Teledyne/Brown Engineering are described in the foot notes.

EPA INTERLABORATORY COMPARISON PROGRAM 1997

Table F-1

Collection Date	Media	Nuclide	EPA Result(a)	Teledyne Brown Engineering Result(b)	Deviation(c)
01/17/97	Water	Sr-89	12.0 ± 5.0	10.00 ± 1.00	-0.69
		Sr-90	25.0 ± 5.0	25.00 ± 1.00	0.00
01/31/97	Water	Gr-Alpha	5.2 ± 5.0	8.10 ± 0.89	1.00
		Gr-Beta	14.7 ± 5.0	15.00 ± 1.00	0.10
02/07/97	Water	I-131	86.0 ± 9.0	106.00 ± 4.36	3.85 (d)
02/14/97	Water	Ra-226	5.9 ± 0.9	5.27 ± 0.23	-1.22
		Ra-228	8.2 ± 2.1	8.40 ± 0.30	0.16
03/07/97	Water	H-3	7900.0 ± 790.0	7366.67 ± 378.59	-1.17
04/15/97	Water	Gr-Beta	102.1 ± 15.3	103.33 ± 5.77	0.14
		Sr-89	24.0 ± 5.0	23.00 ± 1.00	-0.35
		Sr-90	13.0 ± 5.0	12.67 ± 1.15	-0.12
		Co-60	21.0 ± 5.0	22.67 ± 0.58	0.58
		Cs-134	31.0 ± 5.0	28.67 ± 0.58	-0.81
		Cs-137	22.0 ± 5.0	24.67 ± 1.53	0.92
		Gr-Alpha	48.0 ± 12.0	54.67 ± 1.53	0.96
		Ra-226	13.0 ± 2.0	13.00 ± 1.00	0.00
		Ra-228	3.1 ± 0.8	4.87 ± 0.12	3.82 (e)
06/06/97	Water	Co-60	18.0 ± 5.0	19.00 ± 0.00	0.35
		Zn-65	100.0 ± 10.0	99.33 ± 1.15	-0.12
		Cs-134	22.0 ± 5.0	18.67 ± 1.15	-1.15
		Cs-137	49.0 ± 5.0	48.67 ± 0.58	-0.12
		Ba-133	25.0 ± 5.0	22.33 ± 2.52	-0.92
06/13/97	Water	Ra-226	3.0 ± 0.5	3.43 ± 0.49	1.50
		Ra-228	3.1 ± 0.8	3.43 ± 0.23	0.72
06/18/97	Water	Gr-Alpha	3.1 ± 5.0	2.93 ± 0.2[illegible]	-0.06
		Gr-Beta	15.1 ± 5.0	14.00 ± 1.00	0.38
07/11/97	Water	Sr-89	44.0 ± 5.0	38.33 ± 1.53	-1.96
		Sr-90	16.0 ± 5.0	25.00 ± 0.00	3.12 (f)
08/08/97	Water	H-3	11010 ± 1101.0	12000.00 ± 0.00	1.56
09/12/97	Water	Ra-226	20.0 ± 3.0	20.00 ± 1.73	0.00
		Ra-228	8.0 ± 2.0	7.40 ± 0.17	-0.52
09/19/97	Water	I-131	10.0 ± 6.0	11.00 ± 0.00	0.29

Table F-1 (cont)

Collection Date	Media	Nuclide	EPA Result(a)	Teledyne Brown Engineerii.g Result(b)	Deviation(c)
10/21/97	Water	Gr-Alpha	49.9 ± 12.5	45.67 ± 1.15	-0.59
		Ra-226	5.0 ± 0.8	5.90 ± 0.10	1.95
		Ra-228	5.0 ± 1.3	4.27 ± 0.12	-0.98
		Gr-Beta	143.4 ± 21.5	136.67 ± 5.77	-0.54
		Sr-89	36.0 ± 5.0	36.00 ± 1.00	0.00
		Sr-90	22.0 ± 5.0	21.67 ± 2.08	-0.12
		Co-60	10.0 ± 5.0	10.67 ± 0.58	0.23
		Cs-134	41.0 ± 5.0	41.33 ± 0.58	0.12
		Cs-137	34.0 ± 5.0	36.00 ± 1.00	0.69
10/31/97	Water	Gr-Alpha	14.7 ± 5.0	19.67 ± 1.53	1.72
		Gr-Beta	48.9 ± 5.0	50.67 ± 3.51	0.61
11/07/97	Water	Co-60	27.0 ± 5.0	25.00 ± 1.00	-0.69
		Zn-65	75.0 ± 8.0	71.00 ± 3.61	-0.87
		Cs-134	10.0 ± 5.0	10.67 ± 0.58	0.23
		Cs-137	74.0 ± 5.0	76.00 ± 1.00	0.69
		Ba-133	99.0 ± 10.0	78.67 ± 0.58	-3.52 (g)

Footnotes:

(a) EPA Results-Expecte: laboratory precision (1 sigma). Units are pCi/liter for water and milk except K is in mg/litr 'Jnits are total pCi for air particulate filters.

(b) Teledyne Results - Average ± one sigma. Units are pCi/liter for water and milk except K is in mg/liter. Units are total pCi for air particulate filters.

(c) Normalized deviation from the known.

(d) Erroneously high reading of the stable iodine content by ion specific electrode occurred, causing an erroneously low chemical yield. If the electrode reading is ignored, the average I-131 result becomes 90 pCi/l, in good agreement with the given value. An erroneous electrode reading can be caused by certain chemical species in the sample, such as sulfide. We will investigate suspiciously high electrode readings by performing a gravimetric yield on the sample without the addition of iodide carrier or the I-131 content of active samples can also be verified by performing a gamma spectral analysis.

(e) An investigation discovered a low chemical yield on one sample and the loss of another during analysis. In the future we will repeat analyses of samples with yields less than 85%.

(f) Error apparently caused by insufficient training. The strontium separation chemistry was performed on 7/22/97 by a summer employee. Initial results for the three samples did not agree well. so all were remilked by a senior analyst. This was insufficient to correct the problem. In-house QC samples showed satisfactory results at this time. There will be additional qualification of analysts according to performance on in-house blanks and spikes.

