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Nuclear Operations

April 30, 1993
NRC-93-0029

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Reference: Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

Subject: Annual Radiological Environmental Monitoring Report

Pursuant to section 6.9.1.7 of the Technical Specifications, please find attached the 1992 Annual Radiological Environmental Monitoring Report for Fermi 2.

If you should have any questions or comments regarding this report, please contact Joseph M. Pendergast, Compliance Engineer, at (313) 586-1682.

Sincerely,

DRGipson

cc: w/encl.

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Fermi 2 and the Environment

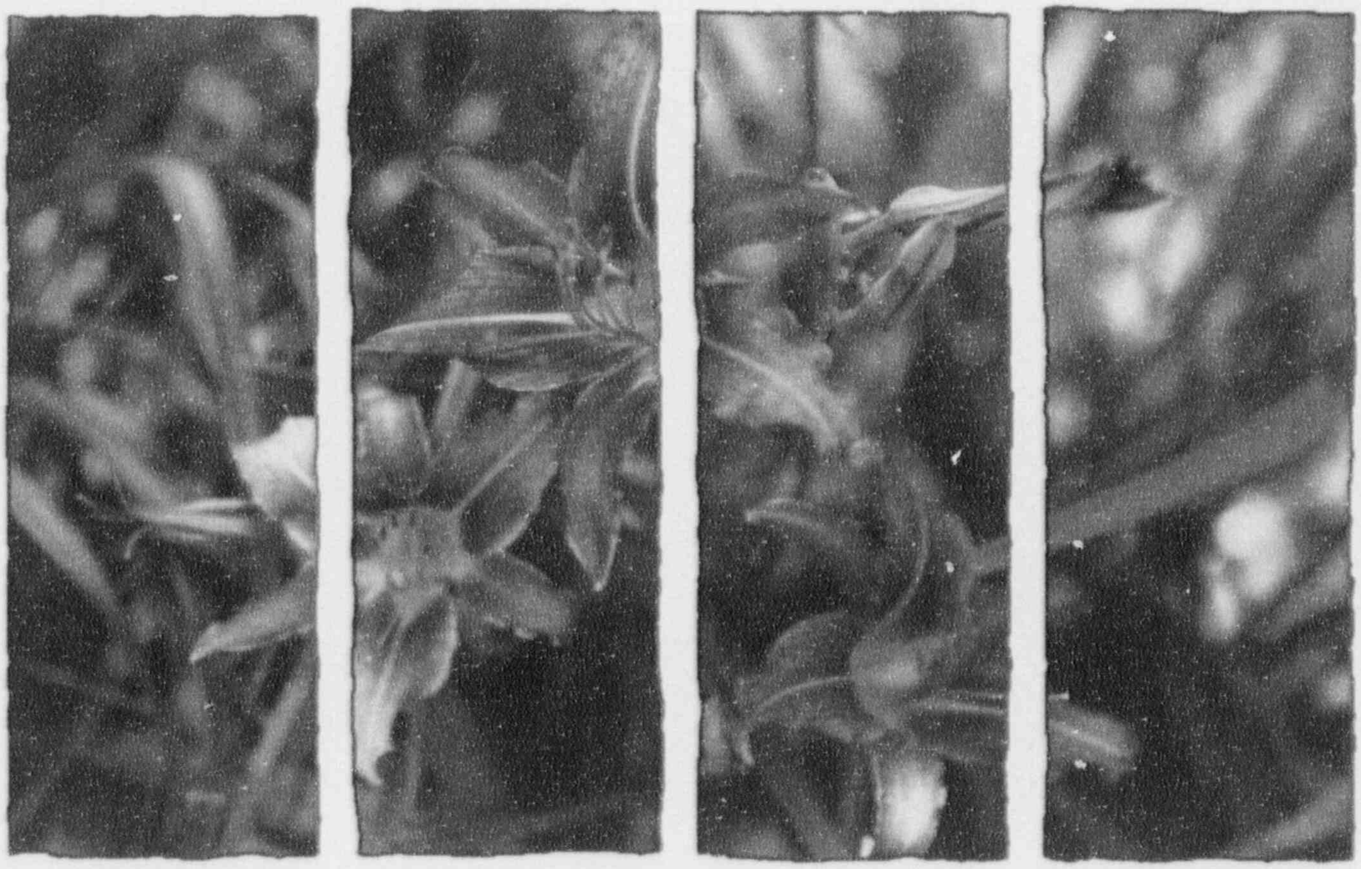
1992 Annual Radiological Environmental Monitoring Report

Detroit Edison

Contents

Some of the photographs published in this report were among the winners in photo contests sponsored by Detroit Edison and the Monroe Camera Club.

Radiological Environmental Monitoring Program



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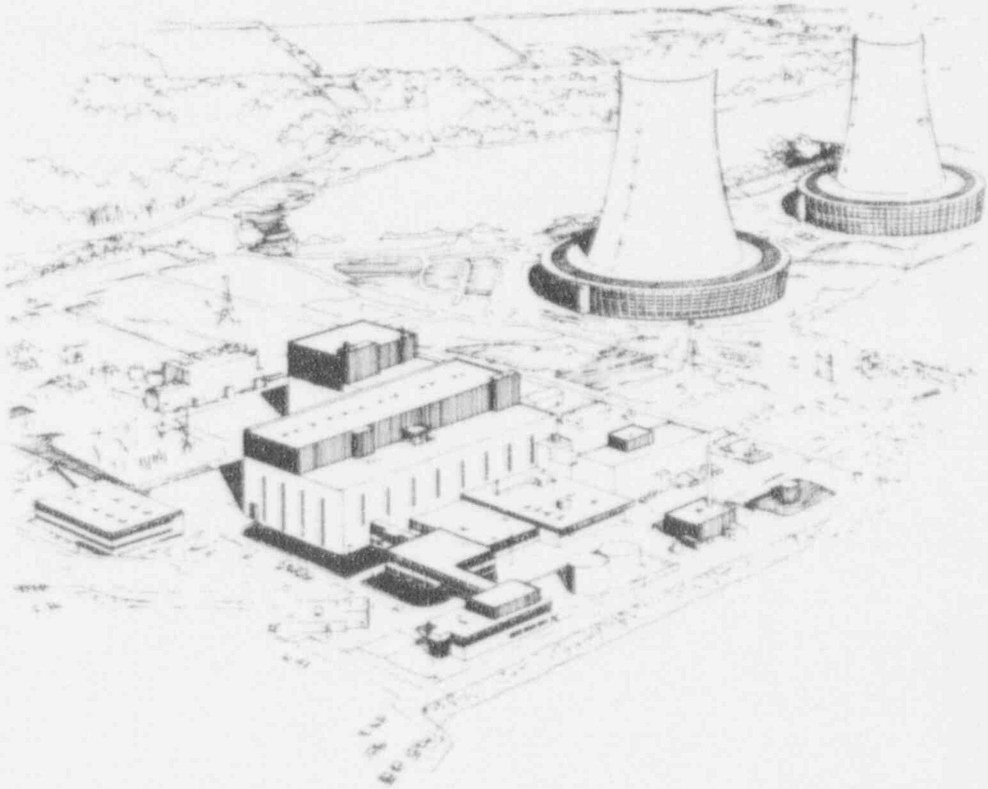
Fermi 2 and the Environment



From land, lake or air the cooling towers of Detroit Edison's Fermi 2 nuclear power plant are a clearly visible landmark in Monroe County, Michigan. These towers symbolize the important economic and environmental benefits of nuclear energy—America's second largest source of electric power.

Without this clean method of generating electricity, many of us might literally be in the dark. Yet in terms of public awareness of what nuclear energy is and why it's important, many people are in the dark. Popular misconceptions, fear of the unknown, and lack of basic information unnecessarily cloud the plant towers in mystery. But when the facts are laid out, they reveal the critical importance of this U.S. energy resource.

You'll find detailed information on nuclear energy and the Fermi 2 power plant in this report. The following pages detail the facts: the key role of nuclear power in the U.S. energy agenda, why Fermi 2 was constructed, how it operates and the benefits it provides to Monroe County. A summary of the 1992 environmental monitoring program which measures Fermi 2's impact on the surrounding environment is also provided.

What is the importance of nuclear energy?

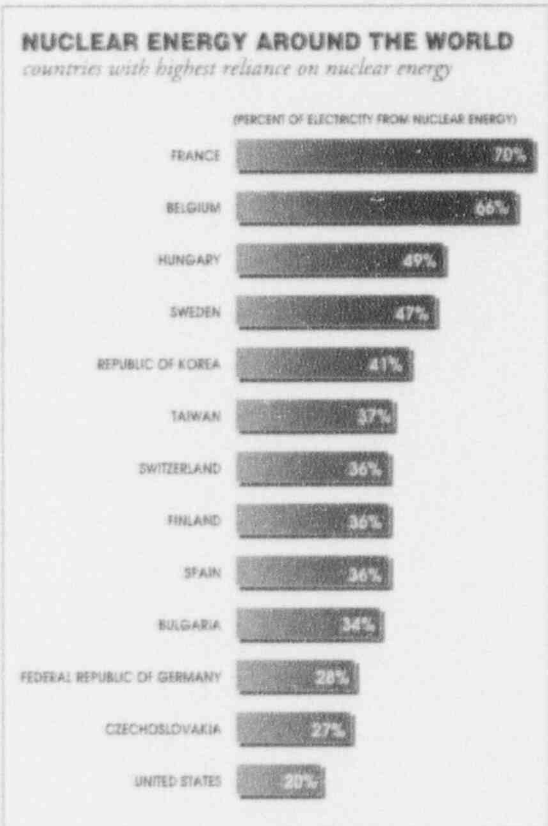
One of the major reasons why nuclear energy is so important to our quality of life is that it helps preserve our country's energy independence.

Only thirty years ago, nuclear energy was a developmental futuristic technology—the stuff of science fiction, it seemed. Yet today, approximately 108 nuclear power plants around the country provide more electricity than oil, natural gas or hydropower technologies.

Detroit Edison contributed heavily to the early history of nuclear power development through the design, construction and operation of the Fermi 1, the first commercial liquid-metal breeder reactor in the world.

Reducing dependence on imported oil

The dangers of depending on foreign oil have already hit home. During the oil embargo of 1973, Americans waited in long lines at the gas station. In 1990, the United States along with the rest of the world was drawn into the Persian Gulf conflict when Iraq invaded Kuwait. The imperative of developing alternative energy sources is widely recognized as critical to national and global stability. Currently, the United States imports almost half of the oil it uses—at a cost of nearly $1 billion per week. Without nuclear energy, which cuts demand for foreign oil by more than 300 million barrels annually, those costs would be even higher. Nuclear power plants reduce U.S. dependence on foreign suppliers and help lower the national trade deficit.



Source: U.S. Council for Energy Awareness

Helping sustain economic growth

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 electric power necessary to launch successful business start-ups and maintain industrial strength. Electricity is so essential to our way of life that we take it for granted.

Protecting the environment

Nuclear energy has helped create a cleaner environment throughout the world. Nuclear power plants produce electricity by splitting uranium atoms, not by burning fuels. That's why they don't pollute the air with dust and emissions of greenhouse gases (like carbon dioxide) that occur from other sources such as coal, natural gas or oil. France, for example, tripled its nuclear energy production during the 1980s in response to concerns about imported oil. During that same period, overall pollution from the French electric power system dropped 80 to 90 percent.

Meeting the needs of a growing population

The demand for electricity is growing as the population increases. Since the 1973 oil embargo, 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.

The outlook for nuclear energy is as bright as its past accomplishments. Building on the proven benefits over the past three decades, government and industry are developing advanced-design nuclear power plants to achieve lower costs, higher-than-ever safety standards and more efficient performance. In the decades to come, nuclear energy will play a major role in "electrifying" our economy while also protecting our environment.

The History of Fermi 2

The history of the Enrico Fermi Atomic Power Plant Unit 2, known as "Fermi 2," began in the late 1960s. Its purpose was twofold: (1) to meet the fast-growing demand for electricity in southeastern Michigan, and (2) to provide the region with a diversity of fuels for generating electricity.

Site selection

In 1968, Detroit Edison announced plans to construct Fermi 2 along the Western shore of Lake Erie in Frenchtown Township. This location was selected for its suitability in maintaining an efficient, cost-effective supply of electricity for the some five million people then in Detroit Edison's service area. Additionally, a nuclear power plant would pose none of the environmental disadvantages to this beautiful area that are associated with other power supplies.

A challenging course

The development of Fermi 2, from its inception in 1968 to its commencement of operations in 1985, followed a course full of challenges arising from the turbulent economic, technological and regulatory changes of that period. The primary driving force in this story was the visionary leader Walker L. Cisler, CEO of Detroit Edison (1954-1971) and later board chairman (1964-1975). Cisler foresaw the need for nuclear power in an expanding economy's increasing demand for electricity. His organizational and managerial skill translated vision into action as he attracted top-caliber nuclear engineers for the project management team.

The chief goals set by Detroit Edison in constructing Fermi 2 were to design and build a safe, reliable plant at a reasonable cost. But the company ran into unforeseen events that slowed construction and sharply boosted costs. In the 1970s, newly established federal regulatory agencies and environmental policies, combined with rigorous self-regulation in the utilities industry, triggered combined delays of five to six years in licensing and construction. But Detroit Edison persisted in its commitment for long-term growth and securing the economic and environmental health of southeastern Michigan.

Environmental Accomplishments for Fermi 2

Today, the cooling towers of Fermi 2 are visible evidence of the successful results of this persevering commitment to safe, clean, efficient and long-term energy production. Detroit Edison continues to be a visionary leader in taking a proactive role in environmental issues and providing industry leadership in radioactive source term reduction. For example, in 1992 the radiation dose due to radioactive effluents discharged from Fermi 2 was less than one percent of federal limits.

In a cooperative program of wildlife habitat restoration with the Wildlife Division of the Michigan Department of Natural Resources, Detroit Edison maintains a two-acre site for raising Sichuan/ringneck pheasants that are released throughout southeastern Michigan.

Other accomplishments for Fermi 2

• The indicators for top performance of Fermi 2 were all on or better than target throughout 1992. Fermi 2 operation standards are so proficient, that several have been adopted as industry standards at the Institute of Nuclear Power Operations.

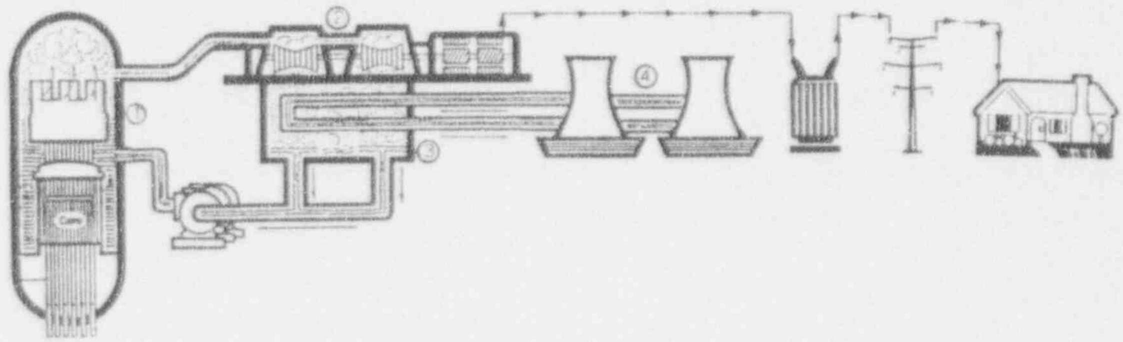
In 1992, ratings for occupational radiation exposure at Boiling Water Reactors, Fermi 2 ranks second best in the industry.

• The Nuclear Regulatory Commission gave the plant its best rating yet in its Systematic Assessment of Licensee Performance (SALP).

• Despite a refueling outage which lasted seven days longer than scheduled, Fermi 2 set a 79% Net Capacity Factor in 1992.

• Plant personnel worked more than 1.5 million consecutive hours without a lost workday due to injury.

How Fermi 2 Works



The benefits of nuclear energy production to the public often are hidden behind an inadequate understanding of how nuclear power plants work. Basically, nuclear plants function like coal, oil and gas power plants by using heat to boil water into steam, which in turn spins a turbine that drives an electric generator.

The only difference between nuclear and conventional power plants is the element used to generate heat: instead of burning coal, oil or gas, nuclear plants split atoms of uranium (a naturally occurring element) in a chain reaction called "fission" that releases tremendous amounts of heat. This splitting, or fission, takes place inside a large containment vessel called a reactor (at Fermi 2, a "boiling water" reactor rather than a "pressurized water" reactor—the difference lies simply in how the water is brought to a boil).

How the heat is generated and collected

As shown above, the reactor (1), surrounded by steel-reinforced concrete, is carefully designed to trigger and control the atomic reaction and capture the resulting heat. At the center of the reactor vessel, ceramic pellets of uranium fuel are stacked inside twelve-foot-long tubes, or "fuel rods," made of zirconium alloy and spaced in bundles. Inserted between the fuel rods are "control rods," made of a special material that controls the speed of the nuclear reaction.

These rod assemblies are encased in a six-inch thick steel pressure vessel, which in turn is encased in the massive steel-reinforced concrete containment structure of the reactor building. When water is circulated through the reactor, the heat it collects from the fissioning uranium atoms causes it to boil.

The resulting steam travels at high pressure to the turbine (2). The force of the steam spins the turbine like a high-speed windmill, which in turn spins the rotor of the electric generator. The electricity that is generated is then transmitted to substations and eventually out to distribution circuits, which feed the demands of the homes, farms, and businesses of southeastern Michigan.

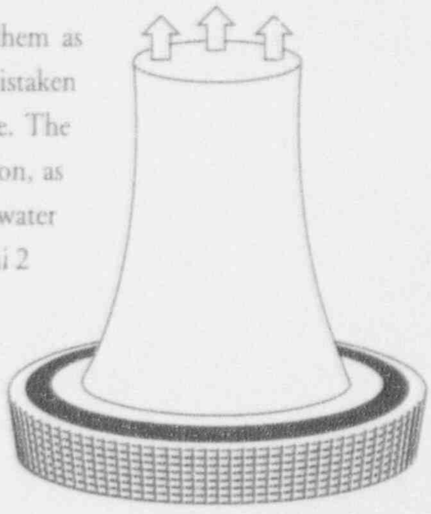
After the steam looses much of its energy by spinning the turbine, it passes through the condenser (3), which contains cooling water. Once the steam has cooled and condenses back into water, it is pumped back through the reactor to collect heat again.

The cooling water in the condenser travels a separate path from the water pumped through the reactor. This cooling water is pumped from a 30-million-gallon reservoir to the condenser, where it picks up heat as it does its job of cooling the steam returning from the turbine. The cooling water releases this excess heat as water vapor that looks like steam when it is pumped to the cooling towers (4). Once it has cooled to its original form as water, it is pumped back to the reservoir.

The cooling towers

Many people wonder whether the water vapor emitted by the cooling towers of Fermi 2 is radioactive. The simple explanation above of how Fermi 2 works reveals that it is not radioactive, because the water vapor is only from the cooling water, not the water circulated through the reactor. The design and operation of Fermi 2 do not permit the cooling water ever to come in contact with the steam from the reactor. Therefore, the plumes you see above the cooling towers are water vapor—like watching your breath come out in puffs on a cold day.

The next time you see the Fermi 2 cooling towers, think of them as structures designed to process clean water—a far cry from the mistaken associations with radioactivity still harbored by too many people. The hourglass shape of the Fermi 2 towers facilitates natural convection, as cool air enters at the bottom and rises to the top. This air cools the water pumped into the tower. This efficient process means that the Fermi 2 cooling towers use no energy to circulate air through them—unlike other designs, which do not use convection and therefore must resort to energy-consuming fans to pull the air through.



Radiation: Shedding Light on Clouded Perceptions

Radiation has become a familiar term in recent decades. But that doesn't mean the term is clearly understood. Many perceptions of radiation remain clouded because of inadequate understanding of what radiation actually is, where it comes from and the benefits it provides.

Simply defined, radiation is the emission of energy from a source, similar to heat from a stove. Radiation is given off by radioactive materials, which have an "unstable" atomic configuration. The unstable atoms undergo a natural process of "decay" in which they emit rays or particles (radiation). Some of the resulting products—the atomic fragments released when the nucleus splits—are themselves radioactive, and some revert to a "stable," nonradioactive state.

Scientists measure radiation exposure in units called millirems. A millirem measures the effect of radiation on our bodies, as degrees measure temperature and inches measure distance.

After more than ninety years of intensive study, radiation is the most scientifically understood, easily detected and precisely measured, effectively controlled and strictly regulated of all environmental agents. It can be categorized in two types: natural background radiation and man-made radiation.

Natural background radiation

Because radiation cannot be detected with our basic human senses (sight, hearing, taste, touch and smell), many people are unaware that the earth is full of naturally occurring radioactivity, called "natural background radiation."

For example, we are continually exposed to radiation from radon in the air (the biggest single source); radioactive potassium in our food and water; radioactive uranium, radium and thorium in the earth's crust; and radioactivity from cosmic rays and from the sun.

This natural background radiation makes up nearly 85 percent of total annual exposure—an average of 300 millirems each year for individuals in the United States. The remainder, 15 percent, is generated by man-made sources.

Man-made radiation

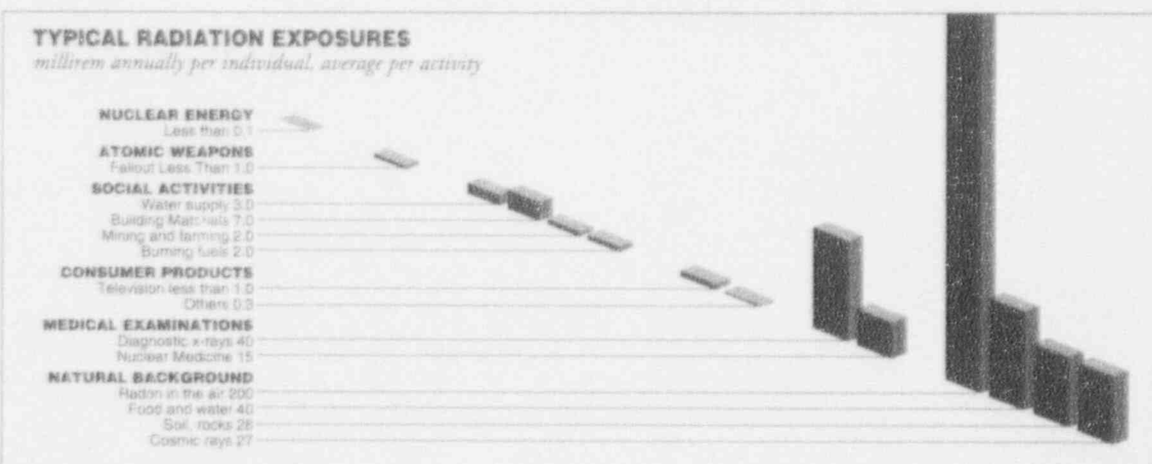
We use radioactive materials in hundreds of beneficial and life-saving ways. For example, many smoke detectors use radioactive materials. Doctors use radiation in X-ray equipment. Nuclear power plants use radioactive material as fuel.

Many people mistakenly distinguish between "natural" and "unnatural" radiation, assuming that one is more harmful than the other. But the fact is that radiation is the same, whether it occurs naturally in the environment or is produced by medical and industrial activities.

How radiation affects us

Very large amounts of radiation—far above the levels we encounter in daily life—can produce cancer and genetic defects. We know this from the few groups of people who have been subjected to large radiation exposures—tens of thousands of millirems and above. These groups include the men and women who pioneered medical radiology and survivors of the atomic bombs dropped on Hiroshima and Nagasaki during World War II.

But radiation from natural and man-made sources generally involves little risk. Scientific studies conducted over several decades indicate that exposures below ten thousand millirems have no measurable effect on humans. Primary health effects associated with radiation show no correlation with low-level exposures. At such low radiation levels, the probability of these health effects follows the same pattern of statistics expected for their occurrence in the general population.



Source: National Council on Radiation Protection and Measurements

Fermi 2 Radiation in Perspective

To put this in perspective for people living near Fermi 2, radiation exposure due to radioactive products from nuclear power generation must be considered relative to the radiation exposure from all other sources.

This comparison has been performed by the National Council on Radiation Protection and Measurements (NCRP), an independent body of experts on radiation and its effects on human beings. The NCRP has established guidelines and recommended limits for human radiation exposure. It uses an "average annual effective dose equivalent" to index comparative radiation exposures from varying sources—in cross-comparison and in relation to established radiation protection standards.

Documented in the publication "NCRP Report No. 93: Ionizing Radiation Exposure of the Population of the United States," the NCRP estimates the average annual effective dose equivalent (due to natural background radiation and man-made sources) as 360 millirems for a U.S. resident. This dose, roughly equivalent to 24 chest X-rays, is primarily the result of radon gas continually emitted from the earth.

How much of this dose is attributable to radioactivity from the use of nuclear fuel activity? The NCRP estimates that radiation exposure from nuclear energy accounts for less than one-tenth of one percent of an average person's annual dose.

Still, many people are concerned that the atomic chain reaction occurring in nuclear power plants might somehow trigger a bomb-like nuclear explosion. Or they assume that radioactivity leaks undetected from nuclear power plants, putting those within the immediate vicinity at great risk. Again, a simple presentation of facts clears these misperceptions.

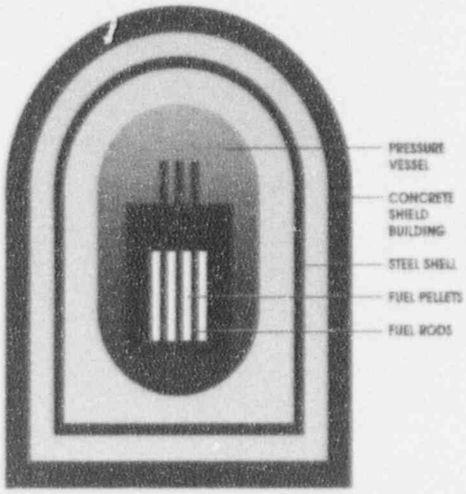
The barriers to radioactivity at Fermi 2

At Fermi 2, the fission of uranium atoms is controlled carefully through the addition or removal of materials that slow the rate of the chain reaction. The design makes it impossible for an instantaneous, uncontrolled reaction, such as that occurs in a nuclear bomb, to take place.

Fermi 2 is engineered and physically constructed to provide multiple barriers against the release of radioactive materials that are the result of fission. There are three primary barriers in the reactor.

Barrier 1 is the nuclear fuel itself. Most of the radioactive fission products never escape from the uranium pellets stacked inside the fuel rods; only a fraction migrate outside the ceramic pellets.

Multiple barriers against release of radioactivity



Source: U.S. Council for Energy Awareness

The pellets are encased in a zirconium alloy fuel rod. The fraction of material that escapes from the pellets becomes trapped in the "air gap" between the fuel pellets and the inside of the fuel rod. After three or four years, these accumulated fragments can reduce the efficiency of the chain reaction—like ashes smothering a fire—and the rod must be replaced. During the life of the fuel rod, microscopic cracks may occur as an unavoidable result of operating the reactor. In this case, the fission products may escape from the rod and are contained in the water circulated through the reactor vessel.

Barrier 2 is the reactor vessel itself, which seals in the water as it cycles through the steel pressure vessel in which the rods are contained, continues to travel as steam through the plant system, and returns to water in the condenser and then back into the reactor.

Barrier 3 is the massive concrete shielded building which has been designed and built to withstand floods, earthquakes, tornados and fires and continue to isolate radioactive materials from the environment.

These multiple barriers prevent all but a tiny fraction of the radioactivity generated in the reactor core from reaching even the threshold of release to the environment. As we will see in the following section, the Fermi 2 buildings provide a fourth barrier to the release of radioactive materials.

Environmental containment systems at Fermi 2

In any facility with as much plumbing as Fermi 2, some leakage is unavoidable. Certain small leaks may, in fact, be required for some plant equipment to ensure normal operation of seals and bearings.

The designers of Fermi 2 anticipated this leakage and specifically designed the plant to prevent radioactive material from escaping directly to the environment. They created systems to contain and treat water, airborne particles and byproduct gases.

Water treatment systems at Fermi 2 collect and store untreated liquid waste from plant buildings. When water carrying radioactive products leaks from plant piping, for example, it collects and flows into floor drains inside the Fermi 2 buildings. These liquids are routed for processing to various building basins or sumps through an extensive drainage system. The sumps are then pumped to a system carefully designed to filter the water so it can be reused.

As the liquids are collected in large holding tanks, some of the radioactive products decay into non-radioactive forms. As waste liquid fills one tank, it is pumped into another tank filled with a filter or resin like the one in home water softeners. As the resin attracts certain molecules in the water, it removes most of the impurities—including most of the dissolved and suspended particles which may be radioactive. If any water must be discharged, the waste handling system then mixes the treated water with clean water from the Fermi 2 cooling pond before it goes into Lake Erie. This process renders the concentration of discharged radioactive products to be close to background radioactivity naturally occurring in the lake.

Air handling systems at Fermi 2 function by controlling and directing the amount of air flow inside Fermi 2 buildings. As some of the water leaking from pipelines evaporates, radioactive products may become airborne. The air handling systems allow Detroit Edison personnel to monitor the amount of radioactivity in the air stream.

Normal operation of the plant creates another source of airborne radioactivity, namely radioactive particles that are radioactive gases created inside the reactor core. These gaseous byproducts are carried out of the reactor with the steam, flowing through the turbine and into the condenser. As the gases accumulate in the air space of the condenser, they must be continuously pumped out. Otherwise, they would prevent the condenser from working properly, just as your car would not work very long with a plugged exhaust pipe.

The gases are pumped from the condenser into a large pipe, designed to require a long time for the gases to travel through it. This is why it's called the "delay pipe." During the long travel through the delay pipe, most of the radioactive gases decay into non-radioactive forms. The gas stream is filtered and then sent through large tanks containing charcoal, which helps remove still more of the radioactive gases. The gas stream emerging from the other end of the charcoal tanks, which is much less radioactive than the gas stream entering the tanks, is mixed with air taken from the rooms of the plant. The air stream and gas stream mix as they leave the plant through an exhaust pipe on top of the reactor building. The emissions from this exhaust pipe are continuously monitored.

Through these carefully constructed systems for accommodating leaks and treating the flow of liquids, air circulation and gaseous by-products through the Fermi 2 plant, Detroit Edison is able to provide a safe working environment for its employes and monitor the low level of radioactivity released into the environment.

Staying abreast of Fermi 2 and the environment

To ensure that in generating electricity, nuclear power plants do not expose nearby residents to unacceptable risks, the Nuclear Regulatory Commission imposes strict operating guidelines on liquid and gaseous releases. These guidelines, which are part of the Fermi 2 operating license, limit the dose to the most highly exposed population groups to a small fraction of the radiation that occurs from natural background sources. Detroit Edison scrupulously adheres to these limits while making every effort to release far less than what the limits allow.

Introducing the REMP

The federal government establishes and the Nuclear Regulatory Commission enforces standards for the emission of radioactive effluents (materials discharged into the environment, generally waste products). Title 10 of the Code of Federal Regulations (CFR), Part 50, Appendix I, Section 4.B, requires that Detroit Edison establish an appropriate surveillance and monitoring program to ensure that radioactive products released into the environment are kept at extremely low levels. Title 10 (Part 20, Section 201) also mandates the evaluation of those radioactive effluents. This evaluation must include an actual physical survey of the locations at which the effluents are discharged along with measurements of the radiation level or concentration of radioactive products. To comply with these requirements, Detroit Edison continuously conducts the Radiological Environmental Monitoring Program (REMP). The REMP provides the mechanism to determine whether the levels of radioactivity in the environment around the plant are within established limits and ensures that accumulation of radionuclides in the environment will not become significant as a result of plant operations.

Preoperational program

To provide a proper before-and-after picture of the effects of Fermi 2 on the environment, the monitoring program started several years before the Fermi 2 reactor began operating. This preoperational environmental monitoring program began acquiring data in 1978 in order to establish a baseline for comparison with later measurements after Fermi 2 began operations.

The preoperational program determined the approximate levels of radiation and radioactive products occurring naturally in the environment near the Fermi 2 reactor. This was done through continuous monitoring and analysis of environmental radiation levels of radioactive products in air, in lake sediment and waters, in drinking water, in milk and in garden vegetables.

Operational program

The preoperational program was phased into the operational program in June 1985, when initial criticality was achieved for the Fermi 2 reactor. The elements that made up the preoperational monitoring program are still in effect today. Sampling and analysis of environmental parameters is conducted regularly as well as the continuous monitoring of environmental radioactive products in the environment and changes in radiation levels.

Sampling

In the sampling program, samples are regularly collected from designated locations around Fermi 2. Depending on the type of samples, collections may be taken on a weekly, monthly, quarterly or semiannual schedule.

Sampling locations within ten miles of Fermi 2 are called "indicator" locations. These sites would be the most likely to indicate if there were any measurable effects in the environment from operation of Fermi 2. Many of the indicator locations have been in the monitoring program since it was established in 1978. Based on the criteria for availability of samples, local climate and hydrological conditions, these locations continue to provide acceptable samples for analysis and to allow satisfactory comparison of sample results from year to year.

