Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

April 28, 2005
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STI: 31878659

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
2004 Annual Environmental and Annual
Radiological Environmental Operating Reports

Pursuant to the South Texas Project (STP) Unit 1 Operating License NPF-76, Unit 2 Operating License NPF-80 Appendix B, Environmental Protection Plan (Nonradiological), and Technical Specification 6.9.1.3, attached are the 2004 Annual Environmental and Annual Radiological Environmental Operating Reports.

There are no commitments included in this report.

If you have any questions, please contact J. D. Sherwood at (361) 972-8766 or me at (361) 972-7130.

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MK

Attachment: 2004 Annual Environmental and Annual Radiological Environmental Operating Reports.

IE25

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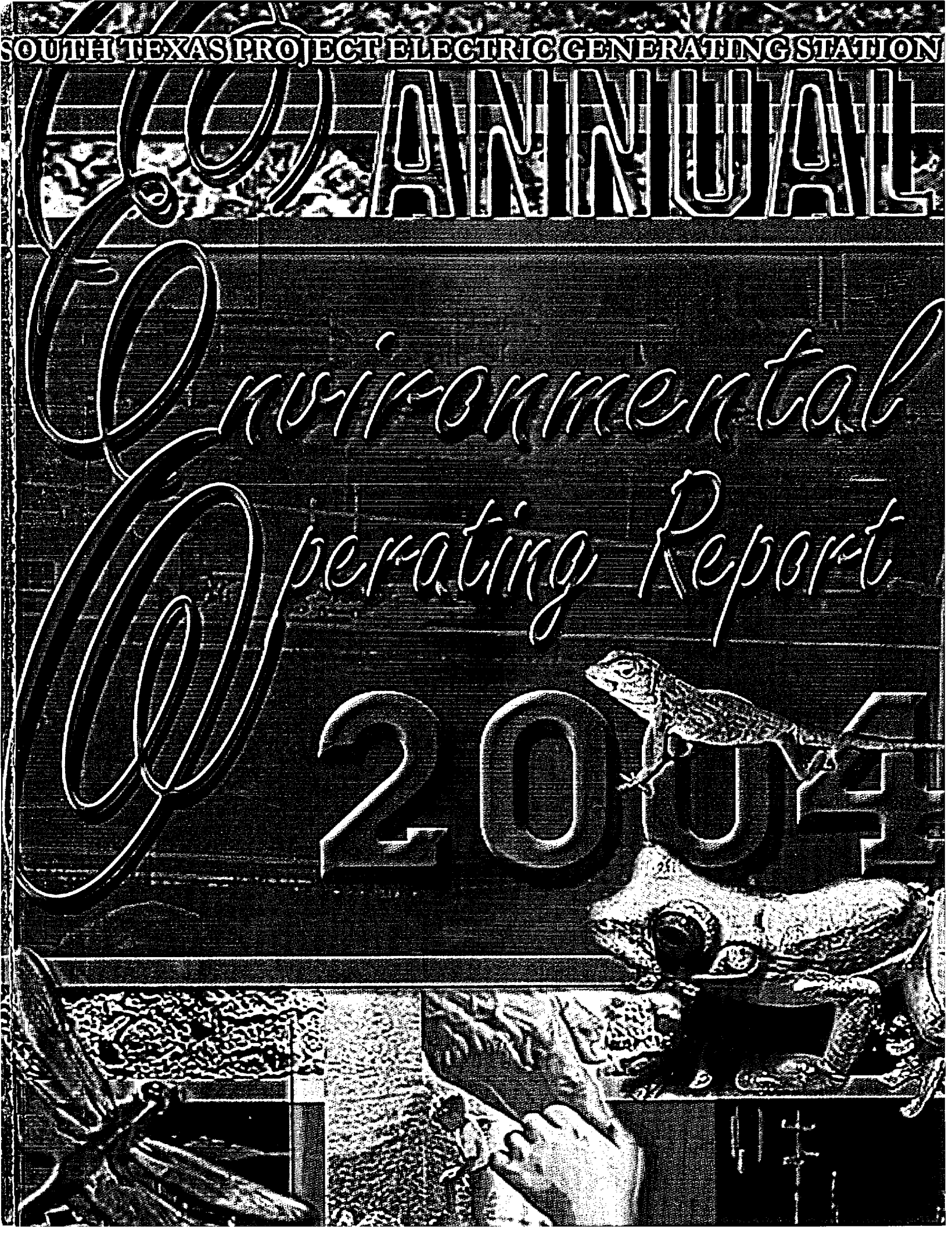
SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

ANNUAL Environmental Operating Report 2004



The 2004 Annual Environmental Operating Report for the South Texas Project Electric Generating Station combines in one report the requirements for the Appendix B to Operating License Nos. NPF-76 and NPF-80 and requirements for the Annual Radiological Environmental Operating Report found in part A of the station's Offsite Dose Calculations Manual.

Photographs By: Gwenna Kelton, Barbara Carnley, CorelDraw Photo Library

Graphic Designs & Layout: Jean Franklin

Please visit our web site at http://www.stpnoc.com

Completed
in accordance with
Technical Specifications
for
United States Nuclear Regulatory Commission
License Nos.
NPF-76 & NPF-80
April 2005

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2004

Annual Environmental
Operating Report

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

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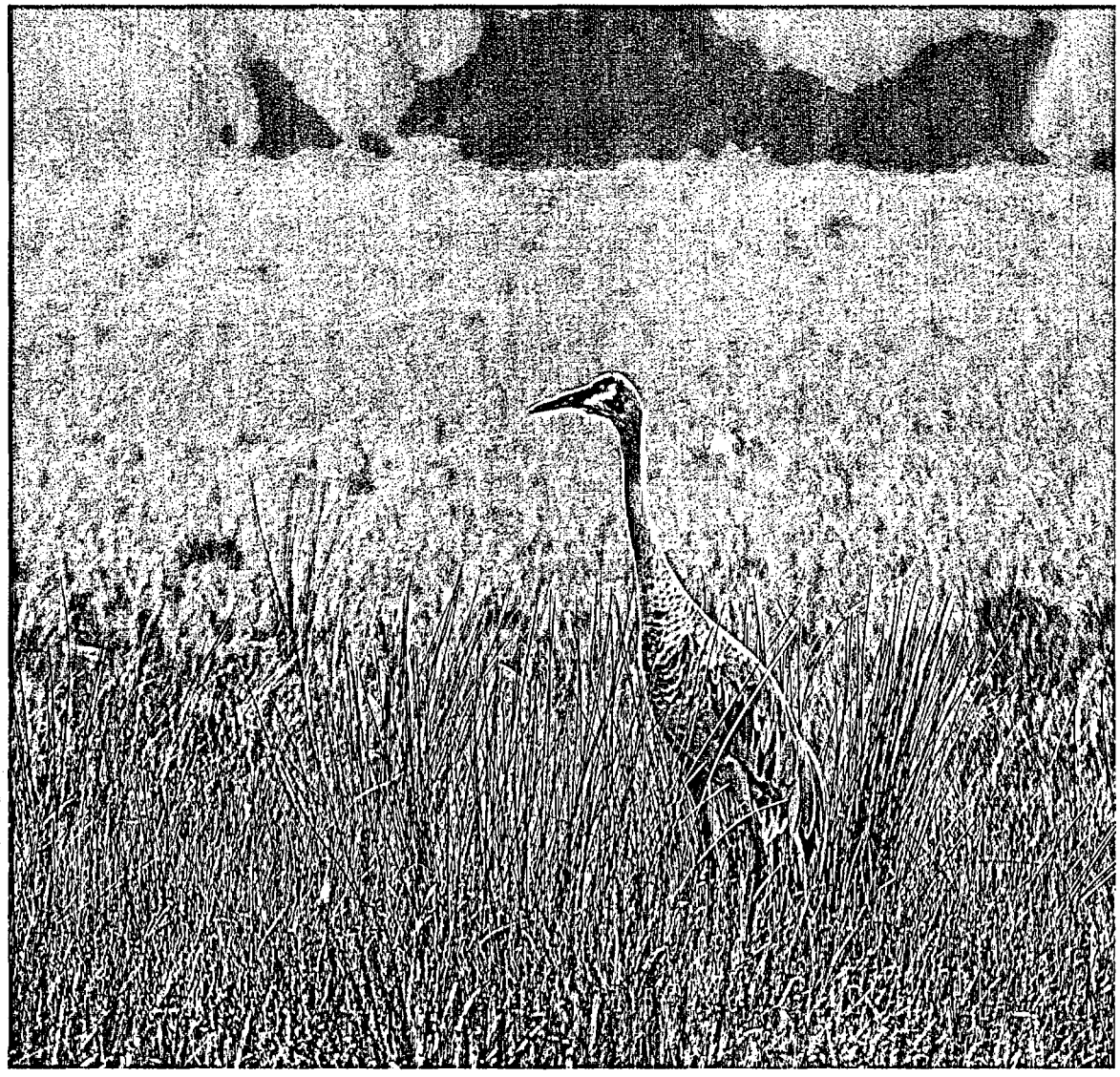


Chapter 1

Executive Summary

Executive Summary

This report describes the environmental monitoring programs, radiological and non-radiological, conducted at the South Texas Project during 2004. Included in this report are the Environmental Protection Plan Status, the results of the Radiological Environmental Monitoring Program and the Land Use Census.

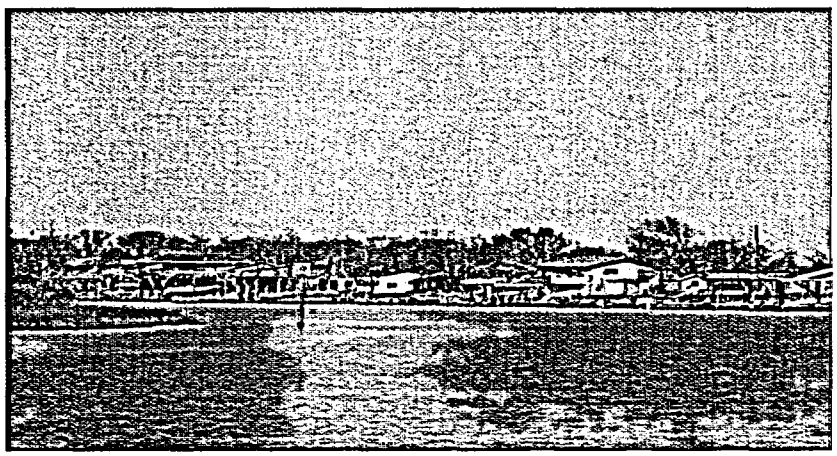


Photo By: Barbara Carnley

Radiation and radioactivity in the environment are constantly monitored within a 15-mile radius of the South Texas Project. Sampling locations are selected using weather, land use and water use information. Two types of sampling locations are used. The first type, control stations, are located in areas that are beyond measurable influence of the South Texas Project or any other nuclear facility. The sample results from these stations are used to explain radiation from sources other than the South Texas Project. Indicator stations are the second type of stations. The samples from these stations measure any radiation contributed to the environment by the project. Indicator stations are located in areas close to the South Texas Project where any plant releases would be at the highest concentration.

Prior to initial operation of the South Texas Project, samples were collected and analyzed to determine the amount of radioactivity present in the area. These results are used as a "pre-operational baseline." Results from the indicator stations are compared to both current control sample results and the pre-operational baseline values to determine if changes in radioactivity levels are attributable to station operations or other causes such as previous nuclear weapons testing programs and natural variations.

Radioactivity levels in the South Texas Project's environment frequently fall below the minimum detection capabilities of the state-of-the-art scientific instruments. Samples with radiation levels that cannot be detected are below the Lower Limits of Detection. The United States Nuclear Regulatory Commission requires that equipment used for radiological monitoring must be able to detect specified minimum limits for certain types of samples. This ensures that radiation measurements are sufficiently sensitive to detect small changes in the environment. The United States Nuclear Regulatory Commission also has a required "reporting level." Licensed nuclear facilities must prepare a special report and increase their sampling if any measured radiation level is equal to or greater than this reporting level. No sample from the South Texas Project has ever reached or exceeded a reporting level.

TEXAS POWER TEAM PERFORMANCE

During 2004, as in each previous year, operation of the South Texas Project created no adverse environmental effects or health risks. The maximum radiation exposure calculated for a hypothetical person living at the boundary of the South Texas Project during 2004 was less than one millirem. For reference, this dose may be compared to the 360 millirem average annual radiation exposure to people in the United States from natural and medical sources. Natural radiation sources in the environment contribute most of the radiation exposure to humans while nuclear energy operations contribute less than one millirem.

Measurements made are divided into four categories or pathways based upon how the results may affect the public. Airborne, waterborne, ingestion and direct radiation are the four pathways that are sampled. Each pathway is described below.

- The airborne pathway is sampled in areas around the South Texas Project by measuring radioactivity of iodine cannisters and particulate air filters. The 2004 airborne results were similar to pre-operational levels with only naturally occurring radioactive material unrelated to the operation of the South Texas Project detected.

- The waterborne pathway includes samples taken from surface water, ground water and drinking water. Also included in this path are sediment samples taken from the Main Cooling Reservoir and the Colorado River. Tritium was the only man-made isotope consistently detected in water samples and was measured in the shallow aquifer, the Main Cooling Reservoir and other bodies of water onsite. The average tritium level in the Main Cooling Reservoir remained similar to past years and remained below United States Nuclear Regulatory Commission reporting limits and within United States Environmental Protection Agency drinking water standards. Sediment samples from the Main Cooling Reservoir continue to show traces of plant-related isotopes. The amount of plant-related isotopes in the reservoir sediment has decreased since 1992 because less Cobalt-60 has been added to the reservoir by plant effluents than has undergone radioactive decay.

- The ingestion pathway includes broadleaf vegetation, agricultural products and food products. Naturally occurring isotopes were detected at average environmental levels in the samples. Man-made isotopes found in the samples were consistent with values found in pre-operational samples.

- The direct exposure pathway measures environmental radiation doses using thermoluminescent dosimeters. These results are consistent with the readings from previous years and continue to show no effect from plant operations.

The South Texas Project continues to operate with no negative effect on the population or the environment. The exposure for people living in the area is maintained at less than one millirem per year. Environmental programs at the site monitor known and predictable relationships between the operation of the South Texas Project and the surrounding area. These monitoring programs verify that the operation of the South Texas Project has no detectable impact offsite and is well within state and federal regulations and guidelines. These programs are verified by the state of Texas through collection and analysis of samples and placement of the state's thermoluminescent dosimeters.