(g) An investigation is being conducted and Teledyne will report the results shortly.

ANALYTICS CROSS CHECK COMPARISON PROGRAM 1997

Table F-2

Collection Date	Media	Nuclide	Analytics Result	Teledyne Brown Engineering Result(a)	Ratio(b)
03/20/97	Milk	I-131	20 ± 1	18 ± 1	0.90
		Ce-141	232 ± 12	232 ± 23	1.00
		Cr-51	387 ± 19	381 ± 38	0.98
		Cs-134	143 ± 7	132 ± 13	0.92
		Cs-137	114 ± 6	128 ± 13	1.12
		Co-58	79 ± 4	89 ± 9	1.13
		Mn-54	176 ± 9	195 ± 20	1.11
		Fe-59	144 ± 7	161 ± 16	1.12
		Zn-65	165 ± 8	171 ± 17	1.04
		Co-60	176 ± 9	179 ± 18	1.02
03/20/97	Milk	Sr-89	25 ± 1	13 ± 3	0.52 (c)
		Sr-90	19 ± 1	16 ± 1	0.84
06/19/97	Air Filter	Ce-141	132 ± 7	143 ± 8	1.08
		Cr-51	198 ± 10	229 ± 17	1.16
		Cs-134	81 ± 4	74 ± 4	0.91
		Cs-137	115 ± 6	143 ± 8	1.24
		Co-58	77 ± 4	89 ± 5	1.16
		Mn-54	84 ± 4	102 ± 6	1.21
		Fe-59	75 ± 4	98 ± 6	1.31
		Zn-65	139 ± 7	188 ± 11	1.35
		Co-60	104 ± 5	113 ± 7	1.09
06/19/97	Cartridge	I-131	88 ± 4	106 ± 6	1.20
06/19/97	Air Filter	Sr-90	96 ± 5	88 ± 5	0.92
06/19/96	Air Filter	Gr-Alpha	93 ± 5	103 ± 6	1.11
		Gr-Beta	193 ± 10	210 ± 6	1.09
09/18/97	Milk	I-131	87 ± 4	97 ± 10	1.11
		Ce-141	77 ± 4	83 ± 8	1.08
		Cr-51	304 ± 15	323 ± 40	1.06
		Cs-134	102 ± 5	98 ± 10	0.96
		Cs-137	107 ± 5	117 ± 12	1.09
		Co-58	60 ± 3	64 ± 6	1.07
		Mn-54	88 ± 4	99 ± 10	1.13
		Fe-59	119 ± 6	132 ± 13	1.11
		Zn-65	196 ± 10	218 ± 22	1.11
		Co-60	197 ± 10	209 ± 21	1.06
09/18/97	Milk	Sr-89	15 1	14 1	0.93
		Sr-90	14 1	18 1	1.29

Footnotes:

(a) Teledyne Results - counting error is two standard deviations. Units are pCi/liter for water and milk. For gamma results, if two standard deviations are less than 10%, then a 10% error is reported. Units are total pCi for air particulate filters.

(b) Ratio of Teledyne Brown Engineering to Analytics results.

(c) Caused by incorrect rinsing of the strontium extraction column. Additional training was conducted on 9/5/97 and was documented in the analyst's training file. Subsequent tests on two milk samples spiked with Sr-89 produced good results.

Fermi 2 and NRC TLD Intercomparison

The U.S. Nuclear Regulatory Commission (NRC) Direct Radiation Monitoring Network is operated in cooperation with the State of Michigan's Division of Radiological Health. This program was established in August 1979 by the NRC Office of Inspection and Enforcement (IE) to measure ambient radiant radiation levels around NRC licensed facilities and to provide the NRC staff with prompt, independent data in emergency response and assessments. As part of Fermi 2's REMP Quality Control program, TLDs that are co-located with the NRC TLDs are compared with each other to determine if there is any significant difference between the two direct radiation monitor programs.

The NRC maintains 41 TLD locations around Fermi 2, and 21 are co-located with Detroit Edison TLDs. The TLDs are collected by State of Michigan representatives and are analyzed independently of the Fermi 2 TLDs. The results from the NRC monitoring program are published quarterly in NUREG 0837 titled ***NRC TLD Direct Radiation Monitoring Network.***

The data for 1997 is tabulated in the tables below. Only the first, second and third quarters of NRC data was available for comparison. The standard deviation for all data ranged from 0.1 to 1.8, which indicates a good correlation between the two programs.

First Quarter (mR/std Qtr)
Table F-3

Station Numbers		Fermi 2	NRC	Std. Dev.
T1	NRC1	14.0	10.6	1.7
T4	NRC36	14.9	11.9	1.5
T5	NRC37	15.5	13.6	0.9
T6	NRC38	14.3	16.4	1.1
T12	NRC25	14.0	13.9	0.1
T13	NRC23	15.7	16.7	0.5
T14	NRC22	14.8	16.2	0.7
T15	NRC21	14.9	12.8	1.0
T19	NRC16	16.2	16.0	0.1
T20	NRC14	17.7	N/D	--
T21	NRC15	14.5	13.9	0.3
T22	NRC13	15.2	15.6	0.2
T23	NRC11	15.5	12.3	1.6
T24	NRC9	14.5	11.7	1.4
T27	NRC17	N/D	N/D	--
T28	NRC32	14.4	14.7	0.1
T30	NRC18	15.0	15.1	0.0
T32	NRC29	15.3	13.2	1.1
T33	NRC28	14.9	13.1	0.9
T35	NRC26	14.3	13.8	0.3
T36	NRC40	15.2	14.4	0.4