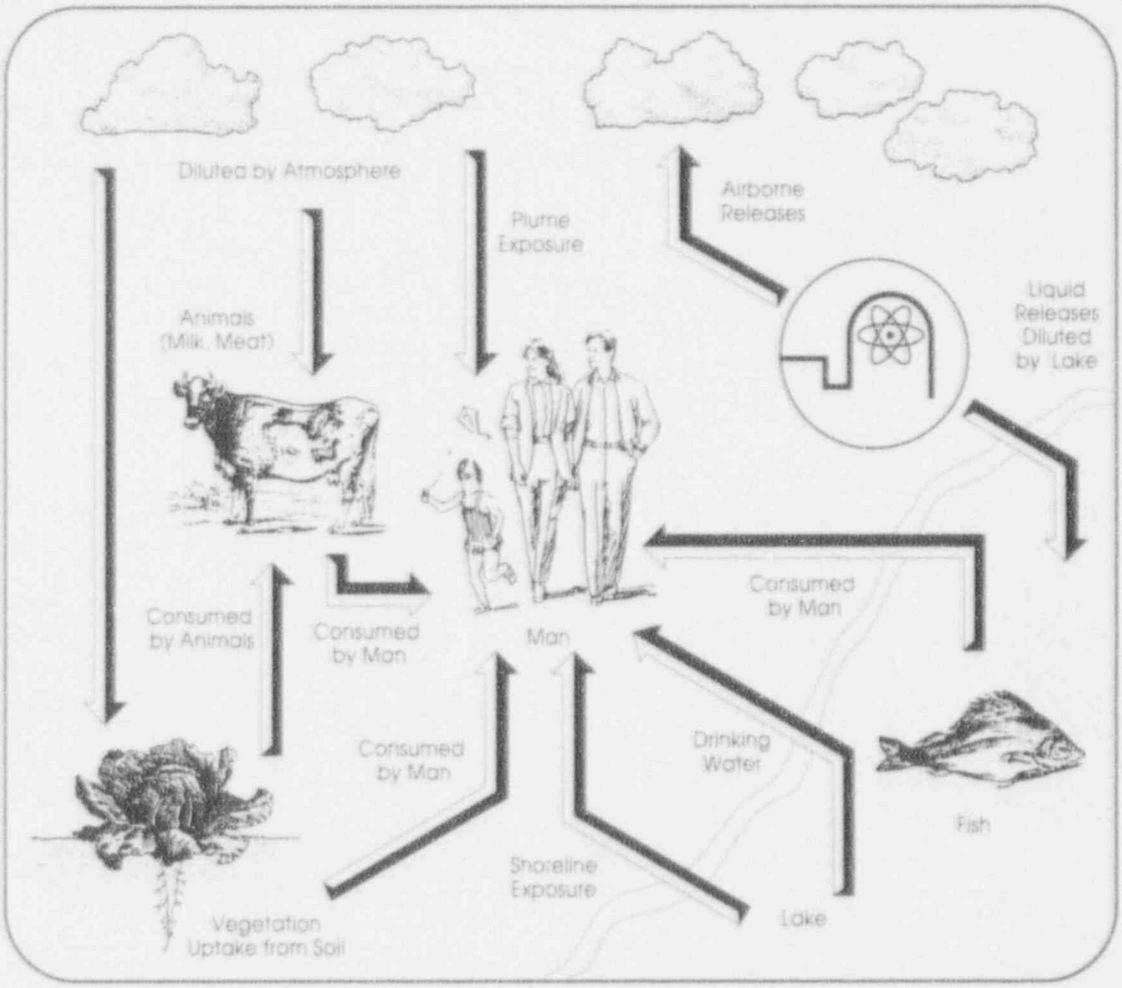
To provide a way to compare Fermi 2's effect on the environment at close-in locations with conditions at distant locations, samples also are collected from "control locations." These sites, which are at least ten miles from Fermi 2 or farther, are considered outside the area that might be affected by Fermi 2 operations.

Analysis

Analysis of indicator and control samples is contracted to an independent laboratory. This laboratory participates in the Environmental Protection Agency's "crosscheck" program to ensure that the lab meets accepted criteria for performing radioactivity analysis. Detroit Edison personnel collect samples from all locations, handling them with extreme care. They follow detailed procedures ensuring that the samples are protected and controlled. The containers are marked with the location, date and type of sample. If necessary, a preservative is added to the sample to ensure that no spoilage will occur during shipment to the laboratory for analysis.

Samples are sent special delivery, so they can be traced if they are not received at the lab within 48 hours. Lab personnel record the date and time the samples were received, along with the type of samples and the analyses required. Once all analyses are completed, the lab reports all results to Fermi 2 for review. Any significant differences in the analyses results between the indicator locations and the control locations must be reported to the NRC.

Pathway to Man



One of the key features of the REMP is that it continuously monitors the food chain cycle that leads to man by collecting samples from steps along the pathways shown in the illustration above.

Most of us aren't used to thinking about ourselves as part of an "environmental food chain." Yet all of us are part of this chain, as we consume plants or animals that in turn have eaten other plants or animals. Because radioactive products behave just like non-radioactive products in our physical and chemical environments, radioactive products released by the plant may be carried down with the rain, absorbed into the soil or deposited on plants, eaten by grazing animals and passed on to people, or breathed in by animals and people. In this way, radioactive products may become part of the environmental food chain.

As precipitation washes material out of the air, radioactive particles settle along with dust and other contaminants. Let's assume the radioactive material settles down on grass. A dairy cow eats the grass. The radioactive material is concentrated in the cow's body, passing into its milk supply. That milk then is collected for human consumption, and the radioactive product thus reaches people.

A similar process takes place when radioactive products settle onto vegetables harvested for human consumption. These milk and vegetation stations along the chain are always considered potential pathways to man because they can be traced directly.

The pathway approach to monitoring radioactivity is also applied to radioactive products released into liquids in the environment. Eating fish and drinking water obtained from Lake Erie are considered the main liquid pathways to man in the local food chain.

It is highly unlikely, however, that significant quantities of radioactive products attributable to the operation of Fermi 2 will be passed directly to people through eating fish. The transmission of significant quantities of radioactive products through the supply of drinking water is similarly unlikely. The water intake for the city of Monroe, for example, is approximately one mile south of Fermi 2.

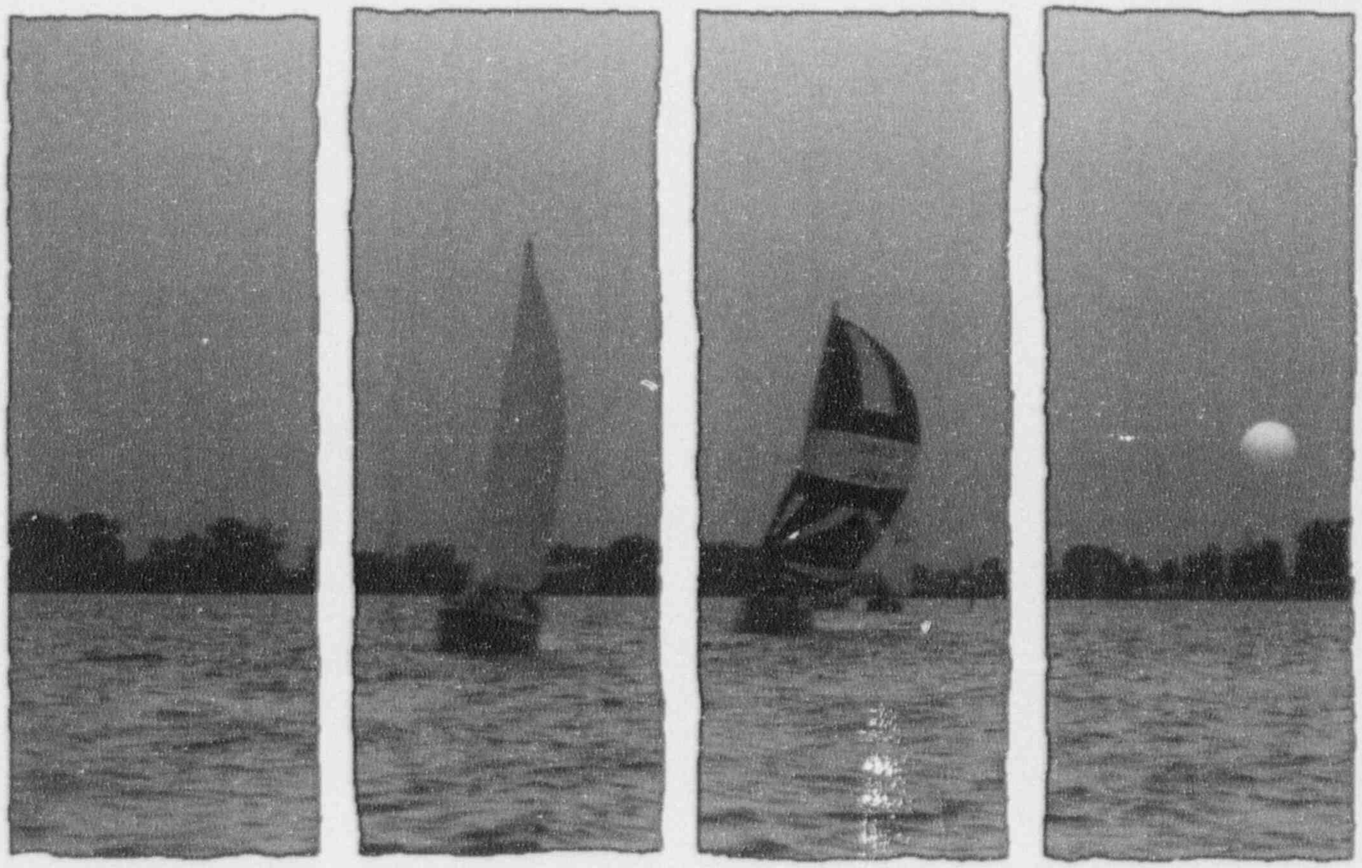
By sampling fish, lake water, drinking water, milk and vegetables, Detroit Edison can monitor the "Pathways to Man" to estimate any possible exposure resulting from radioactive products released into the environment by Fermi 2.

Direct radiation monitoring

Still another way the impact of Fermi 2 on the environment is analyzed is through measurement of direct radiation. You may have noticed small unusual fixtures on utility poles in the vicinity of the Fermi 2 plant. These fixtures contain measuring devices called "Thermoluminescent Dosimeters" (TLDs). Detroit Edison uses TLDs because they are among the simplest and most reliable indicators of general levels of radiation in the environment.

TLDs, which are about the size of an aspirin, are extremely sensitive to Gamma radiation. Before they can be used in the field, they must be subjected to the strict NRC testing requirements. TLDs are located in the area surrounding Fermi 2 to monitor gaseous radioactivity and direct radiation resulting from the plants operation. As an independent check on the information gathered by these TLDs, the NRC also maintains its own TLDs at approximately the same locations as the Fermi TLDs. Consistently, data from the NRC TLDs has shown approximately the same results as data from the Fermi 2 TLDs.

Executive Summary



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Executive Summary

The Annual Radiological Environmental Monitoring Report is a detailed report on the Radiological Environmental Monitoring Program (REMP) conducted at Detroit Edison's Fermi 2 from January 1 through December 31, 1992.

In 1992, more than 1000 environmental samples were collected for the REMP. These samples represented direct radiation; atmospheric, terrestrial, and aquatic environments; and Lake Erie surface water and municipal drinking water supplies. More than 1300 laboratory analyses were performed on these environmental samples. The results showed that radioactivity levels have not significantly increased from the radioactivity levels detected prior to the operation of the plant.

Direct radiation measurements were taken at 63 locations using thermoluminescent dosimeters. The average quarterly dose was 13.8 mrem/standard quarter and is consistent with ambient radiation levels measured prior to the operation of the plant.

Atmospheric monitoring results for 1992 were within the same range as measurements made prior to the operation of the plant. No radioactivity attributable to the operation of Fermi 2 was detected in any atmospheric samples during 1992.

Terrestrial monitoring of leafy garden vegetables, milk, and grass showed naturally occurring radioactivity and radioactivity associated with past weapons testing and the nuclear accident at Chernobyl (U.S.S.R.). The radioactivity levels detected were consistent with the preoperational and, with the exception of 1986, the year of the accident at Chernobyl, prior operational levels.

Aquatic monitoring includes analysis of fish samples, shoreline sediment samples, and lake bottom sediment samples. All sample media from the Fermi 2 REMP program showed radioactivity levels that were consistent with levels detected prior to the operation of the plant.

Drinking water, surface water, and groundwater monitoring results were consistent with the results obtained prior to the operation of the plant. None of the 1992 water samples showed detectable radioactivity due to the operation of Fermi 2.

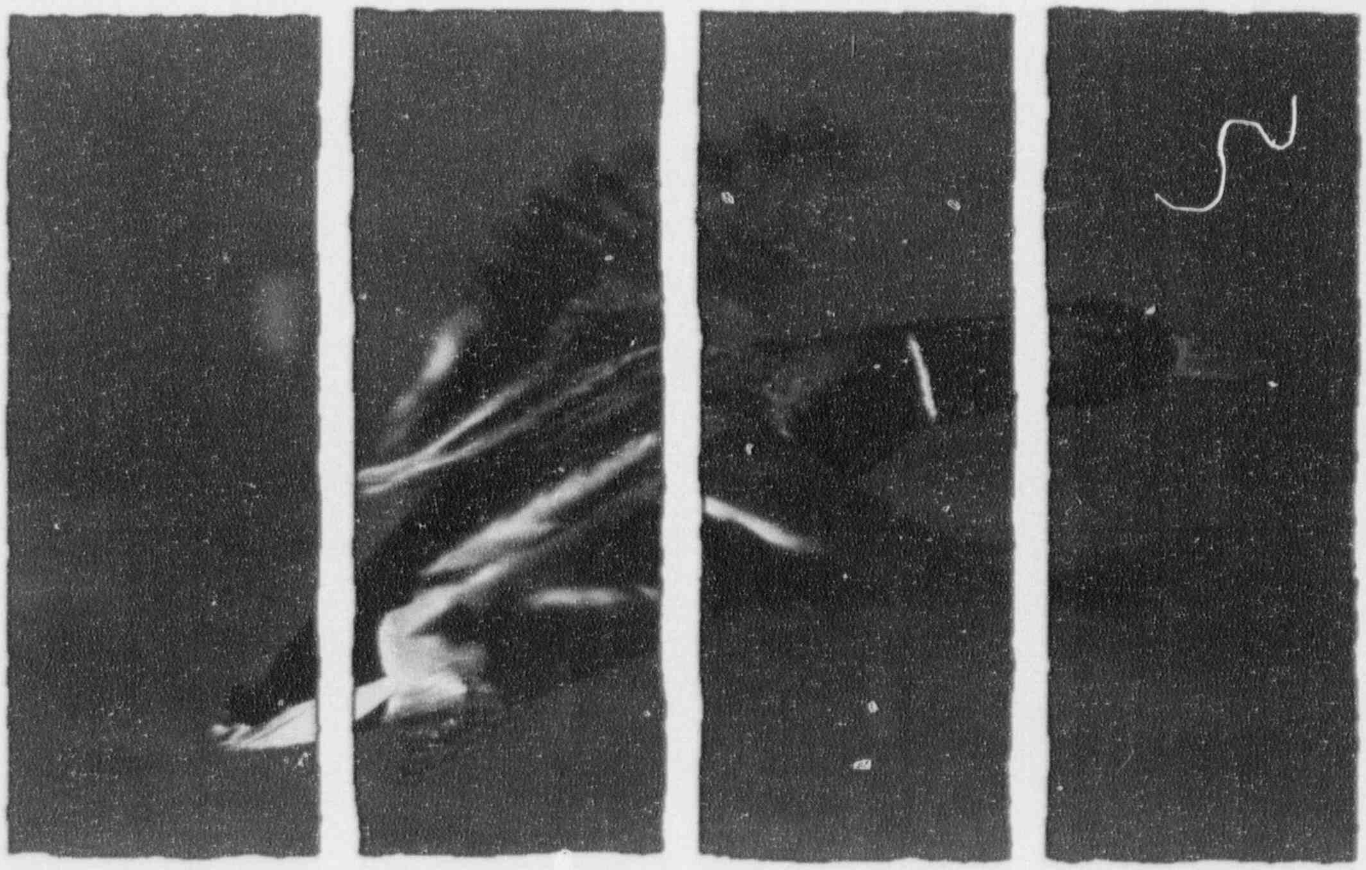
The maximum dose to a member of the general public due to radioactivity released as gaseous effluents was less than 1.0% of the annual limit.

The maximum dose to a member of the general public due to radioactivity released as liquid effluents was less than 0.1% of the annual limit.

Comparisons of 1992 environmental data, pre-1992 data, and preoperational data showed that the operation of Fermi 2 had no significant radiological impact upon the environment.

In October of 1991, sediment samples were collected in the cooling water discharge canal as part of the Fermi 1 Environmental Monitoring Program. These samples showed very low concentrations of Mn-54, Co-60, and Zn-65. Given that Mn-54 and Zn-65 have short half lives (approximately 250 days), and that the last discharge from Fermi 1 was made in June 1975, it is unlikely that these radioisotopes in these samples resulted from the operation of Fermi 1. Detroit Edison believes that the radioactivity in these sediments is the result of the recirculation of Fermi 2 plant liquid effluent releases. Detroit Edison is conducting additional sampling and monitoring to evaluate the recirculation of liquid releases. The evaluation of this additional sampling and monitoring is provided in Appendix "C".

Quality Assurance



3

Quality Assurance

An important part of the environmental monitoring program at Fermi 2 is Quality Assurance (QA), which is conducted in accordance with NRC Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs". As defined by Regulatory Guide 4.15, QA comprises "planned and systematic actions that are necessary to provide adequate confidence in the results of a monitoring program".

Aspects of QA for the Fermi 2 environmental monitoring program include documentation of organizational structure and responsibilities, documentation of personnel qualifications and training, approved written procedures, methods to ensure sampling adequacy, various kinds of internal controls at the contract laboratory, and participation by the contract laboratory in an interlaboratory comparison program. The interlaboratory comparison program used by the contract laboratory (Teledyne Isotopes East) is the EPA's Environmental Radioactivity Laboratory Intercomparison Studies program. Teledyne Isotopes East's 1992 performance in this program is detailed in Appendix A.

Program Summary

4

Program Summary

The purpose of the Radiological Environmental Monitoring Program (REMP) is to assess the environmental impact of operating Fermi 2. This program also provides the verification of the effluent monitoring program during routine operation of the plant and serves as an in place sampling network in the event of an accidental release. Monitoring stations are placed at pre-determined locations which measure any effects from operating the plant, and at control locations which are beyond the influence of the plant. At Fermi 2, the monitoring program is designed to measure radiation exposure to the public. Exposure to the public can occur through direct pathways such as inhalation or immersion, or indirectly through the food chain. These exposure pathways are monitored using thermoluminescent dosimeters (TLDs), and by the collection of air, milk, garden produce, water, fish, and sediment samples. Direct exposure by inhalation or immersion is measured both by TLDs and by collection of air samples. TLDs continuously monitor the radiation environment and provide a direct measurement of ambient gamma radiation levels. The locations of both the TLD and air sampling sites were chosen with respect to the meteorology and population distribution around Fermi 2. Air samples are collected through a particulate filter and an activated charcoal filter in tandem using continuously running air samplers. The particulate filters are analyzed individually for gross beta activity and composited for gamma spectrum analysis. The charcoal filters are analyzed for Iodine-131 (I-131). Radionuclides can enter the food chain through atmospheric or liquid discharges from the plant. Radionuclides released to the atmosphere, such as I-131, may be deposited on agricultural land and then ingested by dairy cows or goats, becoming concentrated in the animal's milk. Radionuclides can also become incorporated in garden produce such as green leafy vegetables. Monitoring for radionuclides due to liquid discharges includes collection of surface and drinking water, fish and sediment samples. These samples are collected upstream of the plant discharge as a control location, and at the discharge and downstream of the discharge as an indicator location.

Fish are sampled semiannually and the species collected correspond to those that may be consumed by the local population. Fish are good indicators because they tend to concentrate radionuclides by ingestion and provide an effective mechanism for integrating the variable concentrations of radionuclides in the water over extended periods. Sediments are also collected semiannually. Sediment, in the vicinity of the liquid radwaste discharge, represents the most likely site for accumulation of radionuclides in the aquatic environment and, with long-lived radionuclides, a gradual increase in radioactivity concentration is expected over time. Sediments, therefore, provides a long-term indication of change that may appear in other sample media (i.e., water and fish samples).

Preoperational program

All nuclear power plants are required by the Nuclear Regulatory Commission (NRC) to conduct radiological environmental monitoring before construction of a facility. This preoperational program at Fermi 2 was aimed at collecting data needed to identify critical pathways, and determine the existing levels of radiation and radioactive products occurring naturally and from man-made sources in the vicinity of the plant. Fermi 2 began its preoperational program seven years (1978) before the plant began producing power in 1985. The data accumulated during those years established a baseline for which to compare operational data. The program consisted of monitoring air, drinking water, surface water, lake sediments, milk, vegetables, fish, and direct radiation in the environment in the vicinity of Fermi 2. The elements that made up the preoperational monitoring program are still in effect today.

Operational program

The preoperational program became the operational program in June of 1985 when initial criticality was achieved for the Fermi 2 reactor. The sampling and analysis program in the operational phase continuously monitors direct radiation, radioactivity in air, lake sediments and water, drinking water, groundwater, cow and goat milk, and local garden vegetables.

TABLE 4-1
Operational Sampling and Analysis

FERMI 2

Media	Number of locations	Samples collected	Frequency	Type of analysis	Number of analyses
Thermoluminescent Dosimeters	63	250	Quarterly	Gamma dose	250
Air Particulate	5	265	Weekly	Particulate-Gross beta radioactivity	265
Air Iodine	5	265	Weekly	Radioiodine I-131	265
				Gamma isotopic of composite by location (Quarterly)	20
				Strontium 89/90 (Quarterly)	20
Surface Water	2	24	Monthly	Gamma isotopic (Monthly)	24
				Strontium 89/90 (Monthly)	24
				H-3 composite (Quarterly)	8
Drinking Water	3	29	Monthly	Gamma isotopic (Monthly)	29
				Strontium 89/90 (Monthly)	29
				Gross beta (Monthly)	28
				H-3 composite (Quarterly)	9
Ground Water	4	16	Quarterly	Gamma isotopic	16
				H-3	16
Fish	3	29	Semiannually	Gamma isotopic (on edible portion)	29
				Strontium 89/90	26
Sediment	5	10	Semiannually	Gamma isotopic	10
				Strontium 89/90	10
Milk	3	46	Monthly & semimonthly	Gamma isotopic	46
				Radioiodine -131	46
				Strontium 89/90	46
Grass	2	24	Monthly & semimonthly	Gamma isotopic	24
				Radioiodine -131	24
Leafy Vegetables	4	24	Monthly at time of harvest	Gamma isotopic	24
				Radioiodine -131 (on edible portion)	24
Total	**99**	**982**			**1312**

Continued on page 4-6

TABLE 4-1

Operational Sampling and Analysis

continued from page 4-5

FERMI 1

Media	Number of locations	Samples collected	Frequency	Type of analysis	Number of analyses
Raw Water	7	14	Semiannually	Gross beta	14
Sediment	3	6	Semiannually	Gamma spec	6
Total	10	20			20

ONSITE EFFLUENTS

Media	Number of locations	Samples collected	Frequency	Type of analysis	Number of analyses
Liquid	1	4	Quarterly*	Strontium 89/90	4
				Iron 55	4
Gaseous	7	28	Quarterly**	Strontium 89/90	28
Total	8	32	Monthly/Weekly	Noble gases/Gamma isotopic	36

GRAND TOTAL

Media	Number of locations	Samples collected	Frequency	Type of analysis	Number of analyses
	117	1034			1368

* *If discharges have been performed.*

** *As part of normal plant operations, additional samples are taken on a weekly and monthly basis.*

Nuclear Regulatory Commission Monitoring Program

5

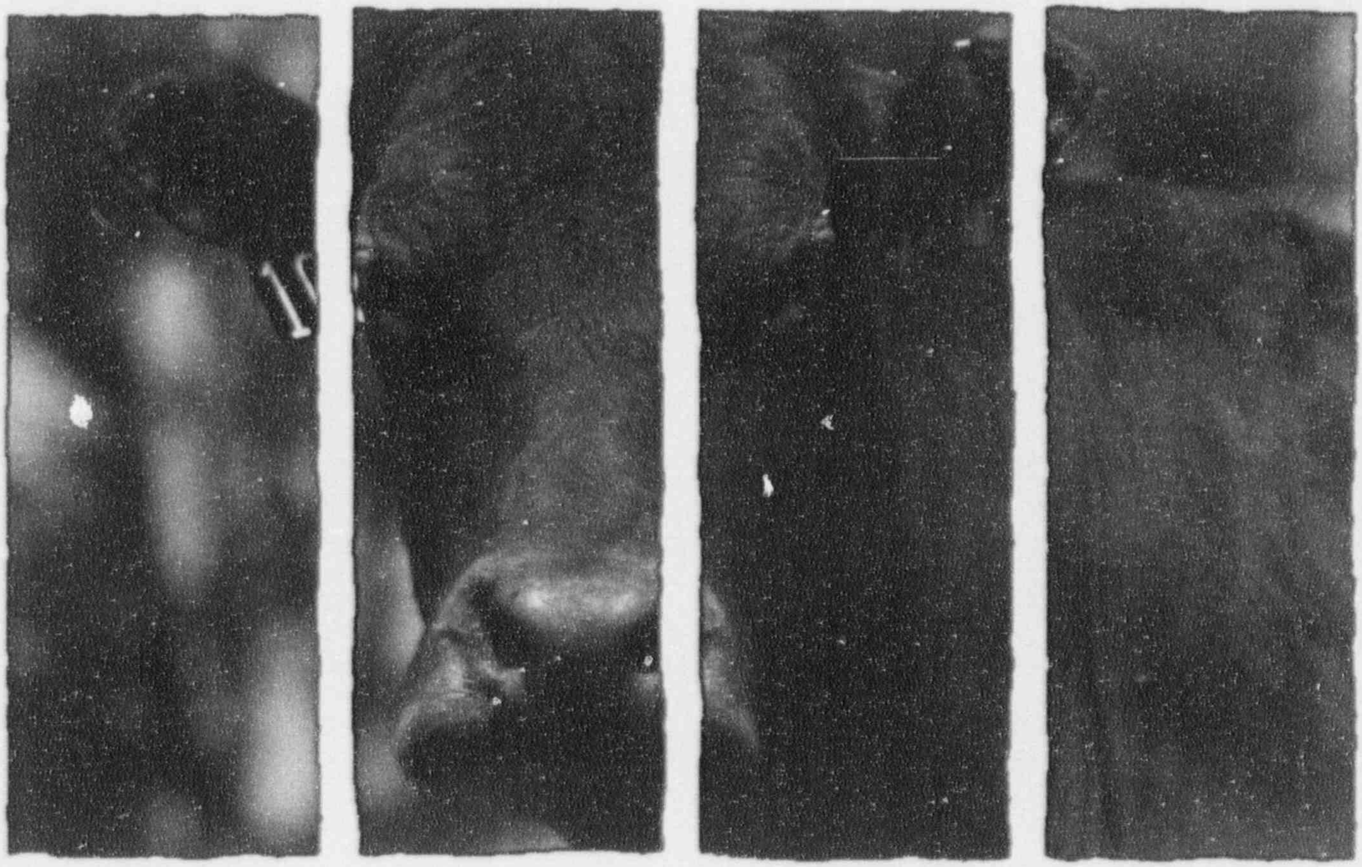
Nuclear Regulatory Commission Monitoring Program

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 provides continuous measurement of ambient radiation levels of radiation around the Fermi 2 site. Ambient radiation levels result from naturally occurring radionuclides present in the soil, cosmic radiation from outer space and the contribution, if any from the monitored nuclear plant. This network both establishes background radiation levels from routine facility operation as well as being available to determine the radiological impact of any abnormal facility operations.

The NRC maintains 21 thermoluminescent dosimeter (TLD) locations around Fermi 2. Their location is listed in Table 10-1. The TLD's are collected by State of Michigan representatives and are analyzed independently of the Fermi 2 TLD's. This independent assessment of the ambient radiation levels around Fermi 2 is consistent with the Fermi 2 TLD monitoring program measurements.

The results from the NRC monitoring program are published quarterly in NUREG 0837 titled *NRC TLD Direct Radiation Monitoring Network.*

Terrestrial Monitoring Program



6

Terrestrial Monitoring Program

Introduction

The terrestrial monitoring portion of the REMP provides for a continuous surveillance of the non-aquatic environment surrounding Fermi 2. The program consists of monitoring the atmosphere, milk, grass, and vegetables for radioactivity that might originate from the operation of the plant. The program also monitors direct radiation in the environment surrounding Fermi 2. The following sections discuss the type and frequency of terrestrial sampling, analyses performed, and a comparison of 1992 data to previous operational and preoperational data.

Direct radiation

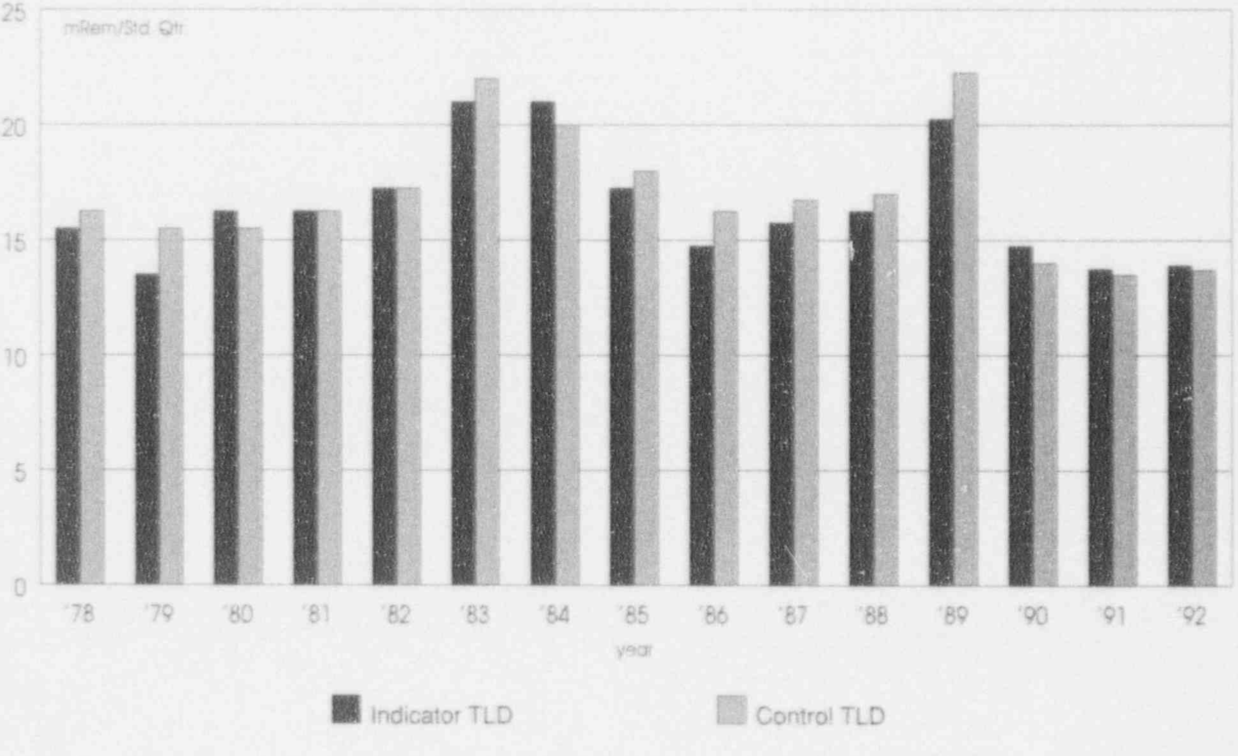
Detroit Edison uses thermoluminescent dosimeters (TLDs) to measure direct gamma radiation in the environs of Fermi 2. Teledyne Isotopes environmental TLDs are presently being used to measure direct radiation. These dosimeters are 25% by weight Calcium Sulfate encased in Teflon. The TLDs are thoroughly 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. While in the field, these 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. Indicator TLDs are located within a ten mile radius of the plant and control TLDs are located greater than ten miles. The average exposure for indicator TLDs during the preoperational program was 17.3 mRem/Std Qtr. and 17.6 mRem/Std Qtr. for control TLDs. The annual average exposure for indicator TLDs ranged from 13.6 mRem/Std Qtr. to 21.0 mRem/Std Qtr. The annual average exposure for control TLDs ranged from 15.5 mRem/Std Qtr. to 21.9 mRem/Std Qtr. From 1985 to 1991 the average exposure for indicator TLDs was 16.1 mRem/Std Qtr. and 16.8 mRem/Std Qtr. for control TLDs. The annual average exposure for indicator TLDs ranged from 13.6 mRem/Std Qtr. to 20.3 mRem/Std Qtr. The annual average exposure means for control TLDs ranged from 13.4 mRem/Std Qtr. to 22.2 mRem/Std Qtr. As Figure 3-1 shows, the operational period from 1985 to 1991 was consistent with the preoperational program.