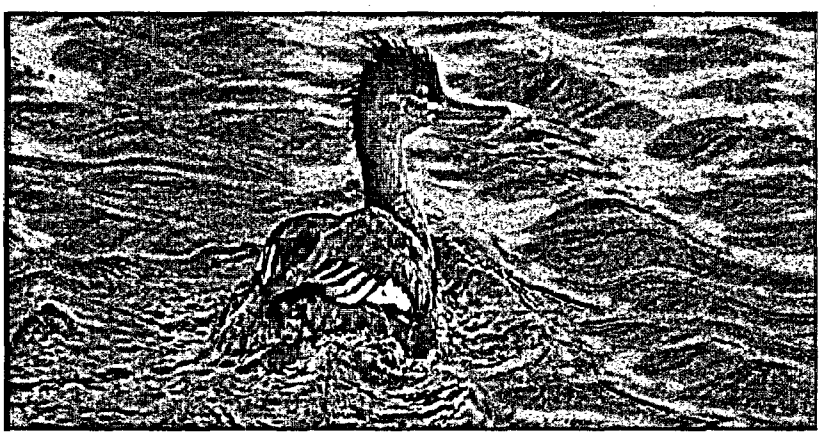
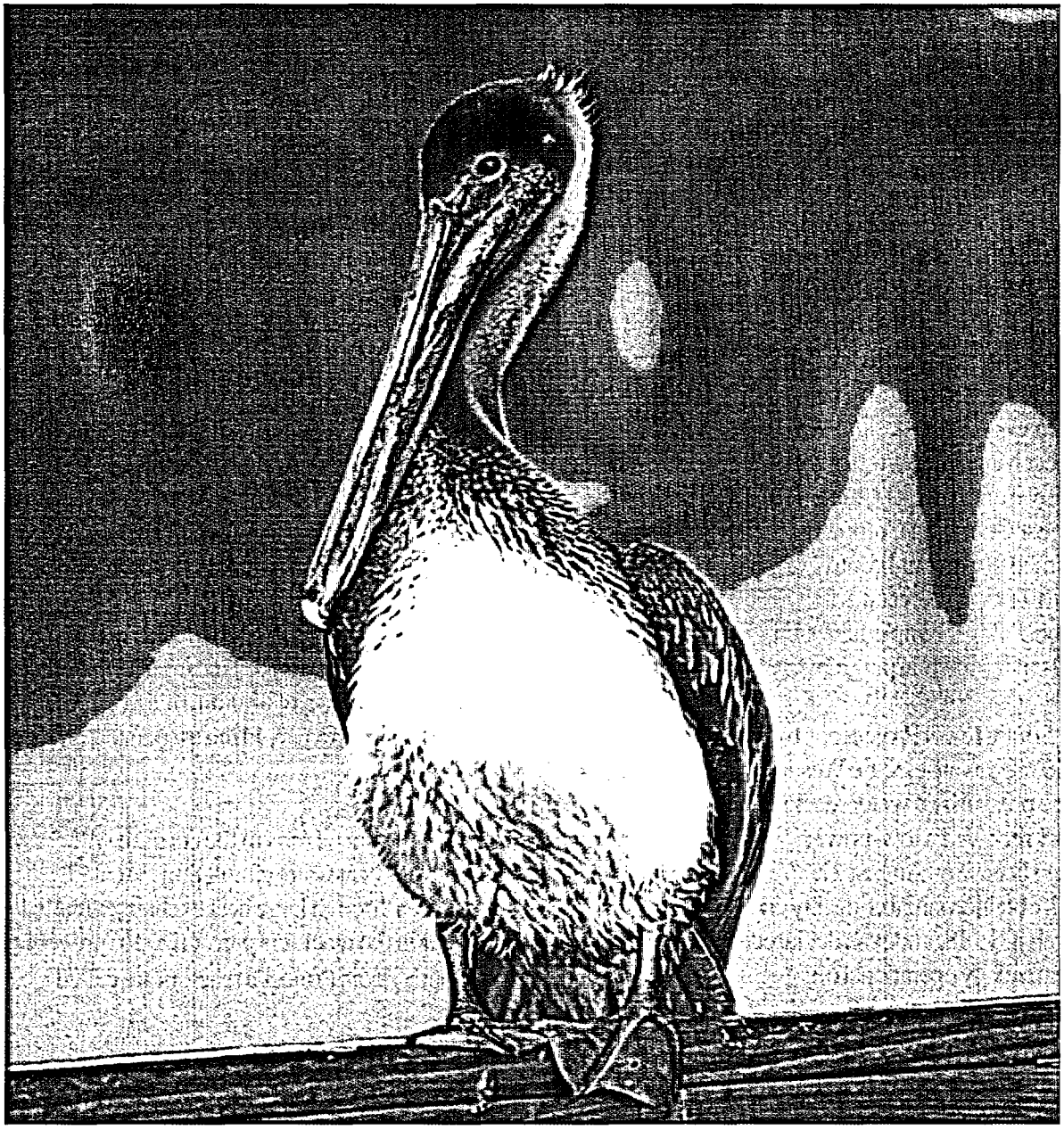


Photo By: Gwenna Kelton



Chapter 2

Site and Area Description

Site and Area Description

The South Texas Project is located on 12,220 acres in Matagorda County, Texas, approximately 15 miles southwest of Bay City along the west bank of the Colorado River. The South Texas Project was jointly owned by Texas Genco LP, AEP Texas Central Company, the City of Austin and the City of San Antonio in 2004. Until late 1997, the Houston Lighting & Power Company was the designated Project Manager for the owners. In November of 1997, the STP Nuclear Operating Company assumed operational control of the South Texas Project and responsibility for implementation of all environmental programs.

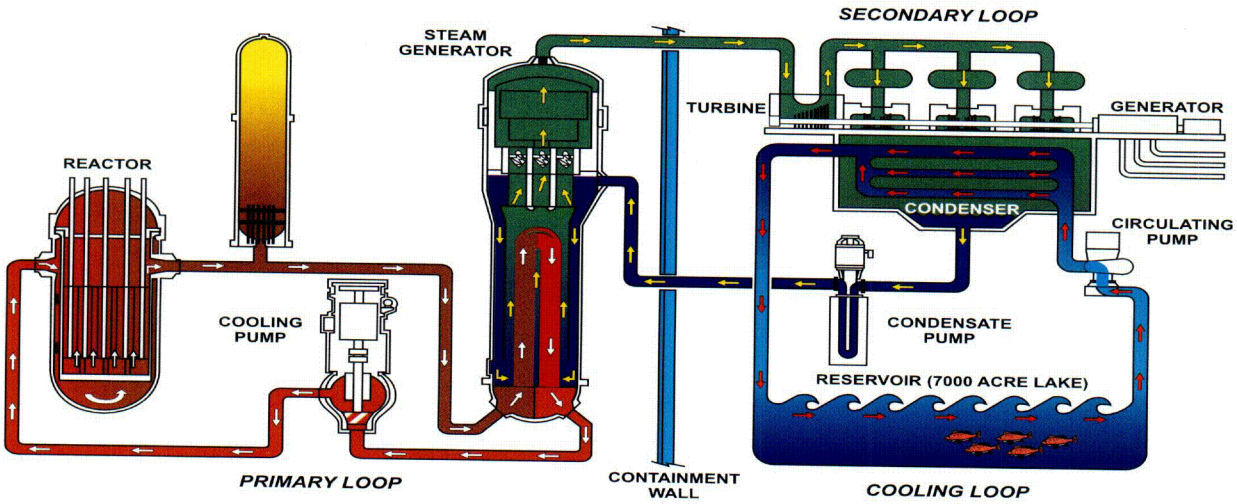
The South Texas Project has two 1,250 megawatt-electric Westinghouse pressurized water reactors. Unit 1 received a low-power testing license on August 21, 1987, obtained initial criticality on March 8, 1988, and was declared commercially operational on August 25, 1988. Unit 2 received a low-power testing license on December 16, 1988, obtained initial criticality on March 12, 1989, and was declared commercially operational on June 19, 1989. Both units together produce enough electricity to serve over a million homes as well as serving as the largest employer and source of revenue for Matagorda County.

How the South Texas Project Works

Fossil-fueled and nuclear-powered steam generating plants operate on the same principle. Fuel is used to produce heat to convert water into high-pressure steam. The steam is directed through a turbine to turn a generator. In a fossil fuel plant, burning coal, lignite, oil or natural gas in a boiler produces the heat. In a nuclear plant, the reactor replaces the boiler and the "fissioning" or splitting of uranium atoms inside the reactor produces the heat.

The fuel for a nuclear reactor is uranium. It is formed into cylindrical ceramic pellets, each about the size of the end of your little finger. One pellet has the energy potential of about a ton of coal. Millions of these pellets are stacked in fuel rods that are arranged into assemblies that make up the core of the reactor. The use of uranium allows us to conserve natural gas, oil and coal and to avoid the associated production of greenhouse gases.

A reactor starts operating when control rods in the core are withdrawn and fission begins. The fuel rods heat water circulating in sealed, stainless steel piping that passes through large heat exchangers called steam generators. The water in the reactor is pressurized to prevent boiling. This is why the South Texas Project's reactors are called "pressurized water reactors."



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This hot, pressurized water heats a separate supply of water in the steam generators to produce steam that is directed through the blades of a turbine generator to produce electricity. The steam is then fed to a condenser where a separate supply of cooling water from the reservoir turns it back into water that is then pumped back to the steam generator for reuse. A diagram of the plant water systems is shown on the previous page.

In addition to its safety systems, the South Texas Project has many built-in physical barriers that would prevent the release of radioactive materials in the unlikely event of an accident. The most visible ones are the 200-foot-tall, domed containment buildings with steel-reinforced walls four feet thick. Inside each of these massive structures, two more concrete walls provide another 11 feet of shielding. The reactor vessel itself has steel walls six inches thick, and the fuel pellets inside it are sheathed in hardened metal tubes.

Nuclear energy has one of the lowest impacts on the environment. It's the most eco-efficient energy source because it produces the most electricity in relation to its minimal environmental impact. In 2003, nuclear generation in the United States prevented 679.8 million metric tons of carbon dioxide, 3.36 million tons of sulfur dioxide and 1.24 million tons of nitrogen oxide from entering the earth's atmosphere. Nuclear power plants were responsible for nearly half of the total voluntary greenhouse gas emissions reductions reported by U.S. companies in 2001. Additional information on nuclear energy and the environment can be found on the website maintained by the Nuclear Energy Institute at http://www.nei.org.

The Site

Sixty-five of the entire 12,220 acres at the South Texas Project are occupied by the two power plants. Plant facilities include a 7,000-acre main cooling reservoir and a 47-acre essential cooling pond. Many smaller bodies of water onsite include wetlands, Kelly Lake, drainage ditches, sloughs and depressions. Much of the land east of the cooling reservoir is leased for cattle grazing. Approximately 1,700 acres remain in a more natural state as a lowland habitat. A 110-acre wetland habitat area was established in 1996 on previously unused land located northeast of the power plants. The area surrounding the South Texas Project is characterized by coastal plain with farmland and pasture predominating. Local relief of the area is characterized by flat land, approximately 23 feet above sea level.

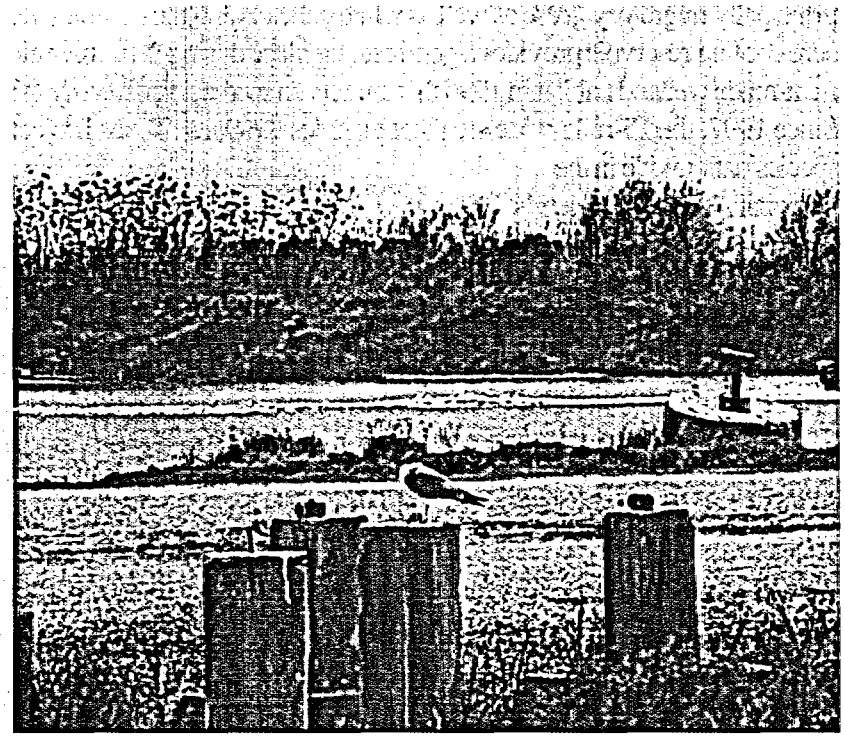


Photo By: Barbara Carnley

Site and Area Description

The Area

The economic base for this area primarily is agricultural related. Most of the land near the site is used for the production of five major agricultural products: beef, rice, grain sorghum, soybeans and cotton. In addition to the agriculture industry, there is commercial fishing in the lower Colorado River, East and West Matagorda Bays, Intracoastal Waterway and the Gulf of Mexico. Currently shrimp, oysters, crab and fin fishes such as catfish and striped bass are the predominant commercial fish in the county. Aquaculture farms continue to be developed in the area with the main crop being catfish.

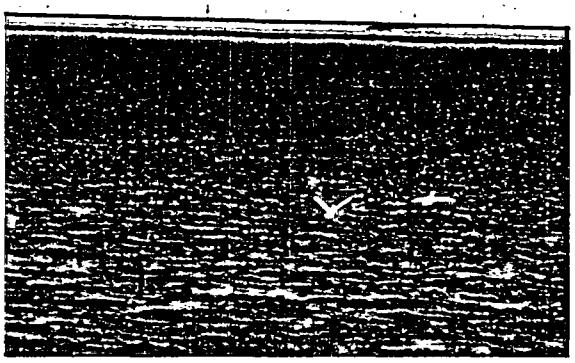


Photo By: Barbara Carnley

Although the surrounding area is heavily cultivated, significant amounts of woodlands, thicket, brush, fields, marsh and open water exist to support wildlife. The area lies in the southern region of the central flyway and is host to an abundance of migratory birds. The local estuary environments provide the necessary habitat for a variety of fish types to complete their life cycles. The area also affords opportunity for recreational hunting and fishing.

The South Texas Project is home to many species of animals. Inhabitants include American alligators, ospreys, bald eagles and several hundred deer. In winter, literally hundreds of thousands of waterfowl, principally migratory geese as well as white pelicans and the common tern, have found that the plant's 7,000-acre cooling reservoir provides a good resting place during their migrations. The station also established a man-made wetland habitat in 1996 that attracts an increasing diversity of migratory fowl and other wildlife. Since 1997, the 15-mile-wide area that includes the South Texas Project has had the highest number of bird species nationwide in the National Audubon Society's annual Christmas Bird Count.