Second Quarter (mR/std Qtr)
Table F-4

Station Numbers		Fermi 2	NRC	Std. Dev.
T1	NRC1	14.8	11.2	1.8
T4	NRC36	13.4	11.6	0.9
T5	NRC37	15.7	14.5	0.6
T6	NRC38	10.5	14.0	1.8
T12	NRC25	12.4	N/A	--
T13	NRC23	14.3	16.3	1.0
T14	NRC22	14.5	17.3	1.4
T15	NRC21	12.6	12.8	0.1
T19	NRC16	14.7	17.5	1.4
T20	NRC14	15.8	17.8	1.0
T21	NRC15	12.6	13.8	0.6
T22	NRC13	13.2	15.3	1.1
T23	NRC11	13.4	14.1	0.4
T24	NRC9	15.8	13.2	1.3
T27	NRC17	11.6	12.6	0.5
T28	NRC32	13.0	13.6	0.3
T30	NRC18	14.3	13.6	0.4
T32	NRC29	14.7	15.4	0.3
T33	NRC28	14.6	13.2	0.7
T35	NRC26	13.6	13.2	0.2
T36	NRC40	14.3	17.8	1.8

Third Quarter (mR/std Qtr)
Table F-5

Station Numbers		Fermi 2	NRC	Std. Dev.
T1	NRC1	13.3	11.8	0.7
T4	NRC36	15.2	13.8	0.7
T5	NRC37	15.9	15.3	0.3
T6	NRC38	12.9	16.4	1.8
T12	NRC25	14.2	15.4	0.6
T13	NRC23	16.3	19.1	1.4
T14	NRC22	16.4	17.2	0.4
T15	NRC21	14.6	13.4	0.6
T19	NRC16	18.5	18.6	0.0
T20	NRC14	19.3	19.7	0.2
T21	NRC15	15.5	15.0	0.3
T22	NRC13	15.2	16.5	0.6
T23	NRC11	16.1	14.4	0.9
T24	NRC9	15.3	13.0	1.2
T27	NRC17	13.4	14.0	0.3
T28	NRC32	14.5	15.7	0.6
T30	NRC18	N/A	N/A	--
T32	NRC29	16.6	15.3	0.7
T33	NRC28	14.6	15.0	0.2
T35	NRC26	15.1	14.7	0.2
T36	NRC40	16.0	15.9	0.1

Independent Blind Spiked Cross Check Program

Analytics, Inc. supplies Detroit Edison's environmental laboratory, Teledyne/Brown Engineering, with blind spiked samples containing strontium-89 (Sr-89), strontium-90 (Sr-90), and iron-55 (Fe-55) on a quarterly basis. As part of the environmental QA program, these samples are analyzed by the vendor laboratory and compared to the known values. To determine if the laboratory results are in agreement with Analytics' known value, a ratio is calculated using the following formula:

Teledyne value / Analytics value = Ratio

The closer the ratio is to (1.0) one, the better the agreement between the two values. To determine if the ratio falls within acceptable limits, upper and lower limits are established using the sample resolution (supplied by Analytics) and the criteria in following table.

Cross Check Agreement Criteria
Table F-6

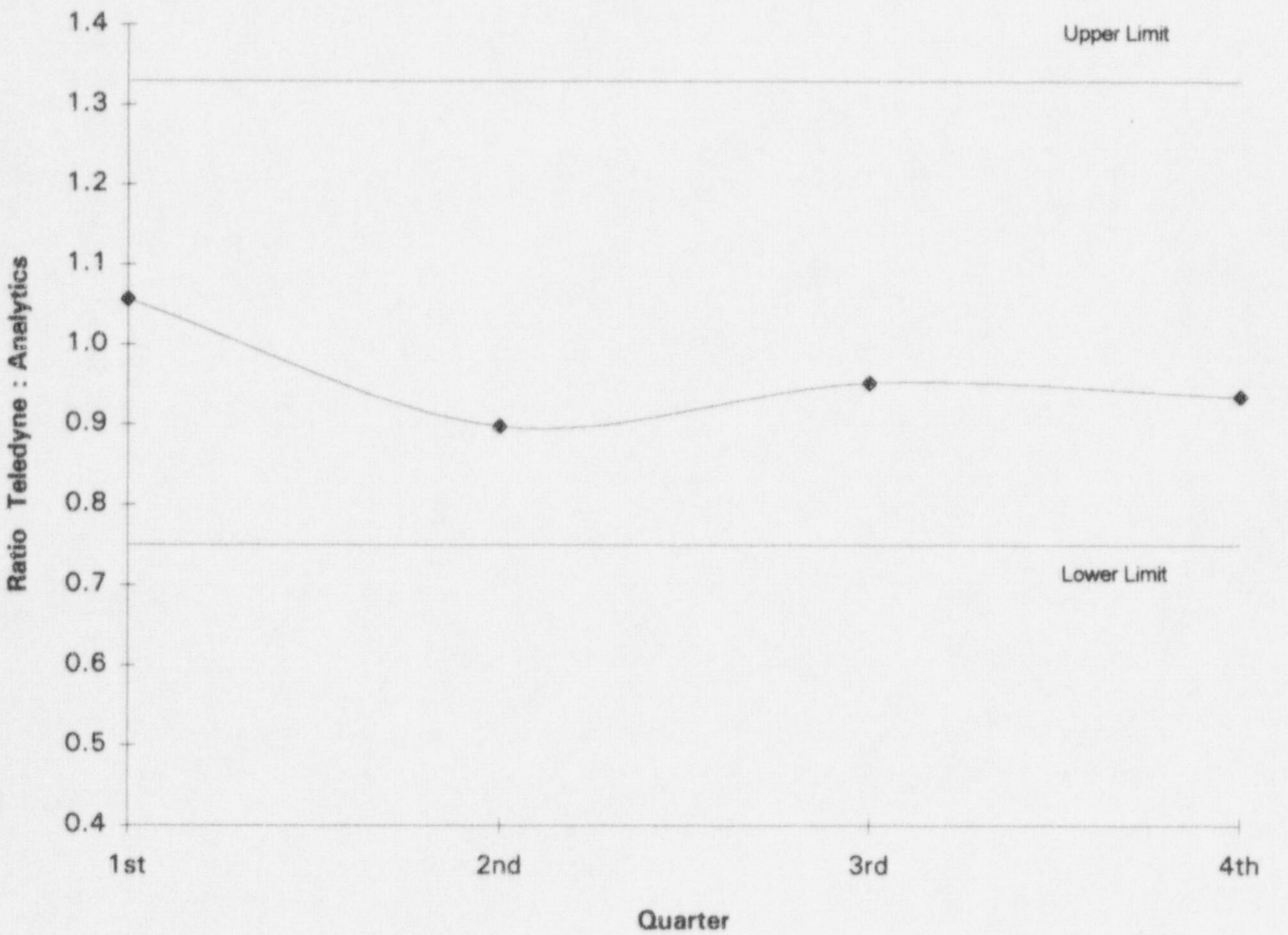
Resolution	Agreement Criteria
less than 4	N/A
4 - 7	0.5 - 2.0
8 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
greater than 200	0.85 - 1.18

For 1997, all spiked samples analyzed by Teledyne/Brown Engineering were in agreement with Analytics' known values. The results of the Independent Blind Spiked Cross Check Program are shown in the following tables and control charts.