In 1992, the TLD monitoring program included sixty-three (63) TLDs. The indicator TLDs had an mean exposure of 13.9 mRem/Std Qtr. and ranged from 10.2 to 21.8 mRem/Std Qtr. The control TLDs had an average exposure of 13.7 mRem/Std Qtr. and ranged from 11.7 to 15.8 mRem/Std Qtr. As Figure 6-1 shows, the average exposure for indicator and control TLDs was slightly lower than most previous years, including preoperational years.

Figure 6-1

Environmental TLD Exposures

Control versus Indicator



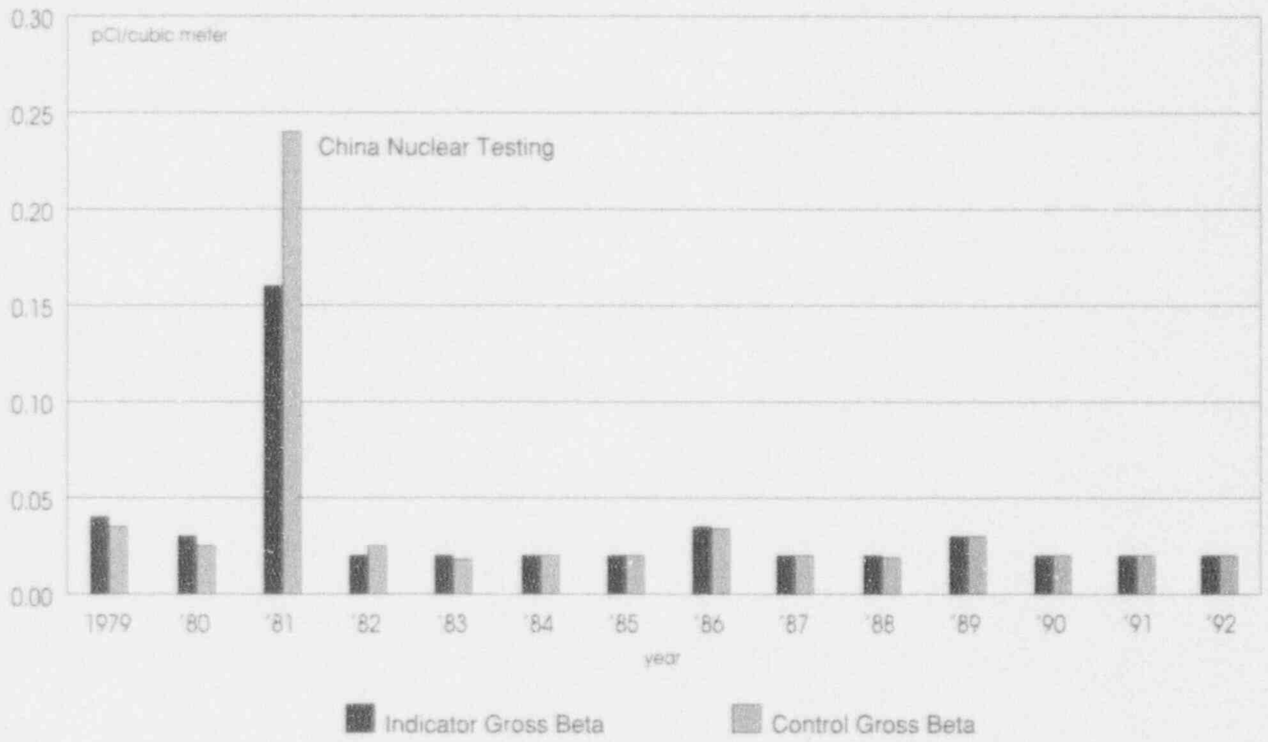
Air sampling

Detroit Edison continuously samples the atmosphere 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 and Iodine-131 activities. 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 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 a control location unaffected by the operation of the plant. During the preoperational program, excluding the year 1981, the average gross beta for indicator air samples was 2.6E-2 pCi/cubic meter and ranged from 2.0E-2 to 4.0E-2 pCi/cubic meter. The average gross beta for the control samples was 2.5E-2 pCi/cubic meter and ranged from 1.9E-2 to 3.5E-2 pCi/cubic meter. In late 1980, the Peoples Republic of China conducted an atmospheric nuclear weapon test. The fallout from this test was detected in Fermi 2 environmental air samples in 1981. The average gross beta for 1981 was 1.6E-1 pCi/cubic meter for indicator samples and 2.4E-1 pCi/cubic meter for control samples. Gamma spectroscopic analyses of the particulate filters revealed Cs-137, Ce-141, Ce-144, Ru-103, Ru-106, Zr-95, Nb-95, Mn-54, and Sb-125 in the atmosphere as a result of this test. From 1985 to 1991 the average gross beta for indicator samples was 2.4E-2 pCi/cubic meter and ranged from 2.1E-2 pCi/cubic meter to 3.4 pCi/cubic meter. The average gross beta for the control samples was 2.4E-2 pCi/cubic meter and ranged from 2.0E-2 pCi/cubic meter to 3.3E-2 pCi/cubic meter. In 1986, as shown in Figure 6-2, there was a slight increase in gross beta activity and a 2.7E-1 pCi/cubic meter "spike" in the Iodine-131 activity. These elevated activity levels have been attributed to the nuclear accident at Chernobyl (U.S.S.R.) on April 26, 1986. For the operational period from 1985 to 1991, excluding 1986, the air sampling data is consistent with the preoperational data.

Figure 6-2

Environmental Air Sampling

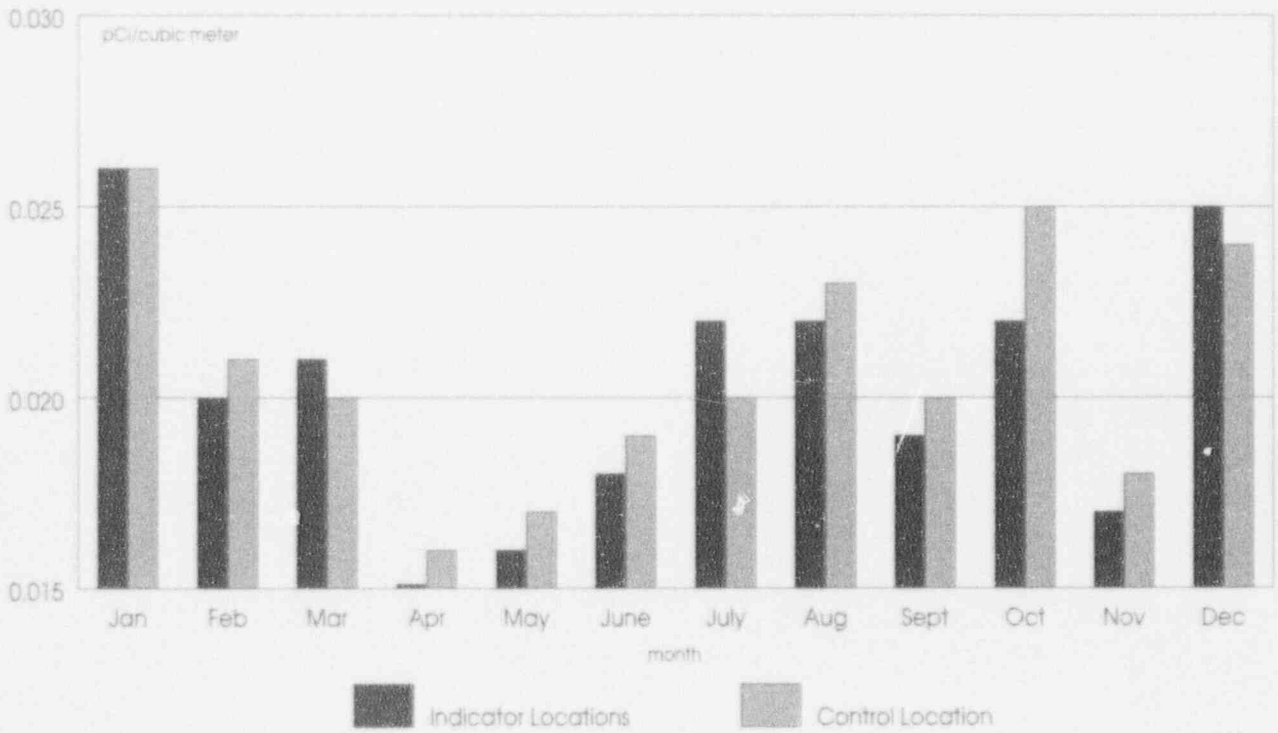
Average Gross Beta and I-131



During 1992, two hundred and sixty five (265) particulate air filters were collected and analyzed for gross beta activity and two hundred and sixty five (265) charcoal filters were collected and analyzed for I-131. The average gross beta for indicator samples was 2.0E-2 pCi/cubic meter and ranged from 2.2E-3 to 6.4E-2 pCi/cubic meter. The average gross beta for control samples was also 2.0E-2 pCi/cubic meter and ranged from 1.2E-2 to 4.1E-2 pCi/cubic meter. The monthly average gross beta is shown in figure 6-3. The small variations in the monthly gross beta averages are attributable to atmospheric factors such as wind patterns, precipitation, dust loading, pollen count, etc. None of the charcoal filters collected showed detectable levels of I-131. Twenty (20) quarterly particulate filter composites were prepared and analyzed for Sr-89/90 and gamma emitting isotopes. Only naturally occurring K-40 and Be-7 were detected in these samples with one exception. One indicator location showed detectable activity for Sr-90 just above the lab's Lower Limit of Detection (LLD). This activity is most likely due to statistical variation in sample counting or residual fallout from past weapons testing.

Figure 6-3

Airborne Particulate Gross Beta – 1992



Milk and grass sampling

The milk and grass sampling portion of the REMP is perhaps the most important aspect of the program. This is because a major radiation exposure pathway to the public can be the consumption of milk from local grazing animals (dairy cows or goats). Milk is collected from two indicator locations and one control location semimonthly when animals are on pasture and monthly at other times. The milk is analyzed for I-131, gamma emitting isotopes, and Sr-89/90. Milk sampling began in 1979 in the preoperational program. During this time period milk samples were only analyzed for I-131 and gamma emitting isotopes. From 1979 to 1984 Cs-137 and naturally occurring K-40 were the only isotopes detected in milk samples. During the operational period between 1985 and 1987, milk samples were also only analyzed for I-131 and gamma emitting isotopes. In 1986, after the nuclear accident at Chernobyl (U.S.S.R.), I-131 and Cs-137 were detected in both indicator and control milk samples. The analysis for Sr-89/90 began in 1988 and Sr-90 is now routinely detected in both indicator and control milk samples. The presence of Sr-90 in milk and other environmental samples is due to past atmospheric nuclear weapons testing. Naturally occurring K-40 was also detected in milk samples during this period. For the operational period from 1985 to 1991, excluding 1986, the milk sample data is consistent with the preoperational data. During 1992, forty six (46) milk samples were collected and analyzed for I-131, gamma emitting isotopes, and Sr-89/90. Naturally occurring K-40 was detected in both indicator and control samples. The indicator samples had an average K-40 concentration of 1.3E+3 pCi/l and ranged from 1.1E+3 pCi/l to 1.8E+3 pCi/l. The control samples had an average K-40 concentration of 1.4E+3 pCi/l and ranged from 1.2E+3 pCi/l to 1.7E+3 pCi/l. Sr-90 was also detected in both indicator and control milk samples. Both indicator and control samples had had an average Sr-90 concentration of 2.0E+0 pCi/l. The indicator samples ranged from 7.6E-1 pCi/l to 4.3E+0 pCi/l. The control samples ranged from 4.9E-1 pCi/l to 5.3E+0 pCi/l.

For 1992, the milk sampling data is consistent with prior operational data and preoperational data.

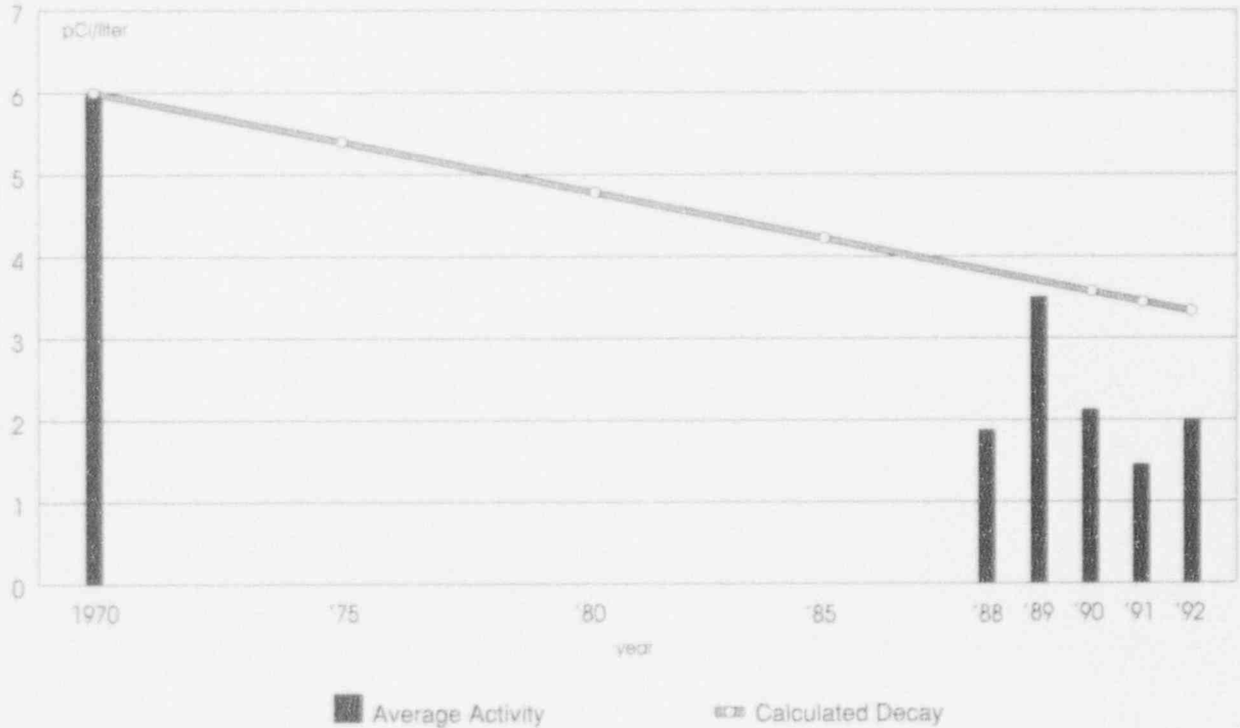
In 1970, the concentration of Sr-90 in local milk was 6 pCi/liter according to the Michigan Department of Health's "Milk Surveillance", Radiation Data and Reports, Vol. 11-15, 1970-1974. Figure 6-4 shows the calculated decay curve for the 1970 concentration of Sr-90 and the average concentrations since 1988. Figure 6-4 shows the inventory of Sr-90 in the local environment is decreasing with time and closely follows the calculated decay curve. This would suggest that the inventory of Sr-90 in the environment is due to past atmospheric nuclear weapons testing.

In addition to milk sampling, grass samples, when available, are collected at the control location and near the critical receptor's location during each sampling period and are analyzed for I-131 and gamma emitting isotopes. Grass samples are collected, instead of milk, adjacent to the critical receptor's location because the individuals at this residence do not participate in the REMP program. Grass sampling began in 1985 in the operational program. During the operational period between 1985 and 1991, naturally occurring K-40 was detected in both indicator and control grass samples. Cs-137 was also detected in both indicator and control samples and had an average concentration of 5.5E+1 pCi/kg wet. In 1986, after the nuclear accident at Chernobyl (U.S.S.R.) I-131, Cs-134 and Cs-137 were detected in both indicator and control grass samples. During 1992, twenty-four (24) grass samples were taken and analyzed for I-131 and gamma emitting isotopes. Naturally occurring K-40 and Be-7 were the only isotopes detected in both indicator and control grass samples. For 1992, the grass sample data is consistent with previous years.

Figure 6-4

Environmental Milk Samples

Sr-90 Concentration



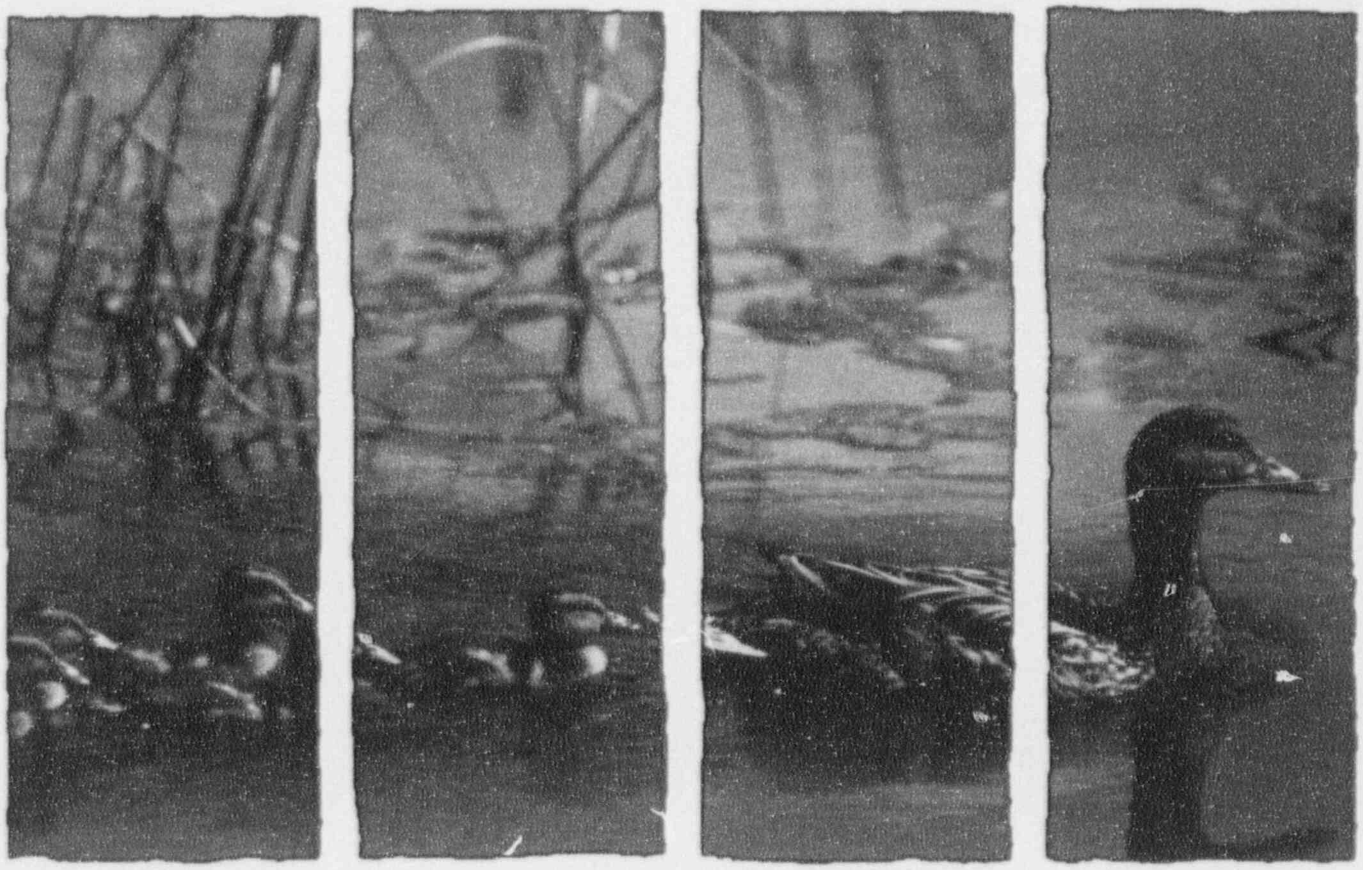
Garden sampling program

Fermi 2 collects samples of leafy 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 I-131 and gamma emitting isotopes.

Vegetable sampling started in 1982. During the preoperational program, only naturally occurring K-40 was detected in both indicator and control vegetable samples. During the operational period from 1985 to 1990, only naturally occurring K-40 was detected in both indicator and control vegetable samples. In 1991 Cs-137 was detected in one indicator sample with a Cs-137 concentration of 1.2E+1 pCi/kg wet wt. The presence of Cs-137 in vegetable samples can be attributed to past atmospheric weapons testing and possibly to the nuclear accident at Chernobyl (U.S.S.R.).

During 1992, twenty four (24) vegetable samples were collected and analyzed for I-131 and gamma emitting isotopes. Naturally occurring K-40 and Be-7 were detected in both indicator and control vegetable samples. One indicator sample detected naturally occurring Th-228. The same indicator sample showed activity for Cs-137 with a concentration of 1.1E+1 pCi/kg wet wt. The presence of Cs-137 in vegetable samples can be attributed to past atmospheric nuclear weapons testing and possibly to the nuclear accident at Chernobyl (U.S.S.R). Since Cs-137 has never been detected in any gaseous effluent sample from Fermi 2, and since the pathway from Fermi 2 to vegetables would be the deposition of gaseous effluents on the ground, it appears that none of the Cs-137 activity in vegetables is due to Fermi 2 effluents. For 1992, the vegetable sample data is consistent with prior operational data and preoperational data.

Aquatic Monitoring Program



7

Aquatic Monitoring Program

Introduction

The aquatic monitoring portion of the REMP provides a continuous surveillance of Lake Erie, on which the plant site borders. The program consists of monitoring raw municipal drinking water, surface water, groundwater, lake sediments, and fish for radioactivity due to the operation of the plant. The following sections discuss the type and frequency of aquatic sampling, analyses performed, and a comparison of 1992 data to previous operational and preoperational data.

Drinking water sampling

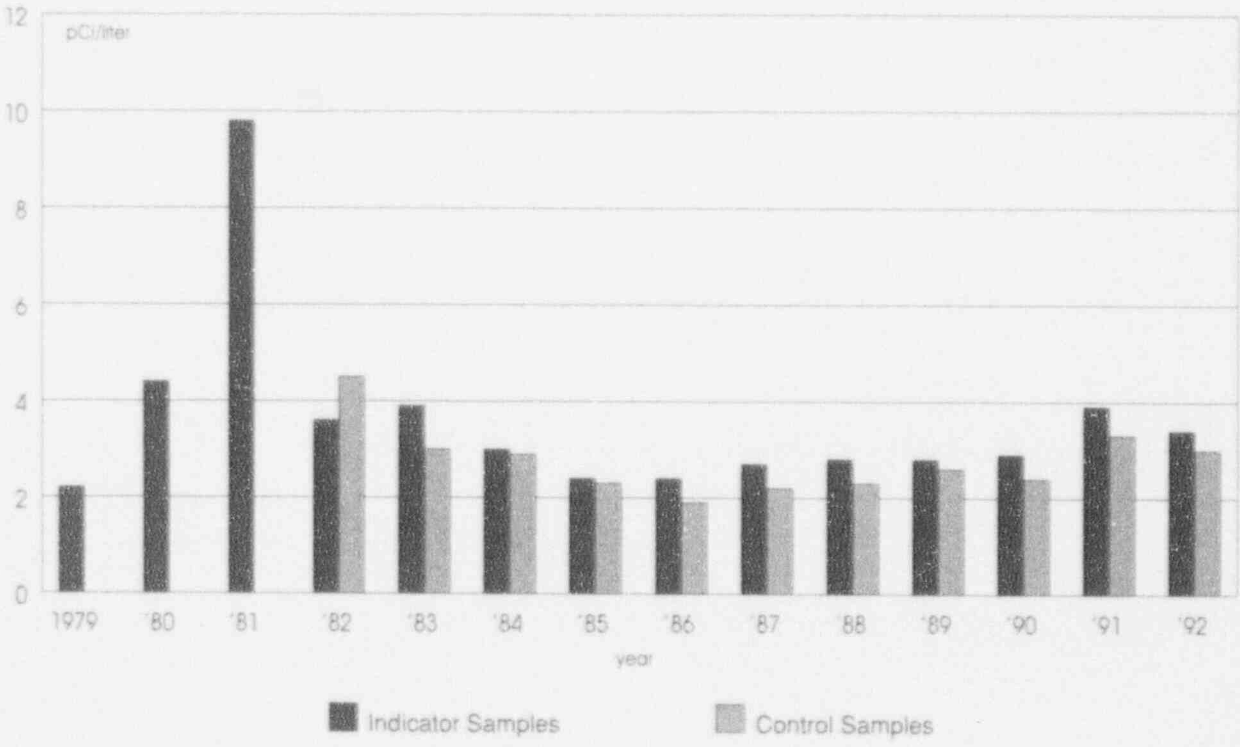
Detroit Edison continuously monitors drinking water at one control location and two indicator locations using automatic compositing samplers. In this program composite sample aliquots are collected at time intervals that are very short (hourly) relative to the compositing period (monthly) in order to assure obtaining a representative sample. Indicator water samples are obtained at the Monroe water intake located approximately 1.1 miles south of the plant and at the Fermi 1 potable water plant located approximately 0.3 miles south southeast of the plant. Detroit municipal water is used for the control samples and are 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 to form a quarterly composite sample and are analyzed for tritium. Drinking water sampling began in 1979 and the samples were only analyzed for gross beta, gamma emitting isotopes, and tritium. The average annual gross beta for indicator drinking water samples, excluding 1981, during the preoperational program was 3.4E+0 pCi/liter and ranged from 2.1E+0 to 4.3E+0 pCi/liter. The average annual gross beta for control drinking water samples during this time period was 3.5E+0 pCi/liter and ranged from 2.9E+0 to 4.5E+0 pCi/liter. In 1980 and 1983 Cs-137 was detected at both control and indicator locations, levels ranging from 5.4E+0 pCi/liter to 1.9E+1 pCi/liter. Tritium was also detected during the preoperational program and had an annual average of 3.2E+2 pCi/liter and ranged from 2.6E+2 to 4.5E+2 pCi/liter.

In 1981, as shown in Figure 7-1, the average gross beta was 9.8E+0 pCi/liter for indicator water samples. This anomalous gross beta activity is a direct result of an atmospheric nuclear weapon test conducted by the Peoples Republic of China in late 1980. From 1985 to 1991, the average annual gross beta activity for indicator drinking water samples was 2.8E+0 pCi/liter and ranged from 2.4E+0 to 3.9E+0 pCi/liter. The average annual gross beta for control drinking water samples was 2.5E+0 pCi/liter and ranged from 1.9E+0 to 3.3E+0 pCi/liter. The analysis for Sr-89/90 began

FIGURE 7-1

Drinking Water Samples

Average Annual Gross Beta



in 1988 and Sr-90 has been detected in both indicator and control samples. The average annual Sr-90 activity for indicator samples was 7.3E-1 pCi/liter and ranged from 4.8E-1 to 1.2E+0 pCi/liter. The average annual Sr-90 activity for control samples was 7.6E-1 pCi/liter and ranged from 7.1E-1 to 8.0E-1 pCi/liter. Tritium was also detected in both indicator and control drinking water samples during this time period. The average annual tritium activity for indicator samples was 2.8E+2 pCi/liter and ranged from 2.2E+2 to 3.9E+2 pCi/liter. The average annual tritium activity for control samples was 3.0E+2 pCi/liter and ranged from 2.7E+2 to 3.4E+2 pCi/liter. For the operational period from 1985 to 1991, the drinking water sample data is consistent with the preoperational data. In 1992, twenty nine (29) drinking water samples were collected and analyzed for gamma emitting isotopes, Sr-89/90, and tritium. Twenty eight (28) of the drinking water samples were analyzed for gross beta. The average annual gross beta for indicator samples was 3.4E+0 and ranged from 1.4E+0 to 6.4E+0 pCi/liter. The average annual gross beta for control samples was 3.0E+0 pCi/liter and ranged from 1.6E+0 to 5.1E+0 pCi/liter. No gamma emitting isotopes were detected in drinking water samples during 1992. Nine (9) quarterly composite drinking water samples were prepared and analyzed for tritium. No tritium or strontium 89/90 activity was detected in drinking water samples for 1992. For 1992, the drinking water sample data is consistent with prior operational data and preoperational data.

Surface water sampling

Detroit Edison continuously monitors surface water at two locations using automatic composite samplers. As with drinking water, surface water aliquots are collected at time intervals that are very short (hourly) relative to the compositing period (monthly) in order to assure obtaining a representative sample. Indicator surface water samples are obtained at the Fermi 1 water intake and the Fermi 2 General Service Water building, both locations are 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 only analyzed for gamma emitting isotopes, and tritium. During this preoperational program no gamma emitting isotopes, except for naturally occurring K-40, were detected. Tritium was detected in both indicator and control samples during this time period and had an annual average of 3.2E+2 pCi/liter and ranged from 2.2E+2 to 4.1E+2 pCi/liter. From 1985 to 1989, no gamma emitting isotopes were detected in surface water samples. Sr-90 was detected in both indicator and control samples. The average annual Sr-90 activity for indicator samples was 1.6E+0 pCi/liter and ranged from 8.3E-1 to 2.4E+0 pCi/liter. One control sample had a Sr-90 activity of 7.6E-1 pCi/liter. Tritium also was detected in both indicator and control samples for this time period. The average annual tritium activity for indicator samples was 2.3E+2 pCi/liter and ranged from 1.6E+2 to 3.1E+2 pCi/liter. One control sample had a tritium activity of 2.4E+2. In 1990, two indicator samples showed detectable activity for Cs-137 at an average concentration of 1.2E+1 pCi/liter and ranged from 9.7E+0 to 1.5E+1 pCi/liter. In 1991, Sr-90 was detected in one indicator sample at a concentration of 5.3E-1 pCi/liter. The presence of Sr-90 in surface water samples is due to past atmospheric nuclear weapons testing.

In 1992 twenty four (24) surface water samples were collected and analyzed for gamma emitting isotopes, Sr-89/90, and tritium. No gamma emitting isotopes or Sr-89/90 were detected in surface water samples. Eight (8) quarterly composite surface water samples were prepared and analyzed for tritium. No tritium activity was detected in surface water samples for 1992. For 1992, the surface water sampling data is consistent with prior operational data and preoperational data.

Groundwater sampling

Groundwater is collected on a quarterly basis from four wells surrounding Fermi 2. The groundwater is analyzed for gamma emitting isotopes and tritium. The subsurface hydrology of the local area is such that groundwater flows towards Lake Erie. For this reason, sampling location GW-4 which is located approximately 0.6 miles west north west is least likely to be affected by the operation of the plant. Groundwater sampling began in 1987. From 1987 to 1989 no radioactivity was detected in groundwater samples. In 1990, one control sample had a Cs-137 activity of 7.71E+0 pCi/liter and one indicator sample had a tritium activity of 9.9E+1 pCi/liter. In 1991 only naturally occurring K-40 was detected in groundwater samples. In 1992, sixteen (16) groundwater samples were collected and analyzed for gamma emitting isotopes and tritium. No gamma emitting isotopes or tritium were detected in groundwater samples. For 1992, the groundwater sample data is consistent with prior operational data and preoperational data.

Sediment sampling

Lake Erie shoreline and bottom sediments from five locations are collected on a semiannual basis 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 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 samples were only analyzed for gamma emitting isotopes. During the preoperational program, except for naturally occurring isotopes, only Cs-137 was detected in sediment samples. For this time period the average Cs-137 concentration was 3.3E+2 pCi/kg and ranged from 5.0E+1 to 6.6E+2 pCi/kg.

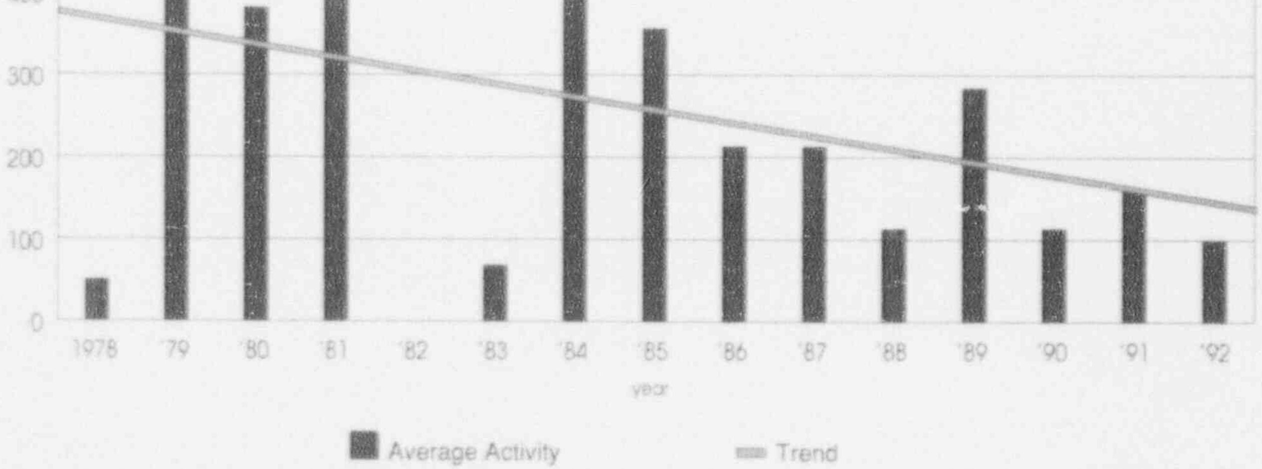
From 1985 to 1991, the average annual Cs-137 concentration for indicator samples was 1.8E+2 pCi/kg and ranged from 2.6E+1 to 3.6E+2 pCi/kg. The control sample had a Cs-137 concentration of 1.4E+2 pCi/kg for this time period and ranged from 1.1E+2 to 1.6E+2 pCi/kg. The analysis for Sr-89/90 began in 1988 and Sr-90 has been detected in both indicator and control samples. The average annual Sr-90 activity for indicator samples was 9.6E+1 pCi/kg and ranged from 2.8E+1 to 1.6E+2 pCi/kg. The average annual Sr-90 activity for control samples was 2.5E+2 pCi/kg and ranged from 1.4E+2 to 3.1E+2 pCi/kg. In 1990 and 1991, the Spring sample taken at the Fermi 2 discharge line S-2 showed activity for plant related isotopes (Mn-54, Co-58, Co-60, and Zn-65) and was a result of liquid effluent from Fermi 2.