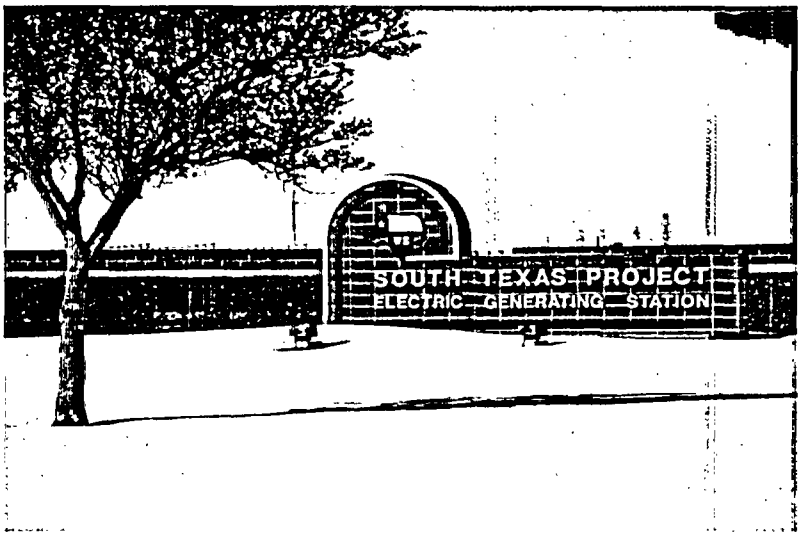
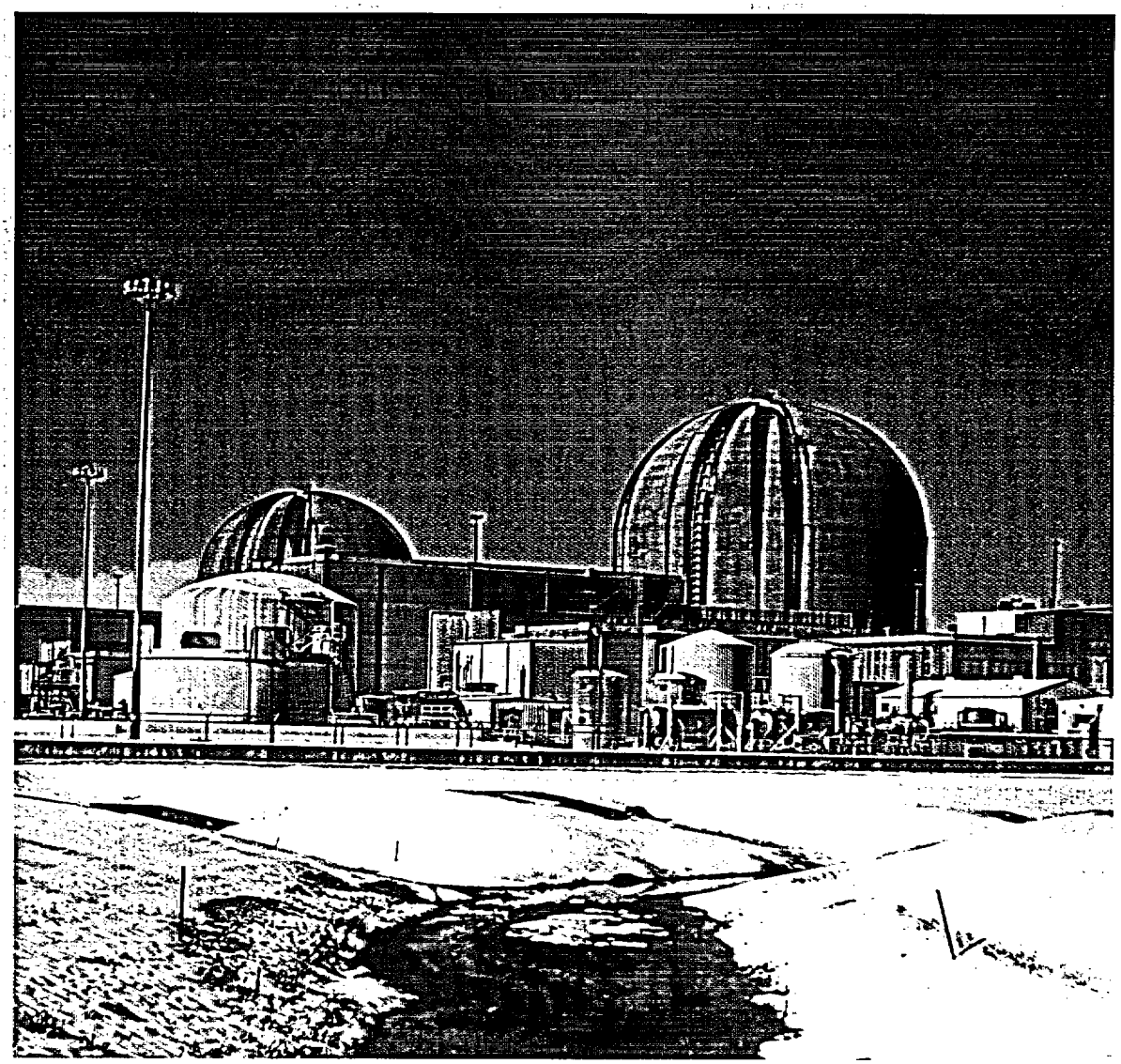


Photo By: Gwenna Kelton

The climate of the region is subtropical maritime, with continental influence. It is characterized by short, mild winters and long, hot and humid summers. Rainfall is usually abundant throughout the year with an annual average of approximately forty-two inches. The prevailing wind direction is from the south-southeast, shifting to north-northeast for short intervals during the winter months.



Non-Radiological Environmental Introduction and Summary

Chapter 3

Non-Radiological Environmental Introduction and Summary

The South Texas Project is committed to the production of electricity in a safe, reliable, and economical manner using nuclear energy. The station's programs, policies and business plan objectives also incorporate a commitment to environmental excellence and sound environmental management. The dedication of station personnel who develop, implement and monitor site environmental protection programs and compliance exemplify this commitment.

The station's commitment to sound environmental management is illustrated by the following environmental successes in 2004:

- Continued classification as a high performer by the Texas Commission on Environmental Quality based on the station's above-average environmental compliance record in all areas considered, including water quality, waste management and air quality compliance
- Station involvement in community efforts to increase public safety awareness, collect hazardous and non-hazardous waste for proper disposal and responsibly manage regional water resources.
- Re-classification as a small-quantity generator based on the station's successful reduction of annual hazardous waste generation.

Environmental Excellence

Nonradiological environmental conditions and performance at the South Texas Project during 2004 remained satisfactory and demonstrated that the South Texas Project continued to operate in an environmentally responsible manner during the year. The South Texas Project achieved and maintained expected high standards of environmental performance and compliance throughout 2004.

Everyone has a responsibility to protect the environment. Commitment to environmental responsibility is an integral component of the South Texas Project operating policy. This responsibility reaches further than mere compliance with laws and regulations to encompass the integration of sound environmental practices into our daily operational and business decisions. The people at the South Texas Project understand the need to balance economic, operational and environmental issues for the benefit of the station and the public. The South Texas Project understands that we must hold ourselves to the highest principles of responsibility for our environmental and station activities.

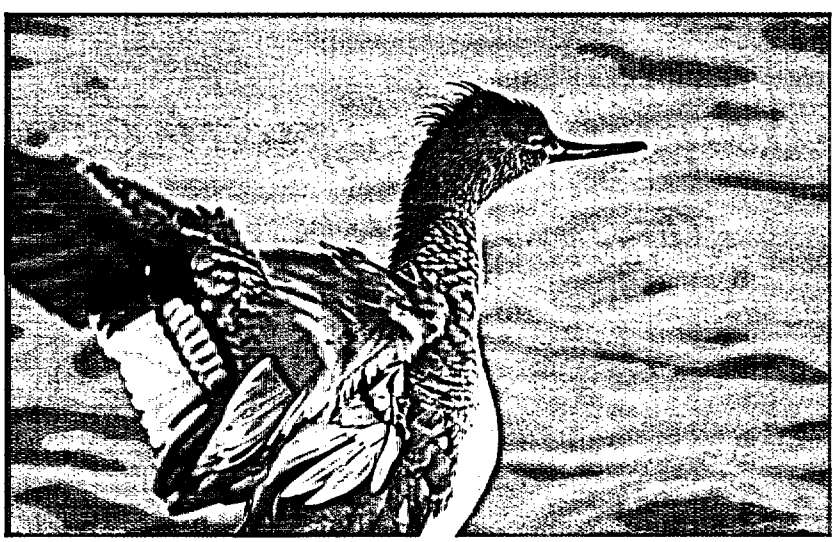


Photo By: Gwenna Kelton

Non-Radiological Environmental Operating Report

Chapter 4

Non-Radiological Environmental Operating Report

Environmental Conditions

This section of the report describes the South Texas Project's non-radiological environmental program performance and environmental conditions from January 1 through December 31, 2004. The STP Nuclear Operating Company environmental staff closely monitors environmental conditions and performance at the South Texas Project. Texas Genco LP provides support and technical assistance to the South Texas Project. In 2004, the Texas Commission on Environmental Quality conducted compliance inspections for onsite beneficial land application and potable water system operations at the station with no violations issued.

In 2002, the South Texas Project applied for recognition as a partner in the CLEAN TEXAS program administered by the Texas Commission on Environmental Quality. The state subsequently granted approval of the station's application. CLEAN TEXAS is a voluntary environmental leadership program comprised of industries, nonprofit groups, counties and other organizations with a common goal to protect the state air, water and land resources. As a partner in the CLEAN TEXAS program, the South Texas Project is committed to meeting established environmental improvement goals, maintaining and improving internal programs and continuing community environmental outreach programs and projects. In 2004, South Texas Project co-sponsored and participated in the Matagorda County Partners in Safety Conference and the Matagorda County Household Hazardous Waste Collection day. The station also supported various bird counts and surveys sponsored by federal and state agencies and volunteer organizations such as the annual Audubon Christmas Bird Count, the Great Texas Birding Classic and Colonial Waterbird Survey.

The Texas Commission on Environmental Quality classified the South Texas Project as a high performer in 2004 based on the station's above-average environmental compliance record. Facilities, such as the South Texas Project, are classified by the state as a high performer, average performer or poor performer based on that facility's compliance history. The state's classification of the South Texas Project as a high performer was based on the station's environmental performance over the last five year period.

AQUATIC AND ECOLOGICAL MONITORING

The location of the South Texas Project falls within the Texas Land Resource Area designation as coastal prairie and can be divided into two broad ecological areas based on topography, soils and vegetation. The bottomland area is a swampy, marshy area that occupies approximately 1,700 acres of the site near the Colorado River. This area provides an important habitat for birds and other wildlife. A spoil impoundment constructed in 1972 by the United States Army Corps of Engineers is included in this area. In addition, a 110-acre wetland habitat area that attracts a variety of bird groups

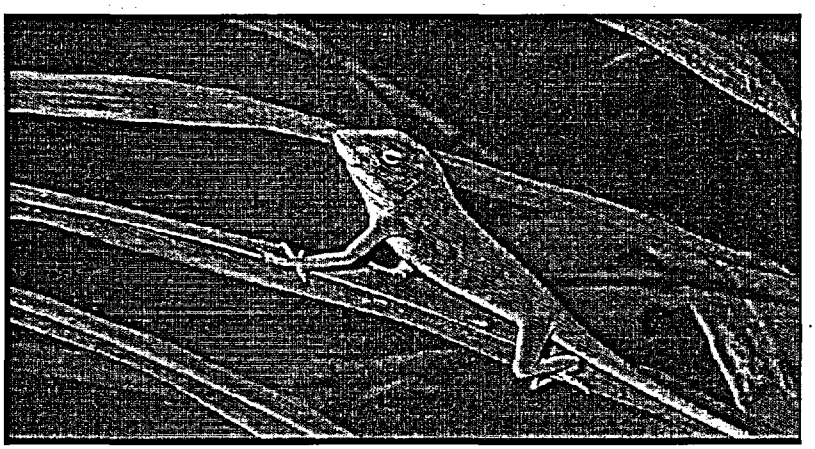


Photo By: Gwenna Kelton

and other wildlife was established in 1996 on previously unused land located northeast of the power plants. The remaining area of the site offers diverse habitats for mammals and several types of birds. The South Texas Project environmental staff regularly monitor the site's environs for changing conditions. Ecological conditions onsite in 2004 remained generally unchanged and satisfactory.

In 1996, the South Texas Project and Houston Industries Incorporated initiated a joint effort with Ducks Unlimited, Texas Parks and Wildlife, the United States Fish and Wildlife Service, and the United States Department of Agriculture Natural Resources Conservation Service to establish a 110-acre wetland habitat for migratory waterfowl at the station. The wetland project received the Ducks Unlimited Habitat Conservation Award in 1996 and a United States Department of Agriculture Conservation Award in 1999 for habitat preservation. This habitat area immediately attracted a variety of bird species and other wildlife and has continued to support an increasing diversity of plants and animals.

The South Texas Project is located on the state-sponsored Great Texas Coastal Birding Trail that spans the entire Texas Gulf Coast from Brownsville to the Louisiana border. Several bird species listed on the state and federal threatened or endangered species lists have been observed at the wetland habitat and elsewhere onsite. These include a nesting pair of bald eagles, peregrine falcon, wood stork, white-faced ibis and white-tailed hawk. Additional migratory and resident bird species such as a variety of ducks, geese, turkey and pheasant have been observed during informal surveys of the site's diverse natural and man-made habitats.

The South Texas Project continues to provide vital habitat for more than 125 different species of wintering and resident birds, including the common tern and white pelicans. A record 144 species were sited during the last annual Christmas Bird Count conducted at the South Texas Project. In 1998, a small number of black skimmers and least terns established nests on a remote parking lot at the station. Special precautions were taken to protect the nesting area and a small, but growing population of both species has continued to return each year to the site. Intensive bird nesting continues throughout the lowland habitat, particularly in a heron rookery around the perimeter of Kelly Lake. U. S. Fish and Wildlife Service biologists estimate that approximately one-third of Texas' breeding adult Gull-billed Tern population, considered to be in decline, nest on the internal dikes of the Main Cooling Reservoir at the South Texas Project.

The South Texas Project continues to monitor important wildlife species to detect population changes. Informal observations by station and Texas Genco LP personnel continue to indicate that the site provides high-quality habitat in which a wide range of animals live. The site continues to attract extensive wildlife populations, offering a refuge for resident species as well as seasonal migrants. The lowland habitat located between the Colorado River and the east bank of the Main Cooling Reservoir offers a significant source of water year-round. These natural resource areas, in concert with numerous additional wetland and grassland areas, offer the key ingredients necessary to sustain the extensive wildlife population at the South Texas Project.