Fermi 2 1997
Environmental Laboratory Cross Check Program
Sr-89 Spiked Samples

Quarter	Teledyne Value (uCi/cc)	Analytics Value (uCi/cc)	Ratio
1st	6.40E-03	6.06E-03	1.06
2nd	5.30E-03	5.90E-03	0.90
3rd	2.20E-03	2.31E-03	0.95
4th	5.90E-03	6.31E-03	0.94

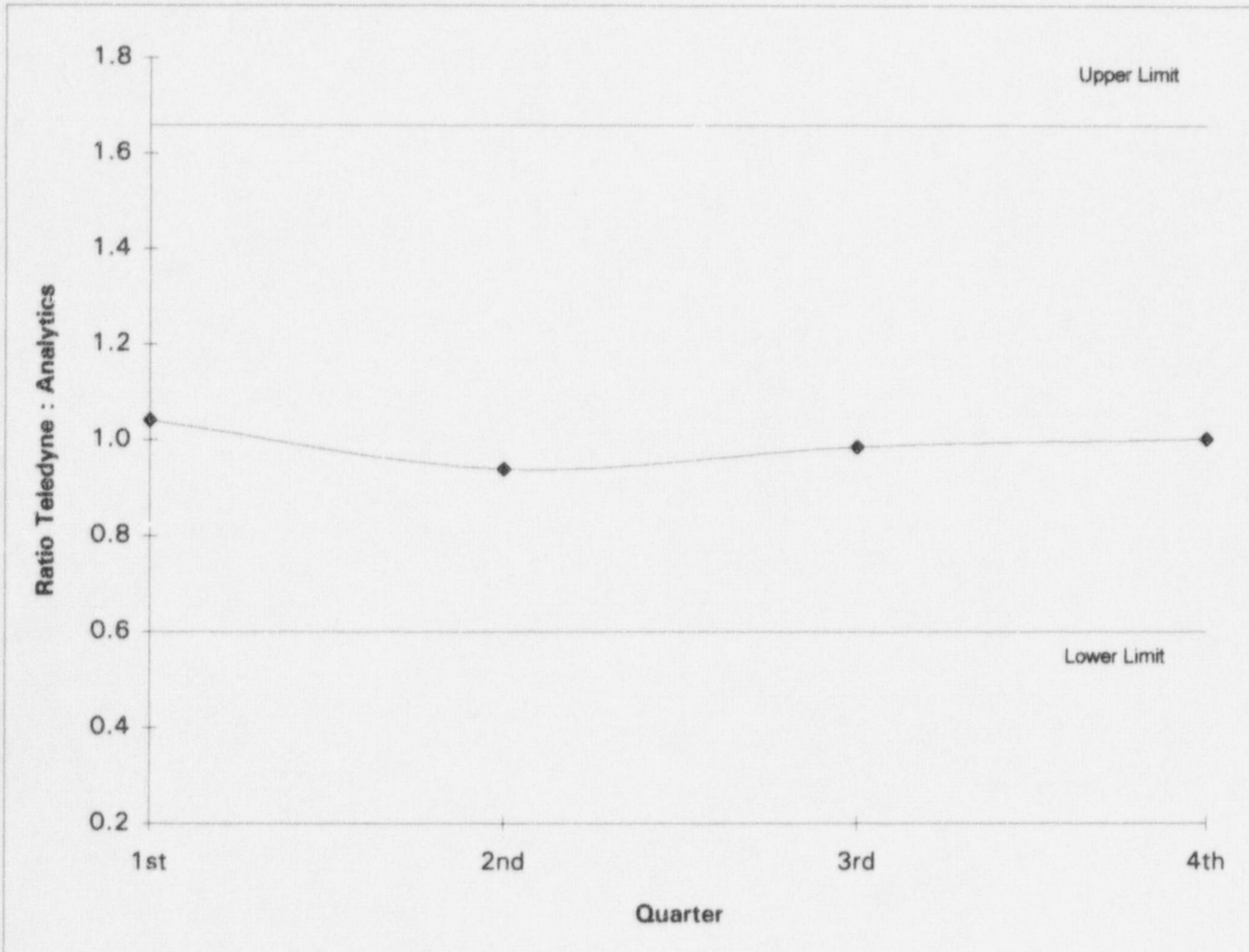
Resolution = 17
Agreement Criteria = 0.75 >= Ratio <= 1.33



Fermi 2 1997
Environmental Laboratory Cross Check Program
Sr-90 Spiked Samples

Quarter	Teledyne Value (uCi/cc)	Analytics Value (uCi/cc)	Ratio
1st	3.50E-04	3.36E-04	1.04
2nd	3.90E-04	4.15E-04	0.94
3rd	2.10E-04	2.13E-04	0.99
4th	3.80E-04	3.79E-04	1.00