Figure 7-2 shows the concentration of Cs-137 in sediment samples from 1978 to 1992 appears to be decreasing with time. The line shown in this figure is a computer generated best fit trend line. This suggests that the inventory of Cs-137 in lake sediments is due to past atmospheric nuclear weapons testing.

Figure 7-2

Environmental Sediment Samples

CS-137 Concentration



In 1992, ten (10) sediment samples were collected and analyzed for gamma emitting isotopes and Strontium 89/90. Naturally occurring gamma emitting isotopes were detected in both indicator and control sediment samples. Cs-137 was detected in one control sediment sample. The control sample showed a Cs-137 concentration of 1.0E+2 pCi/kg. Sr-90 was detected in three indicator samples at an average concentration of 4.8E+1 pCi/kg and had a range of 3.7E+1 to 5.9E+1 pCi/kg. The presence of Cs-137 and Sr-90 in sediment samples is due to past atmospheric nuclear weapons testing. For 1992, the sediment sample data is consistent with prior operational data and preoperational data except that activity was not seen at location S-2 as in 1990 and 1991. This is consistent with the fact that no liquid discharges occurred between July 1991 and December 1992 and that the long term build-up of radioactivity in sediments is not significant.

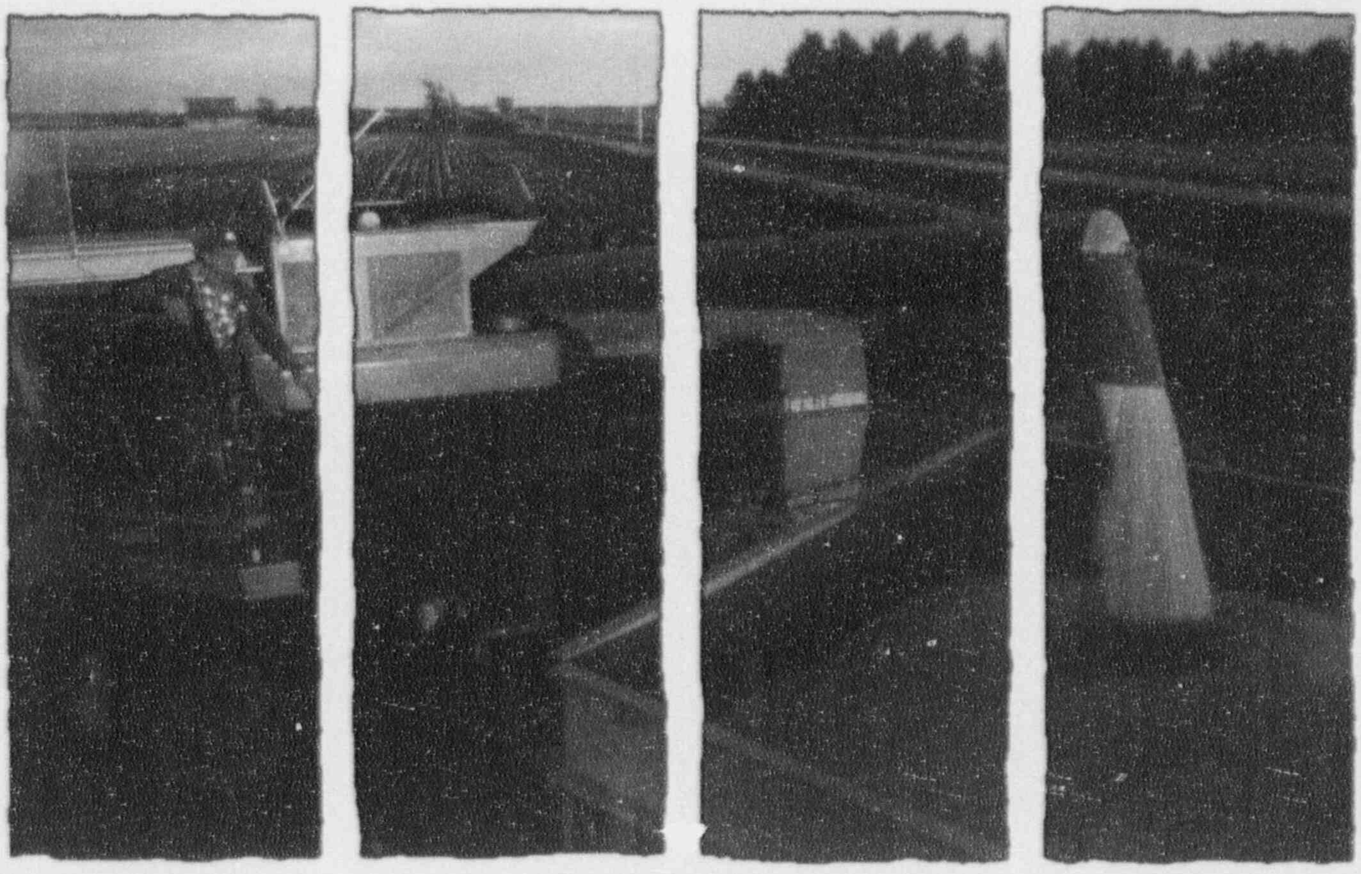
Fish sampling

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 Brest Bay. The indicator location is approximately 1200 feet offshore of the Fermi 2 liquid discharge. Edible portions of the fish are analyzed for gamma emitting isotopes and Strontium 89/90. During the preoperational program only naturally occurring isotopes and Cs-137 were detected. The average Cs-137 concentration for indicator samples was 3.5E+1 pCi/kg and 4.2E+1 pCi/kg for control samples. Preoperational fish samples were only analyzed for gamma emitting isotopes. From 1985 to 1991, the average Cs-137 concentration for indicator samples was 5.2E+1 pCi/kg and ranged from 2.0E+1 to 7.2E+1 pCi/kg. The average Cs-137 concentration for control samples was 5.5E+1 pCi/kg and ranged from 2.5E+1 to 9.7E+1 pCi/kg. The analysis for Sr-89/90 began in 1990 and Sr-90 has been detected in both indicator and control samples. The average Sr-90 concentration for indicator samples was 7.9E+1 pCi/kg and ranged from 2.7E+1 to 1.3E+2 pCi/kg. The average Sr-90 concentration for control samples was 5.2E+1 pCi/kg and ranged from 2.7E+1 to 7.7E+1 pCi/kg.

In 1992, twenty nine (29) fish samples were collected and analyzed for gamma emitting isotopes and 26 of the samples were analyzed for Strontium 89/90. The only gamma emitting isotopes detected in these samples were naturally occurring. Sr-90 was detected in both indicator and control fish samples. The average concentration of Sr-90 for indicator samples was 4.7E+1 pCi/kg and ranged from 7.3E+0 to 1.1E+2 pCi/kg. The average concentration of Sr-90 for control samples was 6.4E+1 pCi/kg and ranged from 3.2E+0 to 3.7E+2 pCi/kg.

For 1992, the fish sample data is consistent with prior operational data and preoperational data.

Land Use Census



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Land Use Census

An annual Land Use Census is conducted by Detroit Edison in order to update information used to estimate radiation dose to the public and to determine if any modifications to the Radiological Environmental Monitoring Program are necessary. This information ensures that these programs are as accurate as possible. The Land Use Census is required by Title 10 of the Code of Federal Regulations, Part 50, Appendix I and Fermi 2 Offsite Dose Calculation Manual. The Land Use Census is conducted a maximum distance of 5 miles from Fermi 2, and identifies the locations of the nearest milk producing animals, the nearest residence, and the nearest garden (greater than 50 square meters and containing broad leaf vegetation) in each of the 16 meteorological sectors. Gardens greater than 50 square meters is the minimum size required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for the 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.

1992 Land Use Census results

The Land Use Census was conducted during the month of August in 1992. The census data was obtained by driving all roads within a five mile radius and in some cases performing door-to-door surveys. The data was then compared with the 1991 data to determine any changes in the local area. The analysis of the new Land Use Census data showed that there was a new critical receptor for calculation of offsite dose due to gaseous effluents. The critical receptor is the individual living offsite who receives the highest dose due to I-131, I-133, H-3 and products with half lives greater than eight days in gaseous effluents. Other minor changes were found in the 1992 data when compared to the 1991 data and were determined to be insignificant. The information gathered during the 1992 Land Use Census is tabulated and presented in tables 8-1 through 8-3.

Table 8-1

Residences

Year	Sector	Address	Distance (Miles)	Change (Miles)
1992	NE	6760 Lakeshore	1.13	NC
1991	NE	6760 Lakeshore	1.13	
1992	NNE	6460 Brancheau	1.07	NC
1991	NNE	6460 Brancheau	1.07	
1992	N	6362 Brancheau	1.09	-0.04
1991	N	6200 Blanchett	1.13	
1992	NNW	5701 Post	1.09	NC
1991	NNW	5701 Post	1.09	
1992	NW	6577 Leroux	1.04	NC
1991	NW	6577 Leroux	1.04	
1992#	WNW	6200 Langton	0.66	NC
1991	WNW	6200 Langton	0.66	
1992	W	6001 Toll	1.11	NC
1991	W	6001 Toll	1.11	
1992	WSW	4981 Pte. Aux Peaux	1.39	NC
1991	WSW	4981 Pte. Aux Peaux	1.39	
1992	SW	5194 Pte. Aux Peaux	1.27	NC
1991	SW	5194 Pte. Aux Peaux	1.27	
1992	SSW	5820 Pte. Aux Peaux	1.12	NC
1991	SSW	5820 Pte. Aux Peaux	1.12	
1992	S	4834 Long	1.03	NC
1991	S	4834 Long	1.03	
	ESE - SSE	Lake Erie		

NC - No Change.

 # - 1992 Critical Receptor.

Table 8-2

Gardens

Year	Sector	Address	Distance (Miles)	Change (Miles)
1992	NE	7491 Sovey	1.96	NC
1991	NE	7491 Sovey	1.96	
1992*	NNE	6441 Brancheau	1.09	NC
1991*	NNE	6441 Brancheau	1.09	
1992*	NNE	7806 Labo	4.0	NC
1991*	NNE	7806 Labo	4.0	
1992*	NNE	9501 Turnpike Hwy.	3.83	NC
1991*	NNE	9501 Turnpike Hwy.	3.83	
1992	N	6080 Trombly	1.64	-0.33
1991	N	6372 Trombly	1.97	
1992	NNW	7007 Schuler	1.33	-0.01
1991	NNW	5846 Trombly	1.34	
1992	NW	7335 Forest	1.73	NC
1991	NW	7335 Forest	1.73	
1992*#	WNW	6200 Langton	0.66	-0.63
1991	WNW	6170 Leroux	1.29	
1992*	WNW	8200 Geirman (control)	14.6	NC
1991*	WNW	8200 Geirman (control)	14.6	
1992	W	6001 Toll	1.11	-0.44
1991	W	5681 Toll	1.55	
1992	WSW	5068 Spaulding	2.35	-0.01
1991	WSW	5111 Spaulding	2.36	
1992	SW	4971 Elm	1.46	-0.01
1991	SW	4828 Elm	1.47	
1992	SSW	4777 St. Clair	1.17	-0.26
1991	SSW	5823 Shady Lane	1.43	
1992	S	6151 Goddard	1.18	-0.07
1991	S	6348 Sterling	1.25	
	ESE - SSE	Lake Erie		

NC - No Change.

** Participants in REMP sampling program.*

 # - 1992 Critical Receptor.

Table 8-3

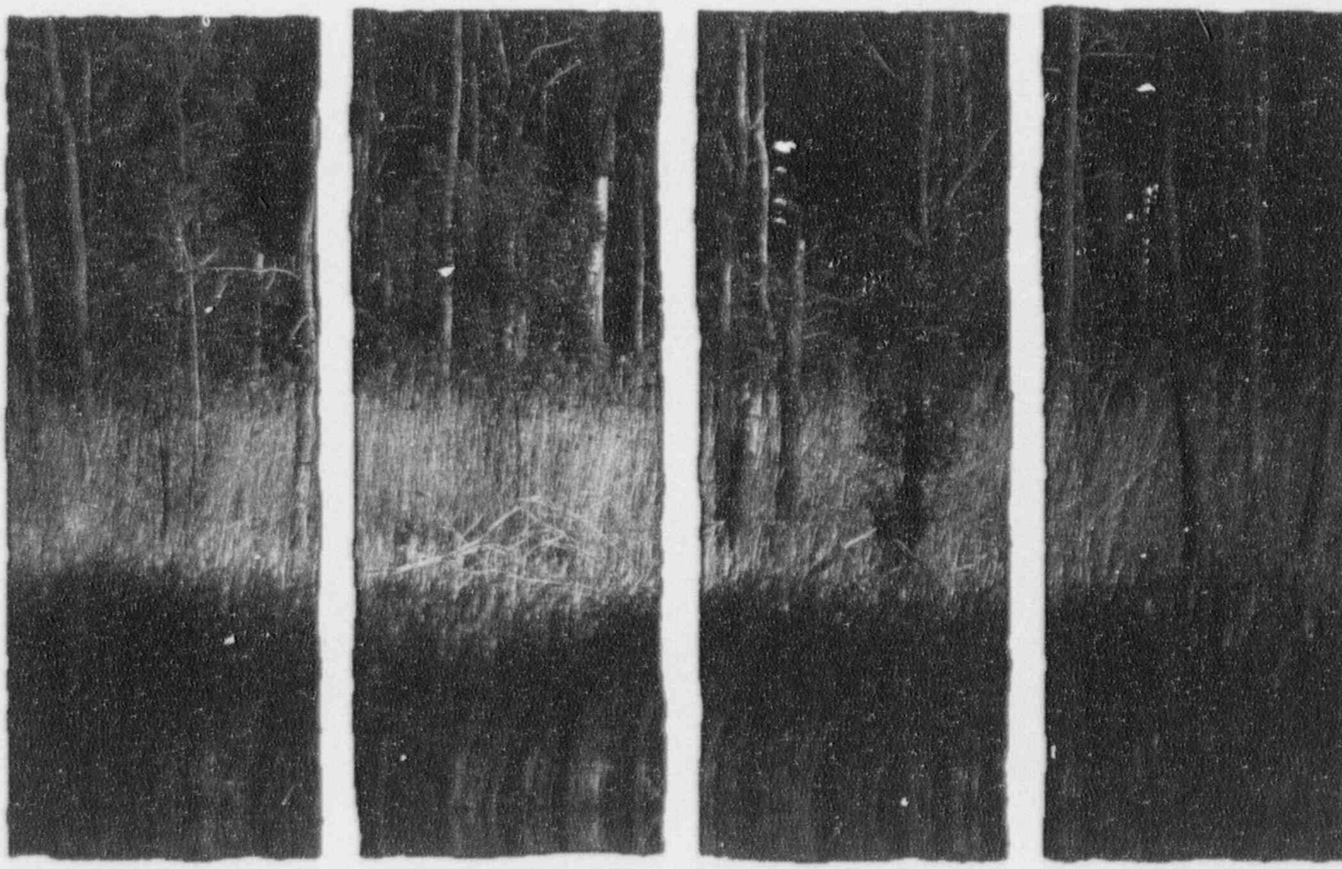
Milk Locations

Year	Sector	Address	Distance (Miles)	Findings
1992	NE	No Identified Locations	—	NA
1991	NE	No Identified Locations	—	NA
1992	NNE	No Identified Locations	—	NA
1991	NNE	No Identified Locations	—	NA
1992	N	No Identified Locations	—	NA
1991	N	No Identified Locations	—	NA
1992	NNW	No Identified Locations	—	NA
1991	NNW	No Identified Locations	—	NA
1992*	NW	3239 Newport Rd.	4.28	Cows
1991*	NW	3239 Newport Rd.	4.28	Cows
1992*	NW	2705 Labo	5.41	Cows
1991*	NW	2705 Labo	5.41	Cows
1992	WNW	4262 Post	2.06	Goats
1991	WNW	4262 Post	2.06	Goats
1992	W	No Identified Locations	—	NA
1991	W	No Identified Locations	—	NA
1992	WSW	No Identified Locations	—	NA
1991	WSW	No Identified Locations	—	NA
1992	SW	No Identified Locations	—	NA
1991	SW	No Identified Locations	—	NA
1992	SSW	No Identified Locations	—	NA
1991	SSW	No Identified Locations	—	NA
1992	S	No Identified Locations	—	NA
1991	S	No Identified Locations	—	NA
	ESE - SSE	Lake Erie		

** - Participated in Fermi 2 REMP.*

NA - No Milk Animals.

Program Execution



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1992 Program Execution

In 1992, the major deviations from scheduled REMP activities at Fermi 2 were the loss of TLDs due to theft, air sampler equipment failure, seasonal unavailability of grass samples, and drinking water sampling equipment malfunctions. The following list includes all deviations and corrective actions from the normal sampling schedule for 1992. These deviations did not have a significant impact on the execution or validity of the REMP.

Environmental TLDs

All TLDs are placed in the field in inconspicuous locations to minimize the loss of TLDs due to pilferage. During 1992, two hundred fifty two (252) TLDs were placed in the field and four (4) were found missing. This represents a 98.4 per cent successful collection rate.

On 05/15/92, during the mid-quarter TLD inspection the following TLD was found missing and was replaced with a spare: T-20.

On 07/02/92, during the quarterly TLD exchange the following TLD was found missing and was replaced during the TLD change out: T-12.

On 08/21/92, during the mid-quarter TLD inspection, the following TLD was found missing and replaced with a spare: T-10.

On 01/05/93, during the quarterly TLD exchange the following TLD was found missing and replaced during the TLD change out: T-20.

Air sampling

During 1992, five hundred thirty (530) air samples were scheduled to be collected. Six (6) of the five hundred thirty (530) air samples collected were considered to be less than representative of the sample period due to equipment failure. This represents a 98.9 per cent successful collection rate for the year.

On 01/08/92 all air samplers ran six (6) days due to the holiday season.

On 07/15/92, during filter exchange API-1 was found inoperable due to a blown fuse. The fuse was replaced during filter exchange. The sample had sufficient volume to be analyzed.

On 07/15/92, during filter exchange API-2 was found inoperable due to the sampling pump carbon vanes that were shattered. The carbon vanes were replaced and the sampler was calibrated. The sample had sufficient volume to be analyzed.

On 08/10/92, API-1 was found inoperable due to a blown fuse. The fuse was replaced and the sampler was restarted. On 08/12/92 the sample was collected and sent for analysis. The sample had sufficient volume to be analyzed.

On 08/12/92, during filter exchange API-4 was found inoperable due to a storm power outage (no power to utility pole). On 08/14/92 during filter exchange and after power was restored to the utility pole a new sampling unit was installed and calibrated. The sample had sufficient volume to be analyzed.

On 08/19/92, during filter exchange API-1 was found inoperable due to a blown fuse. The fuse was replaced during filter exchange.The sample had sufficient volume to be analyzed.

On 09/23/92, during filter exchange API-1 was found inoperable due to a pump malfunction. The sampling unit was replaced and calibrated. The sample had sufficient volume to be analyzed.

On 11/25/92, charcoal cartridge at API-3 ran only six (6) days. The charcoal cartridge was removed for a special analysis. The sample had sufficient volume to be analyzed.

Milk sampling

During 1992, forty six (46) milk samples, were collected. This represents a 100 per cent successful collection rate for the year.

On 08/13/92, milk sampling location M-3 (Yoas Farm, 4.2 mi., NW) was dropped from the REMP program due to all milk animals being sold.

Grass sampling

During 1992, thirty-six (36) grass samples were scheduled to be collected and ten were not collected due to seasonal unavailability and two samples for December were not collected due to grass sampling being dropped at locations M-7 and M-8. These locations were dropped as a result of the identification of a new critical receptor during the 1992 Land Use Census. It should be noted that when grass samples were not available the milk producing animals were not in the pastures grazing. This represents a 72.2

per cent successful collection rate for the year. Grass samples are scheduled to be collected with milk samples at sample locations M-7 and M-8 throughout the year. However, grass is not always available due to the local climate. Grass samples were not available during the following sampling periods.

On 01/16/92, grass samples M-7 and M-8 not collected due to seasonal unavailability.

On 02/13/92, grass samples M-7 and M-8 not collected due to seasonal unavailability.

On 03/12/92, grass samples M-7 and M-8 not collected due to seasonal unavailability.

On 04/16/92, grass samples M-7 and M-8 not collected due to seasonal unavailability.

On 11/12/92, grass samples M-7 and M-8 not collected due to seasonal unavailability.

Water sampling

During 1992 enhancements were made to the drinking and surface water samplers. The samplers were modified according to the locations and systems in the plants that they operate in. The samplers were installed into protective locking cabinets to eliminate problems that have occurred in the past from inadvertent power interruptions and vandalism. The modifications have shown improvement in obtaining reliable and representative samples.

Drinking water sampling

During 1992, of the twenty nine (29) drinking water samples collected, three (3) were considered partial samples and less than fully representative. This represents a 89.6 per cent successful collection rate for the year.

On 05/26/92, the drinking water sample collected at location DW-1 for the month of May is considered to be less than fully representative due to the power interruption to the sampler, the week of 05/04/92. At this time a grab sample was collected and sent to the lab to be analyzed.

On 06/03/92, a new modified sampler was installed at location DW-2. This location has provided a reliable and representative sample since it was installed.

On 07/27/92, the drinking water sample collected at location DW-1 for the month of July is considered to be less than fully representative due to equipment failure on 07/15/92. At this time a grab sample was collected and sent to the lab to be composited with the July sample.

On 09/30/91, the drinking water sample collected at location DW-1 for the month of September is considered to be less than fully representative due to a power interruption to the sampler on 09/16/92. At this time a grab sample was taken and sent to the lab to be composited with the September sample.

On 10/07/92, it was determined that surface water location SW-1 would become drinking water location DW-3. This was done as a program enhancement.

Surface water sampling

During 1992, twenty four (24) surface water samples were collected. This represents a 100 per cent successful collection rate for the year.

On 04/13/92, the sampler at location SW-2 was modified with a digital timer. This system has provided a reliable and representative sample since it was installed.

On 10/07/92, a new surface water location SW-3 located at the Fermi 2 General Service Water building was added to the REMP as a program enhancement.

Laboratory Deviations

Three fish samples collected in May of 1992, were lost during the ashing phase of the fish samples. Three of the beakers containing fish broke and the ash contents spilled out onto the bottom of the furnace. In doing so, the integrity of the samples was compromised and samples were reported as lost in analysis.

The drinking water grab sample collected at DW-1 on 05/04/92, did not have gross beta, Sr-89/90 and gamma spectroscopy analyses performed. Instead, laboratory personnel performed an Iodine 131 analysis. The sample was discarded before the correct analyses could be performed.

Sampling Locations

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Table 10-1

Direct Radiation

Station Number	NRC Co-location Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx)	Description	Frequency	Type
T1	NRC1	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	NRC36	NNW/337	0.6 mi	Site boundary and Toll Rd. on Site fence by API-2	Q	I
T5	NRC37	NW/313	0.6 mi	Site boundary and Toll Rd. on Site fence by API-3	Q	I
T6	NRC38	WNW/293	0.6 mi	Pole, NE corner of Bridge over Toll Rd.	Q	I
T7		W/270	14.2 mi	Pole behind Doty Farm at 7512 N. Custer 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
T11		NNE/23	6.2 mi	Pole, NE corner of Milliman and Jefferson	Q	I
T12	NRC25	NNE/29	6.3 mi	Pointe Mouillee Game Area Field Office, Pole near tree, N area of parking lot	Q	I
T13	NRC23	N/356	4.1 mi	Labo and Dixie Hwy., Pole on SW corner with light	Q	I
T14	NRC22	NNW/337	4.4 mi	Labo and Brandon, Pole on SE corner near RR.	Q	I
T15	NRC21	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 Rds.	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 Rds.	Q	I
T19	NRC16	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	NRC14	WSW/257	2.7 mi	Pole, S side of Williams Rd., 8 poles W of Dixie Hwy. (Special Area)	Q	I
T21	NRC15	WSW/239	2.8 mi	Pole, N side of Pearl at Parkview Woodland Beach (Special Area)	Q	I
T22	NRC13	S/172	1.2 mi	Pole, N side of Pointe Aux Peaux, 2 poles W of Long—Site Boundary	Q	I

I = Indicator   C = Control   Q = Quarterly

continued on page 10-4

Table 10-1
Direct Radiation
continued from page 10-3

Station Number	NRC Co-location Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx)	Description	Frequency	Type
T23	NRC11	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	NRC9	SW/225	1.2 mi	Fermi Gate along Pointe Aux Peaux 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	NRC17	SW/225	6.8 mi	Pole, NE corner of McMillan and East Front St. (Special Area)		
T28	NRC32	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 South Dixie Hwy., 1 pole S of Albain	Q	C
T30	NRC18	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
T32	NRC29	WNW/295	10.3 mi	Pole, corner of Stony Creek and Finzel Rds.	Q	I
T33	NRC28	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, E side of Port Creek, 1 pole S of Will-Carleton Rd.	Q	I
T35	NRC26	N/359	6.9 mi	Pole, S side of South Huron River Dr., across from Race St. (Special Area)	Q	I
T36	NRC40	N/358	9.1 mi	Pole, NE corner of Gibraltar and Cahill Rds.	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 North 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
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	S of Turbine Building rollup door on PAF	Q	I
T48		SW/235	0.2 mi	30 ft. from corner of AAP on PAF	Q	I

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

continued on page 10-5

Table 10-1

Direct Radiation

continued from page 10-4

Station Number	NRC Co-location Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx)	Description	Frequency	Type
T49		WSW/251	1.1 mi	Corner of Site Boundary fence, N of NOC along Critical Path Rd.	Q	I
T50		W/270	0.9 mi	Site Boundary fence near main gate by the South Bullit St. sign	Q	I
T51		N/3	0.4 mi	Site Boundary fence, N of North Cooling Tower	Q	I
T52		NNE/20	0.4 mi	Site Boundary fence, corner of Arson and Tower	Q	I
T53		NE/55	0.2 mi	Site Boundary fence, E 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, N side of Nadeau Rd. across from Sodt Elementary School Marquee	Q	I
T56		WSW/255	4.9 mi	Pole, entrance to Jefferson Middle School on Stony Creek Rd.	Q	I
T57		W/260	2.7 mi	Pole, N side of William Rd. across from Jefferson High School entrance	Q	I
T58		WSW/249	4.9 mi	Pole, W of Hurd Elementary School Marquee	Q	I
T59		NW/325	2.6 mi	Pole, N of St. Charles Church entrance on Dixie Hwy.	Q	I
T60		NNW/341	2.5 mi	1st pole N of North Elementary School's entrance on Dixie Hwy.	Q	I
T61		W/268	10.1 mi	Pole, SW corner of Stewart and Raisinville Rds.	Q	I
T62		SW/232	9.7 mi	Pole, NE corner of Albain and Hull Rds.	Q	I
T63		WSW/245	9.6 mi	Pole, NE corner of Dunbar and Telegraph Rds.	Q	I

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

Table 10-2

Air Particulate/Air Iodine Sample Locations

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx)	Description	Media	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)	Radioiodine/ Particulates	W	I
API-2	NNW/337	0.6 mi	Site Boundary and Toll Rd., on Site Fence by T-4	Radioiodine/ Particulates	W	I
API-3	NW/313	0.6 mi	Site Boundary and Toll Rd., on Site Fence by T-5	Radioiodine/ Particulates	W	I
API-4	W/270	14.2 mi	Pole, behind Doty Farm 7512 North Custer Rd.	Radioiodine/ Particulates	W	C
API-5	S/191	1.2 mi	One pole S of Pointe Aux Peaux Rd. on Erie St.	Radioiodine/ Particulates	W	I

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

Table 10-3

Milk/Grass Sample Locations

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx)	Description	Media	Frequency	Type
M-2	NW/319	5.4 mi	Reaume Farm—2705 East Labo	Milk	M-SM	I
M-3	NW/317	4.2 mi	Yoas Farm—3239 Newport Rd.	Milk	M-SM	I
M-7	WNW/301	2.1 mi	Webb Farm—4362 Post Rd.	Grass	M-SM	I
M-8	WNW/289	9.9 mi	Calder Dairy—9334 Finzel Rd. (Control)	Milk/Grass	M-SM	C

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

Table 10-4

Vegetable Garden Sample Locations

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx)	Description	Media	Frequency	Type
FP-1	NNE/21	3.9 mi	9501 Turnpike Highway	Food Products	M (when available)	I
FP-3	NNE/12	1.1 mi	6441 Brancheau	Food Products	M (when available)	I
FP-5	NNE/19	4.4 mi	7806 Labo	Food Products	M (when available)	I
FP-6	WNW/290	14.5 mi	8200 Gelnman (Control)	Food Products	M (when available)	C

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

Table 10-5

Water Sample Locations

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx)	Description	Media	Frequency	Type
Drinking Water						
DW-1	S/174	1.1 mi	Monroe Water Station N Side of Pointe Aux Peaux 1/2 Block W of Long Rd.	Drinking Water	M	I
DW-2	N/8	18.5 mi	Detroit Water Station 14700 Moran Rd., Allen Park (Control)	Drinking Water	M	C
DW-3	SSE/160	0.3 mi	Fermi 1 Raw Lake Water Intake Structure	Drinking Water	M	I
Surface Water						
SW-1	SSE/160	0.3 mi	Fermi 1 Raw Lake Water Intake Structure	Surface Water	M	I
SW-2	NNE/20	11.7 mi	DECo's Trenton Channel Power Plant intake Structure (Screenhouse #1) (Control)	Surface Water	M	C
SW-3	SSE/160	0.3 mi	DECo's Fermi 2 General Service Water Intake Structure	Surface Water	M	I
Site Wells						
GW-1	S/175	0.4 mi	Approx. 100 ft. W of Lake Erie, EF-1 Parking lot near gas fired peakers	Groundwater	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	Groundwater	Q	I
GW-3	SW/226	1.0 mi	143 ft. W of PAP Rd. Gate, 62 ft. N of PAP Rd. Fence	Groundwater	Q	I
GW-4	WNW/299	0.6 mi	42 ft. S of Langton Rd., 8 ft E of Toll Rd. Fence	Groundwater	Q	C

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

Table 10-6

Fish and Sediment Sample Locations

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx)	Description	Media	Frequency	Type
Sediments						
S-1	SSE/165	0.9 mi	Pointe Aux Peaux, Shoreline to 500 ft. offshore sighting directly to Land Base Water Tower	Sediment	SA	I
S-2	E/81	0.2 mi	Fermi 2 Discharge, approx. 200 ft. offshore	Sediment	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	Sediment	SA	I
S-4	WSW/241	3.0 mi	Indian Trails Community Beach	Sediment	SA	I
S-5	NNE/20	11.7 mi	DECo's Trenton Channel Power Plant intake area (Control)	Sediment	SA	C
Fish						
F-1	NNE/31	9.5 mi	Celeron Island (Control)	Fish	SA	C
F-2	E/86	0.4 mi	Fermi 2 Discharge (approx. 1200 ft. offshore)	Fish	SA	I
F-3	WSW/238	4.8 mi	Breast Bay Marina Area (Control)	Fish	SA	I

I = Indicator   C = Control   SA= Semiannually

FIGURE 10-1
SAMPLING LOCATIONS
BY STATION NUMBER
(SITE AREA)

N
W
E
S

0 1
SCALE IN 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

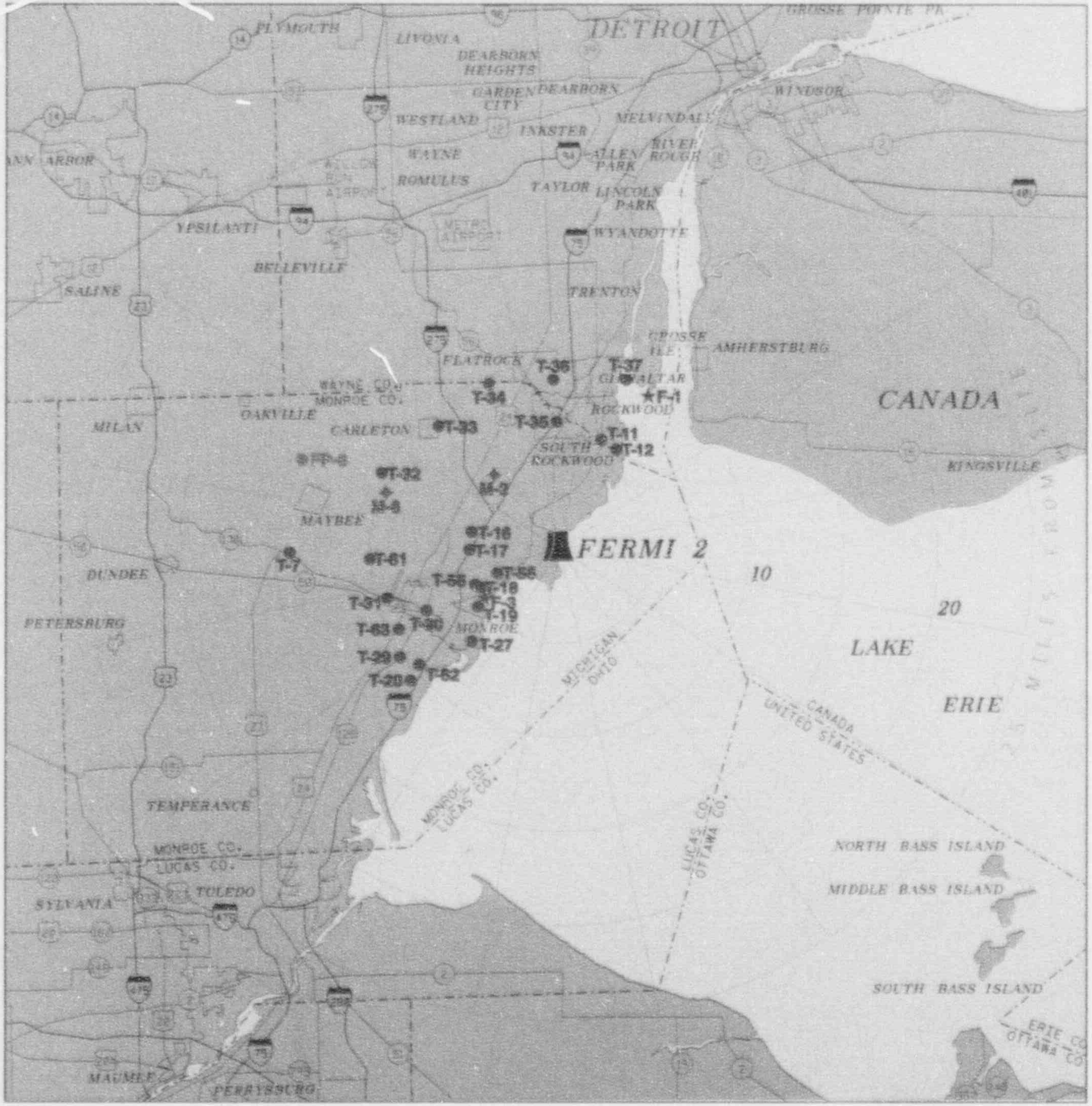

FIGURE 10-2
SAMPLING LOCATIONS
BY STATION NUMBER
(GREATER THAN 10 MILES)

LEGEND

- T DIRECT RADIATION
- AP - AIR PARTICULATES/AIR IODINE
- S - SEDIMENTS
- DW/SW - DRINKING WATER/SURFACE WATER
- GW - GROUND WATER
- M - MILK
- FP - FOOD PRODUCTS
- F - FISH

FIGURE 10-3
SAMPLING LOCATIONS
BY STATION NUMBER
(LESS THAN 10 MILES)

N
W E
S

1 0 1 2 3
SCALE IN 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

FIGURE 10-4
SAMPLING LOCATIONS
BY STATION NUMBER
(SITE AREA – LAKE ERIE)

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

Appendix A: US EPA Interlaboratory Comparison Program for 1992

US EPA Interlaboratory Comparison Program for 1992

Starting in 1991, Detroit Edison contracted Teledyne Isotopes East Laboratory to provide analytical results of REMP environmental samples. Teledyne Isotopes participates in the Environmental Protection Agency's (EPA) crosscheck program.