Non-Radiological Environmental Operating Report

WATER QUALITY MANAGEMENT

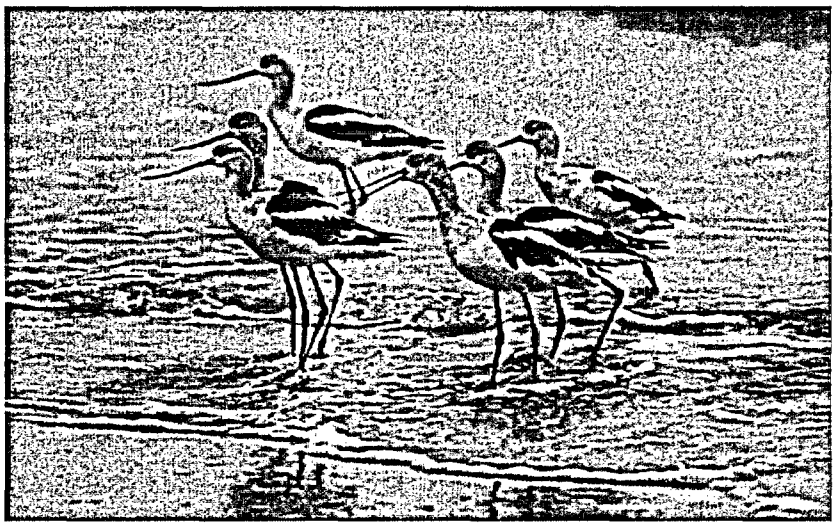


Photo By: Gwenna Kelton

Water is an essential component in electricity production, and all electric utilities must comply with extensive federal, state and local water regulations. These regulations govern virtually every aspect of business operations at the South Texas Project. Water usage and wastewater treatment onsite are regulated under the Safe Drinking Water Act, the Federal Clean Water Act and the Texas Water Quality Act. Collectively, these acts provide for the safeguarding of public drinking water supplies and maintaining the integrity of state and federal waters.

The South Texas Project uses both surface water and groundwater for station purposes. Groundwater provides onsite drinking water for station personnel, replenishes the Essential Cooling Pond, and is used for other industrial purposes onsite. Consistent with the station's environmental principles encouraging efficient water usage and conservation, groundwater usage is carefully managed to conserve this important resource. Groundwater provided approximately two percent of the water utilized in 2004 by the South Texas Project. Surface water from the Main Cooling Reservoir and the Essential Cooling Pond is used as cooling water for plant activities. Water from the Colorado River replenishes the Main Cooling Reservoir via intermittent pumping periods. Surface water diverted to the Main Cooling Reservoir from the Colorado River accounted for approximately 98 percent of the water used at the South Texas Project in 2004. Based on the most current information available from the Texas Water Development Board, the South Texas Project typically accounts for approximately 25 percent of the combined ground and surface water usage in Matagorda County with the bulk of county water use being related to agriculture. Additional information regarding water use in Texas can be found on the website maintained by the Texas Water Development Board at http://www.twdb.state.tx.us/.

Most of the water used by the South Texas Project is needed to condense steam and provide cooling for plant generating systems. The majority of this water is drawn from and returned to the station's Main Cooling Reservoir. The Main Cooling Reservoir is a 7,000-acre, above grade, off-channel reservoir capable of impounding 202,600 acre-feet of water at its maximum level. Reservoir makeup water is withdrawn intermittently from the adjacent Colorado River. In addition, the Essential Cooling Pond, a 46.9-acre, below grade, off-channel reservoir that supplies water to cool crucial plant components is capable of impounding 388 acre-feet of water. Various water rights permits, contractual agreements and compliance documents authorize the South Texas Project to maintain these reservoirs, impound water diverted from the Colorado River, and to circulate, divert and use water from the reservoirs for industrial purposes to

operate the plant. These permits also limit the rate of diversion from the Colorado River. The South Texas Project diverted 62,374 acre-feet from the Colorado River in 2004 for the Main Cooling Reservoir fill operations while preserving adequate freshwater flow conditions for downstream bay and estuarine ecosystems.

Existing federal and state water quality standards are implemented and enforced through the Texas Pollutant Discharge Elimination System (TPDES) permit program to restore and maintain the state's waters. In 1998, the State of Texas assumed authority to administer and implement the federal National Pollutant Discharge Elimination System (NPDES) program. Accordingly, federal and state requirements were consolidated in November of 2000 into one wastewater discharge permit for the station under the TPDES permit program. Under this permit program, the South Texas Project monitors, records and reports the types and quantities of pollutants from wastewater discharges to ensure that we meet or exceed the stringent levels set in the permit. A monthly monitoring report is submitted to the Texas Commission on Environmental Quality for wastewater discharges. Reports identifying ground and surface water use are also submitted annually to the Texas Commission on Environmental Quality and Texas Water Development Board.

Wastewater generated at the South Texas Project is processed and discharged to the onsite Main Cooling Reservoir to be re-used by the station as cooling water for plant systems. No water was released from the reservoir in 2004. The station continued its outstanding wastewater discharge compliance performance record in 2004. Station conditions did not require site aquatic monitoring studies be conducted in 2004 nor were any additional studies required by the United States Environmental Protection Agency or the State of Texas either by way of station discharge permits or otherwise. Wastewater discharges met state and federal water quality standards demonstrating a 100 percent compliance record for the year while conserving and maximizing efficient water usage at the station.

In addition to the wastewater discharge permit program, the Federal Clean Water Act, as amended in 1987, requires permits for storm water discharges associated with industrial activity. The South Texas Project Storm Water Pollution Prevention Plan, implemented in October of 1993, ensures that potential pollution sources at the site are evaluated, and that appropriate measures are selected and implemented to prevent or control the discharge of pollutants in storm water runoff. In September of 1998, the United States Environmental Protection Agency modified the storm water permit program to require facilities, such as the South Texas Project, permitted under the baseline general permit to obtain permit coverage under a multi-sector general storm water permit. Accordingly, the station filed a Notice of Intent for transfer from the General Permit to the Multi-Sector General Permit with the United States Environmental Protection Agency in 1998. The Texas Natural Resource Conservation Commission issued a TPDES Multi-Sector General Permit in August of 2001. The station filed a Notice of Intent in November of 2001 to obtain coverage under the state permit and the station's Storm Water

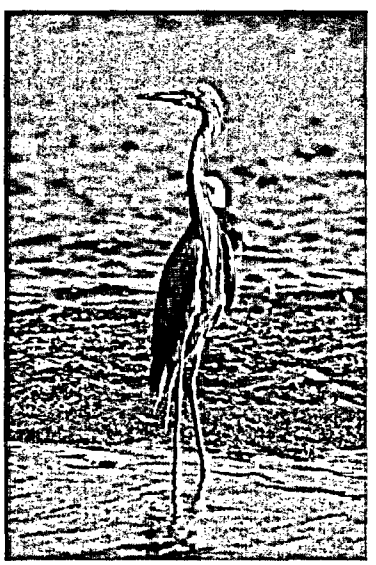


Photo By: Gwenna Kelton

Pollution Prevention Plan was modified accordingly to reflect these changes. This plan is a working document that is revised whenever there is a change in design, construction, operation or maintenance that has a significant effect on the potential for the discharge of pollutants from the station.

Following a severe drought in 1996, the Texas Legislature recognized the need to address a wide range of state water resource management issues. In 1997, the Texas Senate drafted legislation known as Senate Bill 1 to address these issues and to develop a comprehensive state water policy. Towards this end, this legislation required that the Texas Water Development Board create a statewide water plan that emphasizes regional planning. Sixteen planning regions were created, each tasked to prepare a regional plan for the orderly development, management and conservation of water resources. The South Texas Project was chosen to represent the electric generating utility interest for the water-planning region that encompasses the lower Colorado River Basin. Plans subsequently submitted by each planning region were incorporated into a State Water Plan in the year 2001. However, water resource planning is a continuous process and the Regional and State water plans must be updated every five years. The South Texas Project continues to actively participate in the Lower Colorado Regional Water Planning Group to identify strategies to meet future water supply demand projections for the region and update the existing plan accordingly. Additional information regarding regional water planning in Texas can be found on the website maintained by the Texas Water Development Board at http://www.twdb.state.tx.us/.

The South Texas Project understands that the water resources of the state are a critical natural resource requiring careful management and conservation to preserve water quality and availability. Accordingly, the station continues to explore and support efforts focusing on the efficient use of water resources and reduction of water waste.

AIR QUALITY MANAGEMENT

Air emission sources at the South Texas Project fall under the scope of air pollution regulations promulgated under the Texas Clean Air Act and the Federal Clean Air Act and the numerous associated amendments. The purpose of these regulations is to protect air resources from pollution by controlling or abating air pollution and emissions. Regulated emission sources at the South Texas Project include a fossil-fuel boiler, emergency diesel generators, fire-fighting training and other minor maintenance equipment and activities.

Fossil-Fueled Emission Sources

Unlike conventional electrical generating stations, nuclear

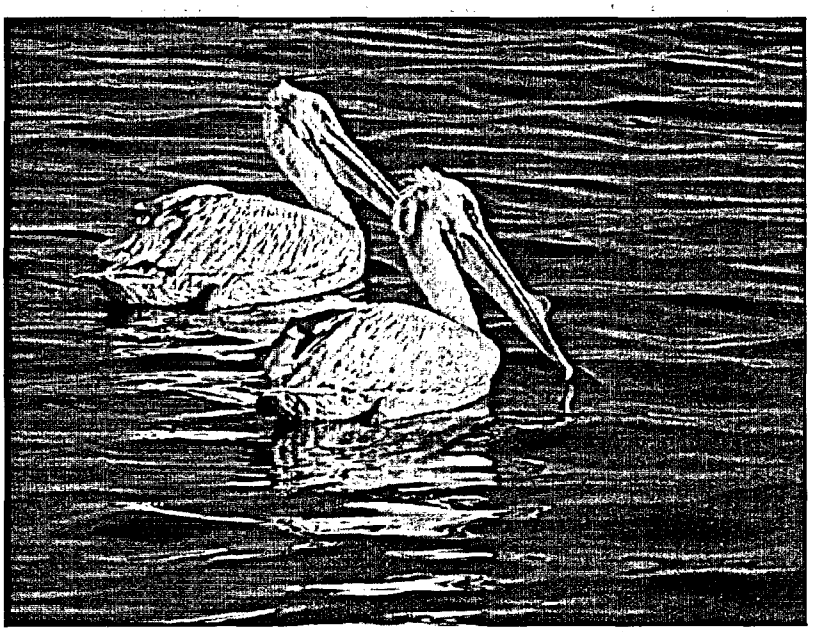


Photo By: Gwenna Kelton

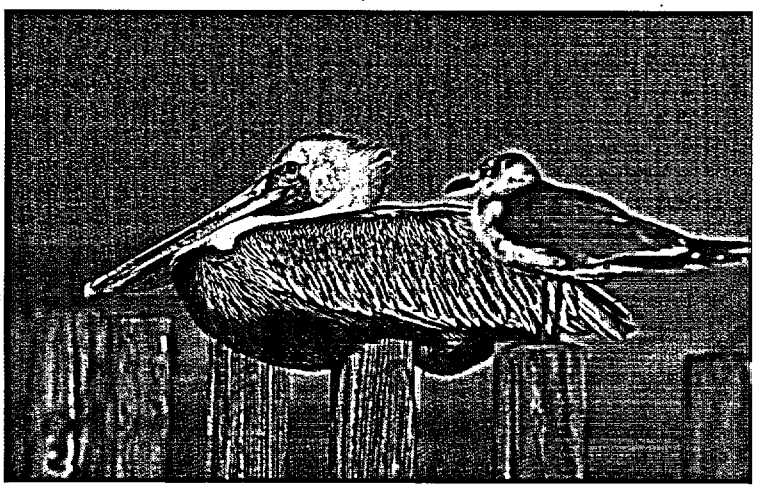


Photo By: Gwenna Kelton

power plants do not burn petroleum fuel. Therefore, the South Texas Project produces virtually no greenhouse gases or other air pollutants that are the typical by-products of industrial production processes. The use of emissions-free nuclear power is a significant contributor to the preservation of our community's clean air resources. The South Texas Project uses small amounts of fossil fuel for backup and emergency equipment. Air emission sources at the South Texas Project fall under the scope of air pollution regulations promulgated under the Texas Clean Air Act, the Federal Clean Air Act and numerous associated amendments that protect air resources from pollution by controlling or abating air pollution and emissions. The major regulated air emission sources at the South Texas Project include one fossil-fueled boiler and various emergency diesel generators.

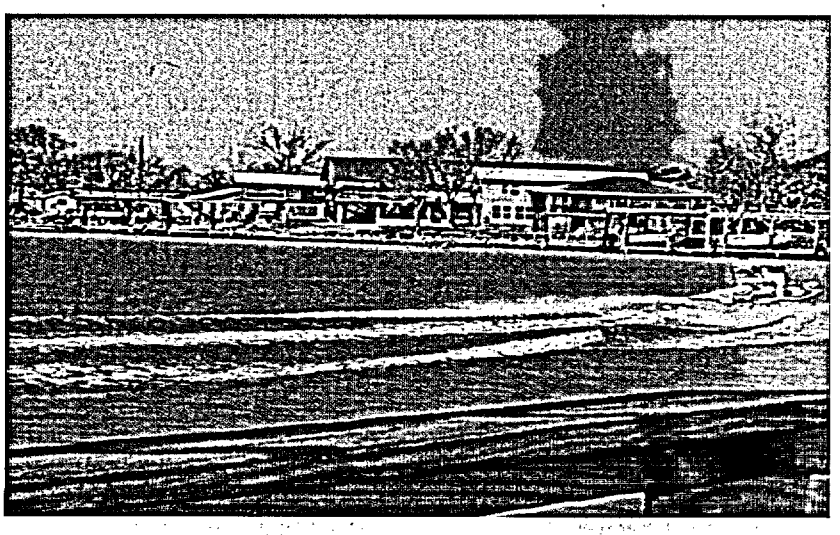


Photo By: Barbara Carnley

The South Texas Project has one oil-fired auxiliary steam boiler available to furnish steam for deaerator startup, turbine gland seals and radioactive liquid waste processing when steam is not available from the nuclear steam supply system. In March of 2004 during maintenance on the station's auxiliary boiler, stack emissions exceeded permitted opacity limits for a short duration. This excursion was anticipated and prior notification for this scheduled maintenance activity was submitted to and also subsequently reported as a deviation to the Texas Commission on Environmental Quality. In addition to the auxiliary steam boiler, a number of fossil-fueled diesel generators are located onsite. These diesels are designed to provide emergency power to various plant systems or buildings in the event of a loss of power. This equipment is not normally needed for daily operations and the station does not use it to produce electricity for distribution. Routine maintenance runs are conducted to ensure availability if needed and for equipment maintenance.

Title V Federal Operating Permit

In 1990, amendments to the Federal Clean Air Act mandated

a new permitting program to clearly define applicable air quality requirements for affected facilities such as the South Texas Project. This program is commonly known as the Title V Operating Permit Program and is administered by the state. The Texas Natural Resource Conservation Commission (now known as the Texas Commission on Environmental Quality) issued a Federal Operating Permit in January of 2000 for the South Texas Project granting authority to operate identified emission sources at the station in accordance with applicable permit and regulatory requirements. The Texas Commission on Environmental Quality revised the permit in July of 2003 to add applicable requirements regarding minor new source review authorizations. In accordance with the South Texas Project's Federal Operating Permit's reporting requirements, one deviation from permit conditions was reported to the Texas Commission on Environmental Quality as discussed previously.