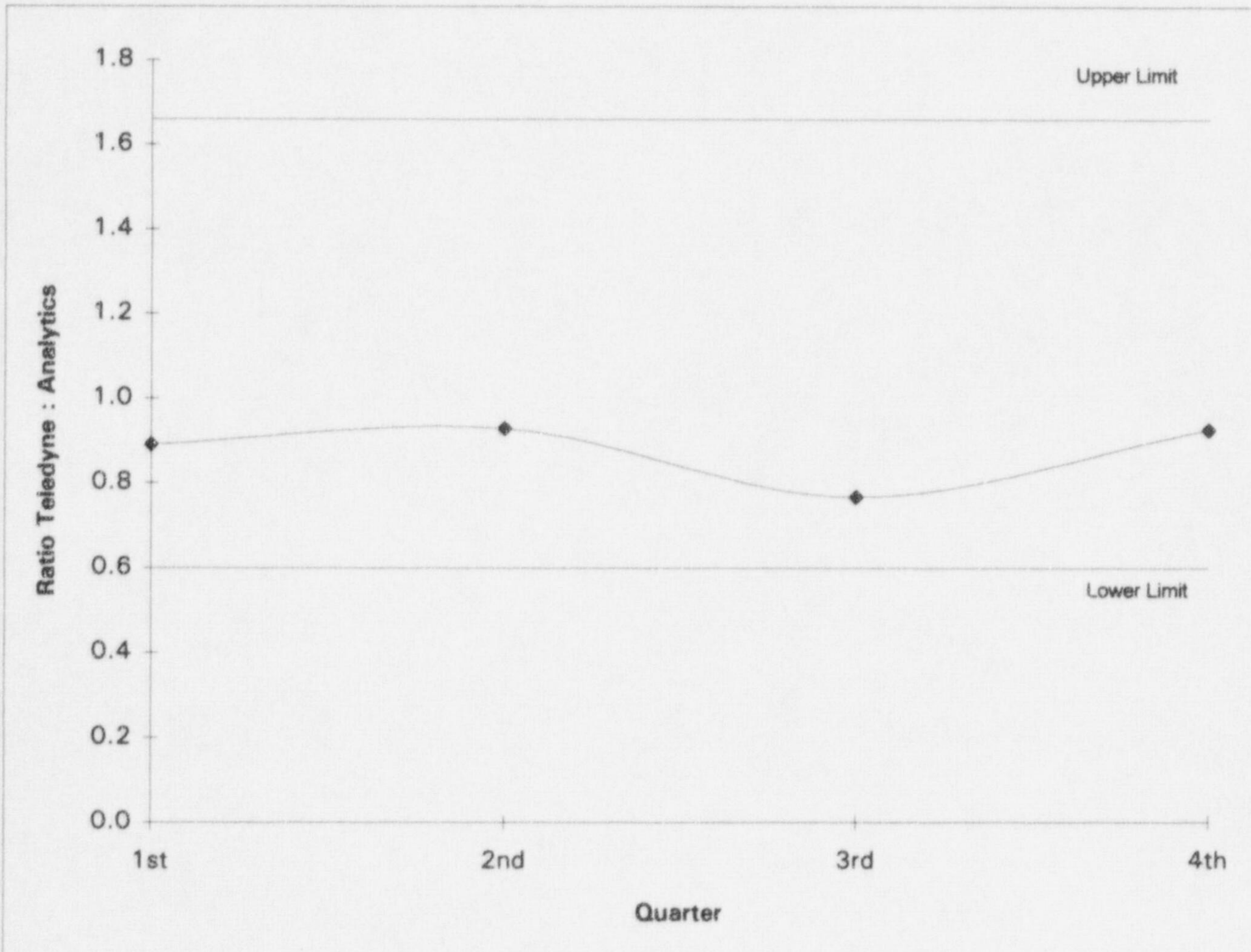
Resolution = 12.5
Agreement Criteria = 0.6 >= Ratio <=1.66



Fermi 2 1997
Environmental Laboratory Cross Check Program
Fe-55 Spiked Samples

Quarter	Teledyne Value (uCi/cc)	Ananlytics Value (uCi/cc)	Ratio
1st	4.20E-04	4.72E-04	0.89
2nd	3.60E-04	3.88E-04	0.93
3rd	1.90E-04	2.48E-04	0.77
4th	2.60E-04	2.81E-04	0.93

Resolution = 12.5
Agreement Criteria = 0.6 > = Ratio < = 1.66



Appendix G

Meteorological Data

Fermi 2 Joint Frequency Distribution Tables - 1997

Table G-1 *Stability Class* *A*

Wind Speed (MPH)	*N*	*NNE*	*NE*	*ENE*	*E*	*ESE*	*SE*	*SSE*	*S*	*SSW*	*SW*	*WSW*	*W*	*WNW*	*NW*	*NNW*	*Total*
0 *to* 0.75	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	**3**
0.76 *to* 2.5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
2.51 *to* 4.5	1	1	1	4	2	2	0	0	0	1	0	0	1	1	4	2	**20**
4.51 *to* 6.5	1	0	3	7	7	4	2	0	1	0	0	6	11	17	16	5	**80**
6.51 *to* 8.5	0	7	13	7	9	4	1	0	0	0	8	17	14	26	20	11	**137**
8.51 *to* 11.5	9	12	25	13	28	4	5	2	6	3	18	13	34	50	21	26	**269**
11.51 *to* 14.5	2	3	3	1	11	1	2	2	2	4	3	4	10	7	4	6	**65**
14.51 *to* 18.5	0	0	0	3	6	2	0	0	0	0	0	0	0	2	0	4	**17**
18.51 *to* 23.5	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	**2**
23.51 *to* 30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
30.51 *to* 39.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
39.51 *to* 42.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**13**	**24**	**45**	**37**	**65**	**18**	**10**	**4**	**9**	**8**	**29**	**40**	**70**	**103**	**65**	**54**	

Table G-2 ***Stability Class*** ***B***

Wind Speed (MPH)	*N*	*NNE*	*NE*	*ENE*	*E*	*ESE*	*SE*	*SSE*	*S*	*SSW*	*SW*	*WSW*	*W*	*WNW*	*NW*	*NNW*	*Total*
0 *to* 0.75	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	**3**
0.76 *to* 2.5	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	**4**
2.51 *to* 4.5	0	4	2	1	0	3	1	2	1	0	3	3	2	4	3	2	**31**
4.51 *to* 6.5	4	4	4	3	2	5	6	3	2	0	4	12	15	15	8	6	**93**
6.51 *to* 8.5	1	7	8	11	5	7	6	2	5	2	3	11	0	11	7	15	**101**
8.51 *to* 11.5	8	10	19	9	11	14	8	1	8	10	5	12	8	11	3	10	**147**
11.51 *to* 14.5	3	3	6	2	9	3	1	0	3	0	8	3	2	5	1	1	**50**
14.51 *to* 18.5	0	1	0	2	6	0	0	0	0	0	2	0	0	0	0	0	**11**
18.51 *to* 23.5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
23.51 *to* 30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
30.51 *to* 39.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
39.51 *to* 42.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**17**	**29**	**39**	**30**	**33**	**33**	**22**	**8**	**19**	**12**	**27**	**42**	**27**	**46**	**22**	**35**	