In the EPA crosscheck program, participant laboratories receive from the EPA environmental samples of known activity concentration for analysis. After the samples have been analyzed by the laboratory, the EPA reports the known activity concentration of the samples to the laboratory. The laboratory compares its results to the EPA 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 1992, seventy-seven (77) EPA crosscheck samples were analyzed by Teledyne Isotopes East. The Teledyne results for seventy-three (73) (95%) of these samples agreed with the EPA analysis results within one standard deviation (allowing the reported standard deviation in both sets of results). Of the 4 results which did not agree within one standard deviation, 3 agreed within 2 standard deviations, and one within 3 standard deviations. As required, the 4 deviations were investigated. The probable cause of the largest discrepancy was determined to be dilution error, and corrective measures have been taken. Corrective action was determined not to be necessary in 2 of the discrepancies, and the investigation of one discrepancy is in progress. The results are shown in the following tables and indicate that Teledyne Isotopes is capable of routinely performing high quality analysis on environmental samples.

Teledyne Isotopes

US EPA Interlaboratory Comparison Program for 1992

Collection Date	Media	Nuclide	EPA Result (a)	Teledyne Isotopes Result (b)
01/1. /92	Water	Sr-89	51.00 +/- 5.00	45.67 +/- 1.53
		Sr-90	20.00 +/- 5.00	18.67 +/- 1.53
01/31/92	Water	Gr-Alpha	30.00 +/- 8.00	25.00 +/- 4.00
		Gr-Beta	30.00 +/- 5.00	31.67 +/- 0.58
02/07/92	Water	I-131	59.00 +/- 6.00	61.00 +/- 1.73
02/14/92	Water	Co-60	40.00 +/- 5.00	38.00 +/- 2.65
		Zn-65	148.00 +/- 15.00	145.00 +/- 1.73
		Ru-106	203.00 +/- 20.00	191.00 +/- 21.66
		Cs-134	31.00 +/- 5.00	29.00 +/- 2.00
		Cs-137	49.00 +/- 5.00	53.67 +/- 2.52
		Ba-133	76.00 +/- 8.00	75.67 +/- 7.51
02/21/92	Water	H-3	7904.00 +/- 790.00	7800.00 +/- 100.00
03/06/92	Water	Ra-226	10.10 +/- 1.50	5.30 +/- 0.95 (c)
		Ra-228	15.50 +/- 3.90	20.00 +/- 2.00
03/27/92	Air Filter	Gr-Alpha	7.00 +/- 5.00	11.33 +/- 0.58
		Gr-Beta	41.00 +/- 5.00	43.00 +/- 1.00
		Sr-90	15.00 +/- 5.00	12.67 +/- 0.58
		Cs-137	10.00 +/- 5.00	11.00 +/- 1.73
04/14/92	Water	Gr-Beta	140.00 +/- 21.00	98.00 +/- 2.00 (d)
		Sr-89	15.00 +/- 5.00	16.00 +/- 1.00
		Sr-90	17.00 +/- 5.00	14.33 +/- 1.15
		Co-60	56.00 +/- 5.00	55.00 +/- 1.73
		Cs-134	24.00 +/- 5.00	22.67 +/- 1.53
		Cs-137	22.00 +/- 5.00	24.67 +/- 3.06
		Gr-Alpha	40.00 +/- 10.00	34.33 +/- 2.08
		Ra-226	14.90 +/- 2.20	13.33 +/- 2.08
		Ra-228	14.00 +/- 3.50	15.33 +/- 0.58
04/24/92	Milk	Sr-89	38.00 +/- 5.00	36.00 +/- 4.58
		Sr-90	29.00 +/- 5.00	26.00 +/- 0.00
		I-131	78.00 +/- 8.00	71.67 +/- 4.04
		Cs-137	39.00 +/- 5.00	46.67 +/- 2.31 (e)
		K	1710.00 +/- 86.00	1680.00 +/- 72.11
05/08/92	Water	Sr-89	29.00 +/- 5.00	24.00 +/- 1.73
		Sr-90	8.00 +/- 5.00	6.33 +/- 0.58
05/15/92	Water	Gr-Alpha	15.00 +/- 5.00	10.00 +/- 1.00
		Gr-Beta	44.00 +/- 5.00	44.67 +/- 1.15

Collection Date	Media	Nuclide	EPA Result (a)	Teledyne Isotopes Result (b)
06/05/92	Water	Co-60	20.00 +/- 5.00	21.33 +/- 0.58
		Zn-65	99.00 +/- 10.00	107.00 +/- 3.61
		Ru-106	141.00 +/- 14.00	127.00 +/- 11.53
		Cs-134	15.00 +/- 5.00	15.00 +/- 1.00
		Cs-137	15.00 +/- 5.00	16.00 +/- 1.00
		Ba-133	98.00 +/- 10.00	93.33 +/- 6.03
06/19/92	Water	H-3	2125.00 +/- 347.00	2100.00 +/- 0.00
07/17/92	Water	Ra-226	24.90 +/- 3.70	23.33 +/- 1.15
		Ra-228	16.70 +/- 4.20	17.33 +/- 0.58
08/07/92	Water	I-131	45.00 +/- 6.00	43.33 +/- 6.03
08/28/92	Air Filter	Gr-Alpha	30.00 +/- 8.00	27.33 +/- 0.58
		Gr-Beta	69.00 +/- 10.00	69.00 +/- 1.00
		Sr-90	25.00 +/- 5.00	22.67 +/- 1.15
		Cs-137	18.00 +/- 5.00	16.67 +/- 2.31
		Co-60	10.00 +/- 5.00	11.00 +/- 1.00
		Zn-65	148.00 +/- 15.00	156.67 +/- 0.58
		Ru-106	175.00 +/- 18.00	164.33 +/- 7.51
		Cs—134	8.00 +/- 5.00	8.67 +/- 0.58
		Cs-137	8.00 +/- 5.00	8.67 +/- 0.58
		Ba-133	74.00 +/- 7.00	75.67 +/- 9.29
09/18/92	Water	Gr-Alpha	45.00 +/- 11.00	45.00 +/- 2.00
		Gr-Beta	50.00 +/- 5.00	45.00 +/- 1.73
09/11/92	Water	Sr-89	20.00 +/- 5.00	16.00 +/- 1.00
		Sr-90	15.00 +/- 5.00	13.00 +/- 1.00
09/25/92	Milk	Sr-89	15.00 +/- 5.00	16.00 +/- 2.00
		Sr-90	15.00 +/- 5.00	12.67 +/- 1.15
		I-131	100.00 +/- 10.00	99.00 +/- 7.21
		Cs-137	15.00 +/- 5.00	15.67 +/- 1.15
		K	1750.00 +/- 88.00	1660.00 +/- 85.44
10/20/92	Water	Gr-Beta	53.00 +/- 10.00	49.00 +/- 2.65
		Sr-89	8.00 +/- 5.00	8.67 +/- 0.58
		Sr-90	10.00 +/- 5.00	8.00 +/- 1.00
		Co-60	15.00 +/- 5.00	15.00 +/- 1.00
		Cs-134	5.00 +/- 5.00	5.00 +/- 0.00
		Cs-137	8.00 +/- 5.00	8.67 +/- 0.58
		Gr-Alpha	29.00 +/- 7.00	27.33 +/- 4.16
		Ra-226	7.40 +/- 1.10	7.23 +/- 0.68
		Ra-228	10.00 +/- 2.50	10.33 +/- 0.68
10/23/92	Water	H-3	5962.00 +/- 596.00	5666.67 +/- 57.74
11/11/92	Water	Ra-226	7.50 +/- 1.10	5.27 +/- 0.40 (f)
		Ra-228	5.00 +/- 1.30	6.07 +/- 0.47

Footnotes:

(a) EPA Results-Expected laboratory precision (1 sigma). Units are pCi/liter for water and milk except K is in mg/liter. Units 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) All lab data sheets were verified for accuracy. Three different detectors were used with aliquot ingrowth times of 9 and 19 days. Results ranged from 4 to 6 pCi/l. Dilution error has been determined to be the probable cause for the deviation from the spike value. Internal biweekly spike analyses have been in control. Corrective action includes implementation of a dilution form to record aliquot and solvent volumes. Entries will be made by the technician and reviewed by the supervisor.

(d) There was large fraction of low energy beta emitters (Co-60 and Cs-134) in the sample. Detector efficiency decreases with decreasing energy. We are required to calibrate with the high energy beta emitters (Cs-137 and Sr-90). No corrective action necessary.

(e) There is no apparent reason for the high Cs-137 results. The sample geometry and detector efficiencies were verified to be correct. The total K and I-131 by gamma spectroscopy were in good agreement with EPA values. There is no trend and results were within +/- three sigma so no action taken.

(f) An investigation is being conducted; the results will be available shortly.

Appendix B: Radiological Environmental Monitoring Program Data Summary

TABLE B-1

Radiological Environmental Monitoring Program Data Summary

Name of facility: Fermi 2 *Docket No.: 50-341*

Location of facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

FERMI 2

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean: Location	Location with Highest Annual Mean: Mean and Range	Control Locations Mean and Range	Number of Non-routine Results
Gamma (TLD) Background (mRem/Std Qtr)	Gamma Radiation 250	1.0E+0	13.9 (234/234) 10.2 to 21.8	T-43 (Indicator)	17.8 (4/4) 14.7 to 21.8	13.7 (16/16) 11.7 to 15.8	none
Airborne Particulates (pCi/cu.m.)	GB 265	1.0E-2	2.0E-2 (212/212) 2.2E-3 to 6.4E-2	API-1 (Indicator)	2.1E-2 (53/53) 1.2E-2 to 4.0E-2	2.0E-2 (53/53) 1.2E-2 to4.1E-2	none
	GS 20						
	BE-7	N/A	1.1E-1 (16/16) 6.2E-2 to 1.5E-1	API-1 (Indicator)	1.2E-1 (4/4) 9.4E-2 to 1.4E-1	1.2E-2 (4/4) 9.3E-2 to 1.4E-1	none
	K-40	N/A	1.8E-2 (7/16) 6.7E-3 to 3.9E-2	API-1 (Indicator)	1.8E-2 (3/4) 6.7E-2 to 3.9E-2	1.0E-2 (2/4) 7.7E-3 to 1.2E-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/NB-95	N/A	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	5.0E-2	<MDA			<MDA	none
	CS-137	6.0E-2	<MDA			<MDA	none
	BA/LA-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	2.6E-4 (1/20)	API-3 (Indicator)	2.6E-4 (1/4)	<MDA	none
Airborne Iodine (pCi/cu.m.)	I-131 265	7.0E-2	<MDA			<MDA	none

FERMI 2

Sample Types (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean: Location	Location with Highest Annual Mean: Mean and Range	Control Locations Mean and Range	Number of Non-routine Results
Milk (pCi/l)	I-131 46	1.0E+0	<MDA			<MDA	none
	SR-89 46	N/A	<MDA			<MDA	none
	SR-90	N/A	2.0E+0 (27/28) 7.6E-1 to 4.3E+0	M-3 (Indicator)	2.0E+0 (10/10) 7.6E-1 to 4.3E+0	2.0E+0 (17/18) 4.9E-1 to 5.3E+0	none
	GS 46						
	BE-7	N/A	<MDA			<MDA	none
	K-40	N/A	1.3E+3 (27/28) 1.1E+3 to 1.8E+3	M-3 (Indicator)	1.4E+3 (10/10) 1.2E+3 to 1.8E+3	1.4E+3 (18/18) 1.2E+3 to 1.7E+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/NB-95	N/A	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	1.5E+1	<MDA			<MDA	none
	CS-137	1.8E+1	<MDA			<MDA	none
	BA/LA-140	1.5E+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
Grass (pCi/kg wet)	I-131 24	6.0E+1	<MDA			<MDA	none
	GS 24						
	BE-7	N/A	1.6E+3 (12/12) 3.6E+2 to 5.7E+3	M-8 (Control)	1.9E+3 (11/12) 3.5E+2 to 5.3E+3	1.9E+3 (11/12) 3.5E+2 to 5.3 E+3	none
	K-40	N/A	6.0E+3 (12/12) 3.8E+3 to 8.8E+3	M-7 (Indicator)	6.0E+3 (12/12) 3.8E+3 to 8.8E+3	5.6E+3 (12/12) 4.1E+3 to 7.5E+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/NB-95	N/A	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	6.0E+1	<MDA			<MDA	none
	CS-137	8.0E+1	<MDA			<MDA	none
	BA/LA-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

FERMI 2

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean: Location	Location with Highest Annual Mean: Mean and Range	Control Locations Mean and Range	Number of Non-routine Results
Vegetables (pCi/kg wet)	I-131 24	6.0E+1	<MDA			<MDA	none
	GS 24						
	BE-7	N/A	2.8E+2 (7/18) 9.7E+1 to 6.5E+2	FP-5 (Indicator)	3.8E+2 (2/6) 1.1E+2 to 6.5E+2	1.9E+2 (3/6) 5.9E+1 to 3.5E+2	none
	K-40	N/A	3.1E+3 (18/18) 1.2E+3 to 6.5E+3	FP-5 (Indicator)	3.7E+3 (6/6) 2.8E+3 to 6.5E+3	2.3E+3 (6/6) 3.7E+2 to 4.1E+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/NB-95	N/A	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	6.0E+1	<MDA			<MDA	none
	CS-137	8.0E+1	1.1E+1 (1/18)	FP-5 (Indicator)	1.1E+1 (1/18)	<MDA	none
	BA/LA-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	3.3E+1 (1/18)	FP-5 (Indicator)	3.3E+1 (1/18)	<MDA	none
Drinking Water (pCi/l)	GB 28	4.0E+0	3.4E+0 (16/16) 1.4E+0 to 6.4E+0	DW-3 (Indicator)	3.7E+0 (3/3) 3.1E+0 to 4.8E+0	3.0E+0 (11/12) 1.6E+0 to 5.1E+0	none
	GS 29						
	BE-7	N/A	<MDA			<MDA	none
	K-40	N/A	4.6E+1 (1/14)	DW-1 (Indicator)	4.6E+1 (1/14)	<MDA	none
	CR-51	N/A	<MDA			<MDA	none
	MN-54	1.5E+1	<MDA			<MDA	none
	CO-58	1.5E+1	<MDA			<MDA	none
	FE-59	3.0E+1	<MDA			<MDA	none
	CO-60	1.5E+1	<MDA			<MDA	none
	ZN-65	3.0E+1	<MDA			<MDA	none
	ZR/NB-95	1.5E+1	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	1.5E+1	<MDA			<MDA	none
	CS-137	1.8E+1	<MDA			<MDA	none
	BA/LA-140	1.5E+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 9	2.0E+3	<MDA			<MDA	none
	SR-89 29	N/A	<MDA			<MDA	none
	SR-90	N/A	<MDA			<MDA	none

FERMI 2

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean: Location	Location with Highest Annual Mean: Mean and Range	Control Locations Mean and Range	Number of Non-routine Results
Surface Water (pCi/l)	GS 24						
	BE-7	N/A	<MDA			<MDA	none
	K-40	N/A	<MDA			<MDA	none
	CR-51	N/A	<MDA			<MDA	none
	MN-54	1.5E+1	<MDA			<MDA	none
	CO-58	1.5E+1	<MDA			<MDA	none
	FE-59	3.0E+1	<MDA			<MDA	none
	CO-60	1.5E+1	<MDA			<MDA	none
	ZN-65	3.0E+1	<MDA			<MDA	none
	ZR/NB-95	1.5E+1	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	1.5E+1	<MDA			<MDA	none
	CS-137	1.8E+1	<MDA			<MDA	none
	BA/LA-140	1.5E+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	2.0E+3	<MDA			<MDA	none
	SR-89 24	N/A	<MDA			<MDA	none
	SR-90	N/A	<MDA			<MDA	none
Groundwater (pCi/l)	GS 16						
	BE-7	N/A	<MDA			<MDA	none
	K-40	N/A	<MDA			<MDA	none
	CR-51	N/A	<MDA			<MDA	none
	MN-54	1.5E+1	<MDA			<MDA	none
	CO-58	1.5E+1	<MDA			<MDA	none
	FE-59	3.0E+1	<MDA			<MDA	none
	CO-60	1.5E+1	<MDA			<MDA	none
	ZN-65	3.0E+1	<MDA			<MDA	none
	ZR/NB-95	1.5E+1	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	1.5E+1	<MDA			<MDA	none
	CS-137	1.8E+1	<MDA			<MDA	none
	BA/LA-140	1.5E+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	2.0E+3	<MDA			<MDA	none

FERMI 2

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean: Location	Location with Highest Annual Mean: Mean and Range	Control Locations Mean and Range	Number of Non-routine Results
Sediment (pCi/kg dry)	GS 10						
	BE-7	N/A	6.3E+2 (2/8) 4.8E+2 to 7.9E+2	S-2 (indicator)	6.3E+2 (2/8) 4.8E+2 to 7.9E+2	<MDA	none
	K-40	N/A	1.2E+4 (8/8) 9.4E+3 to 1.8E+4	S-2 (Indicator)	1.7E+4 (2/2) 1.6E+4 to1.8E+4	1.2E+4 (2/2) 1.1E+4 to 1.3E+4	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/NB-95	N/A	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	1.5E+1	<MDA			<MDA	none
	CS-137	1.8E+1	<MDA	S-5 (Control)	1.0E+2 (1/2)	1.0E+2 (1/2)	none
	BA/LA-140	1.5E+1	<MDA			<MDA	none
	CE-141	N/A	<MDA			<MDA	none
	CE-144	N/A	<MDA			<MDA	none
	RA-226	N/A	1.3E+3 (4/8) 4.4E+2 to 2.2E+3	S-2 (indicator)	2.0E+3 (2/2) 1.8E+3 to 2.2E+3	1.4E+3 (2/2) 1.2E+3 to 1.6E+3	none
	TH-228	N/A	4.0E+2 (8/8) 1.4E+2 to 1.1E+3	S-5 (Control)	4.2E+2 (2/2) 3.9E+2 to 4.5E+2	4.2E+2 (2/2) 3.9E+2 to 4.5E+2	none
	SR-89 10	N/A	<MDA				
	SR-90	N/A	4.8E+1 (3/8) 3.7E+1 to 5.9E+1	S-2 (Indicator)	5.3E+1 (2/2) 4.7E+1 to 5.9E+1	<MDA	none
Fish (pCi/kg wet)	GS 29						
	BE-7	N/A	<MDA			<MDA	none
	K-40	N/A	2.9E+3 (9/9) 2.3E+2 to 4.6E+3	F-3 (Control)	3.2E+3 (10/10) 2.4E+3 to 4.6E+3	3.0E (20/20) 2.1E+3 to 4.6E+3	none
	MN-54	1.3E+2	<MDA			<MDA	none
	CO-58	1.3E+2	<MDA			<MDA	none
	FE-59	2.6E+2	<MDA			<MDA	none
	CO-60	1.3E+2	<MDA			<MDA	none
	ZN-65	2.6E+2	<MDA			<MDA	none
	ZR/NB-95	N/A	<MDA			<MDA	none
	RU-103	N/A	<MDA			<MDA	none
	RU-106	N/A	<MDA			<MDA	none
	CS-134	1.3E+2	<MDA			<MDA	none
	CS-137	1.5E+2	<MDA			<MDA	none
	BA/LA-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 26	N/A	<MDA			<MDA	none
	SR-90	N/A	4.7E+1 (6/8) 7.3E+0 to 1.1E+2	F-1 (Control)	8.8E+1 (9/9) 6.6E+0 to 3.7E+2	6.4E+1 (16/18) 3.2E+0 to 3.7E+2	none

Notes

GB = gross beta

GS = gamma scan

LLD = Fermi 2 Offsite Dose Calculation Manual (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 Offsite Dose Calculation Manual (ODCM).

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

Appendix C: Special Environmental Samples

Special Environmental Samples

In October 1991, as part of the Fermi 1 Environmental Monitoring Program, sediment samples were collected from the cooling water discharge canal formerly used by Fermi 1. Highly sensitive monitoring equipment indicated low levels of radionuclides, barely above the level necessary for detection. Although it is not uncommon to find such low-level detectable activity near the discharges of nuclear power plants, and although the measurements were barely above background levels of naturally-occurring radioactivity, Detroit Edison began an investigation to determine the source of these low-level accumulations.

The study, which was completed in 1992, ruled out the likelihood of any Fermi 1 operations as the source of any of the radioactive materials present in the sample. The materials detected were: 481 uCi of Mn-54; 891 uCi of Co-60; and 270 uCi of Zn -65. Mn-54 and Zn-65 have short half-lives of less than one year; the latest discharge from Fermi 1 was made in June 1975. (Using conservative numbers to estimate area and depth, the total activity was estimated to be 1.4 mCi.)

After sampling over one hundred additional locations and analyzing the results, it was determined that only three areas could be potential sources of the low-level radioactivity in the cooling water channel. These potential sources were in the General Service Water (GSW) intake and forebay area. By facility design, however, no radioactive systems are directly connected to the GSW intake. Therefore, analysts suspected that the activity was part of the lake bottom material that was filtered and collected by the GSW traveling screens, where it was then transferred to the discharge pipe and released into the cooling water channel.

To confirm this theory, samples were taken from the nearby lake bottom and shoreline. These samples revealed that the radionuclides had absorbed on the lake sediments. Due to wind-induced lake currents and the design of the GSW forebay, the materials were concentrated in and around the forebay. But even at these concentrated low levels, the measurements were barely above those established by preoperational estimates (of naturally-occurring radioactivity) during the licensing process of Fermi 2. It is believed that the presence of the radioactivity in the sediments is a result of recirculation of plant liquid effluents, which are well under federally established standards.

The study concluded that the levels of radioactive material detected in the cooling water channel are of no concern to the general public. This conclusion was based on conservative assumptions in evaluating radiological concern: (1) the individual potentially affected lives on the land with the highest activity, and all food and drink consumed comes from the land with the highest activity; and (2) no credit is taken for the reduction of activity by radioactive decay over time. The radiation dose received by this individual would be less than 1 mrem in one year; over fifty years, the radiation dose would be less than 0.001 mrem per year. An additional 1 mrem per year is not even a measurable dosage, given the variation in background (i.e. naturally-occurring) radiation.

Because the low levels of radioactivity in the samples studied are no different in their potential effect on the public than preoperational levels of radioactive materials, there is no basis for current or future radiological safety concern. Therefore, Detroit Edison will continue to monitor the identified locations and address final disposition of the material at the time of decommissioning (an option stipulated under Title 10 of the Code of Federal Regulations when no radiological concern is present; other methods of control include retrieval and containment or in-place burial). Remediation of the affected sites is not an appropriate option since in the absence of radiological concern, costs would far exceed any benefits.

In summary, sediment samples from the cooling water discharge canal indicating the presence of barely detectable levels of radionuclides were carefully analyzed to identify the source of the emissions. Activity from Fermi 1 operations was ruled out, and it was determined that lake currents and the GSW forebay screens had concentrated low levels of radioactive material traceable to liquid effluents well within federal guidelines for releases from normal plant operations. Because these low levels present no radiological concerns, Detroit Edison will continue to analyze the identified locations as part of its ongoing Radiological Environmental Monitoring Program.

Appendix D: Data Tables

TLD ANALYSIS

(mRem/Std Qtr)

STATION NUMBER	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
T01	12.0 +/- 0.2	13.8 +/- 0.4	11.1 +/- 0.4	13.3 +/- 0.3
T02	13.7 +/- 0.1	15.8 +/- 0.2	13.4 +/- 0.4	15.7 +/- 0.3
T03	10.2 +/- 0.2	12.1 +/- 0.2	10.9 +/- 0.5	11.7 +/- 0.2
T04	11.7 +/- 0.1	14.4 +/- 0.3	12.0 +/- 0.4	14.0 +/- 0.2
T05	12.5 +/- 0.2	14.9 +/- 0.2	12.2 +/- 0.9	15.1 +/- 0.2
T06	12.3 +/- 0.2	14.3 +/- 0.5	11.2 +/- 0.2	13.2 +/- 0.5
T07	13.6 +/- 0.1	15.8 +/- 0.4	13.0 +/- 0.7	15.2 +/- 0.4
T08	12.4 +/- 0.4	14.9 +/- 1.1	12.0 +/- 0.2	14.5 +/- 0.3
T09	11.7 +/- 0.2	14.7 +/- 0.4	11.9 +/- 0.6	13.7 +/- 0.5
T10	13.2 +/- 0.1	16.1 +/- 0.6	11.5 +/- 0.7	14.9 +/- 0.3
T11	11.5 +/- 0.3	14.0 +/- 0.9	11.2 +/- 0.6	14.0 +/- 0.3
T12	11.0 +/- 0.1	①	10.3 +/- 0.3	12.6 +/- 0.6
T13	13.4 +/- 0.4	16.3 +/- 0.6	13.1 +/- 0.7	15.0 +/- 0.3
T14	12.6 +/- 0.3	17.3 +/- 0.6	13.0 +/- 0.2	15.4 +/- 0.4
T15	12.8 +/- 0.5	16.0 +/- 0.3	11.8 +/- 0.3	14.4 +/- 0.7
T16	13.1 +/- 0.4	15.8 +/- 0.4	12.3 +/- 0.5	14.3 +/- 0.3
T17	11.2 +/- 0.3	15.2 +/- 0.9	10.9 +/- 0.4	13.1 +/- 0.4
T18	12.4 +/- 0.2	15.7 +/- 0.5	12.1 +/- 0.3	13.9 +/- 0.3
T19	13.7 +/- 0.3	18.3 +/- 1.0	13.6 +/- 0.6	15.7 +/- 0.8
T20	13.1 +/- 0.5	17.4 +/- 0.6	13.9 +/- 0.6	④
T21	12.0 +/- 0.1	15.7 +/- 1.0	11.4 +/- 0.2	13.9 +/- 0.4
T22	13.3 +/- 0.2	15.5 +/- 0.8	11.9 +/- 0.3	14.4 +/- 0.9
T23	13.1 +/- 0.4	17.2 +/- 0.6	13.4 +/- 0.6	15.0 +/- 0.5
T24	12.1 +/- 0.3	14.8 +/- 0.7	13.0 +/- 0.7	13.6 +/- 0.4
T25	14.5 +/- 0.1	18.6 +/- 0.7	14.5 +/- 1.1	16.8 +/- 0.7
T26	14.6 +/- 0.8	17.8 +/- 0.5	14.4 +/- 0.5	16.6 +/- 0.7
T27	10.7 +/- 0.2	12.3 +/- 0.3	10.9 +/- 0.3	12.0 +/- 0.1
T28	11.7 +/- 0.3	14.5 +/- 0.3	12.4 +/- 0.2	13.6 +/- 0.2
T29	12.7 +/- 0.3	15.0 +/- 0.5	13.1 +/- 0.5	14.1 +/- 0.6
T30	10.9 +/- 0.1	12.8 +/- 0.2	11.3 +/- 0.1	12.2 +/- 0.1
T31	12.4 +/- 0.3	15.0 +/- 0.4	12.6 +/- 0.5	13.8 +/- 0.2
T32	12.0 +/- 0.3	15.8 +/- 1.1	13.2 +/- 0.5	14.6 +/- 0.3

STATION NUMBER	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
T33	11.6 +/- 0.2	14.0 +/- 0.7	11.8 +/- 0.4	13.4 +/- 0.4
T34	11.9 +/- 0.1	13.7 +/- 0.3	12.1 +/- 0.4	12.9 +/- 0.2
T35	11.6 +/- 0.1	14.3 +/- 0.3	12.2 +/- 0.4	13.0 +/- 0.0
T36	12.7 +/- 0.2	14.7 +/- 0.3	13.5 +/- 0.4	14.2 +/- 0.5
T37	12.0 +/- 0.3	14.6 +/- 0.4	12.6 +/- 0.4	13.5 +/- 0.2
T38	13.2 +/- 0.3	16.0 +/- 0.3	13.4 +/- 0.6	14.6 +/- 0.1
T39	15.0 +/- 0.4	16.9 +/- 0.6	13.7 +/- 0.4	12.9 +/- 0.2
T40	12.9 +/- 0.4	14.4 +/- 0.3	11.7 +/- 0.3	11.8 +/- 0.3
T41	17.9 +/- 0.4	2C [illegible] 0.4	15.8 +/- 0.4	14.3 +/- 0.2
T42	16.0 +/- 0.5	18.7 +/- 0.8	15.9 +/- 0.6	13.5 +/- 0.2
T43	18.5 +/- 0.5	20.5 +/- 0.2	16.2 +/- 0.4	14.7 +/- 0.3
T44	18.1 +/- 0.9	19.7 +/- 0.3	15.0 +/- 0.6	14.5 +/- 0.2
T45	14.8 +/- 0.8	16.1 +/- 0.2	12.6 +/- 0.2	14.2 +/- 0.2
T46	13.6 +/- 0.4	16.0 +/- 0.7	12.3 +/- 0.3	13.3 +/- 0.7
T47	18.9 +/- 0.5	20.7 +/- 0.5	15.5 +/- 0.6	14.1 +/- 0.4
T48	14.7 +/- 0.7	15.9 +/- 0.3	13.0 +/- 0.5	12.8 +/- 0.3
T49	15.3 +/- 0.6	19.8 +/- 0.5	15.9 +/- 0.6	18.1 +/- 0.5
T50	14.6 +/- 0.9	16.2 +/- 0.3	13.3 +/- 0.8	14.9 +/- 0.4
T51	11.0 +/- 0.3	12.7 +/- 1.2	10.7 +/- 0.3	11.7 +/- 0.1
T52	11.8 +/- 0.2	13.8 +/- 0.1	11.3 +/- 0.6	12.5 +/- 0.2
T53	13.7 +/- 0.3	15.7 +/- 0.1	12.5 +/- 0.7	13.5 +/- 0.2
T54	11.7 +/- 0.1	13.5 +/- 0.5	11.5 +/- 0.7	12.4 +/- 0.1
T55	13.5 +/- 0.2	16.7 +/- 0.4	14.4 +/- 0.2	14.6 +/- 0.3
T56	13.3 +/- 0.2	15.1 +/- 0.2	12.7 +/- 0.5	14.1 +/- 0.1
T57	14.6 +/- 0.3	17.9 +/- 0.4	15.2 +/- 0.3	16.6 +/- 0.6
T58	13.1 +/- 0.3	14.6 +/- 0.2	12.2 +/- 0.4	13.4 +/- 0.1
T59	12.7 +/- 0.4	13.9 +/- 0.3	11.4 +/- 0.7	12.7 +/- 0.1
T60	12.8 +/- 0.3	16.1 +/- 0.3	13.6 +/- 0.3	14.9 +/- 0.6
T61	12.9 +/- 0.4	16.3 +/- 1.2	12.9 +/- 0.5	14.3 +/- 0.3
T62	13.6 +/- 0.5	17.1 +/- 0.3	13.8 +/- 0.5	15.7 +/- 0.5
T63	12.7 +/- 0.9	14.7 +/- 0.6	12.1 +/- 0.3	13.6 +/- 0.4

① T12 missing for the second quarter
② T20 missing & replaced with spare (5/15/92) second quarter

③ T10 missing & replaced with spare (8/21/92) third quarter
④ T20 missing for the fourth quarter

FERMI 2

AIR PARTICULATE ANALYSIS

Gross Beta (pCi/cu.m.)