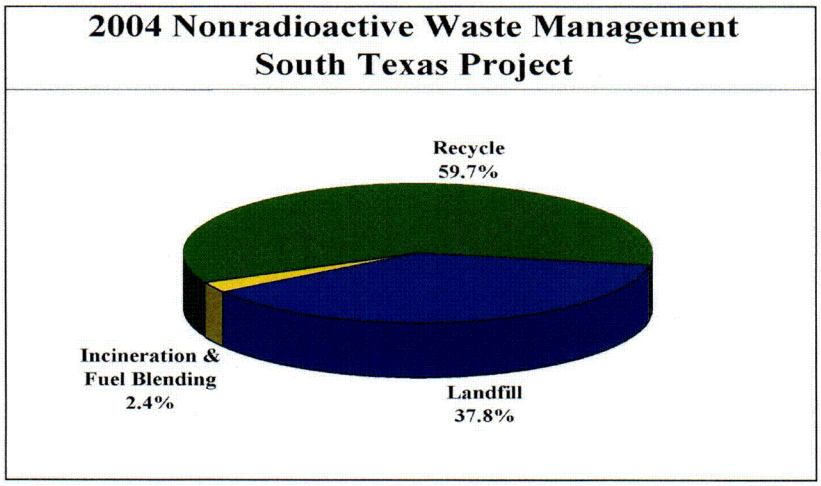


Figure 4-1

NON-RADIOACTIVE WASTE MANAGEMENT

Solid waste management procedures for hazardous and non-hazardous wastes generated at the South Texas Project ensure that wastes are properly dispositioned in accordance with applicable federal, state and local environmental and health regulations. By regulatory definition, solid waste includes solid, semi-solid, liquid and gaseous waste material. The Texas Commission on Environmental Quality, which administers the Texas Solid Waste Disposal Act and also the federal Resource Conservation and Recovery Act program, is the primary agency regulating non-radioactive wastes generated at the South Texas Project. The Texas Commission on Environmental Quality regulates the collection, handling, storage and disposal of solid wastes, including hazardous wastes. The transportation of waste materials is regulated by the United States Department of Transportation.

The South Texas Project was re-classified with the Texas Commission on Environmental Quality as a small quantity generator of industrial solid wastes in 2004 based on reduced annual hazardous waste generation quantities. Texas Commission on Environmental Quality regulations require that industrial solid wastes generated at the South Texas Project be identified to the Commission and these are listed in the Texas Commission on Environmental Quality Notice of Registration for the South Texas Project. The registration is revised whenever there is a change in waste management practices at the site. Waste handling and disposal activities are summarized and documented in a waste summary report for the South Texas Project that is submitted annually to the Texas Commission on Environmental Quality.

Hazardous waste accumulation at the South Texas Project in 2004 was limited to a maximum holding period of 180

C02

days. The Resource Conservation and Recovery Act and Texas Solid Waste Disposal Act also require the use of proper storage and shipping containers, labels, manifests, reports, personnel training, a spill control plan and an accident contingency plan. Plant personnel routinely inspect areas throughout the site to ensure wastes are not stored or accumulated inappropriately.

Station policies and regulations encourage the recycling, recovery or re-use of waste when possible to reduce the amount of waste generated or disposed of in landfills. Approximately 60 percent of the industrial non-radioactive waste generated in 2004 at the South Texas Project was recycled or processed for re-use. (Reference Figure 4-1) The South Texas Project ships waste oil, grease, electrohydraulic fluid, adhesives, liquid paint and solvent for fuel blending and thermal energy recovery. Used oil, diesel fuels and antifreeze solutions are sent to a recycling vendor for re-processing. Lead-acid batteries are returned, when possible, to the original manufacturer for recycling or are shipped to a registered battery recycler, thereby reducing the volume of hazardous waste that might otherwise be generated. A site paper recycling program results in the collection of several tons of paper each year. In 2004, the station collected approximately 71 tons of paper for recycling. Every ton of paper recycled saves approximately 17 trees, eliminates approximately three cubic yards of landfill material and saves enough energy to power the average home for six months. The station continues to explore new areas where recycling may be expanded or initiated.

Non-radioactive solid waste that cannot be shipped for recycling is shipped for disposal. Municipal-type trash is transported to the county landfill transfer station for appropriate disposition. Construction-related non-combustible, inert debris, if generated, is placed in the onsite landfill. Waste minimization and source reduction efforts by employees allowed the South Texas Project to to re-classify as a small-quantity generator early

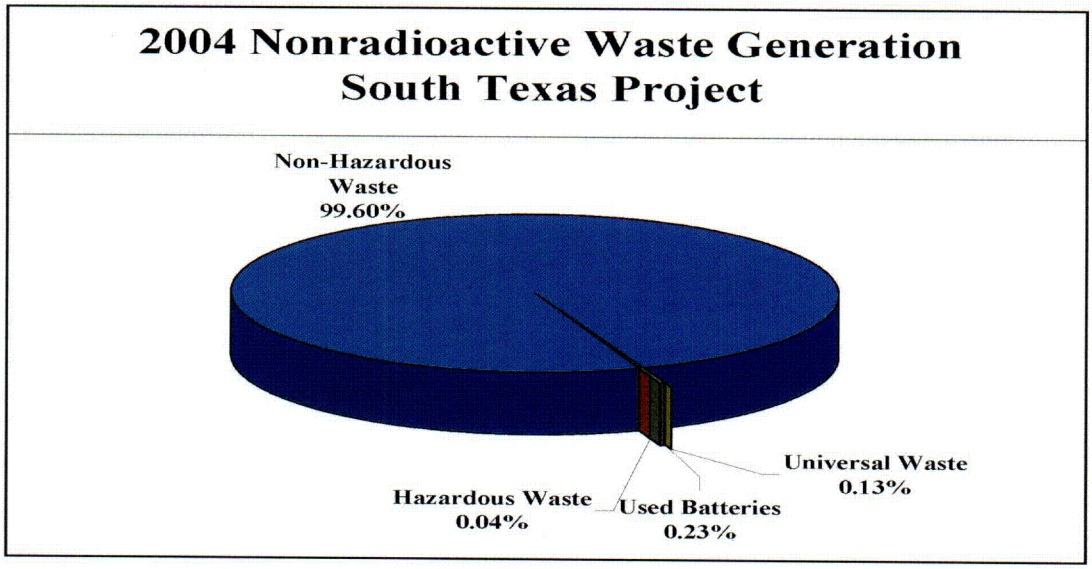


Figure 4-2

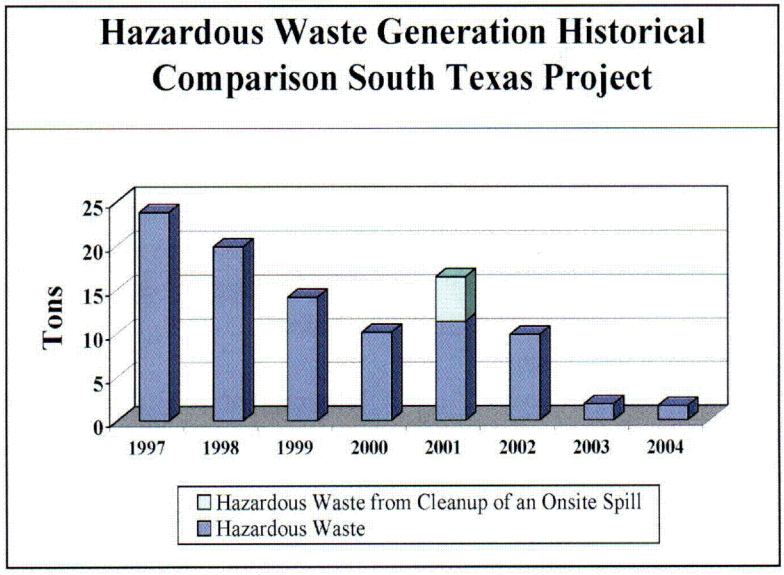


Figure 4-3

in 2004. Hazardous waste accounts for only a small portion of the waste generated at the South Texas Project; however, minimization and reduction of hazardous waste generation where feasible remains an important goal at the station. (Reference Figures 4-2 and 4-3)

CHEMICAL CONTROL AND MANAGEMENT

In 2004, the station completed and implemented the *Integrated Spill Contingency Plan for the South Texas Project Electric Generating Station*. This plan replaced the previous *Oil and Hazardous Material Contingency Plan* for the station. *The Integrated Spill Contingency Plan* consolidates multiple federal and state requirements into one plan. The plan is implemented through standard site operating procedures and guidelines. The South Texas Project uses standard operating procedures, policies and programs to minimize the generation of waste materials, control chemical usage and prevent spills. The South Texas Project also evaluates chemicals and products proposed for use, which could come in contact with plant components. Site procedures address the evaluation, storage, use, spill control, and disposal requirements of chemicals. These guidelines assist in reducing wastes, ensure proper packaging for disposal and mitigate the consequences of inadvertent spillage.

The South Texas Project emphasizes awareness training for spill prevention and maintains station readiness to respond should a spill occur. Spill response team members receive annual refresher training in hazardous material incident response. In April and August of 2004, the South Texas Project reported to state, federal and local agencies two small releases of lubricating oil from separate screenwash pumps of approximately half a pint and 1 quart respectively to the Reservoir Makeup Pumping Facility forebay area. The releases were contained to the forebay area and no offsite release occurred. Final cleanup of the area was completed on each occasion and the pumps were subsequently removed and modified to eliminate the need for lubricating oil. No other significant or consequential spills occurred in 2004.

ENVIRONMENTAL PROTECTION PLAN STATUS

The South Texas Project's Environmental Protection Plan was issued in March of 1989 to provide for the protection of non-radiological environmental values during operation of the South Texas Project. This report reviews Environmental Protection Plan non-compliances identified by the plant in 2004 and the associated corrective actions taken to prevent their recurrence. Potential nonconformities are promptly addressed, as identified, to maintain operations in an environmentally acceptable manner. The station uses its Corrective Action Program to document

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these conditions and track corrective actions to completion. Internal assessments, reviews and inspections are also used to document plant compliance.

This report also reviews non-routine reports submitted by plant personnel and any activities that involved a potentially significant unreviewed environmental question. A proposed change, test or experiment is considered to present an unreviewed environmental questions if it concerns:

1) A matter that may result in a significant increase in any adverse environmental impact previously evaluated in the Final Environmental Statement related to the Operation of South Texas Project, Units 1 and 2 (Docket Nos. 50-498 and 50-499), environmental impact appraisals, or in any decisions of the Atomic Safety and Licensing Board; or,
2) A significant change in effluents or power level; or,
3) A matter not previously reviewed and evaluated in the documents specified in (1) above, that may have a significant adverse environmental impact.

No unreviewed environmental questions were identified in 2004.

Events that require reports to federal, state or local agencies other than the Nuclear Regulatory Commission such as those discussed earlier in this report are reported in accordance with the applicable reporting requirements. The Nuclear Regulatory Commission is provided with a copy of any such report at the time it is submitted to the cognizant agency. If a non-routine event occurs and a report is not required by another agency, then a 30-day report to the Nuclear Regulatory Commission is required by the Environmental Protection Plan. No such 30-day or other non-routine report of this type was required in 2004.

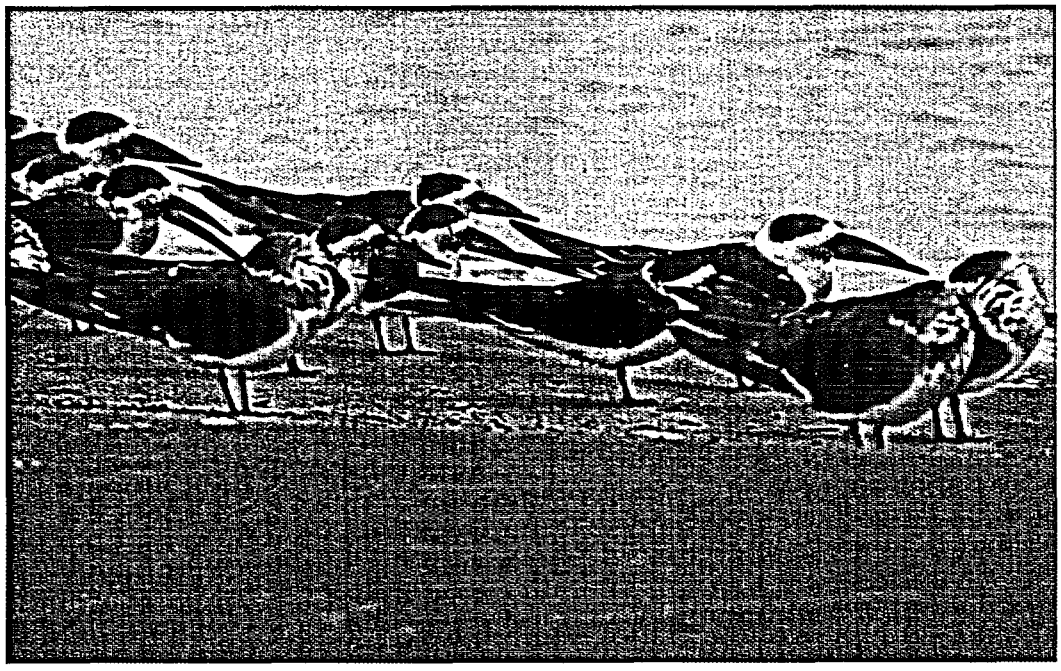

Photo By: Gwenna Kelton

Chapter 5

Radiological Environmental Introduction and Summary

Radiological Environmental Introduction and Summary

There were two items of interest identified by this program during 2004. A short description of them follows.

- Cobalt-60 levels in reservoir bottom sediment samples vary but remain within the expected range. The amount of Cobalt-60 in the Main Cooling Reservoir has decreased because of additional equipment installed to reduce radioactive effluents.

- Low level tritium was monitored in shallow aquifer ground water samples. The shallow well was located within approximately seventy-five yards of the Main Cooling Reservoir dike base. The concentration was lower than 2003 but is probably due to the rain infiltration into the well and the concentration is less than in the Main Cooling Reservoir.

Operation of the South Texas Project continues to have no detectable radiological impact offsite. Samples analyzed from the off-site sampling stations continue to show no radiological contribution from plant operation. The radiological doses received by the general public from plant operations were less than one millirem which is insignificant when compared to the 360 millirems average annual radiation exposure to people in the United States from natural and medical sources.

Teamwork

The purpose of the Radiological Environmental Monitoring Program is to verify that the South Texas Project is operating within its design parameters and to assure that plant effluents do not result in a significant radiological dose to individuals off-site. This objective is accomplished by thoroughly evaluating known and predictable relationships between the plant and the environment, and performing additional evaluations where unique relationships may exist. Approximately 900 analyses of air, water, sediment, vegetation and meat samples were performed during 2004.

Radiological Environmental Operating Report

Chapter 6

Radiological Environmental

PROGRAM DESCRIPTION

The South Texas Project initiated a comprehensive pre-operational Radiological Environmental Monitoring Program in July 1985. That program terminated on March 7, 1988, when the operational program was implemented. The pre-operational monitoring program data forms the baseline against which operational changes are measured.

Critical pathway analysis requires that samples be taken from water, air, and land environments. These samples are obtained to evaluate potential radiation exposure. Sample types are based on established pathways and experience gained at other nuclear facilities. Sample locations were determined after considering site meteorology, Colorado River hydrology, local demography and land use. Sampling locations are further evaluated and modified according to field and analysis experience. Table 1 lists the minimum sampling locations and frequency of collection.