Table G-3 *Stability Class* *C*

Wind Speed (MPH)	*N*	*NNE*	*NE*	*ENE*	*E*	*ESE*	*SE*	*SSE*	*S*	*SSW*	*SW*	*W W*	*W*	*WNW*	*NW*	*NNW*	*Total*
0 *to* 0.75	1	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0	**5**
0.76 *to* 2.5	1	1	0	0	0	1	1	0	0	1	1	6	2	0	2	0	**16**
2.51 *to* 4.5	4	4	4	4	3	1	6	1	4	5	5	5	10	7	8	8	**79**
4.51 *to* 6.5	5	4	14	4	6	21	19	11	11	13	15	22	15	18	8	12	**198**
6.51 *to* 8.5	5	9	11	10	8	6	25	12	19	12	23	25	10	15	11	13	**214**
8.51 *to* 11.5	25	11	21	12	19	11	5	8	8	19	30	15	15	16	13	10	**238**
11.51 *to* 14.5	2	1	8	2	24	5	4	0	1	4	8	3	7	7	1	6	**83**
14.51 *to* 18.5	0	5	2	7	4	2	2	0	0	1	9	1	0	0	0	0	**33**
18.51 *to* 23.5	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	**2**
23.51 *to* 30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
30.51 *to* 39.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
39.51 *to* 42.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**43**	**35**	**60**	**40**	**65**	**47**	**62**	**33**	**43**	**55**	**92**	**78**	**60**	**63**	**43**	**49**	

Table G-4 ***Stability Class*** ***D***

Wind Speed (MPH)	*N*	*NNE*	*NE*	*ENE*	*E*	*ESE*	*SE*	*SSE*	*S*	*SSW*	*SW*	*WSW*	*W*	*WNW*	*NW*	*NNW*	*Total*
0 *to* 0.75	1	0	2	2	3	0	1	6	0	2	1	1	0	0	1	1	**21**
0.76 *to* 2.5	6	4	4	1	4	3	4	10	7	3	15	18	19	22	13	7	**140**
2.51 *to* 4.5	28	36	18	14	8	17	14	25	24	22	59	100	74	66	76	52	**633**
4.51 *to* 6.5	33	47	81	30	26	40	52	50	65	49	131	109	77	64	67	72	**993**
6.51 *to* 8.5	38	32	94	59	27	72	59	79	66	70	129	101	68	48	42	63	**1049**
8.51 *to* 11.5	49	35	63	46	60	30	54	50	50	132	151	56	38	28	23	31	**896**
11.51 *to* 14.5	8	8	30	18	23	5	18	4	10	28	76	22	11	18	1	5	**285**
14.51 *to* 18.5	2	1	3	3	10	0	4	0	0	11	24	14	0	2	0	0	**74**
18.51 *to* 23.5	0	0	0	1	0	1	2	0	0	1	8	1	0	0	0	0	**14**
23.51 *to* 30.5	0	0	0	0	[illegible]	0	0	0	0	0	1	0	0	0	0	0	**1**
30.51 *to* 39.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
39.51 *to* 42.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**165**	**163**	**295**	**174**	**161**	**168**	**208**	**224**	**224**	**318**	**595**	**422**	**287**	**248**	**223**	**231**	

Table G-5 *Stability Class* *E*

Wind Speed (MPH)	*N*	*NNE*	*NE*	*ENE*	*E*	*ESE*	*SE*	*SSE*	*S*	*SSW*	*SW*	*WSW*	*W*	*WNW*	*NW*	*NNW*	*Total*
0 *to* 0.75	1	1	2	1	0	2	1	0	2	3	1	0	1	1	0	1	**17**
0.76 *to* 2.5	13	8	4	2	0	3	4	4	17	15	23	31	36	31	30	12	**233**
2.51 *to* 4.5	37	17	6	9	15	9	9	24	32	43	102	73	48	75	71	51	**621**
4.51 *to* 6.5	23	27	13	14	22	25	16	22	41	46	56	39	28	29	20	43	**464**
6.51 *to* 8.5	14	10	18	12	12	19	28	27	37	53	50	12	19	10	5	10	**336**
8.51 *to* 11.5	5	4	4	3	9	12	23	25	29	73	24	1	1	5	0	2	**220**
11.51 *to* 14.5	1	0	0	0	1	0	2	2	8	24	19	0	0	1	0	0	**58**
14.51 *to* 18.5	0	0	0	0	0	0	0	0	1	11	5	0	0	0	0	0	**17**
18.51 *to* 23.5	0	0	0	0	0	0	0	0	0	3	1	1	0	0	0	0	**5**
23.51 *to* 30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
30.51 *to* 39.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
39.51 *to* 42.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**94**	**67**	**47**	**41**	**59**	**70**	**83**	**104**	**167**	**271**	**281**	**157**	**133**	**152**	**126**	**119**	

Table G-6 *Stability Class* *F*

Wind Speed (MPH)	*N*	*NNE*	*NE*	*ENE*	*E*	*ESE*	*SE*	*SSE*	*S*	*SSW*	*SW*	*WSW*	*W*	*WNW*	*NW*	*NNW*	*Total*
0 *to* 0.75	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	**2**
0.76 *to* 2.5	7	3	2	0	0	0	3	1	10	7	16	12	38	31	13	10	**153**
2.51 *to* 4.5	6	1	0	1	4	4	9	1	8	14	41	31	13	35	28	42	**238**
4.51 *to* 6.5	9	0	0	0	1	4	9	7	3	13	1	0	1	3	2	6	**59**
6.51 *to* 8.5	0	1	0	0	3	6	4	5	1	12	0	0	0	0	0	0	**32**
8.51 *to* 11.5	0	0	0	0	1	0	2	6	9	10	0	0	0	0	0	0	**28**
11.51 *to* 14.5	0	0	0	0	0	0	0	2	4	2	0	0	0	0	0	0	**8**
14.51 *to* 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
18.51 *to* 23.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
23.51 *to* 30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
30.51 *to* 39.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
39.51 *to* 42.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**22**	**5**	**2**	**1**	**9**	**14**	**27**	**22**	**35**	**59**	**58**	**43**	**52**	**70**	**43**	**58**	