Date Collected	API-1			API-2			API-3			API-4			API-5		
01/02/92	3.4E-02	+/-	4.0E-03	3.1E-02	+/-	3.0E-03	3.0E-02	+/-	3.0E-03	2.7E-02	+/-	3.0E-03	2.6E-02	+/-	3.0E-03
01/08/92	2.7E-02	+/-	4.0E-03	2.4E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.9E-02	+/-	4.0E-03	2.7E-02	+/-	4.0E-03
01/15/92	2.2E-02	+/-	3.0E-03	2.7E-02	+/-	3.0E-03	2.5E-02	+/-	3.0E-03	2.4E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03
01/22/92	2.6E-02	+/-	3.0E-03	2.7E-02	+/-	3.0E-03	2.8E-02	+/-	3.0E-03	2.8E-02	+/-	3.0E-03	2.8E-02	+/-	3.0E-03
01/29/92	2.6E-02	+/-	3.0E-03	2.5E-02	+/-	3.0E-03	2.5E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.3E-02	+/-	3.0E-03
02/05/92	2.3E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.7E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03
02/12/92	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.5E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03
02/19/92	2.0E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03
02/26/92	1.9E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03
03/04/92	2.2E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	2.4E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03
03/11/92	3.1E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03
03/18/92	2.0E-02	+/-	3.0E-03	2.3E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03
03/25/92	2.0E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03
04/01/92	1.4E-02	+/-	3.0E-03	1.4E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03	1.4E-02	+/-	3.0E-03	1.2E-02	+/-	3.0E-03
04/08/92	1.6E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03
04/15/92	1.3E-02	+/-	2.0E-03	1.9E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03
04/22/92	1.2E-02	+/-	3.0E-03	1.2E-02	+/-	3.0E-03	1.2E-02	+/-	2.0E-03	1.2E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03
04/29/92	1.2E-02	+/-	2.0E-03	1.4E-02	+/-	2.0E-03	1.4E-02	+/-	2.0E-03	1.4E-02	+/-	2.0E-03	1.7E-02	+/-	3.0E-03
05/06/92	1.8E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.5E-02	+/-	3.0E-03
05/13/92	1.4E-02	+/-	2.0E-03	1.5E-02	+/-	2.0E-03	1.5E-02	+/-	2.0E-03	1.6E-02	+/-	3.0E-03	1.4E-02	+/-	2.0E-03
05/20/92	1.7E-02	+/-	3.0E-03	1.3E-02	+/-	2.0E-03	1.4E-02	+/-	2.0E-03	1.4E-02	+/-	3.0E-03	1.3E-02	+/-	2.0E-03
05/27/92	1.8E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03
06/03/92	1.8E-02	+/-	3.0E-03	1.7E-02	+/-	2.0E-03	1.6E-02	+/-	2.0E-03	1.6E-02	+/-	2.0E-03	1.5E-02	+/-	2.0E-03
06/10/92	2.1E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03
06/17/92	1.9E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03
06/24/92	1.6E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.5E-02	+/-	2.0E-03

① All samplers (1/8/92) ran six days

FERMI 2

AIR PARTICULATE ANALYSIS

Gross Beta (pCi/cu.m.)

Date Collected	API-1			API-2			API-3			API-4			API-5		
07/01/92	2.4E-02	+/-	3.0E-03	2.3E-02	+/-	3.0E-03	2.3E-02	+/-	3.0E-03	2.6E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03
07/08/92	1.5E-02	+/-	3.0E-03	1.5E-02	+/-	3.0E-03	1.5E-02	+/-	2.0E-03	1.7E-02	+/-	3.0E-03	1.5E-02	+/-	3.0E-03
07/15/92	3.2E-02	+/-	4.0E-03	6.4E-02	+/-	1.3E-02	2.2E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	2.3E-02	+/-	3.0E-03
07/22/92	2.2E-02	+/-	3.0E-03	1.5E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03	1.5E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03
07/29/92	1.9E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03
08/05/92	2.2E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03
08/12/92	3.3E-02	+/-	7.0E-03	2.1E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.7E-02	+/-	4.0E-03	2.3E-02	+/-	3.0E-03
08/19/92	2.1E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	2.3E-02	+/-	4.0E-03	1.6E-02	+/-	3.0E-03
08/26/92	2.5E-02	+/-	3.0E-03	2.7E-02	+/-	3.0E-03	2.5E-02	+/-	3.0E-03	2.6E-02	+/-	3.0E-03	2.4E-02	+/-	3.0E-03
09/02/92	1.8E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03
09/09/92	1.8E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03
09/16/92	1.8E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03
09/23/92	2.4E-02	+/-	4.0E-03	1.8E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03
09/30/92	2.0E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03
10/07/92	2.1E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.4E-02	+/-	3.0E-03	2.3E-02	+/-	3.0E-03
10/14/92	2.2E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	2.3E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03
10/21/92	2.3E-02	+/-	3.0E-03	2.5E-02	+/-	3.0E-03	2.2E-03	+/-	3.0E-04	2.4E-02	+/-	3.0E-03	2.4E-02	+/-	3.0E-03
10/28/92	2.9E-02	+/-	3.0E-03	2.6E-02	+/-	3.0E-03	2.6E-02	+/-	3.0E-03	2.8E-02	+/-	3.0E-03	3.2E-02	+/-	3.0E-03
11/04/92	1.6E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03
11/11/92	1.7E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.2E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03
11/18/92	1.5E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.7E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03
11/25/92	1.6E-02	+/-	3.0E-03	1.2E-02	+/-	3.0E-03	1.1E-02	+/-	3.0E-03	1.3E-02	+/-	3.0E-03	1.3E-02	+/-	3.0E-03
12/02/92	2.6E-02	+/-	3.0E-03	2.1E-02	+/-	3.0E-03	2.6E-02	+/-	3.0E-03	2.3E-02	+/-	3.0E-03	2.4E-02	+/-	3.0E-03
12/09/92	2.0E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	2.0E-02	+/-	3.0E-03	1.9E-02	+/-	3.0E-03	1.8E-02	+/-	3.0E-03
12/16/92	1.5E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03	1.6E-02	+/-	3.0E-03	1.3E-02	+/-	2.0E-03	1.5E-02	+/-	3.0E-03
12/23/92	4.0E-02	+/-	4.0E-03	3.9E-02	+/-	4.0E-03	4.6E-02	+/-	4.0E-03	4.1E-02	+/-	4.0E-03	4.4E-02	+/-	4.0E-03
12/30/92	2.6E-02	+/-	3.0E-03	2.9E-02	+/-	3.0E-03	2.6E-02	+/-	3.0E-03	2.6E-02	+/-	3.0E-03	2.9E-02	+/-	3.0E-03

① API-1 (7/15/92) blown fuse

② API-2 (7/15/92) pump malfunction

③ API-4 (7/15/92) power outage

④ API-1 (8/19/92) blown fuse

⑤ API-4 (8/19/92) damaged during storm

⑥ API-1 (9/23/92) pump malfunction

FERMI 2 AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

First Quarter (pCi/cu. m.)

Nuclide	API-1	API-2	API-3	API-4	API-5
Be-7	1.28E-01 +/- 1.30E-02	1.06E-01 +/- 1.10E-02	1.19E-01 +/- 1.20E-02	9.27E-02 +/- 1.09E-02	6.20E-02 +/- 8.90E-03
K-40	3.90E-02 +/- 7.50E-03	2.66E-02 +/- 6.00E-03	< 9.00E-03	7.72E-03 +/- 4.13E-03	2.46E-02 +/- 5.70E-03
Mn-54	< 6.00E-04	< 6.00E-04	< 5.00E-04	< 5.00E-04	< 5.00E-04
Co-58	< 1.00E-03	< 9.00E-04	< 8.00E-04	< 7.00E-04	< 6.00E-04
Fe-59	< 2.00E-03	< 2.00E-03	< 1.00E-03	< 2.00E-03	< 2.00E-03
Co-60	< 6.00E-04	< 5.00E-04	< 5.00E-04	< 5.00E-04	< 5.00E-04
Zn-65	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03
Zr/Nb-95	< 1.00E-03	< 1.00E-03	< 7.00E-04	< 8.00E-04	< 8.00E-04
Ru-103	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03
Ru-106	< 6.00E-03	< 5.00E-03	< 4.00E-03	< 4.00E-03	< 4.00E-03
I-131	< 8.00E-02	< 6.00E-02	< 6.00E-02	< 7.00E-02	< 6.00E-02
Cs-134	< 6.00E-04	< 6.00E-04	< 4.00E-04	< 5.00E-04	< 4.00E-04
Cs-137	< 6.00E-04	< 5.00E-04	< 5.00E-04	< 5.00E-04	< 5.00E-04
Ba/La-140	< 1.00E-02	< 1.00E-02	< 1.00E-02	< 2.00E-02	< 1.00E-02
Ce-141	< 3.00E-03	< 2.00E-03	< 2.00E-03	< 2.00E-03	< 2.00E-03
Ce-144	< 5.00E-03	< 3.00E-03	< 3.00E-03	< 3.00E-03	< 2.00E-03
Ra-226	< 1.00E-02	< 7.00E-03	< 9.00E-03	< 9.00E-03	< 7.00E-03
Th-228	< 1.00E-03	< 7.00E-04	< 9.00E-04	< 1.00E-03	< 7.00E-04
Sr-89	< 1.00E-03	< 7.00E-04	< 9.00E-04	< 1.00E-03	< 1.00E-03
Sr-90	< 2.00E-04	< 2.00E-04	< 2.00E-04	< 2.00E-04	< 2.00E-04

Second Quarter (pCi/cu. m.)

Nuclide	API-1	API-2	API-3	API-4	API-5
Be-7	1.38E-01 +/- 1.40E-02	1.62E-01 +/- 1.60E-02	1.32E-01 +/- 1.30E-02	1.36E-01 +/- 1.40E-02	1.53E-01 +/- 1.50E-02
K-40	6.71E-03 +/- 3.89E-03	9.85E-03 +/- 3.92E-03	< 8.00E-03	< 2.00E-02	1.00E-02 +/- 4.60E-03
Mn-54	< 5.00E-04	< 4.00E-04	< 5.00E-04	< 7.00E-04	< 6.00E-04
Co-58	< 8.00E-04	< 7.00E-04	< 7.00E-04	< 9.00E-04	< 8.00E-04
Fe-59	< 2.00E-03	< 2.00E-03	< 2.00E-03	< 3.00E-03	< 3.00E-03
Co-60	< 5.00E-04	< 5.00E-04	< 5.00E-04	< 6.00E-04	< 6.00E-04
Zn-65	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03
Zr/Nb-95	< 8.00E-04	< 7.00E-04	< 7.00E-04	< 1.00E-03	< 8.00E-04
Ru-103	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03
Ru-106	< 4.00E-03	< 4.00E-03	< 3.00E-03	< 6.00E-03	< 5.00E-03
I-131	< 6.00E-02	< 6.00E-02	< 5.00E-02	< 7.00E-02	< 6.00E-02
Cs-134	< 5.00E-04	< 5.00E-04	< 4.00E-04	< 6.00E-04	< 6.00E-04
Cs-137	< 5.00E-04	< 5.00E-04	< 6.00E-04	< 6.00E-04	< 5.00E-04
Ba/La-140	< 1.00E-02	< 1.00E-02	< 1.00E-02	< 1.00E-02	< 1.00E-02
Ce-141	< 1.00E-03	< 2.00E-03	< 2.00E-03	< 2.00E-03	< 2.00E-03
Ce-144	< 2.00E-03	< 3.00E-03	< 2.00E-03	< 3.00E-03	< 3.00E-03
Ra-226	< 7.00E-03	< 9.00E-03	< 7.00E-03	< 8.00E-03	< 8.00E-03
Th-228	< 7.00E-04	< 8.00E-04	< 6.00E-04	< 8.00E-04	< 8.00E-04
Sr-89	< 2.00E-03	< 1.00E-03	< 9.00E-04	< 1.00E-03	< 1.00E-03
Sr-90	< 3.00E-04	< 2.00E-04	2.60E-04 +/- 1.00E-04	< 2.00E-04	< 2.00E-04

FERMI 2 AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

Third Quarter (pCi/cu. m.)

Nuclide	API-1	API-2	API-3	API-4	API-5
Be-7	1.23E-01 +/- 1.20E-02	1.10E-01 +/- 1.10E-02	1.15E-01 +/- 1.20E-02	1.40E-01 +/- 1.40E-02	1.10E-01 +/- 1.10E-02
K-40	8.49E-03 +/- 3.75E-03	< 1.00E-02	< 2.00E-02	1.21E-02 +/- 4.00E-03	< 1.00E-02
Mn-54	< 6.00E-04	< 5.00E-04	< 5.00E-04	< 3.00E-04	< 5.00E-04
Co-58	< 9.00E-04	< 7.00E-04	< 7.00E-04	< 6.00E-04	< 7.00E-04
Fe-59	< 2.00E-03	< 2.00E-03	< 3.00E-03	< 2.00E-03	< 2.00E-03
Co-60	< 6.00E-04	< 5.00E-04	< 5.00E-04	< 4.00E-04	< 4.00E-04
Zn-65	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 8.00E-04	< 1.00E-03
Zr/Nb-95	< 8.00E-04	< 7.00E-04	< 9.00E-04	< 6.00E-04	< 7.00E-04
Ru-103	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 8.00E-04	< 1.00E-03
Ru-106	< 5.00E-03	< 4.00E-03	< 5.00E-03	< 4.00E-03	< 4.00E-03
I-131	< 6.00E-02	< 4.00E-02	< 5.00E-02	< 4.00E-02	< 4.00E-02
Cs-134	< 6.00E-04	< 5.00E-04	< 5.00E-04	< 4.00E-04	< 5.00E-04
Cs-137	< 6.00E-04	< 5.00E-04	< 5.00E-04	< 4.00E-04	< 5.00E-04
Ba/La-140	< 1.00E-02	< 9.00E-03	< 1.00E-02	< 8.00E-03	< 1.00E-02
Ce-141	< 2.00E-03	< 1.00E-03	< 2.00E-03	< 2.00E-03	< 1.00E-03
Ce-144	< 3.00E-03	< 2.00E-03	< 3.00E-03	< 2.00E-03	< 2.00E-03
Ra-226	< 1.00E-02	< 7.00E-03	< 8.00E-03	< 7.00E-03	< 7.00E-03
Th-228	< 9.00E-04	< 6.00E-04	< 7.00E-04	< 7.00E-04	< 6.00E-04
Sr-89	< 7.00E-04	< 6.00E-04	< 5.00E-04	< 5.00E-04	< 1.00E-03
Sr-90	< 1.00E-04	< 8.00E-05	< 8.00E-05	< 9.00E-05	< 2.00E-04

Fourth Quarter (pCi/cu. m.)

Nuclide	API-1	API-2	API-3	API-4	API-5
Be-7	9.35E-02 +/- 1.01E-02	8.38E-02 +/- 8.40E-03	8.86E-02 +/- 1.03E-02	9.45E-02 +/- 9.90E-03	7.99E-02 +/- 9.00E-03
K-40	< 9.00E-03	< 1.00E-02	< 2.00E-02	< 7.00E-03	< 1.00E-02
Mn-54	< 5.00E-04	< 5.00E-04	< 6.00E-04	< 5.00E-04	< 5.00E-04
Co-58	< 7.00E-04	< 7.00E-04	< 9.00E-04	< 6.00E-04	< 7.00E-04
Fe-59	< 2.00E-03	< 2.00E-03	< 3.00E-03	< 2.00E-03	< 2.00E-03
Co-60	< 5.00E-04	< 4.00E-04	< 6.00E-04	< 5.00E-04	< 6.00E-04
Zn-65	< 1.00E-03	< 1.00E-03	< 2.00E-03	< 1.00E-03	< 1.00E-03
Zr/Nb-95	< 8.00E-04	< 8.00E-04	< 1.00E-03	< 7.00E-04	< 9.00E-04
Ru-103	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03	< 1.00E-03
Ru-106	< 4.00E-03	< 4.00E-03	< 5.00E-03	< 3.00E-03	< 4.00E-03
I-131	< 8.00E-02	< 7.00E-02	< 9.00E-02	< 6.00E-02	< 7.00E-02
Cs-134	< 5.00E-04	< 5.00E-04	< 6.00E-04	< 4.00E-04	< 5.00E-04
Cs-137	< 5.00E-04	< 4.00E-04	< 6.00E-04	< 4.00E-04	< 5.00E-04
Ba/La-140	< 2.00E-02	< 1.00E-02	< 2.00E-02	< 1.00E-02	< 2.00E-02
Ce-141	< 2.00E-03	< 1.00E-03	< 2.00E-03	< 2.00E-03	< 2.00E-03
Ce-144	< 3.00E-03	< 2.00E-03	< 3.00E-03	< 3.00E-03	< 2.00E-03
Ra-226	< 9.00E-03	< 6.00E-03	< 8.00E-03	< 7.00E-03	< 7.00E-03
Th-228	< 8.00E-04	< 6.00E-04	< 7.00E-04	< 7.00E-04	< 7.00E-04
Sr-89	< 7.00E-04	< 1.00E-03	< 8.00E-04	< 8.00E-04	< 8.00E-04
Sr-90	< 1.00E-04	< 1.00E-04	< 1.00E-04	< 1.00E-04	< 1.00E-04

FERMI 2
AIR IODINE ANALYSIS
I-131 (pCi/cu.m.)

Date Collected	API-1	API-2	API-3	API-4	API-5
01/02/92	< 4.0E-02	< 4.0E-02	< 3.0E-02	< 4.0E-02	< 1.0E-02
01/08/92	< 5.0E-02	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 3.0E-02
01/15/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 1.0E-02
01/22/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 1.0E-02
01/29/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
02/05/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
02/12/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
02/19/92	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 2.0E-02
02/26/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
03/04/92	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 1.0E-02
03/11/92	< 1.0E-02	< 1.0E-02	< 1.0E-02	< 1.0E-02	< 1.0E-02
03/18/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
03/25/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
04/01/92	< 3.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
04/08/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
04/15/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
04/22/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02
04/29/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 1.0E-02
05/06/92	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 2.0E-02
05/13/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
05/20/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
05/27/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
06/03/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
06/10/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
06/17/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
06/24/92	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 2.0E-02
07/01/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
07/08/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
07/15/92	< 5.0E-02	< 2.0E-01	< 3.0E-02	< 3.0E-02	< 2.0E-02
07/22/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
07/29/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 1.0E-02
08/05/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 1.0E-02
08/12/92	< 6.0E-02	< 2.0E-02	< 2.0E-02	< 3.0E-02	< 1.0E-02
08/19/92	< 4.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 1.0E-02
08/26/92	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 2.0E-02
09/02/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
09/09/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
09/16/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
09/23/92	< 5.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
09/30/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
10/07/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
10/14/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
10/21/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02
10/28/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 1.0E-02
11/04/92	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 2.0E-02
11/11/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02
11/18/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 1.0E-02
11/25/92	< 3.0E-02	< 3.0E-02	< 2.0E-02	< 3.0E-02	< 2.0E-02
12/02/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
12/09/92	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 2.0E-02	< 1.0E-02
12/16/92	< 4.0E-02	< 3.0E-02	< 4.0E-02	< 4.0E-02	< 2.0E-02
12/23/92	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 4.0E-02	< 2.0E-02
12/30/92	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 3.0E-02	< 2.0E-02

① API-3 (11/25/92) was a six day sample

FERMI 2 MILK ANALYSIS
M-2 (Indicator) (pCi/l)

Nuclide	01/16/92	02/13/92	03/12/92	04/16/92	05/07/92	05/21/92
Be-7	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01
K-40	1.2E+03 +/- 1.2E+02	1.2E+03 +/- 1.2E+02	1.2E+03 +/- 1.2E+02	1.3E+03 +/- 1.3E+02	1.3E+03 +/- 1.3E+02	1.3E+03 +/- 1.3E+02
Mn-54	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Co-58	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Fe-59	< 9.0E+00	< 9.0E+00	< 8.0E+00	< 9.0E+00	< 9.0E+00	< 8.0E+00
Co-60	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Zn-65	< 1.0E+01	< 9.0E+00	< 8.0E+00	< 1.0E+01	< 9.0E+00	< 1.0E+01
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-103	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Cs-134	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ba/La-140	< 6.0E+00	< 7.0E+00	< 5.0E+00	< 7.0E+00	< 6.0E+00	< 6.0E+00
Ce-141	< 6.0E+00	< 6.0E+00	< 6.0E+00	< 7.0E+00	< 8.0E+00	< 6.0E+00
Ce-144	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01
Ra-226	< 7.0E+01	< 7.0E+01	< 7.0E+01	< 8.0E+01	< 9.0E+01	< 8.0E+01
Th-228	< 7.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00	< 8.0E+00	< 7.0E+00
Sr-89	< 2.0E+00	< 2.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00
Sr-90	1.1E+00 +/- 1.0E-01	1.8E+00 +/- 4.0E-01	2.1E+00 +/- 3.0E-01	3.0E+00 +/- 3.0E-01	2.5E+00 +/- 3.0E-01	2.2E+00 +/- 3.0E-01
I-131	< 1.0E-01	< 2.0E-01	< 3.0E-01	< 1.0E-01	< 2.0E-01	< 2.0E-01

Nuclide	06/11/92	06/26/92	07/09/92	07/23/92	08/13/92	08/27/92
Be-7	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
K-40	1.3E+03 +/- 1.3E+02	1.4E+03 +/- 1.4E+02	1.2E+03 +/- 1.2E+02	1.3E+03 +/- 1.3E+02	1.4E+03 +/- 1.4E+02	< 2.0E+02
Mn-54	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00
Co-58	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Fe-59	< 9.0E+00	< 1.0E+01	< 7.0E+00	< 8.0E+00	< 9.0E+00	< 9.0E+00
Co-60	< 4.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00
Zn-65	< 9.0E+00	< 1.0E+01	< 8.0E+00	< 8.0E+00	< 9.0E+00	< 9.0E+00
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-103	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-106	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01
Cs-134	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00
Cs-137	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 4.0E+00
Ba/La-140	< 6.0E+00	< 6.0E+00	< 5.0E+00	< 4.0E+00	< 6.0E+00	< 4.0E+00
Ce-141	< 6.0E+00	< 9.0E+00	< 5.0E+00	< 6.0E+00	< 8.0E+00	< 6.0E+00
Ce-144	< 2.0E+01	< 4.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Ra-226	< 7.0E+01	< 1.0E+02	< 7.0E+01	< 7.0E+01	< 9.0E+01	< 8.0E+01
Th-228	< 6.0E+00	< 9.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00	< 7.0E+00
Sr-89	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00
Sr-90	< 4.0E-01	3.4E+00 +/- 5.0E-01	1.1E+00 +/- 2.0E-01	2.3E+00 +/- 4.0E-01	1.6E+00 +/- 9.0E-01	1.9E+00 +/- 2.0E-01
I-131	< 2.0E-01	< 2.0E-01	< 1.0E-01	< 1.0E-01	< 4.0E-01	< 1.0E-01

FERMI 2 MILK ANALYSIS
M-2 (Indicator) (pCi/l)

Nuclide	09/11/92	09/24/92	10/15/92	10/29/92	11/12/92	12/10/92
Be-7	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01
K-40	1.5E+03 +/- 1.5E+02	1.1E+03 +/- 1.1E+02	1.4E+03 +/- 1.4E+02	1.4E+03 +/- 1.4E+02	1.3E+03 +/- 1.3E+02	1.4E+03 +/- 1.4E+02
Mn-54	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Co-58	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Fe-59	< 9.0E+00	< 7.0E+00	< 9.0E+00	< 9.0E+00	< 9.0E+00	< 8.0E+00
Co-60	< 4.0E+00	< 3.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00
Zn-65	< 9.0E+00	< 7.0E+00	< 1.0E+01	< 1.0E+01	< 9.0E+00	< 1.0E+01
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-103	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01
Cs-134	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ba/La-140	< 6.0E+00	< 4.0E+00	< 6.0E+00	< 6.0E+00	< 5.0E+00	< 6.0E+00
Ce-141	< 7.0E+00	< 5.0E+00	< 9.0E+00	< 8.0E+00	< 6.0E+00	< 6.0E+00
Ce-144	< 2.0E+01	< 2.0E+01	< 4.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01
Ra-226	< 8.0E+01	< 6.0E+01	< 1.0E+02	< 9.0E+01	< 8.0E+01	< 6.0E+01
Th-228	< 7.0E+00	< 6.0E+00	< 9.0E+00	< 8.0E+00	< 7.0E+00	< 6.0E+00
Sr-89	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 2.0E+00	< 2.0E+00
Sr-90	1.8E+00 +/- 2.0E-01	1.4E+00 +/- 2.0E-01	2.1E+00 +/- 3.0E-01	2.4E+00 +/- 3.0E-01	1.4E+00 +/- 2.0E-01	1.1E+00 +/- 1.0E-01
I-131	< 9.0E-02	< 2.0E-01	< 2.0E-01	< 2.0E-01	< 2.0E-01	< 2.0E-01

FERMI 2 MILK ANALYSIS
M-3 (Indicator) (pCi/l)

Nuclide	01/16/92	02/13/92	03/12/92	04/16/92	05/07/92	05/21/92
Be-7	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01
K-40	1.3E+03 +/- 1.3E+02	1.2E+03 +/- 1.2E+02	1.6E+03 +/- 1.6E+02	1.8E+03 +/- 1.8E+02	1.5E+03 +/- 1.5E+02	1.4E+03 +/- 1.4E+02
Mn-54	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Co-58	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Fe-59	< 9.0E+00	< 1.0E+01	< 8.0E+00	< 9.0E+00	< 9.0E+00	< 8.0E+00
Co-60	< 5.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00
Zn-65	< 9.0E+00	< 9.0E+00	< 9.0E+00	< 1.0E+01	< 1.0E+01	< 9.0E+00
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-103	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01
Cs-134	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ba/La-140	< 5.0E+00	< 6.0E+00	< 6.0E+00	< 6.0E+00	< 6.0E+00	< 5.0E+00
Ce-141	< 7.0E+00	< 7.0E+00	< 7.0E+00	< 6.0E+00	< 9.0E+00	< 6.0E+00
Ce-144	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 4.0E+01	< 2.0E+01
Ra-226	< 8.0E+01	< 7.0E+01	< 7.0E+01	< 7.0E+01	< 1.0E+02	< 7.0E+01
Th-228	< 7.0E+00	< 7.0E+00	< 6.0E+00	< 6.0E+00	< 9.0E+00	< 6.0E+00
Sr-89	< 2.0E+00	< 3.0E+00	< 2.0E+00	< 3.0E+00	< 5.0E+00	< 3.0E+00
Sr-90	9.2E-01 +/- 1.6E-01	3.1E+00 +/- 4.0E-01	1.2E+00 +/- 2.0E-01	1.7E+00 +/- 2.0E-01	4.3E+00 +/- 4.0E-01	1.7E+00 +/- 2.0E-01
I-131	< 2.0E-01	< 2.0E-01	< 2.0E-01	< 2.0E-01	< 1.0E-01	< 2.0E-01

Nuclide	06/11/92	06/26/92	07/09/92	07/23/92
Be-7	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01
K-40	1.4E+03 +/- 1.4E+02	1.5E+03 +/- 1.5E+02	1.4E+03 +/- 1.4E+02	1.3E+03 +/- 1.3E+02
Mn-54	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Co-58	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Fe-59	< 8.0E+00	< 9.0E+00	< 8.0E+00	< 1.0E+01
Co-60	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00
Zn-65	< 9.0E+00	< 9.0E+00	< 9.0E+00	< 1.0E+01
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00
Ru-103	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01
Cs-134	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00
Cs-137	< 5.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00
Ba/La-140	< 6.0E+00	< 6.0E+00	< 4.0E+00	< 6.0E+00
Ce-141	< 6.0E+00	< 6.0E+00	< 6.0E+00	< 7.0E+00
Ce-144	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01
Ra-226	< 8.0E+01	< 7.0E+01	< 8.0E+01	< 8.0E+01
Th-228	< 6.0E+00	< 6.0E+00	< 8.0E+00	< 7.0E+00
Sr-89	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 4.0E+00
Sr-90	2.2E+00 +/- 3.0E-01	7.6E-01 +/- 2.2E-01	1.5E+00 +/- 3.0E-01	2.4E+00 +/- 3.0E-01
I-131	< 3.0E-01	< 2.0E-01	< 2.0E-01	< 1.0E-01

① Milk animals sold 8/13/92 M-3 dropped from program

FERMI 2 MILK ANALYSIS
M-8 (Control) (pCi/l)

Nuclide	01/16/92	02/13/92	03/12/92	04/16/92	05/07/92	05/21/92
Be-7	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01
K-40	1.4E+03 +/- 1.4E+02	1.3E+03 +/- 1.3E+02	1.6E+03 +/- 1.6E+02	1.7E+03 +/- 1.7E+02	1.5E+03 +/- 1.5E+02	1.4E+03 +/- 1.4E+02
Mn-54	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 4.0E+00
Co-58	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00
Fe-59	< 9.0E+00	< 9.0E+00	< 1.0E+01	< 1.0E+01	< 9.0E+00	< 1.0E+01
Co-60	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00
Zn-65	< 1.0E+01	< 1.0E+01	< 9.0E+00	< 1.0E+01	< 1.0E+01	< 1.0E+01
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00
Ru-103	< 4.0E+00	< 5.0E+00	< 5.0E+00	< 6.0E+00	< 4.0E+00	< 5.0E+00
Ru-106	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01
Cs-134	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00
Ba/La-140	< 6.0E+00	< 7.0E+00	< 6.0E+00	< 8.0E+00	< 5.0E+00	< 6.0E+00
Ce-141	< 8.0E+00	< 8.0E+00	< 8.0E+00	< 9.0E+00	< 6.0E+00	< 8.0E+00
Ce-144	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01
Ra-226	< 8.0E+01	< 8.0E+01	< 8.0E+01	< 9.0E+01	< 7.0E+01	< 9.0E+01
Th-228	< 7.0E+00	< 7.0E+00	< 7.0E+00	< 8.0E+00	< 7.0E+00	< 7.0E+00
Sr-89	< 2.0E+00	< 3.0E+00	< 2.0E+00	< 2.0E+00	< 4.0E+00	< 2.0E+00
Sr-90	4.9E-01 +/- 1.2E-01	8.2E-01 +/- 1.5E-01	1.4E+00 +/- 2.0E-01	1.1E+00 +/- 2.0E-01	3.1E+00 +/- 3.0E-01	9.1E-01 +/- 1.9E-01
I-131	< 1.0E-01	< 2.0E-01	< 2.0E-01	< 2.0E-01	< 2.0E-01	< 2.0E-01

Nuclide	06/11/92	06/26/92	07/09/92	07/23/92	08/13/92	08/27/92
Be-7	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01
K-40	1.3E+03 +/- 1.3E+02	1.4E+03 +/- 1.4E+02	1.3E+03 +/- 1.3E+02	1.2E+03 +/- 1.2E+02	1.3E+03 +/- 1.3E+02	1.4E+03 +/- 1.4E+02
Mn-54	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00
Co-58	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00
Fe-59	< 8.0E+00	< 9.0E+00	< 7.0E+00	< 8.0E+00	< 1.0E+01	< 9.0E+00
Co-60	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 5.0E+00	< 5.0E+00
Zn-65	< 8.0E+00	< 8.0E+00	< 7.0E+00	< 9.0E+00	< 9.0E+00	< 8.0E+00
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-103	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Cs-134	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00
Cs-137	< 5.0E+00	< 5.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00
Ba/La-140	< 5.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00	< 6.0E+00	< 5.0E+00
Ce-141	< 7.0E+00	< 6.0E+00	< 5.0E+00	< 6.0E+00	< 9.0E+00	< 7.0E+00
Ce-144	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 4.0E+01	< 3.0E+01
Ra-226	< 7.0E+01	< 7.0E+01	< 7.0E+01	< 7.0E+01	< 1.0E+02	< 8.0E+01
Th-228	< 6.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00	< 9.0E+00	< 7.0E+00
Sr-89	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00
Sr-90	2.7E+00 +/- 3.0E-01	3.3E+00 +/- 4.0E-01	1.2E+00 +/- 3.0E-01	5.3E+00 +/- 5.0E-01	< 4.0E-01	1.3E+00 +/- 2.0E-01
I-131	< 3.0E-01	< 2.0E-01	< 1.0E-01	< 1.0E-01	< 1.0E-01	< 1.0E-01