Sampling locations consist of indicator and control stations. Indicator stations are locations on or off the site that may be influenced by plant discharges during plant operation. Control stations are located beyond the measurable influence of the South Texas Project or any other nuclear facility. Although most samples analyzed are accompanied by a control sample, it should be noted that this practice is not always possible or meaningful with all sample types. Fluctuations in the concentration of radionuclides and direct radiation exposure at indicator stations are evaluated in relation to historical data and against the control stations. Indicator stations are compared with characteristics identified during the pre-operational program to monitor for radiological effects from plant operation.

Several sample identification methods are used to implement the program. Figures 6-1 and 6-2 are maps that identify permanent sample stations. Descriptions of sample stations shown on Figures 6-1 and 6-2 are found in Table 2. Table 2 also includes additional sampling locations and media types that may be used for additional information. Figure 6-3 illustrates the zones used when collection locations are not permanent sample stations.

ANALYSIS OF RESULTS AND TRENDS

Environmental samples from areas surrounding the South Texas Project continue to indicate no significant radiological effects from plant operation. Analytical values from offsite indicator sample stations continue to trend with the control stations. Onsite indicator samples continued to increase or decrease in measured values as expected.

Average quarterly beta activity from three onsite indicator stations and a single control station for air particulate samples have been compared historically from 1988

Designated Sample Locations

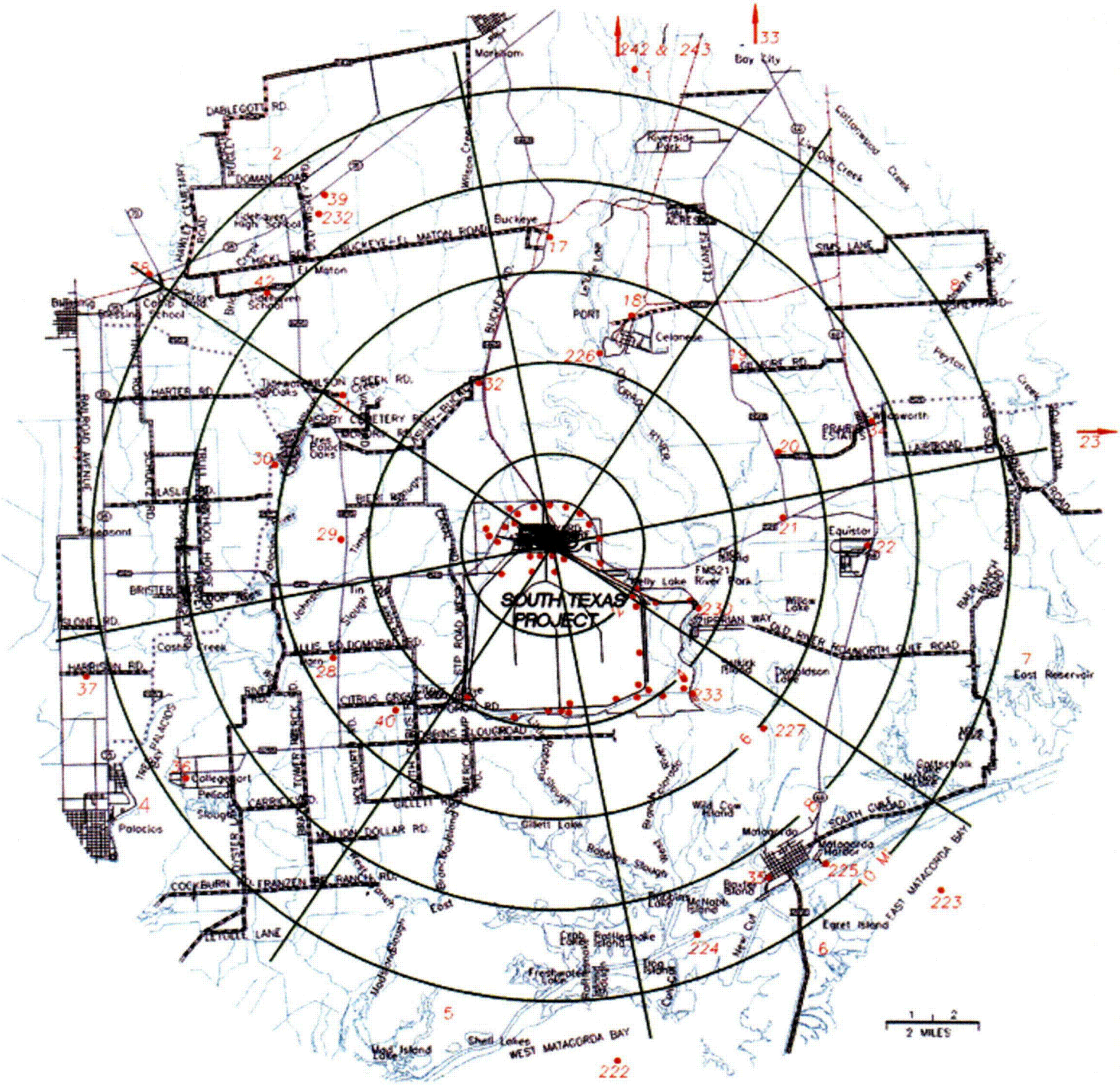

Figure 6-1

Radiological Environmental

Designated Sample Locations
(On Site Sample Locations)

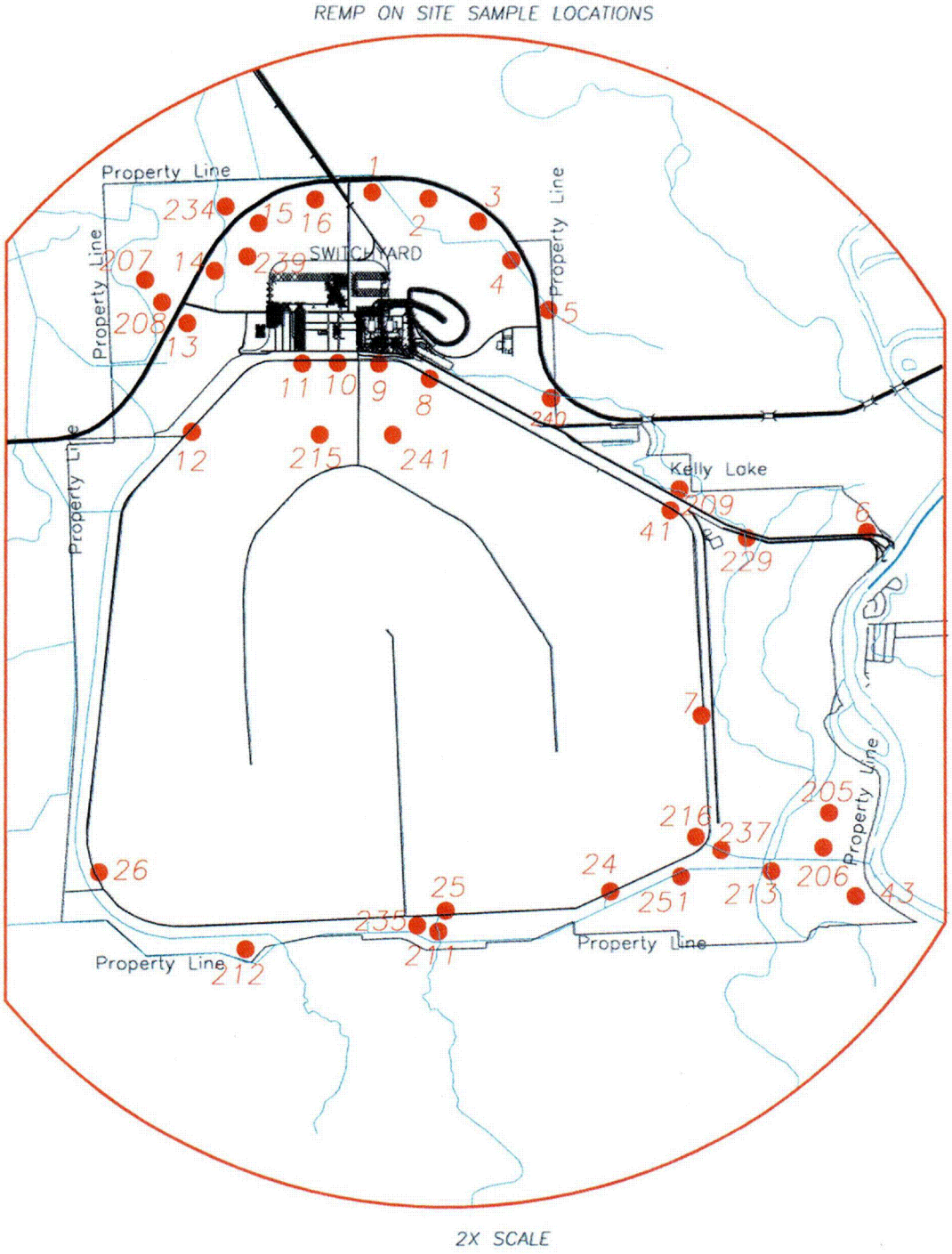

Figure 6-2

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Zone Location Map

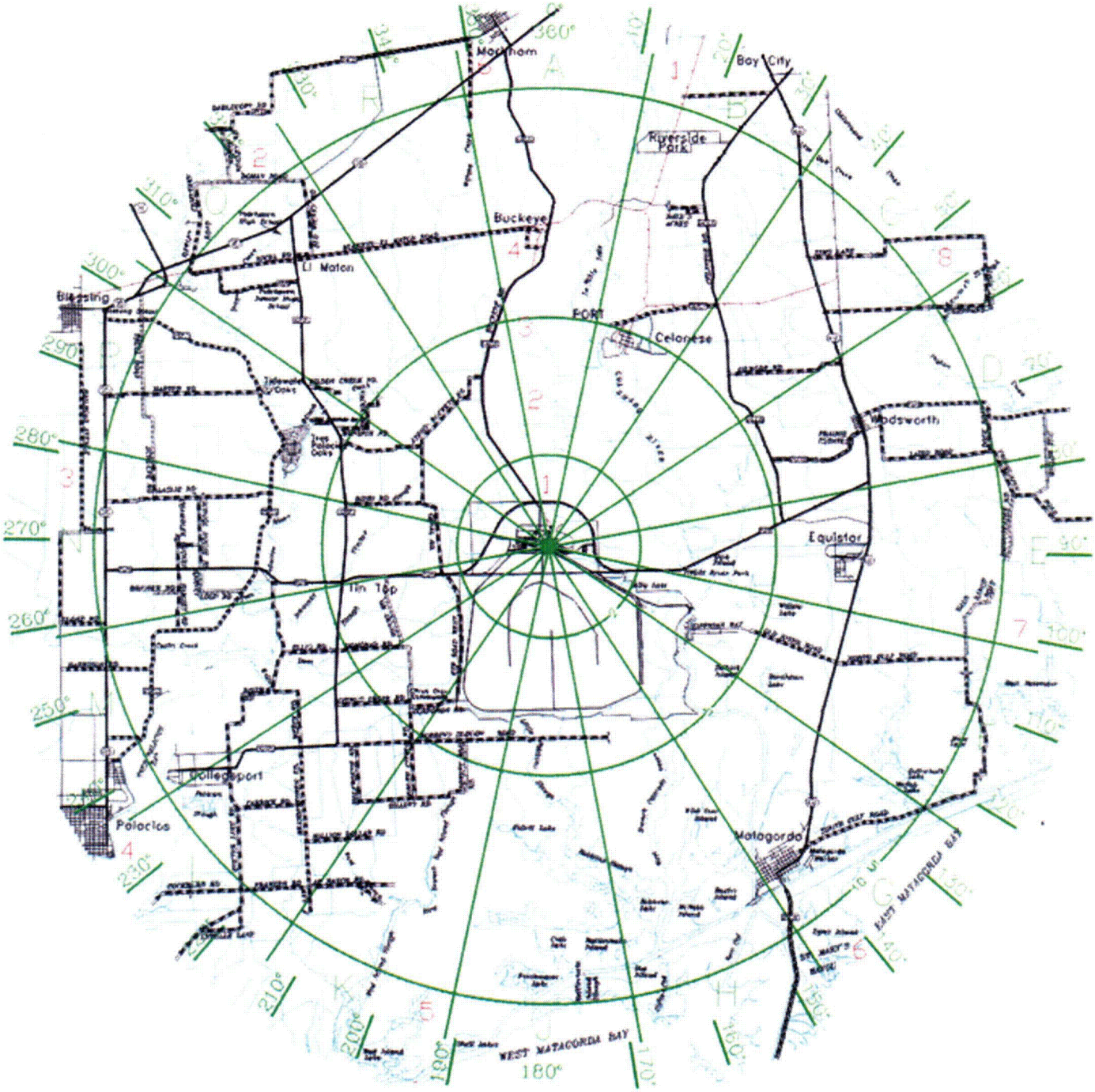

Figure 6-3

through 2004 (see Figure 6-4). The average of the onsite indicators trend closely with the offsite control values. The comparison illustrates that plant operations are not having an impact on air particulate activity even at the Sensitive Indicator Stations (#1, #15, and #16). These stations are located near the plant and are located downwind from the plant based on the prevailing wind direction. The beta activity measured in the air particulate samples is from natural radioactive material. As a routine part of the program, we perform gamma analysis on quarterly composites of the air particulate samples to determine if any activity is from the South Texas Project. The gamma analysis revealed that it was all natural radioactivity.