Table G-7 ***Stability Class*** ***G***

Wind Speed (MPH)	*N*	*NNE*	*NE*	*ENE*	*E*	*ESE*	*SE*	*SSE*	*S*	*SSW*	*SW*	*WSW*	*W*	*WNW*	*NW*	*NNW*	*Total*
0 *to* 0.75	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	**2**
0.76 *to* 2.5	0	0	0	0	2	1	2	0	0	3	3	11	23	29	18	7	**99**
2.51 *to* 4.5	0	0	0	0	0	1	0	2	3	9	4	20	24	27	18	16	**124**
4.51 *to* 6.5	0	0	0	0	1	0	1	0	1	3	0	0	0	0	0	3	**9**
6.51 *to* 8.5	0	0	0	0	2	2	2	3	0	0	0	0	0	0	0	1	**10**
8.51 *to* 11.5	0	0	0	0	2	0	6	1	3	0	0	0	0	0	0	0	**12**
11.51 *to* 14.5	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	**2**
14.51 *to* 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
18.51 *to* 23.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
23.51 *to* 30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
30.51 *to* 39.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
39.51 *to* 42.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**7**	**4**	**14**	**6**	**8**	**15**	**7**	**31**	**47**	**56**	**36**	**27**	

1997 Wind Rose
All Stability Classes

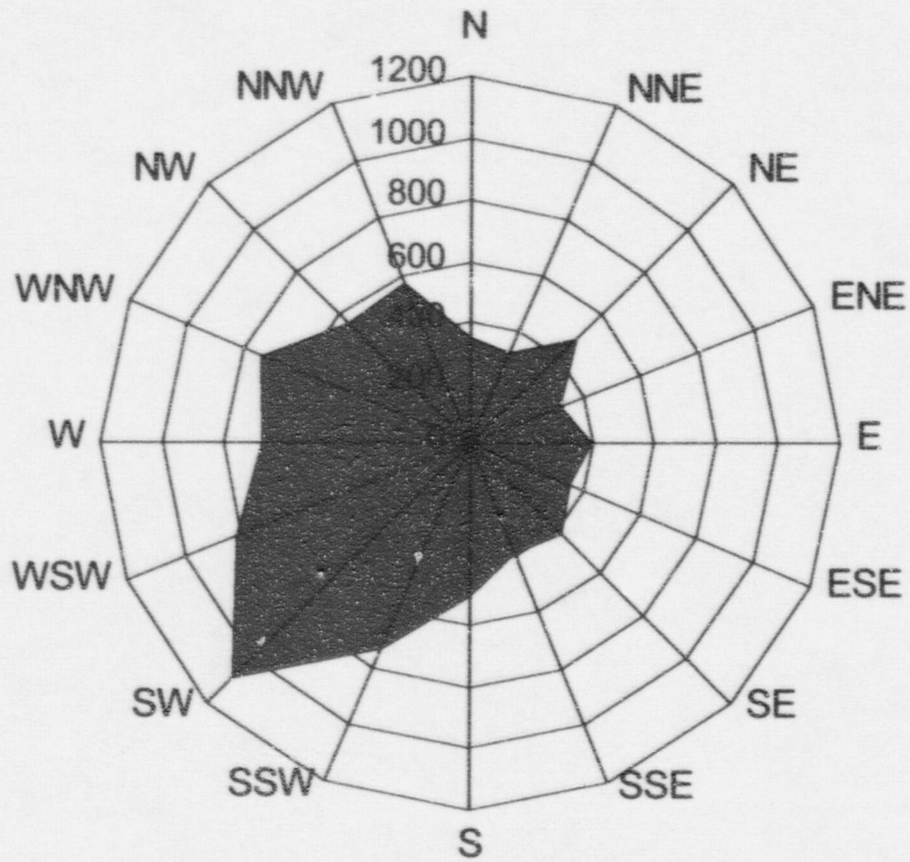


Figure 11

Direction and number of hours the wind was traveling from at 10 meters.

Appendix H

Glossary of Terms

Glossary of Terms

activation products	Radioactive material that is created when stable substances are bombarded by neutron radiation.
ALARA	Acronym for "As Low As Reasonably Achievable," a basic concept of radiation protection that specifies radioactive discharges from nuclear plants and radiation exposure to personnel be kept as far below regulatory limits as possible.
alpha particle	A positively charged particle ejected from the nuclei of some radioactive elements. It is identical to a helium nucleus, and has a mass number 4 and a charge of +2. It has low penetrating power and short range. Alpha particles are easily stopped by a thin layer of paper or fabric, or the dead outer layer of skin cells.
atom	The smallest portion of an element that shares the general characteristics of that element and cannot be divided or broken up by chemical means. An atom has a nucleus, composed of positively charged protons and electrically neutral neutrons, around which orbit negatively charged electrons.
background radiation	The radiation in man's environment, including cosmic rays from space and radiation that exists everywhere--in the air, in the earth, and in man-made materials that surround us, In the United States, most people receive 100 to 250 millirem of background radiation per year. Common sources of man-made background radiation include consumer products such as color televisions, radium dials on watches or clocks, smoke detectors, coast-to-coast jet flights, construction materials, and certain foods.
beta particle	A charged particle emitted from a nucleus during radioactive decay, with a mass equal to 1/1837 that of a proton. A negatively charged beta particle is identical to an electron. A positively charged beta particle is called a positron. Beta particles are easily stopped by a thin sheet of metal, plastic or wood.
composite sample	A sample made of grab or continuous samples combined to represent a particular location or a set period of time (e.g., four weekly water samples combined to make one monthly composite sample).