FERMI 2 MILK ANALYSIS
M-8 (Control) (pCi/l)

Nuclide	09/11/92	09/24/92	10/15/92	10/29/92	11/12/92	12/10/92
Be-7	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01
K-40	1.6E+03 +/- 1.6E+02	1.5E+03 +/- 1.5E+02	1.4E+03 +/- 1.4E+02	1.4E+03 +/- 1.4E+02	1.4E+03 +/- 1.4E+02	1.4E+03 +/- 1.4E+02
Mn-54	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Co-58	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Fe-59	< 1.0E+01	< 9.0E+00	< 9.0E+00	< 1.0E+01	< 9.0E+00	< 8.0E+00
Co-60	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 3.0E+00
Zn-65	< 1.0E+01	< 1.0E+01	< 9.0E+00	< 1.0E+01	< 1.0E+01	< 7.0E+00
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Ru-103	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 3.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 2.0E+01
Cs-134	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 3.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 3.0E+00
Ba/La-140	< 6.0E+00	< 6.0E+00	< 5.0E+00	< 6.0E+00	< 5.0E+00	< 4.0E+00
Ce-141	< 8.0E+00	< 8.0E+00	< 6.0E+00	< 9.0E+00	< 7.0E+00	< 6.0E+00
Ce-144	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 4.0E+01	< 3.0E+01	< 2.0E+01
Ra-226	< 8.0E+01	< 9.0E+01	< 7.0E+01	< 1.0E+02	< 8.0E+01	< 6.0E+01
Th-228	< 7.0E+00	< 8.0E+00	< 6.0E+00	< 9.0E+00	< 7.0E+00	< 6.0E+00
Sr-89	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 2.0E+00	< 2.0E+00	< 2.0E+00
Sr-90	1.2E+00 +/- 2.0E-01	1.0E+00 +/- 2.0E-01	2.2E+00 +/- 3.0E-01	1.6E+00 +/- 2.0E-01	1.6E+00 +/- 2.0E-01	1.5E+00 +/- 2.0E-01
I-131	< 1.0E-01	< 5.0E-01	< 2.0E-01	< 2.0E-01	< 2.0E-01	< 2.0E-01

FERMI 2 GRASS ANALYSIS
M-7 (Indicator) (pCi/l)

Nuclide	05/07/92	05/21/92	06/11/92	06/25/92	07/09/92	07/23/92
Be-7	5.1E+02 +/- 1.6E+02	3.6E+02 +/- 1.3E+02	7.4E+02 +/- 1.5E+02	1.3E+03 +/- 1.5E+02	1.1E+03 +/- 1.1E+02	7.4E+02 +/- 1.1E+02
K-40	6.9E+03 +/- 6.9E+02	6.2E+03 +/- 6.2E+02	6.6E+03 +/- 6.6E+02	7.2E+03 +/- 7.2E+02	5.3E+03 +/- 5.3E+02	4.2E+03 +/- 4.2E+02
Mn-54	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01
Co-58	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01	< 1.0E+01
Fe-59	< 5.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 2.0E+01	< 3.0E+01
Co-60	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01
Zn-65	< 5.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 2.0E+01	< 3.0E+01
Zr/Nb-95	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01
Ru-103	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01
Ru-106	< 2.0E+02	< 2.0E+02	< 2.0E+02	< 1.0E+02	< 9.0E+01	< 1.0E+02
Cs-134	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01
Cs-137	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01
Ba/La-140	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 1.0E+01	< 4.0E+01
Ce-141	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01
Ce-144	< 1.0E+02	< 1.0E+02	< 1.0E+02	< 1.0E+02	< 6.0E+01	< 7.0E+01
Ra-226	< 3.0E+02	< 3.0E+02	< 3.0E+02	< 3.0E+02	< 2.0E+02	< 2.0E+02
Th-228	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01
I-131	< 5.0E+00	< 8.0E+00	< 4.0E+00	< 1.0E+01	< 3.0E+00	< 5.0E+00

Nuclide	08/13/92	08/27/92	09/11/92	09/24/92	10/15/92	10/29/92
Be-7	1.5E+03 +/- 1.5E+02	1.5E+03 +/- 3.5E+02	2.5E+03 +/- 2.5E+02	1.2E+03 +/- 1.5E+02	2.9E+03 +/- 2.9E+02	5.7E+03 +/- 5.7E+02
K-40	8.8E+03 +/- 8.8E+02	5.3E+03 +/- 6.0E+02	4.9E+03 +/- 4.9E+02	6.4E+03 +/- 6.4E+02	3.8E+03 +/- 3.8E+02	7.4E+03 +/- 7.4E+02
Mn-54	< 2.0E+01	< 4.0E+01	< 1.0E+01	< 1.0E+01	< 2.0E+01	< 2.0E+01
Co-58	< 2.0E+01	< 4.0E+01	< 1.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01
Fe-59	< 5.0E+01	< 9.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01
Co-60	< 2.0E+01	< 5.0E+01	< 1.0E+01	< 1.0E+01	< 2.0E+01	< 2.0E+01
Zn-65	< 4.0E+01	< 9.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01
Zr/Nb-95	< 2.0E+01	< 4.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01
Ru-103	< 2.0E+01	< 5.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01
Ru-106	< 2.0E+02	< 4.0E+02	< 1.0E+02	< 1.0E+02	< 1.0E+02	< 1.0E+02
Cs-134	< 2.0E+01	< 5.0E+01	< 1.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01
Cs-137	< 2.0E+01	< 5.0E+01	< 1.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01
Ba/La-140	< 4.0E+01	< 6.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01
Ce-141	< 3.0E+01	< 8.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Ce-144	< 1.0E+02	< 3.0E+02	< 8.0E+01	< 1.0E+02	< 9.0E+01	< 1.0E+02
Ra-226	< 3.0E+02	< 1.0E+03	< 2.0E+02	< 3.0E+02	< 3.0E+02	< 3.0E+02
Th-228	< 3.0E+01	< 9.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
I-131	< 2.0E+01	< 9.0E+00	< 1.0E+01	< 5.0E+00	< 6.0E+00	< 5.0E+00

① Samples were not collected on 1/16/92, 2/13/92, 3/12/92, 4/16/92, & 11/12/92 due to seasonal unavailability
② M-7 dropped from program due to new critical receptor

FERMI 2 GRASS ANALYSIS
M-8 (Control) (pCi/l)

Nuclide	05/07/92	05/21/92	06/11/92	06/25/92	07/09/92	07/23/92
Be-7	3.5E+02 +/- 1.2E+02	< 2.0E+02	5.3E+02 +/- 9.1E+01	2.1E+03 +/- 2.1E+02	6.7E+02 +/- 7.6E+01	1.7E+03 +/- 1.7E+02
K-40	5.7E+03 +/- 5.7E+02	4.6E+03 +/- 4.6E+02	6.0E+03 +/- 6.0E+02	6.3E+03 +/- 6.3E+02	5.1E+03 +/- 5.0E+02	4.4E+03 +/- 4.4E+02
Mn-54	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01	< 9.0E+00	< 1.0E+01
Co-58	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01	< 8.0E+00	< 1.0E+01
Fe-59	< 4.0E+01	< 5.0E+01	< 3.0E+01	< 4.0E+01	< 2.0E+01	< 3.0E+01
Co-60	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01	< 9.0E+00	< 1.0E+01
Zn-65	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 2.0E+01	< 3.0E+01
Zr/Nb-95	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01	< 9.0E+00	< 1.0E+01
Ru-103	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01	< 9.0E+00	< 1.0E+01
Ru-106	< 1.0E+02	< 2.0E+02	< 1.0E+02	< 1.0E+02	< 8.0E+01	< 1.0E+02
Cs-134	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01	< 9.0E+00	< 1.0E+01
Cs-137	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 1.0E+01	< 9.0E+00	< 1.0E+01
Ba/La-140	< 2.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 9.0E+00	< 3.0E+01
Ce-141	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01
Ce-144	< 9.0E+01	< 1.0E+02	< 7.0E+01	< 9.0E+01	< 5.0E+01	< 7.0E+01
Ra-226	< 3.0E+02	< 4.0E+02	< 2.0E+02	< 2.0E+02	< 2.0E+02	< 2.0E+02
Th-228	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01
I-131	< 5.0E+00	< 6.0E+00	< 3.0E+00	< 1.0E+01	< 4.0E+00	< 5.0E+00

Nuclide	08/13/92	08/27/92	09/11/92	09/24/92	10/15/92	10/29/92
Be-7	9.8E+02 +/- 1.4E+02	3.8E+02 +/- 1.6E+02	6.9E+02 +/- 1.6E+02	2.3E+03 +/- 2.2E+02	3.4E+03 +/- 3.4E+02	2.9E+03 +/- 2.9E+02
K-40	6.9E+03 +/- 6.9E+02	5.5E+03 +/- 5.5E+02	4.1E+03 +/- 4.1E+02	6.4E+03 +/- 6.4E+02	4.9E+03 +/- 4.9E+02	7.5E+03 +/- 7.5E+02
Mn-54	< 1.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01
Co-58	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01
Fe-59	< 4.0E+01	< 4.0E+01	< 5.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01
Co-60	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01
Zn-65	< 4.0E+01	< 5.0E+01	< 4.0E+01	< 5.0E+01	< 3.0E+01	< 4.0E+01
Zr/Nb-95	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01
Ru-103	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01
Ru-106	< 1.0E+02	< 2.0E+02	< 2.0E+02	< 2.0E+02	< 1.0E+02	< 2.0E+02
Cs-134	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01
Cs-137	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 1.0E+01	< 2.0E+01
Ba/La-140	< 4.0E+01	< 4.0E+01	< 5.0E+01	< 4.0E+01	< 3.0E+01	< 2.0E+01
Ce-141	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Ce-144	< 1.0E+02	< 2.0E+02	< 1.0E+02	< 1.0E+02	< 9.0E+01	< 1.0E+02
Ra-226	< 3.0E+02	< 4.0E+02	< 4.0E+02	< 3.0E+02	< 3.0E+02	< 3.0E+02
Th-228	< 2.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
I-131	< 5.0E+00	< 2.0E+01	< 1.0E+01	< 4.0E+00	< 9.0E+00	< 3.0E+00

① Samples were not collected on 1/16/92, 2/13/92, 3/12/92, 4/16/92, & 11/12/92 due to seasonal unavailability
② M-8 dropped from program due to new critical receptor

FERMI 2 VEGETABLE ANALYSIS
(pCi/kg wet)

Nuclide	FP-1 07/30/92 Cabbage	FP-1 07/30/92 Broccoli	FP-1 07/30/92 Swiss Chard	FP-3 07/30/92 Cabbage	FP-3 07/30/92 Swiss Chard	FP-3 07/30/92 Broccoli
Be-7	< 4.00E+01	1.69E+02 +/- 3.00E+01	1.24E+02 +/- 2.70E+01	< 4.00E+01	9.72E+01 +/- 2.13E+01	< 6.00E+01
K-40	1.64E+03 +/- 1.60E+02	3.64E+03 +/- 3.60E+02	2.93E+03 +/- 2.90E+02	1.55E+03 +/- 1.60E+02	3.64E+03 +/- 3.60E+02	2.84E+03 +/- 2.80E+02
Mn-54	< 3.00E+00	< 4.00E+00	< 3.00E+00	< 4.00E+00	< 3.00E+00	< 6.00E+00
Co-58	< 4.00E+00	< 4.00E+00	< 3.00E+00	< 5.00E+00	< 3.00E+00	< 6.00E+00
Fe-59	< 1.00E+01	< 1.00E+01	< 9.00E+00	< 1.00E+01	< 9.00E+00	< 2.00E+01
Co-60	< 4.00E+00	< 4.00E+00	< 3.00E+00	< 4.00E+00	< 3.00E+00	< 6.00E+00
Zn-65	< 8.00E+00	< 1.00E+01	< 9.00E+00	< 1.00E+01	< 8.00E+00	< 2.00E+01
Zr/Nb-95	< 4.00E+00	< 4.00E+00	< 4.00E+00	< 5.00E+00	< 3.00E+00	< 7.00E+00
Ru-103	< 4.00E+00	< 5.00E+00	< 4.00E+00	< 5.00E+00	< 4.00E+00	< 7.00E+00
Ru-106	< 3.00E+01	< 3.00E+01	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 5.00E+01
I-131	< 2.00E+01	< 8.00E+00	< 6.00E+00	< 2.00E+01	< 5.00E+00	< 7.00E+00
Cs-134	< 4.00E+00	< 4.00E+00	< 3.00E+00	< 5.00E+00	< 3.00E+00	< 7.00E+00
Cs-137	< 4.00E+00	< 4.00E+00	< 4.00E+00	< 5.00E+00	< 3.00E+00	< 6.00E+00
Ba/La-140	< 8.00E+00	< 7.00E+00	< 7.00E+00	< 9.00E+00	< 5.00E+00	< 1.00E+01
Ce-141	< 7.00E+00	< 7.00E+00	< 6.00E+00	< 8.00E+00	< 6.00E+00	< 1.00E+01
Ce-144	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 5.00E+01
Ra-226	< 7.00E+01	< 7.00E+01	< 6.00E+01	< 8.00E+01	< 6.00E+01	< 1.00E+02
Th-228	< 6.00E+00	< 6.00E+00	< 5.00E+00	< 7.00E+00	< 5.00E+00	< 1.00E+01

Nuclide	FP-5 07/30/92 Cabbage	FP-5 07/30/92 Broccoli	FP-5 07/30/92 Lettuce	FP-6 07/30/92 Cabbage	FP-6 07/30/92 Broccoli	FP-6 07/30/92 Swiss Chard
Be-7	< 6.00E+01	1.09E+02 +/- 2.70E+01	6.47E+02 +/- 6.70E+01	< 4.00E+01	5.87E+01 +/- 2.65E+01	1.59E+02 +/- 3.10E+01
K-40	3.34E+03 +/- 3.30E+02	3.71E+03 +/- 3.70E+02	6.48E+03 +/- 6.50E+02	1.85E+03 +/- 1.90E+02	2.14E+03 +/- 2.10E+02	2.57E+03 +/- 2.60E+02
Mn-54	< 5.00E+00	< 3.00E+00	< 6.00E+00	< 5.00E+00	< 3.00E+00	< 3.00E+00
Co-58	< 6.00E+00	< 4.00E+00	< 7.00E+00	< 5.00E+00	< 4.00E+00	< 4.00E+00
Fe-59	< 2.00E+01	< 1.00E+01	< 2.00E+01	< 1.00E+01	< 9.00E+00	< 1.00E+01
Co-60	< 6.00E+00	< 4.00E+00	< 7.00E+00	< 5.00E+00	< 4.00E+00	< 4.00E+00
Zn-65	< 1.00E+01	< 9.00E+00	< 2.00E+01	< 1.00E+01	< 8.00E+00	< 9.00E+00
Zr/Nb-95	< 6.00E+00	< 4.00E+00	< 7.00E+00	< 5.00E+00	< 4.00E+00	< 4.00E+00
Ru-103	< 6.00E+00	< 4.00E+00	< 7.00E+00	< 6.00E+00	< 4.00E+00	< 4.00E+00
Ru-106	< 5.00E+01	< 3.00E+01	< 6.00E+01	< 4.00E+01	< 3.00E+01	< 3.00E+01
I-131	< 2.00E+01	< 2.00E+01	< 1.00E+01	< 8.00E+00	< 5.00E+00	< 7.00E+00
Cs-134	< 6.00E+00	< 4.00E+00	< 7.00E+00	< 5.00E+00	< 4.00E+00	< 3.00E+00
Cs-137	< 6.00E+00	< 4.00E+00	1.13E+01 +/- 6.00E+00	< 5.00E+00	< 4.00E+00	< 4.00E+00
Ba/La-140	< 1.00E+01	< 7.00E+00	< 1.00E+01	< 1.00E+01	< 8.00E+00	< 6.00E+00
Ce-141	< 1.00E+01	< 6.00E+00	< 1.00E+01	< 1.00E+01	< 6.00E+00	< 6.00E+00
Ce-144	< 4.00E+01	< 2.00E+01	< 5.00E+01	< 4.00E+01	< 2.00E+01	< 2.00E+01
Ra-226	< 9.00E+01	< 7.00E+01	< 1.00E+02	< 1.00E+02	< 6.00E+01	< 5.00E+01
Th-228	< 9.00E+00	< 6.00E+00	3.25E+01 +/- 9.70E+00	< 1.00E+01	< 6.00E+00	< 5.00E+00

FERMI 2 VEGETABLE ANALYSIS
(pCi/kg wet)

Nuclide	FP-1 08/27/92 Swiss Chard	FP-1 08/27/92 Cabbage	FP-1 08/27/92 Broccoli	FP-3 08/27/92 Swiss Chard	FP-3 08/27/92 Cabbage	FP-3 08/27/92 Lettuce
Be-7	4.31E+02 +/- 1.73E+02	< 2.00E+02	< 2.00E+02	3.76E+02 +/- 1.71E+02	< 3.00E+02	< 3.00E+02
K-40	4.19E+03 +/- 4.20E+02	1.63E+03 +/- 2.10E+02	2.59E+03 +/- 2.60E+02	5.17E+03 +/- 5.20E+02	1.18E+03 +/- 2.50E+02	2.73E+03 +/- 3.00E+02
Mn-54	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01
Co-58	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01
Fe-59	< 5.00E+01	< 4.00E+01	< 5.00E+01	< 5.00E+01	< 6.00E+01	< 5.00E+01
Co-60	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 3.00E+01	< 3.00E+01
Zn-65	< 5.00E+01	< 4.00E+01	< 5.00E+01	< 5.00E+01	< 6.00E+01	< 5.00E+01
Zr/Nb-95	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01
Ru-103	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 3.00E+01	< 4.00E+01	< 3.00E+01
Ru-106	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 3.00E+02	< 2.00E+02
I-131	< 1.00E+01	< 2.00E+01	< 3.00E+01	< 4.00E+01	< 4.00E+01	< 3.00E+01
Cs-134	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01
Cs-137	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01
Ba/La-140	< 4.00E+01	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 6.00E+01	< 4.00E+01
Ce-141	< 3.00E+01	< 4.00E+01	< 4.00E+01	< 4.00E+01	< 5.00E+01	< 5.00E+01
Ce-144	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 2.00E+02	< 2.00E+02
Ra-226	< 4.00E+02	< 4.00E+02	< 4.00E+02	< 4.00E+02	< 5.00E+02	< 6.00E+02
Th-228	< 3.00E+01	< 3.00E+01	< 4.00E+01	< 4.00E+01	< 5.00E+01	< 6.00E+01

Nuclide	FP-5 07/30/92 Cabbage	FP-5 07/30/92 Broccoli	FP-5 07/30/92 Lettuce	FP-6 08/27/92 Swiss Chard	FP-6 08/27/92 Cabbage	FP-6 08/27/92 Broccoli
Be-7	< 2.00E+02	< 2.00E+02	< 2.00E+02	3.50E+02 +/- 1.67E+02	< 2.00E+02	< 2.00E+02
K-40	3.28E+03 +/- 3.30E+02	2.84E+03 +/- 2.80E+02	2.81E+03 +/- 2.80E+02	2.94E+03 +/- 2.90E+02	3.71E+02 +/- 1.61E+02	4.12E+03 +/- 4.10E+02
Mn-54	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01
Co-58	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01
Fe-59	< 5.00E+01	< 4.00E+01	< 5.00E+01	< 5.00E+01	< 5.00E+01	< 4.00E+01
Co-60	< 3.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01
Zn-65	< 5.00E+01	< 4.00E+01	< 6.00E+01	< 5.00E+01	< 6.00E+01	< 4.00E+01
Zr/Nb-95	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01
Ru-103	< 3.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01
Ru-106	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02
I-131	< 3.00E+01	< 1.00E+01	< 6.00E+01	< 4.00E+01	< 6.00E+01	< 1.00E+01
Cs-134	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 2.00E+01	< 2.00E+01
Cs-137	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01
Ba/La-140	< 4.00E+01	< 3.00E+01	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 4.00E+01
Ce-141	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01
Ce-144	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 1.00E+02
Ra-226	< 4.00E+02	< 4.00E+02	< 5.00E+02	< 4.00E+02	< 4.00E+02	< 3.00E+02
Th-228	< 4.00E+01	< 4.00E+01	< 4.00E+01	< 4.00E+01	< 4.00E+01	< 3.00E+01

FERMI 2 DRINKING WATER ANALYSIS

DW-1 (Indicator) (pCi/l)

Nuclide	01/27/92	02/24/92	03/30/92	04/24/92	05/26/92 ①	06/29/92
Be-7	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01
K-40	< 5.0E+01	< 9.0E+01	4.6E+01 +/- 2.6E+01	< 6.0E+01	< 4.0E+01	< 6.0E+01
Cr-51	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01
Mn-54	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Co-58	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Fe-59	< 8.0E+00	< 9.0E+00	< 7.0E+00	< 9.0E+00	< 6.0E+00	< 7.0E+00
Co-60	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00
Zn-65	< 7.0E+00	< 8.0E+00	< 8.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Ru-103	< 5.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Cs-134	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 5.0E+00
Ba/La-140	< 1.0E+01	< 9.0E+00	< 4.0E+00	< 1.0E+01	< 4.0E+00	< 6.0E+00
Ce-141	< 9.0E+00	< 7.0E+00	< 6.0E+00	< 1.0E+01	< 6.0E+00	< 6.0E+00
Ce-144	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01
Ra-226	< 8.0E+01	< 7.0E+01	< 8.0E+01	< 9.0E+01	< 7.0E+01	< 7.0E+01
Th-228	< 6.0E+00	< 6.0E+00	< 6.0E+00	< 7.0E+00	< 6.0E+00	< 6.0E+00
Gross Beta	1.4E+00 +/- 9.0E-01	3.1E+00 +/- 9.0E-01	2.6E+00 +/- 9.0E-01	6.4E+00 +/- 1.2E+00	3.1E+00 +/- 9.0E-01	2.6E+00 +/- 1.0E+00
Sr-89	< 1.0E+00	< 2.0E+00	< 1.0E+00	< 2.0E+00	< 2.0E+00	< 2.0E+00
Sr-90	< 7.0E-01	< 6.0E-01	< 5.0E-01	< 5.0E-01	< 1.0E+00	< 7.0E-01

Nuclide	07/15/92 ②	07/27/92 ①	08/24/92	09/16/92 ②	09/30/92 ①	10/28/92
Be-7	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01
K-40	< 1.0E+02	< 5.0E+01	< 5.0E+01	< 9.0E+01	< 5.0E+01	< 5.0E+01
Cr-51	< 3.0E+01	< 4.0E+01	< 5.0E+01	< 3.0E+01	< 6.0E+01	< 3.0E+01
Mn-54	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Co-58	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Fe-59	< 8.0E+00	< 8.0E+00	< 9.0E+00	< 8.0E+00	< 1.0E+01	< 7.0E+00
Co-60	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Zn-65	< 8.0E+00	< 6.0E+00	< 8.0E+00	< 7.0E+00	< 7.0E+00	< 6.0E+00
Zr/Nb-95	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Ru-103	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 6.0E+00	< 3.0E+00
Ru-106	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01
Cs-134	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Ba/La-140	< 6.0E+00	< 9.0E+00	< 1.0E+01	< 7.0E+00	< 2.0E+01	< 6.0E+00
Ce-141	< 6.0E+00	< 7.0E+00	< 9.0E+00	< 6.0E+00	< 1.0E+01	< 5.0E+00
Ce-144	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01
Ra-226	< 7.0E+01	< 6.0E+01	< 7.0E+01	< 7.0E+01	< 8.0E+01	< 6.0E+01
Th-228	< 6.0E+00	< 5.0E+00	< 7.0E+00	< 7.0E+00	< 7.0E+00	< 5.0E+00
Gross Beta	③	2.9E+00 +/- 1.1E+00	4.5E+00 +/- 1.0E+00	3.5E+00 +/- 1.0E+00	3.9E+00 +/- 1.0E+00	2.2E+00 +/- 1.1E+00
Sr-89	< 2.0E+00	< 3.0E+00	< 2.0E+00	< 2.0E+00	< 3.0E+00	< 2.0E+00
Sr-90	< 6.0E-01	< 7.0E-01	< 9.0E-01	< 1.0E+00	< 7.0E-01	< 5.0E-01

① Considered less than representative ② Grab sample ③ Analysis not performed by laboratory

FERMI 2 DRINKING WATER ANALYSIS

DW-1 (Indicator) (pCi/l)

Nuclide	11/30/92	12/28/92
Be-7	< 3.0E+01	< 3.0E+01
K-40	< 9.0E+01	< 9.0E+01
Cr-51	< 3.0E+01	< 3.0E+01
Mn-54	< 3.0E+00	< 3.0E+00
Co-58	< 3.0E+00	< 3.0E+00
Fe-59	< 7.0E+00	< 7.0E+00
Co-60	< 4.0E+00	< 3.0E+00
Zn-65	< 8.0E+00	< 8.0E+00
Zr/Nb-95	< 4.0E+00	< 3.0E+00
Ru-103	< 4.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+01
Cs-134	< 4.0E+00	< 4.0E+00
Cs-137	< 4.0E+00	< 4.0E+00
Ba/La-140	< 5.0E+00	< 5.0E+00
Ce-141	< 5.0E+00	< 6.0E+00
Ce-144	< 2.0E+01	< 2.0E+01
Ra-226	< 7.0E+01	< 6.0E+01
Th-228	< 7.0E+00	< 6.0E+00
Gross Beta	3.4E+00 +/- 9.0E-01	3.9E+00 +/- 1.0E+00
Sr-89	< 1.0E+00	< 2.0E+00
Sr-90	< 6.0E-01	< 1.0E+00

FERMI 2 DRINKING WATER ANALYSIS
DW-2 (Control) (pCi/l)

Nuclide	01/27/92	02/24/92	03/30/92	04/24/92	05/26/92	06/29/92
Be-7	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01
K-40	< 6.0E+01	< 1.0E+02	< 9.0E+01	< 7.0E+01	< 6.0E+01	< 6.0E+01
Cr-51	< 4.0E+01	< 4.0E+01	< [illegible]	< 5.0E+01	< 3.0E+01	< 3.0E+01
Mn-54	< 3.0E+00	< 4.0E+00	< 3.[illegible]E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Co-58	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00
Fe-59	< 8.0E+00	< 9.0E+00	< 7.0E+00	< 9.0E+00	< 6.0E+00	< 6.0E+00
Co-60	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00
Zn-65	< 7.0E+00	< 8.0E+00	< 8.0E+00	< 8.0E+00	< 6.0E+00	< 7.0E+00
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 5.0E+00	< 3.0E+00	< 3.0E+00
Ru-103	< 5.0E+00	< 5.0E+00	< 4.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Cs-134	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00
Cs-137	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00
Ba/La-140	< 1.0E+01	< 9.0E+00	< 4.0E+00	< 1.0E+01	< 4.0E+00	< 6.0E+00
Ce-141	< 1.0E+01	< 8.0E+00	< 5.0E+00	< 1.0E+01	< 7.0E+00	< 6.0E+00
Ce-144	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01
Ra-226	< 1.0E+02	< 8.0E+01	< 7.0E+01	< 1.0E+02	< 8.0E+01	< 7.0E+01
Th-228	< 8.0E+00	< 7.0E+00	< 6.0E+00	< 9.0E+00	< 7.0E+00	< 6.0E+00
Gross Beta	2.8E+00 +/- 1.0E+00	3.1E+00 +/- 9.0E-01	4.2E+00 +/- 1.0E+00	5.1E+00 +/- 1.1E+00	3.3E+00 +/- 9.0E-01	2.3E+00 +/- 9.0E-01
Sr-89	< 3.0E+00	< 2.0E+00	< 2.0E+00	< 2.0E+00	< 2.0E+00	< 3.0E+00
Sr-90	< 6.0E-01	< 5.0E-01	< 6.0E-01	< 5.0E-01	< 7.0E-01	< 9.0E-01

Nuclide	07/27/92	08/24/92	09/30/92	10/28/92	11/30/92	12/28/92
Be-7	< 3.0E+01	< 3.0E+01	< 5.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01
K-40	< 9.0E+01	< 5.0E+01	< 6.0E+01	< 5.0E+01	< 6.0E+01	< 1.0E+02
Cr-51	< 4.0E+01	< 4.0E+01	< 7.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01
Mn-54	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00
Co-58	< 3.0E+00	< 3.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00
Fe-59	< 8.0E+00	< 8.0E+00	< 1.0E+01	< 8.0E+00	< 7.0E+00	< 1.0E+01
Co-60	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00
Zn-65	< 7.0E+00	< 7.0E+00	< 7.0E+00	< 5.0E+00	< 7.0E+00	< 9.0E+00
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 5.0E+00
Ru-103	< 4.0E+00	< 5.0E+00	< 7.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01
Cs-134	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 5.0E+00	< 5.0E+00
Cs-137	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 5.0E+00
Ba/La-140	< 9.0E+00	< 1.0E+01	< 3.0E+01	< 1.0E+01	< 5.0E+00	< 6.0E+00
Ce-141	< 7.0E+00	< 9.0E+00	< 1.0E+01	< 9.0E+00	< 7.0E+00	< 8.0E+00
Ce-144	< 2.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Ra-226	< 6.0E+01	< 7.0E+01	< 9.0E+01	< 7.0E+01	< 9.0E+01	< 9.0E+01
Th-228	< 6.0E+00	< 6.0E+00	< 9.0E+00	< 6.0E+00	< 8.0E+00	< 8.0E+00
Gross Beta	1.6E+00 +/- 9.0E-01	3.4E+00 +/- 1.0E+00	2.7E+00 +/- 9.0E-01	< 1.0E+00	2.1E+00 +/- 8.0E-01	2.8E+00 +/- 9.0E-01
Sr-89	< 3.0E+00	< 3.0E+00	< 2.0E+00	< 2.0E+00	< 1.0E+00	< 2.0E+00
Sr-90	< 1.0E+00	< 7.0E-01	< 7.0E-01	< 7.0E-01	< 5.0E-01	< 5.0E-01

FERMI 2 DRINKING WATER ANALYSIS
DW-3 (Indicator) (pCi/l)

Nuclide	10/28/92	11/30/92	12/28/92
Be-7	< 3.0E+01	< 3.0E+01	< 3.0E+01
K-40	< 8.0E+01	< 6.0E+01	< 5.0E+01
Cr-51	< 4.0E+01	< 3.0E+01	< 3.0E+01
Mn-54	< 3.0E+00	< 3.0E+00	< 3.0E+00
Co-58	< 4.0E+00	< 3.0E+00	< 3.0E+00
Fe-59	< 9.0E+00	< 7.0E+00	< 7.0E+00
Co-60	< 3.0E+00	< 4.0E+00	< 4.0E+00
Zn-65	< 7.0E+00	< 7.0E+00	< 6.0E+00
Zr/Nb-95	< 4.0E+00	< 3.0E+00	< 3.0E+00
Ru-103	< 5.0E+00	< 4.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+00	< 3.0E+01
Cs-134	< 3.0E+00	< 5.0E+00	< 3.0E+00
Cs-137	< 3.0E+00	< 4.0E+00	< 3.0E+00
Ba/La-140	< 1.0E+01	< 4.0E+00	< 5.0E+00
Ce-141	< 7.0E+00	< 7.0E+00	< 6.0E+00
Ce-144	< 2.0E+01	< 3.0E+01	< 3.0E+01
Ra-226	< 6.0E+01	< 8.0E+01	< 7.0E+01
Th-228	< 5.0E+00	< 7.0E+00	< 6.0E+00
Gross Beta	3.1E+00 +/- 1.2E+00	4.8E+00 +/- 1.1E+00	3.1E+00 +/- 1.0E+00
Sr-89	< 2.0E+00	< 1.0E+00	< 2.0E+00
Sr-90	< 4.0E-01	< 9.0E-01	< 6.0E-01

① Added to the program as an enhancement at the end of the fourth quarter

FERMI 2 DRINKING AND SURFACE WATER ANALYSIS FOR TRITIUM

Quarterly Composite of Monthly Samples (pCi/l)

Station Number	First Quarter	Second Quarter	Third Quarter	Forth Quarter
DW-1	< 1.0E+03	< 1.0E+03	< 2.0E+03	< 4.0E+02
DW-2	< 1.0E+03	< 1.0E+03	< 2.0E+03	< 4.0E+02
DW-3				< 4.0E+02
SW-1	< 1.0E+03	< 1.0E+03	< 1.0E+03	
SW-2	< 1.0E+03	< 1.0E+03	< 1.0E+03	< 1.0E+03
SW-3				< 1.0E+03

FERMI 2 SURFACE WATER ANALYSIS

(pCi/l)