Direct gamma radiation is monitored in the environment by thermoluminescent dosimeters located at 43 sites. The natural direct gamma radiation varies according to location because of differences in the natural radioactive materials in the soil, its moisture content and the vegetation cover. Figure 6-5 compares the amount of direct gamma radiation measured at the plant since the fourth quarter of 1985 for three different types of stations. The Control Stations are greater than 10 miles from the site and are in the direction of the least prevailing winds (Stations #23 and #37). The Sensitive Indicator Stations are in the directions that the wind blows most often and are one mile from the power plants on Farm-to-Market Road 521 (Stations #1, #15 and #16). The Indicator Stations are the remainder of the stations excluding Stations #38, 40, and 42. The values plotted are the averages for all of the stations according to type. Figure 6-5 indicates changing conditions in the area of the individual stations. The average of the Control Stations is higher than the other stations because station #23 is in an area that has a slightly higher natural background radiation, probably due to the soil composition. The trends of Figure 6-5 clearly show that the power plants are not adding

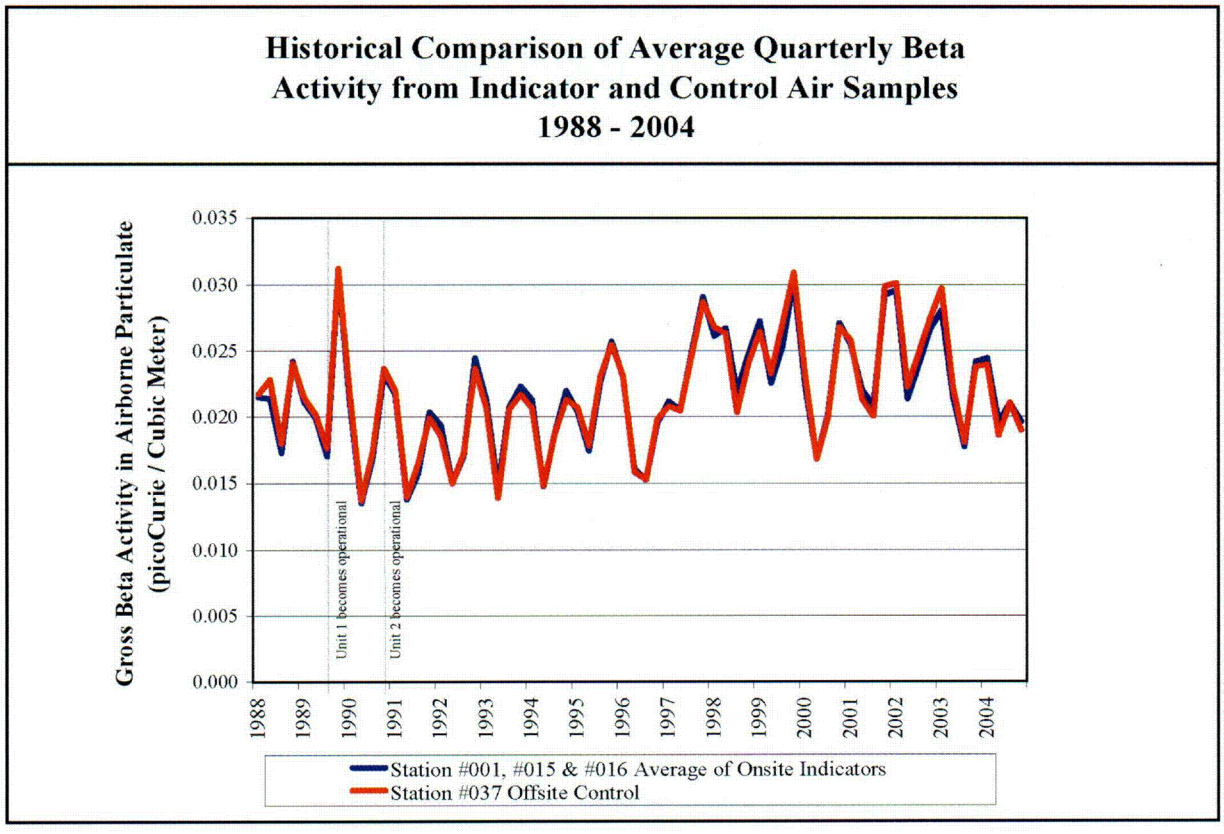

Figure 6-4

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to the direct radiation in the environment.

Bottom sediment samples are taken from the Main Cooling Reservoir each year. Figure 6-6 shows the positive results from two plant-produced radioactive materials, Cobalt-58 and Cobalt-60. The Cobalt-58 and Cobalt-60 inventory in the reservoir has decreased since 1992 because of equipment installed to reduce radioactive effluents. The amount of Cobalt-58 has decreased below levels that can be reliably detected. The concentration of Cobalt-60 in the reservoir bottom sediment samples varies but is within the expected range. Figure 6-7 demonstrates the decline in the total amount of Cobalt-60 in the reservoir.

Cesium-137 was also measured in four of seven Main Cooling Reservoir bottom sediment samples and in one of three indicator station and one of two control station shoreline sediment samples on the Colorado River. However, Cesium-137 was present in the environment before the operation of the South Texas Project and the sample concentrations were approximately equal to pre-operational values. No other isotopes released from the plant were identified in the shoreline samples, which indicates that the plant was probably not the source of Cesium-137 in these samples. The Cesium-137 measured in the Main Cooling Reservoir does not suggest an increase due to plant operation.

Tritium is a radioactive isotope of hydrogen and is produced during plant operation. Tritium produced in the reactors is a part of the water molecule. Wastewater is treated to remove impurities before release, but tritium cannot be removed because it is chemically part of the water molecule. Some of the tritium is released into the atmosphere and the remainder is released into the Main Cooling Reservoir. The tritium escapes from the Main Cooling Reservoir by evaporation, movement into the shallow aquifer, and by percolation from the relief wells that are a part of the dike's stabilization system. Figure 6-8 shows the amount of tritium released to the Main Cooling Reservoir each year and the amount present during the last quarter of each year. This indicates that