continuous sample	A continuous sample is one that collects samples non-stop and is used to evaluate conditions over a specific period of time. The typical continuous samples collected at Fermi 2 include TLDs and air samples.
control location	A sample collection location generally more than 10 miles away from Fermi 2. Analyses of samples collected at control locations provide information on normally-occurring background radiation and radioactivity.
coolant	A fluid, usually water, used to cool the nuclear reactor core by transferring the heat energy emitted during the fission process into the fluid medium.
cosmic radiation	Penetrating ionizing radiation, both particulate and electromagnetic, that originates in space.
critical receptor	The segment of the population that could receive the greatest radiation dose.
curie (Ci)	The basic unit used to describe the intensity of radioactivity in a sample or material. One curie is equal to 37 billion disintegrations per second, which is approximately the rate of decay of one gram of radium. A curie is also a quantity of any radionuclide that decays at a rate of 37 billion disintegrations per second.
dose	A quantity (total or accumulated) of ionizing radiation received.
dose rate	The radiation dose delivered per unit of time. Measured, for example, in rem per hour.
effluent	In general, a waste material, such as smoke, liquid, industrial refuse, or sewage discharged into the environment. Effluents discharged from the Fermi 2 Nuclear Power Plant include liquid and gaseous media containing extremely small concentrations of radionuclides. The concentrations released are well below the limits established by the NRC.
electron	An elementary particle with a negative charge and a mass 1/1837 that of the proton. Electrons orbit around the positively charged nucleus. In an electrically neutral atom, the negative charges of the electrons are balanced by the positive charges of the protons.

exposure	The absorption of radiation or ingestion of a radionuclide. Acute exposure is generally accepted to be a large exposure received over a short period of time. Chronic exposure is low level exposure received during a lifetime or over a long period of time.
external radiation	Exposure to ionizing radiation when the radiation source is located outside of the body.
fission	The splitting or breaking apart of a heavy atom into two or more fragments. When a heavy atom such as uranium is split, large amounts of energy in the form of heat, radiation, and one or more neutrons are released.
fission gases	Those fission products that exist in the gaseous state. Primarily the noble gases (krypton, xenon, etc.).
fission products	The fragments formed by the fission of heavy elements, plus the nuclides formed by the fragments' radioactive decay.
gamma ray	High energy, short wavelength electromagnetic radiation emitted from the nucleus of a radioactive atom. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating but may be shielded by dense materials, such as lead or concrete. Gamma rays are similar to X-rays, but are usually more energetic.
grab samples	A grab sample represents a single sample collected in a finite period of time.
half-life	The time in which half the atoms of a particular radioactive substance disintegrate to another nuclear form. Measured half-lives vary from millionths of a second to billions of years.
indicator location	A sample collection location generally within 10 miles of Fermi 2. Analyses from samples collected at indicator locations provide information on the radiological impact, if any, Fermi 2 has on the surrounding environment.
internal radiation	Nuclear radiation resulting from radioactive substances in the body. Some examples are iodine-131 deposited in the thyroid gland and strontium-90 deposited in bone tissue.
ionizing radiation	Any radiation capable of displacing electrons from atoms or molecules, thereby producing ions. For example, alpha and beta particles, gamma and X-rays, neutrons, and ultraviolet light.

isotope	One of two or more atoms with the same number of protons, but different numbers of neutrons in their nuclei. Thus, carbon-12, carbon-13, and carbon-14 are isotopes of the element carbon; the numbers denoting their approximate atomic weights. Isotopes have the same chemical properties, but often different physical properties (for example, carbon-12 and carbon-13 are stable, while carbon-14 is radioactive).
lower limit of detection (LLD)	The smallest amount of sample activity that will give a net count, for which there is a confidence at a predetermined level, that the activity is present. The LLD is actually a measure of the ability of an individual analysis to detect extremely minute amounts of radioactivity in a sample.
mean	Arithmetic average. In a series of 3 or more numbers, the mean is calculated by the equation: $X = (xl + x2 + xn)/n$ Where n is the number of observations in a data set, and xl, x2, ...xn are the various observations.
microcurie	One-millionth of a curie.
millirem	One-thousandth of a rem.
neutron	An uncharged elementary particle with a mass slightly greater than that of a proton, and found in the nucleus of every atom heavier than hydrogen-1.
noble gas	A gaseous chemical element that does not readily enter into chemical combination with other elements. An inert gas such as krypton, xenon, neon or argon.
nuclide	A general term referring to all known isotopes, both stable (279) and unstable (about 5000), of the chemical elements.
picocurie	One-trillionth of a curie.
quality control (QC)	The field check or verification of work while it is being performed to assure that the task is properly done.
radiation	The conveyance of energy through space, for example, the radiation of heat from a stove. Ionizing radiation is the emission of particles or gamma rays from the nucleus of an unstable (radioactive) atom as a result of radioactive decay.

radioactive decay	The decrease in the amount of radioactivity with the passage of time due to the spontaneous emission of particulate or gamma radiation from the atomic nuclei.
radioactivity	The spontaneous emission of radiation from the nucleus of an unstable isotope. Radioactivity is a process and radiation is the product.
radioiodine	A radioactive isotope of iodine. The radioisotopes of iodine are among the most abundant of the fission products. All told, 27 isotopes of iodine are known to exist, but only the naturally-occurring iodine-127 is stable. Of the remaining 26 radioisotopes, 12 are produced during fission and these have half-lives ranging from 1.5 seconds to 16 million years.
radioisotope	The term "radioisotope" is used to specifically describe the relationship between an element and a radioactive isotope of that element. For instance, in describing Cs-137, one could state that Cs-137 is a radioisotope of cesium (stable).
rem	Acronym for "roentgen equivalent man". The unit of dose of any ionizing radiation that produces the same biological effect as a unit of absorbed dose of X-rays.
terrestrial radiation	The portion of natural radiation (background) that is emitted by naturally occurring radioactive materials in the earth.
tritium	A radioactive isotope of hydrogen (one proton, two neutrons). Because it is chemically identical to natural hydrogen, tritium can easily be taken into the body by any ingestion path. Tritium decays by beta emission. Its radioactive half-life is about 12-1/2 years.