Nuclide	SW-1 01/27/92	SW-1 02/24/92	SW-1 03/30/92	SW-1 04/24/92	SW-1 05/26/92	SW-1 06/29/92	SW-1 07/27/92	SW-1 08/24/92	SW-1 09/30/92	SW-2 01/27/92	SW-2 02/24/92	SW-2 03/30/92
Be-7	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 2.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 5.0E+01	< 3.0E+01
K-40	< 5.0E+01	< 9.0E+01	< 6.0E+01	< 5.0E+01	< 5.0E+01	< 1.0E+02	< 6.0E+01	< 6.0E+01	< 5.0E+01	< 5.0E+01	< 1.0E+02	< 6.0E+01
Cr-51	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 2.0E+01	< 3.0E+01	< 4.0E+01	< 5.0E+01	< 5.0E+01	< 4.0E+01	< 5.0E+01	< 3.0E+01
Mn-54	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00
Co-58	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 2.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 5.0E+00	< 4.0E+00
Fe-59	< 7.0E+00	< 8.0E+00	< 7.0E+00	< 8.0E+00	< 5.0E+00	< 8.0E+00	< 8.0E+00	< 9.0E+00	< 7.0E+00	< 7.0E+00	< 1.0E+01	< 8.0E+00
Co-60	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00
Zn-65	< 6.0E+00	< 9.0E+00	< 6.0E+00	< 7.0E+00	< 5.0E+00	< 8.0E+00	< 6.0E+00	< 8.0E+00	< 5.0E+00	< 7.0E+00	< 1.0E+01	< 9.0E+00
Zr/Nb-95	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 5.0E+00	< 4.0E+00
Ru-103	< 4.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 5.0E+00	< 5.0E+00	< 5.0E+00	< 4.0E+00	< 6.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01
Cs-134	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 5.0E+00	< 4.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 5.0E+00	< 5.0E+00
Ba/La-140	< 1.0E+01	< 1.0E+01	< 4.0E+00	< 1.0E+01	< 4.0E+00	< 5.0E+00	< 1.0E+01	< 1.0E+01	< 2.0E+01	< 9.0E+00	< 1.0E+01	< 4.0E+00
Ce-141	< 7.0E+00	< 8.0E+00	< 6.0E+00	< 8.0E+00	< 5.0E+00	< 6.0E+00	< 1.0E+01	< 9.0E+00	< 1.0E+01	< 7.0E+00	< 1.0E+01	< 7.0E+00
Ce-144	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01
Ra-226	< 6.0E+01	< 7.0E+01	< 8.0E+01	< 7.0E+01	< 6.0E+01	< 7.0E+01	< 9.0E+01	< 7.0E+01	< 6.0E+01	< 6.0E+01	< 8.0E+01	< 9.0E+01
Th-228	< 6.0E+00	< 6.0E+00	< 7.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00	< 7.0E+00	< 7.0E+00	< 5.0E+00	< 5.0E+00	< 8.0E+00	< 7.0E+00
Sr-89	< 1.0E+00	< 3.0E+00	< 2.0E+00	< 1.0E+00	< 2.0E+00	< 3.0E+00	< 2.0E+00	< 3.0E+00	< 2.0E+00	< 1.0E+00	< 2.0E+00	< 1.0E+00
Sr-90	< 9.0E-01	< 6.0E-01	< 2.0E+00	< 4.0E-01	< 5.0E-01	< 9.0E-01	< 8.0E-01	< 5.0E-01	< 6.0E-01	< 9.0E-01	< 4.0E-01	< 1.0E+00

Nuclide	SW-2 04/24/92	SW-2 05/26/92	SW-2 06/29/92	SW-2 07/27/92	SW-2 08/24/92	SW-2 09/30/92	SW-2 10/28/92	SW-2 11/30/92	SW-2 12/28/92	SW-3 10/28/92	SW-3 11/30/92	SW-3 12/28/92
Be-7	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01
K-40	< 5.0E+01	< 4.0E+01	< 6.0E+01	< 9.0E+01	< 1.0E+02	< 9.0E+01	< 5.0E+01	< 6.0E+01	< 6.0E+01	< 5.0E+01	< 5.0E+01	< 5.0E+01
Cr-51	< 4.0E+01	< 2.0E+01	< 3.0E+01	< 4.0E+01	< 5.0E+01	< 6.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 2.0E+01	< 3.0E+01
Mn-54	< 3.0E+00	< 2.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Co-58	< 4.0E+00	< 2.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Fe-59	< 7.0E+00	< 5.0E+00	< 7.0E+00	< 9.0E+00	< 1.0E+01	< 1.0E+01	< 7.0E+00	< 7.0E+00	< 8.0E+00	< 8.0E+00	< 6.0E+00	< 7.0E+00
Co-60	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Zn-65	< 7.0E+00	< 5.0E+00	< 7.0E+00	< 7.0E+00	< 9.0E+00	< 8.0E+00	< 6.0E+00	< 8.0E+00	< 7.0E+00	< 6.0E+00	< 5.0E+00	< 7.0E+00
Zr/Nb-95	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 5.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Ru-103	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 6.0E+00	< 6.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00
Ru-106	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Cs-134	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00
Ba/La-140	< 1.0E+01	< 4.0E+00	< 6.0E+00	< 1.0E+01	< 1.0E+01	< 2.0E+01	< 1.0E+01	< 5.0E+00	< 6.0E+00	< 1.0E+01	< 3.0E+00	< 5.0E+00
Ce-141	< 8.0E+00	< 5.0E+00	< 7.0E+00	< 6.0E+00	< 9.0E+00	< 1.0E+01	< 7.0E+00	< 5.0E+00	< 7.0E+00	< 7.0E+00	< 5.0E+00	< 8.0E+00
Ce-144	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01
Ra-226	< 7.0E+01	< 6.0E+01	< 9.0E+01	< 6.0E+01	< 7.0E+01	< 6.0E+01	< 6.0E+01	< 6.0E+01	< 8.0E+01	< 6.0E+01	< 7.0E+01	< 8.0E+01
Th-228	< 6.0E+00	< 5.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00	< 6.0E+00	< 5.0E+00	< 6.0E+00	< 7.0E+00	< 5.0E+00	< 6.0E+00	< 7.0E+00
Sr-89	< 3.0E+00	< 2.0E+00	< 5.0E+00	< 3.0E+00	< 3.0E+00	< 2.0E+00	< 2.0E+00	< 2.0E+00	< 2.0E+00	< 2.0E+00	< 1.0E+00	< 1.0E+00
Sr-90	< 9.0E-01	< 5.0E-01	< 1.0E+00	< 8.0E-01	< 7.0E-01	< 5.0E-01	< 5.0E-01	< 5.0E-01	< 5.0E-01	< 8.0E-01	< 4.0E-01	< 4.0E-01

① SW-3 added to the program as an enhancement at the end of the fourth quarter

FERMI 2 GROUNDWATER ANALYSIS
Quarterly Samples (pCi/l)

Nuclide	GW-1 03/13/92	GW-1 06/19/92	GW-1 09/18/92	GW-1 12/10/92	GW-2 03/13/92	GW-2 06/19/92	GW-2 09/18/92	GW-2 12/10/92
H-3	< 1.0E+03	< 1.0E+03	< 1.0E+02	< 1.0E+02	< 1.0E+03	< 1.0E+03	< 1.0E+02	< 1.0E+02
Be-7	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
K-40	< 1.0E+02	< 6.0E+01	< 6.0E+01	< 5.0E+01	< 7.0E+01	< 7.0E+01	< 9.0E+01	< 6.0E+01
Cr-51	< 5.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01
Mn-54	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 2.0E+00
Co-58	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00
Fe-59	< 1.0E+01	< 7.0E+00	< 8.0E+00	< 8.0E+00	< 6.0E+00	< 7.0E+00	< 8.0E+00	< 6.0E+00
Co-60	< 5.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 2.0E+00
Zn-65	< 1.0E+01	< 7.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00	< 8.0E+00	< 6.0E+00	< 5.0E+00
Zr/Nb-95	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00
Ru-103	< 6.0E+00	< 4.0E+00	< 5.0E+00	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Ru-106	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01
Cs-134	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Cs-137	< 5.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Ba/La-140	< 8.0E+00	< 6.0E+00	< 8.0E+00	< 9.0E+00	< 4.0E+00	< 6.0E+00	< 9.0E+00	< 5.0E+00
Ce-141	< 9.0E+00	< 7.0E+00	< 9.0E+00	< 1.0E+01	< 5.0E+00	< 9.0E+00	< 6.0E+00	< 5.0E+00
Ce-144	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01
Ra-226	< 9.0E+01	< 8.0E+01	< 8.0E+01	< 8.0E+01	< 5.0E+01	< 9.0E+01	< 7.0E+01	< 5.0E+01
Th-228	< 8.0E+00	< 7.0E+00	< 7.0E+00	< 7.0E+00	< 4.0E+00	< 8.0E+00	< 7.0E+00	< 4.0E+00

Nuclide	GW-3 03/13/92	GW-3 06/19/92	GW-3 09/18/92	GW-3 12/10/92	GW-4 03/13/92	GW-4 06/19/92	GW-4 09/18/92	GW-4 12/10/92
H-3	< 1.0E+03	< 1.0E+03	< 1.0E+02	< 1.0E+02	< 1.0E+03	< 1.0E+03	< 1.0E+02	< 1.0E+02
Be-7	< 3.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
K-40	< 1.0E+02	< 9.0E+01	< 6.0E+01	< 5.0E+01	< 4.0E+01	< 5.0E+01	< 6.0E+01	< 3.0E+01
Cr-51	< 3.0E+01	< 4.0E+01	< 4.0E+01	< 4.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01
Mn-54	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Co-58	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Fe-59	< 8.0E+00	< 8.0E+00	< 8.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00	< 8.0E+00	< 6.0E+00
Co-60	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Zn-65	< 9.0E+00	< 8.0E+00	< 7.0E+00	< 7.0E+00	< 6.0E+00	< 7.0E+00	< 7.0E+00	< 6.0E+00
Zr/Nb-95	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Ru-103	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 4.0E+00	< 4.0E+00	< 3.0E+00
Ru-106	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01	< 3.0E+01	< 3.0E+01	< 2.0E+01
Cs-134	< 4.0E+00	< 4.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00	< 3.0E+00
Cs-137	< 4.0E+00	< 4.0E+00	< 5.0E+00	< 4.0E+00	< 3.0E+00	< 5.0E+00	< 4.0E+00	< 3.0E+00
Ba/La-140	< 5.0E+00	< 7.0E+00	< 8.0E+00	< 8.0E+00	< 6.0E+00	< 6.0E+00	< 8.0E+00	< 7.0E+00
Ce-141	< 6.0E+00	< 6.0E+00	< 7.0E+00	< 8.0E+00	< 6.0E+00	< 6.0E+00	< 7.0E+00	< 5.0E+00
Ce-144	< 2.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01	< 2.0E+01	< 3.0E+01	< 2.0E+01
Ra-226	< 7.0E+01	< 7.0E+01	< 7.0E+01	< 8.0E+01	< 6.0E+01	< 7.0E+01	< 7.0E+01	< 5.0E+01
Th-228	< 6.0E+00	< 7.0E+00	< 6.0E+00	< 8.0E+00	< 6.0E+00	< 6.0E+00	< 6.0E+00	< 5.0E+00

FERMI 2 SEDIMENT ANALYSIS
(pCi/kg dry)

Nuclide	S-1 05/26/92	S-2 05/27/92	S-3 05/27/92	S-4 05/11/92	S-5 05/28/92
Sr-89	< 3.00E+02	< 2.00E+02	< 1.00E+02	< 4.00E+01	< 1.00E+02
Sr-90	< 4.00E+01	5.90E+01 +/- 2.70E+01	3.70E+01 +/- 2.30E+01	< 1.00E+02	< 2.00E+01
Be-7	< 2.00E+02	4.77E+02 +/- 2.04E+02	< 2.00E+02	< 2.00E+02	< 3.00E+02
K-40	1.13E+04 +/- 1.10E+03	1.56E+04 +/- 1.60E+03	1.10E+04 +/- 1.10E+03	9.40E+03 +/- 9.40E+02	1.06E+04 +/- 1.10E+03
Mn-54	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 2.00E+01	< 3.00E+01
Co-58	< 3.00E+01	< 3.00E+01	< 2.00E+01	< 2.00E+01	< 4.00E+01
Fe-59	< 6.00E+01	< 7.00E+01	< 6.00E+01	< 6.00E+01	< 1.00E+02
Co-60	< 3.00E+01	< 3.00E+01	< 2.00E+01	< 2.00E+01	< 3.00E+01
Zn-65	< 6.00E+01	< 7.00E+01	< 5.00E+01	< 6.00E+01	< 7.00E+01
Zr/Nb-95	< 3.00E+01	< 3.00E+01	< 2.00E+01	< 3.00E+01	< 4.00E+01
Ru-103	< 3.00E+01	< 3.00E+01	< 2.00E+01	< 2.00E+01	< 4.00E+01
Ru-106	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 3.00E+02
I-131	< 8.00E+01	< 9.00E+01	< 7.00E+01	< 5.00E+01	< 3.00E+02
Cs-134	< 3.00E+01	< 4.00E+01	< 2.00E+01	< 2.00E+01	< 4.00E+01
Cs-137	< 3.00E+01	< 3.00E+01	< 2.00E+01	< 3.00E+01	1.00E+02 +/- 2.90E+01
Ba/La-140	< 5.00E+01	< 6.00E+01	< 4.00E+01	< 3.00E+01	< 1.00E+02
Ce-141	< 5.00E+01	< 6.00E+01	< 4.00E+01	< 4.00E+01	< 7.00E+01
Ce-144	< 2.00E+02	< 2.00E+02	< 1.00E+02	< 1.00E+02	< 2.00E+02
Ra-226	< 4.00E+02	1.83E+03 +/- 4.50E+02	< 4.00E+02	4.41E+02 +/- 2.53E+02	1.20E+03 +/- 4.20E+02
Th-228	1.60E+02 +/- 2.80E+01	8.50E+02 +/- 8.50E+01	1.83E+02 +/- 2.20E+01	1.36E+02 +/- 2.20E+01	4.45E+02 +/- 4.50E+01

Nuclide	S-1 09/22/92	S-2 09/22/92	S-3 09/22/92	S-4 09/22/92	S-5 10/14/92
Sr-89	< 8.00E+01	< 9.00E+01	< 9.00E+01	< 2.00E+02	< 2.00E+02
Sr-90	< 3.00E+01	4.70E+01 +/- 1.90E+01	< 2.00E+01	< 4.00E+01	< 4.00E+01
Be-7	< 2.00E+02	7.90E+02 +/- 2.67E+02	< 3.00E+02	< 2.00E+02	< 3.00E+02
K-40	1.08E+04 +/- 1.10E+03	1.80E+04 +/- 1.80E+03	1.27E+04 +/- 1.30E+03	9.90E+03 +/- 9.90E+02	1.30E+04 +/- 1.30E+03
Mn-54	< 2.00E+01	< 3.00E+01	< 3.00E+01	< 2.00E+01	< 3.00E+01
Co-58	< 2.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01	< 4.00E+01
Fe-59	< 6.00E+01	< 8.00E+01	< 8.00E+01	< 7.00E+01	< 9.00E+01
Co-60	< 3.00E+01	< 3.00E+01	< 3.00E+01	< 2.00E+01	< 3.00E+01
Zn-65	< 6.00E+01	< 7.00E+01	< 7.00E+01	< 6.00E+01	< 7.00E+01
Zr/Nb-95	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 3.00E+01	< 4.00E+01
Ru-103	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 3.00E+01	< 4.00E+01
Ru-106	< 2.00E+02	< 3.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02
I-131	< 8.00E+01	< 1.00E+02	< 9.00E+01	< 8.00E+01	< 2.00E+02
Cs-134	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01
Cs-137	< 3.00E+01	< 5.00E+01	< 3.00E+01	< 3.00E+01	< 3.00E+01
Ba/La-140	< 6.00E+01	< 8.00E+01	< 5.00E+01	< 5.00E+01	< 1.00E+02
Ce-141	< 5.00E+01	< 7.00E+01	< 5.00E+01	< 5.00E+01	< 7.00E+01
Ce-144	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02
Ra-226	6.50E+02 +/- 3.23E+02	2.18E+03 +/- 5.10E+02	< 5.00E+02	< 5.00E+02	1.57E+03 +/- 4.90E+02
Th-228	3.90E+02 +/- 3.90E+01	1.10E+03 +/- 1.10E+02	2.11E+02 +/- 2.[illegible]0E+01	1.76E+02 +/- 3.00E+01	3.87E+02 +/- 3.90E+01

FERMI 2 FISH ANALYSIS
(pCi/kg wet)

Nuclide	F-1 05/14/92 Yellow Perch	F-1 05/14/92 Walleye	F-1 05/14/92 Drum	F-1 05/28/92 Yellow Perch	F-1 05/28/92 Walleye	F-1 05/28/92 White Bass
Be-7	< 9.00E+02	< 4.00E+02	< 9.00E+02	< 1.00E+03	< 4.00E+02	< 5.00E+02
K-40	2.44E+03 +/- 7.00E+02	3.81E+03 +/- 5.50E+02	2.89E+03 +/- 6.80E+02	3.51E+03 +/- 7.70E+02	2.67E+03 +/- 3.70E+02	2.06E+03 +/- 5.90E+02
Mn-54	< 7.00E+01	< 4.00E+01	< 7.00E+01	< 9.00E+01	< 3.00E+01	< 4.00E+01
Co-58	< 8.00E+01	< 4.00E+01	< 8.00E+01	< 1.00E+02	< 4.00E+01	< 4.00E+01
Fe-59	< 2.00E+02	< 9.00E+01	< 2.00E+02	< 2.00E+02	< 1.00E+02	< 1.00E+02
Co-60	< 9.00E+01	< 4.00E+01	< 8.00E+01	< 8.00E+01	< 4.00E+01	< 5.00E+01
Zn-65	< 2.00E+02	< 9.00E+01	< 2.00E+02	< 2.00E+02	< 7.00E+01	< 8.00E+01
Zr/Nb-95	< 9.00E+01	< 4.00E+01	< 1.00E+02	< 1.00E+02	< 4.00E+01	< 5.00E+01
Ru-103	< 1.00E+02	< 6.00E+01	< 1.00E+02	< 1.00E+02	< 5.00E+01	< 7.00E+01
Ru-106	< 6.00E+02	< 3.00E+02	< 7.00E+02	< 9.00E+02	< 3.00E+02	< 4.00E+02
I-131	< 8.00E+02	< 5.00E+02	< 1.00E+03	< 1.00E+03	< 4.00E+02	< 6.00E+02
Cs-134	< 9.00E+01	< 4.00E+01	< 8.00E+01	< 9.00E+01	< 4.00E+01	< 4.00E+01
Cs-137	< 1.00E+02	< 4.00E+01	< 8.00E+01	< 1.00E+02	< 4.00E+01	< 5.00E+01
Ba/La-140	< 3.00E+02	< 2.00E+02	< 4.00E+02	< 4.00E+02	< 2.00E+02	< 2.00E+02
Ce-141	< 2.00E+02	< 1.00E+02	< 2.00E+02	< 2.00E+02	< 9.00E+01	< 1.00E+02
Ce-144	< 5.00E+02	< 2.00E+02	< 6.00E+02	< 5.00E+02	< 2.00E+02	< 3.00E+02
Ra-226	< 1.00E+03	< 7.00E+02	< 2.00E+03	< 2.00E+03	< 6.00E+02	< 9.00E+02
Th-228	< 1.00E+02	< 6.00E+01	< 2.00E+02	< 1.00E+02	< 5.00E+01	< 9.00E+01
Sr-89	< 8.00E+01	①	< 8.00E+01	< 5.00E+01	< 5.00E+01	< 9.00E+01
Sr-90	1.10E+02 +/- 2.00E+01	①	7.30E+01 +/- 1.70E+01	4.80E+01 +/- 1.20E+01	3.70E+02 +/- 1.50E+02	7.70E+01 +/- 1.90E+01

Nuclide	F-1 05/28/92 White Perch	F-2 05/27/92 Yellow Perch	F-2 05/27/92 Drum	F-2 05/27/92 Sucker	F-2 05/27/92 Walleye	F-3 05/20/92 Sucker
Be-7	< 4.00E+02	< 4.00E+02	< 1.00E+02	< 3.00E+02	< 5.00E+02	< 4.00E+02
K-40	2.92E+03 +/- 4.00E+02	2.76E+03 +/- 4.90E+02	2.33E+02 +/- 8.50E+01	3.24E+03 +/- 4.70E+02	3.30E+03 +/- 6.10E+02	2.81E+03 +/- 4.60E+02
Mn-54	< 3.00E+01	< 3.00E+01	< 9.00E+00	< 3.00E+01	< 4.00E+01	< 4.00E+01
Co-58	< 4.00E+01	< 4.00E+01	< 9.00E+00	< 3.00E+01	< 4.00E+01	< 4.00E+01
Fe-59	< 9.00E+01	< 7.00E+01	< 2.00E+01	< 6.00E+01	< 9.00E+01	< 1.00E+02
Co-60	< 3.00E+01	< 4.00E+01	< 1.00E+01	< 3.00E+01	< 4.00E+01	< 4.00E+01
Zn-65	< 8.00E+01	< 9.00E+01	< 2.00E+01	< 6.00E+01	< 8.00E+01	< 9.00E+01
Zr/Nb-95	< 4.00E+01	< 4.00E+01	< 1.00E+01	< 3.00E+01	< 4.00E+01	< 4.00E+01
Ru-103	< 5.00E+01	< 5.00E+01	< 1.00E+01	< 4.00E+01	< 6.00E+01	< 5.00E+01
Ru-106	< 3.00E+02	< 3.00E+02	< 1.00E+02	< 2.00E+02	< 3.00E+02	< 3.00E+02
I-131	< 4.00E+02	< 2.00E+02	< 4.00E+01	< 1.00E+02	< 2.00E+02	< 1.00E+02
Cs-134	< 3.00E+01	< 3.00E+01	< 1.00E+01	< 3.00E+01	< 4.00E+01	< 4.00E+01
Cs-137	< 3.00E+01	< 4.00E+01	< 1.00E+01	< 3.00E+01	< 4.00E+01	< 4.00E+01
Ba/La-140	< 2.00E+02	< 6.00E+01	< 3.00E+01	< 6.00E+01	< 1.00E+02	< 1.00E+02
Ce-141	< 7.00E+01	< 8.00E+01	< 2.00E+01	< 7.00E+01	< 1.00E+02	< 6.00E+01
Ce-144	< 2.00E+02	< 2.00E+02	< 7.00E+01	< 2.00E+02	< 4.00E+02	< 2.00E+02
Ra-226	< 5.00E+02	< 7.00E+02	< 2.00E+02	< 7.00E+02	< 1.00E+03	< 7.00E+02
Th-228	< 5.00E+01	< 6.00E+01	< 2.00E+01	< 6.00E+01	< 9.00E+01	< 6.00E+01
Sr-89	< 7.00E+01	< 7.00E+01	< 6.00E+01	①	< 5.00E+01	< 1.00E+02
Sr-90	7.30E+01 +/- 1.80E+01	7.20E+01 +/- 1.70E+01	1.10E+02 +/- 2.00E+01	①	2.20E+01 +/- 1.00E+01	9.60E+01 +/- 1.90E+01

① Sample lost in analysis

FERMI 2 FISH ANALYSIS
(pCi/kg wet)

Nuclide	F-3 05/20/92 Yellow Perch	F-3 05/20/92 White Perch	F-3 05/20/92 Walleye	F-2 09/23/92 Walleye	F-2 09/23/92 Yellow Perch	F-2 09/23/92 White Perch
Be-7	< 4.00E+02	< 2.00E+02	< 3.00E+02	< 4.00E+02	< 5.00E+02	< 5.00E+02
K-40	2.53E+03 +/- 5.40E+02	2.79E+03 +/- 2.80E+02	3.49E+03 +/- 4.40E+02	3.13E+03 +/- 5.20E+02	4.63E+03 +/- 5.60E+02	2.70E+03 +/- 5.30E+02
Mn-54	< 4.00E+01	< 1.00E+01	< 3.00E+01	< 3.00E+01	< 5.00E+01	< 4.00E+01
Co-58	< 5.00E+01	< 1.00E+01	< 3.00E+01	< 4.00E+01	< 5.00E+01	< 5.00E+01
Fe-59	< 1.00E+02	< 4.00E+01	< 8.00E+01	< 6.00E+01	< 1.00E+02	< 1.00E+02
Co-60	< 4.00E+01	< 1.00E+01	< 4.00E+01	< 3.00E+01	< 5.00E+01	< 4.00E+01
Zn-65	< 9.00E+01	< 3.00E+01	< 7.00E+01	< 7.00E+01	< 1.00E+02	< 9.00E+01
Zr/Nb-95	< 5.00E+01	< 2.00E+01	< 3.00E+01	< 4.00E+01	< 5.00E+01	< 5.00E+01
Ru-103	< 5.00E+01	< 2.00E+01	< 4.00E+01	< 5.00E+01	< 7.00E+01	< 6.00E+01
Ru-106	< 4.00E+02	< 1.00E+02	< 2.00E+02	< 3.00E+02	< 4.00E+02	< 4.00E+02
I-131	< 2.00E+02	< 1.00E+02	< 1.00E+02	< 2.00E+02	< 3.00E+02	< 3.00E+02
Cs-134	< 5.00E+01	< 1.00E+01	< 3.00E+01	< 4.00E+01	< 5.00E+01	< 4.00E+01
Cs-137	< 7.00E+01	< 1.00E+01	< 4.00E+01	< 3.00E+01	< 5.00E+01	< 4.00E+01
Ba/La-140	< 1.00E+02	< 5.00E+01	< 7.00E+01	< 9.00E+01	< 1.00E+02	< 1.00E+02
Ce-141	< 9.00E+01	< 4.00E+01	< 6.00E+01	< 8.00E+01	< 9.00E+01	< 1.00E+02
Ce-144	< 3.00E+02	< 1.00E+02	< 2.00E+02	< 3.00E+02	< 3.00E+02	< 3.00E+02
Ra-226	< 9.00E+02	< 3.00E+02	< 6.00E+02	< 7.00E+02	< 9.00E+02	< 9.00E+02
Th-228	< 8.00E+01	< 3.00E+01	< 5.00E+01	< 6.00E+01	< 7.00E+01	< 1.00E+02
Sr-89	< 6.00E+01	[1]	< 1.00E+01	< 8.00E+00	< 2.00E+01	< 3.90E+01
Sr-90	4.60E+01 +/- 1.20E+01	[1]	3.90E+00 +/- 2.10E+00	7.30E+00 +/- 1.90E+00	3.50E+01 +/- 5.00E+00	3.60E+01 +/- 8.00E+00

Nuclide	F-2 09/23/92 Carp	F-2 09/23/92 Sucker	F-3 09/24/92 Yellow Perch	F-3 09/24/92 Walleye	F-3 09/24/92 White Perch	F-3 09/24/92 Carp
Be-7	< 3.00E+02	< 2.00E+02	< 3.00E+02	< 3.00E+02	< 4.00E+02	< 3.00E+02
K-40	2.63E+03 +/- 3.80E+02	3.51E+03 +/- 3.90E+02	2.97E+03 +/- 4.00E+02	3.54E+03 +/- 4.50E+02	4.63E+03 +/- 4.90E+02	2.41E+03 +/- 4.10E+02
Mn-54	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 3.00E+01	< 3.00E+01
Co-58	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 4.00E+01	< 3.00E+01
Fe-59	< 7.00E+01	< 6.00E+01	< 8.00E+01	< 5.00E+01	< 8.00E+01	< 7.00E+01
Co-60	< 3.00E+01	< 2.00E+01	< 3.00E+01	< 2.00E+01	< 4.00E+01	< 3.00E+01
Zn-65	< 5.00E+01	< 5.00E+01	< 8.00E+01	< 6.00E+01	< 8.00E+01	< 7.00E+01
Zr/Nb-95	< 3.00E+01	< 2.00E+01	< 4.00E+01	< 3.00E+01	< 5.00E+01	< 4.00E+01
Ru-103	< 3.00E+01	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 5.00E+01	< 4.00E+01
Ru-106	< 2.00E+02	< 2.00E+02	< 3.00E+02	< 2.00E+02	< 3.00E+02	< 3.00E+02
I-131	< 1.00E+02	< 1.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02
Cs-134	< 2.00E+01	< 2.00E+01	< 3.00E+01	< 3.00E+01	< 4.00E+01	< 2.00E+01
Cs-137	< 3.00E+01	< 3.00E+01	< 4.00E+01	< 3.00E+01	< 4.00E+01	< 3.00E+01
Ba/La-140	< 8.00E+01	< 6.00E+01	< 9.00E+01	< 1.00E+02	< 9.00E+01	< 8.00E+01
Ce-141	< 4.00E+01	< 6.00E+01	< 6.00E+01	< 7.00E+01	< 7.00E+01	< 7.00E+01
Ce-144	< 1.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02
Ra-226	< 4.00E+02	< 5.00E+02	< 5.00E+02	< 6.00E+02	< 6.00E+02	< 6.00E+02
Th-228	< 4.00E+01	< 4.00E+01	< 5.00E+01	< 5.00E+01	< 5.00E+01	< 5.00E+01
Sr-89	< 7.00E+00	< 1.00E+01	< 2.00E+01	< 8.00E-03	< 3.00E+01	< 2.00E+01
Sr-90	< 3.00E+00	< 2.00E+00	1.70E+01 +/- 5.00E+00	< 3.00E-03	4.50E+01 +/- 9.00E+00	2.20E+01 +/- 4.00E+00

[1] Sample lost in analysis

FERMI 2 FISH ANALYSIS
(pCi/kg wet)

Nuclide	F-3 09/24/92 Small Mouth Bass	F-3 09/24/92 Rock Bass	F-1 10/14/92 Walleye	F-1 10/14/92 Carp	F-1 10/14/92 Sucker
Be-7	< 3.00E+02	< 6.00E+02	< 4.00E+02	< 7.00E+02	< 1.00E+02
K-40	3.18E+03 +/- 4.80E+02	4.02E+03 +/- 8.40E+02	3.20E+03 +/- 5.60E+02	2.06E+03 +/- 6.90E+02	2.11E+03 +/- 2.10E+02
Mn-54	< 3.00E+01	< 6.00E+01	< 4.00E+01	< 6.00E+01	< 2.00E+01
Co-58	< 3.00E+01	< 7.00E+01	< 4.00E+01	< 5.00E+01	< 2.00E+01
Fe-59	< 9.00E+01	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 4.00E+01
Co-60	< 3.00E+01	< 8.00E+01	< 4.00E+01	< 2.00E+01	< 2.00E+01
Zn-65	< 6.00E+01	< 2.00E+02	< 8.00E+01	< 1.00E+02	< 3.00E+01
Zr/Nb-95	< 4.00E+01	< 8.00E+01	< 5.00E+01	< 7.00E+01	< 2.00E+01
Ru-103	< 4.00E+01	< 8.00E+01	< 6.00E+01	< 8.00E+01	< 2.00E+01
Ru-106	< 3.00E+02	< 4.00E+02	< 4.00E+02	< 5.00E+02	< 1.00E+02
I-131	< 2.00E+02	< 3.00E+02	< 3.00E+02	< 4.00E+02	< 9.00E+01
Cs-134	< 4.00E+01	< 8.00E+01	< 4.00E+01	< 6.00E+01	< 1.00E+01
Cs-137	< 4.00E+01	< 7.00E+01	< 5.00E+01	< 7.00E+01	< 2.00E+01
Ba/La-140	< 1.00E+02	< 2.00E+02	< 1.00E+02	< 2.00E+02	< 5.00E+01
Ce-141	< 8.00E+01	< 1.00E+02	< 1.00E+02	< 2.00E+02	< 3.00E+01
Ce-144	< 2.00E+02	< 3.00E+02	< 3.00E+02	< 5.00E+02	< 8.00E+01
Ra-226	< 6.00E+02	< 1.00E+03	< 9.00E+02	< 2.00E+03	< 3.00E+02
Th-228	< 7.00E+01	< 1.00E+02	< 9.00E+01	< 1.00E+02	< 2.00E+01
Sr-89	< 1.00E+01	< 2.00E+01	< 7.00E+00	< 1.00E+01	< 4.00E+00
Sr-90	3.20E+00 +/- 1.90E+00	< 1.00E+01	8.50E+00 +/- 1.80E+00	2.80E+01 +/- 3.00E+00	6.60E+00 +/- 1.10E+00

Glossary

Glossary

activation products – Radioactive material 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, surrounded by 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 250 to 300 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 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.

criticality – The point at which a chain reaction can be sustained without aid of an external radioactive source.

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.

decay – Nucleus spontaneous emission of changed particles or photons from an unstable atom.

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 material 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 surround 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 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 short period of time.

half-life – The time in which half the atoms of a particular radioactive substance decay to a more stable form. Measured half-lives vary from millionths of a second to billions of years.

indicator location – A sample collection location generally within 5 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 and plutonium-239 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 = (x1 + x2 + ...xn)/n. Where n is the number of observations in a data set, and x1, 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 anyknown isotope, both stable (279) and unstable (about 5000), of the chemical elements.

ODCM – Acronym for "Offsite Dose Calculation Manual," a document that contains the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents; in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints; and in the conduct of the radiological environmental monitoring program.

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 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 atom.

radioactivity – The spontaneous emission of radiation from 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.

unstable – An atom that will undergo radioactive decay through a nuclear reaction.

1 Results Count

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If you have questions about radiation, please write to:

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