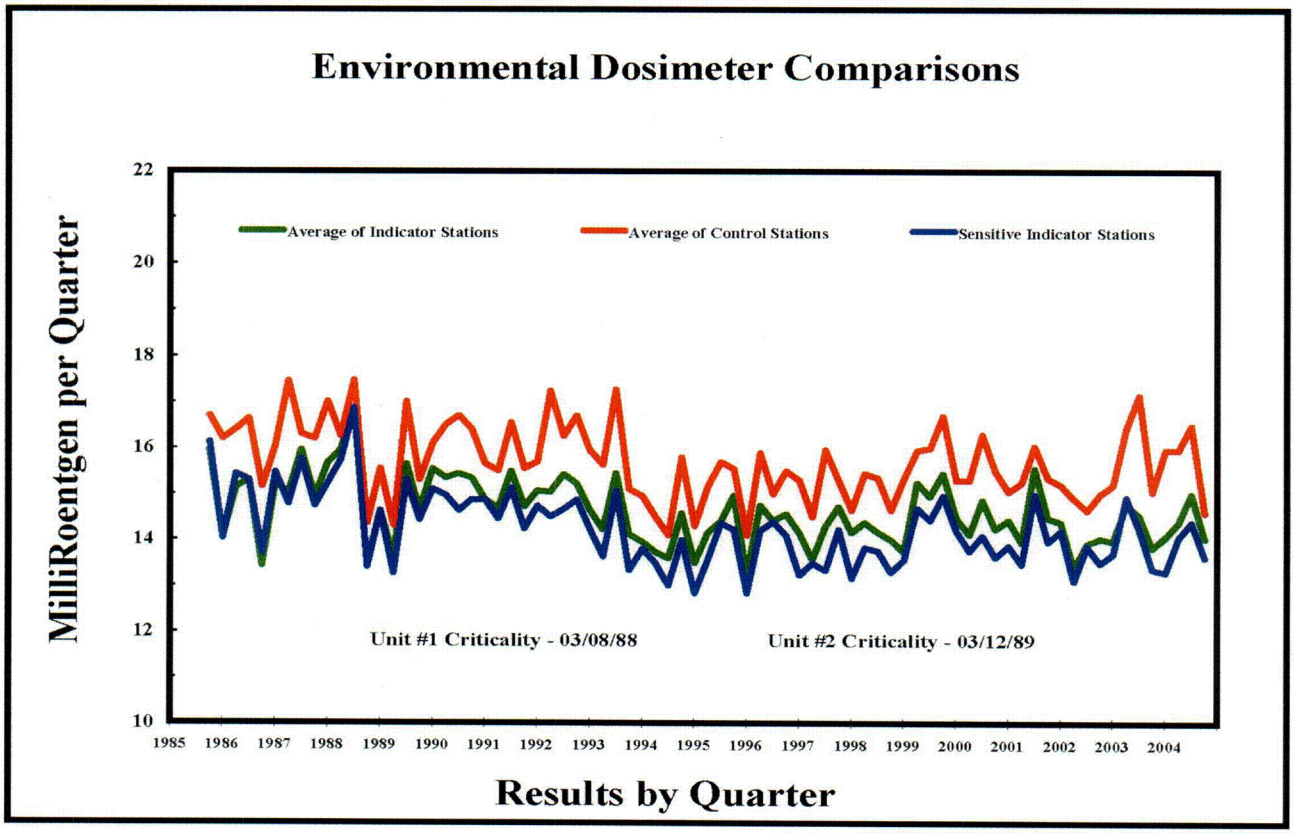

Figure 6-5

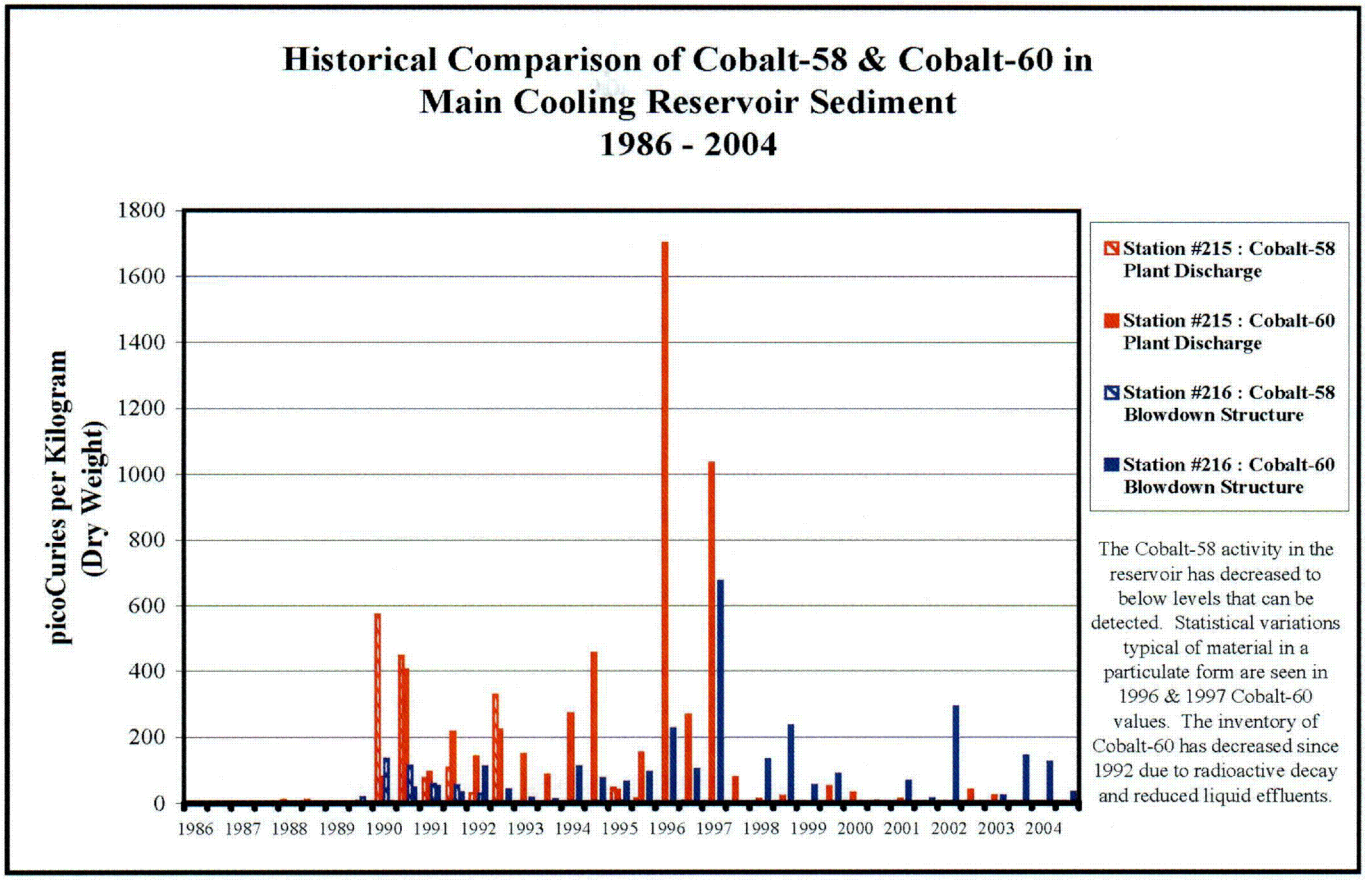

Figure 6-6

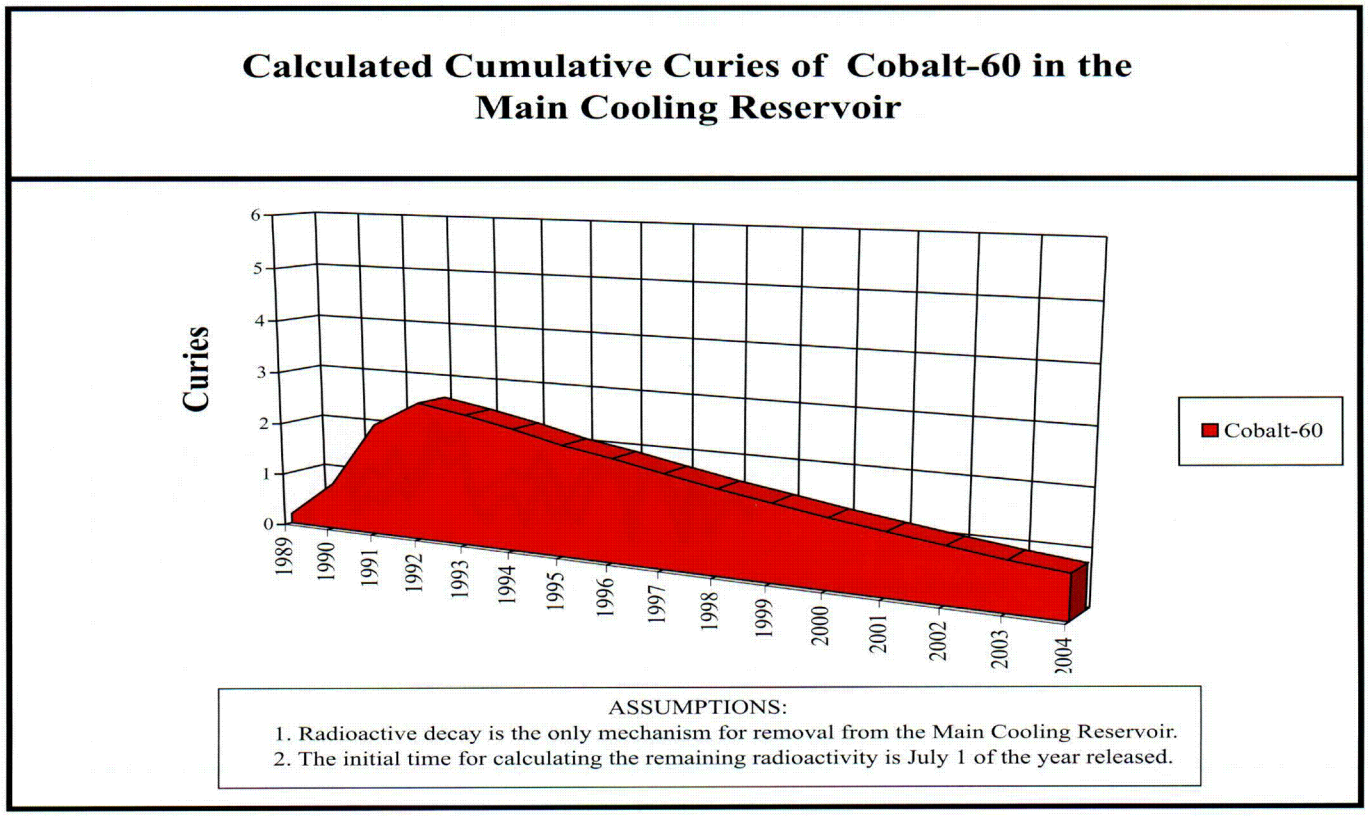

Figure 6-7

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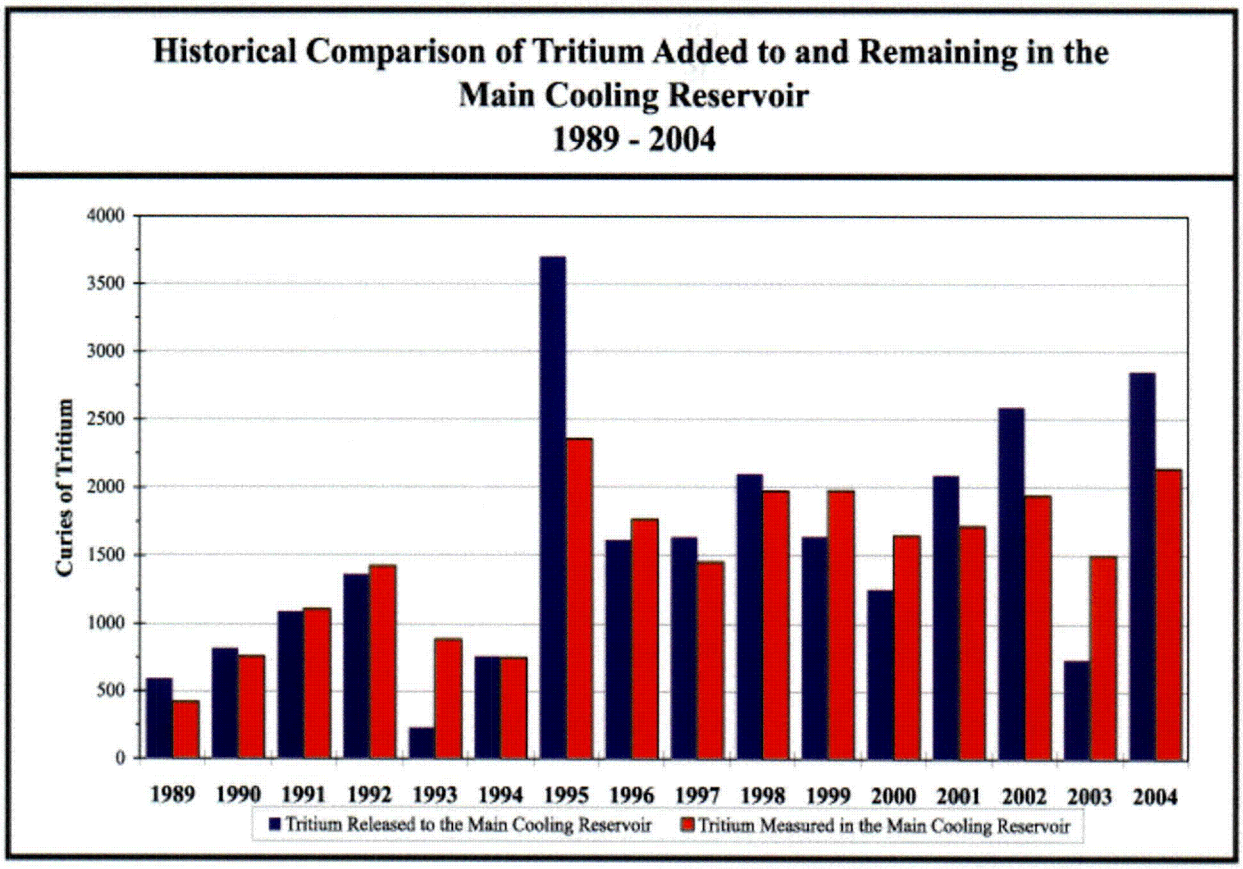

Figure 6-8

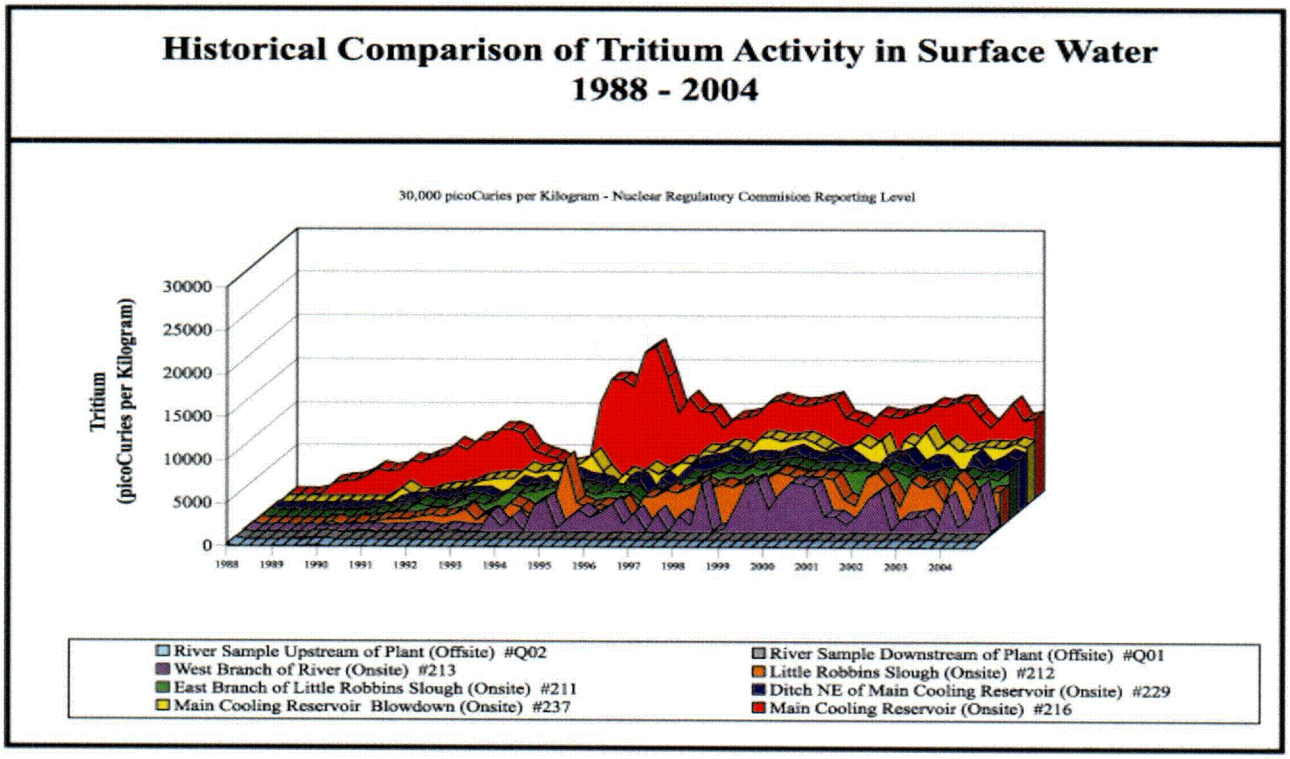

Figure 6-9

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almost half of the tritium is removed from the reservoir annually. One of the pathways tritium escapes from the reservoir is by evaporation. Rainwater was collected during 2004 to determine if the tritium remained in the local area. Tritium was not found in any rain water samples.

The concentration of tritium in the Main Cooling Reservoir increased in 2004. Tritium enters the sloughs and ditches of the site as runoff from the relief wells that surround the reservoir. The tritium concentration in eight surface water sample points for 1988 through 2004 is shown in Figure 6-9. The specific sample point locations can be found in Table 2. Tritium levels in the onsite sloughs and ditches have increased and are expected to continue increasing until they are near equilibrium with reservoir levels. The average tritium concentration has increased in the sloughs and ditches because it takes several years for water to move from the reservoir to the relief wells.

Tritium was identified in a shallow (ten to thirty feet deep) aquifer test well approximately seventy-five yards south of the reservoir dike base during 1999. In 2004, the concentration decreased in this well which could be the result of rainwater seeping into the well. The concentration should rise and fall if it follows the trends observed in surface water samples onsite.

The drinking water onsite is pumped from deep aquifer wells and is tested quarterly to verify tritium is not present. The waters in the reservoir and other surface bodies of water onsite are not used as drinking water. The only way tritium could be introduced into humans is by eating fish from the reservoir, which is not permitted. If a person ate forty pounds of fish a year from water that contained the United States Nuclear Regulatory Commission reporting level (30,000 picoCuries per kilogram), that person would receive less than one millirem. This is insignificant compared to the almost twenty millirem a year everyone receives from naturally occurring radioactive potassium in the body. The current reservoir concentration is less than 1/3 of the reporting level.

Some samples are collected and analyzed in addition to those

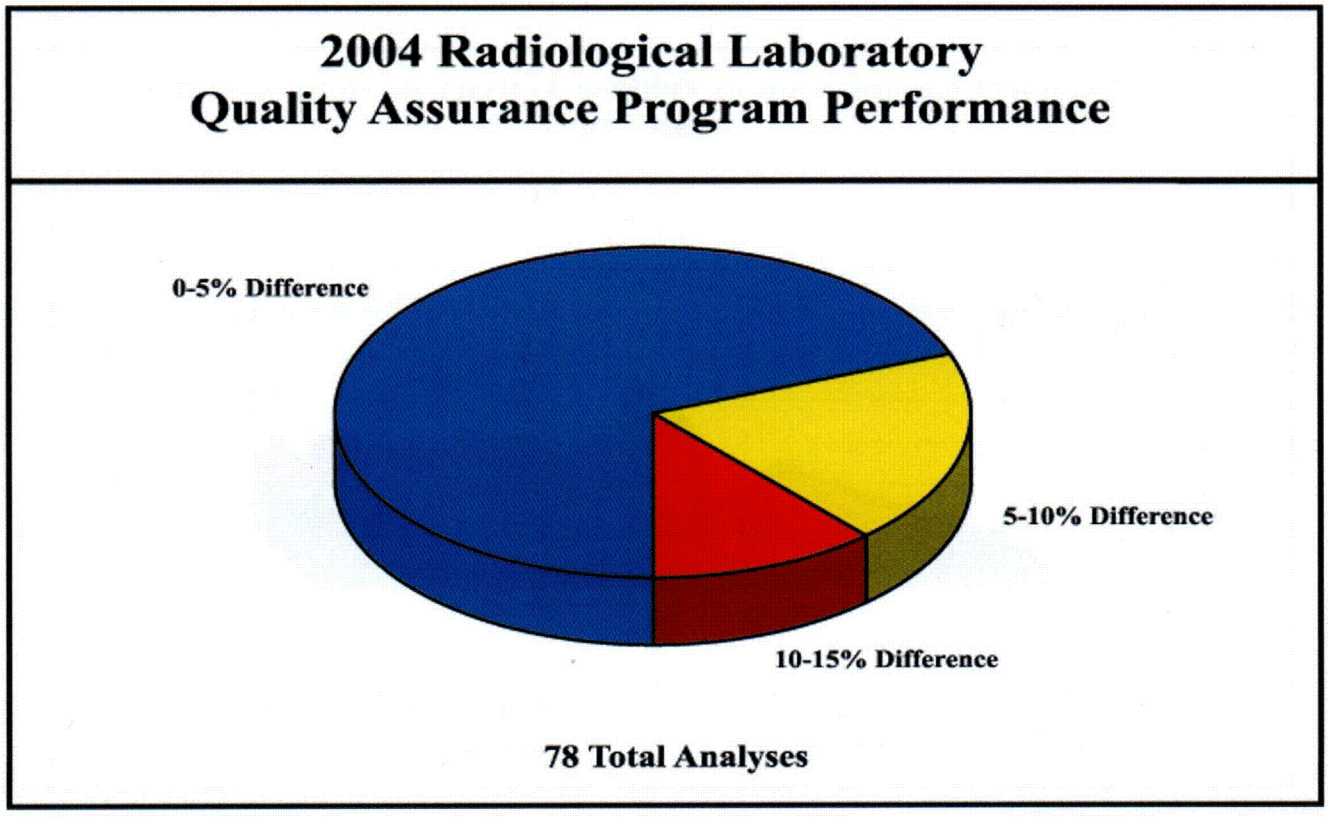

Figure 6-10

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required by our licensing documents or internal procedures. These samples are obtained to give additional assurance that the public and the environment are protected from any adverse effects from the plant. These samples include pasture grass, sediment samples, rain water, and water samples from various ditches and sloughs onsite, and air samples near communities or other areas of interest. The results of these analyses indicate that there is no detectable radiological effect on the environment by plant operation.

LAND USE CENSUS

The Annual Land Use Census is performed to determine if any changes have occurred in the location of residents and the use of the land within five miles of the South Texas Project generating units. The information is used to determine whether any changes are needed in the Radiological Environmental Monitoring Program. The census is performed by contacting area residents and local government agencies that provide the information. The results of the survey indicated that no changes were required.

In addition, a survey is performed to verify the nearest residents within five miles of the South Texas Project generating units in each of 16 sectors. The nine sectors that have residents within five miles and the distance to the nearest residence in each sector are listed below.

Photo By: Gwenna Kelton

Sector	Distance(approx. miles)	Location
ESE	3.5	Selkirk Island
SE	3.5	Selkirk Island
SW	4.5	Citrus Grove
WSW	2.5	FM 521
W	4.5	FM 1095
WNW	4.0	Ashby-Buckeye Road
NW	4.5	Mondrik Road
NNW	3.5	Runnells Ranch (FM 1468)
N	3.5	Runnells Ranch (FM 1468)

Radiological Environmental

The following items of interest were noted during the census

- A 110-acre wetland prairie project continues to provide a habitat for migratory birds and waterfowl. The habitat is located northeast of the power plants.
- Colorado River water from below the Bay City Dam has not been used to irrigate crops.
- No commercial dairy operates in Matagorda County and there is no agricultural milk source within the five-mile Zone.
- There were no identified commercial vegetable farms located within the five-mile Zone.
- Two commercial fish farms continue to operate. One is two miles west of the plant near FM 521 and the second is five miles southwest of the plant. The water supply for the ponds is not affected by the operation of the STP power plants.

Photo By: Gwenna Kelton

Photo By: Gwenna Kelton

QUALITY ASSURANCE

Quality assurance encompasses planned and systematic actions to ensure that an item or facility will perform satisfactorily. Reviews, surveillance and audits have determined that the programs, procedures and personnel are adequate and do perform satisfactorily.

Quality audits and independent technical reviews help to determine areas that need attention and re-evaluation. Areas that need attention are addressed in accordance with the station's Corrective Action Program.

The measurement capabilities of the Radiological Laboratory are demonstrated by participating in inter-laboratory measurement assurance programs. These programs provide samples that are similar in matrix and size to those measured for the Radiological Environmental Monitoring Program.

Figure 6-10 summarizes the results of these inter-comparison programs. In addition, approximately twenty percent of the analyses made are quality control samples that consist of duplicate, split and blind samples.

Radiochemical measurements must meet sensitivity requirements at the lower level of detection for environmental samples. These stringent requirements were met in all samples taken in 2004.

PROGRAM DEVIATIONS

Deviations from the sampling program must be acknowledged and explained in this report. During 2004 the following samples were not collected or were unacceptable for analysis:

- Six out of thirty-six required broadleaf vegetation samples were not collected due to seasonal unavailability in January and February.
- Four out of two hundred and sixty air samples were not continuously collected for the full time interval due to power failures. However, all air particulate and air iodine samples met the LLD requirements and the results are included in Table 3.

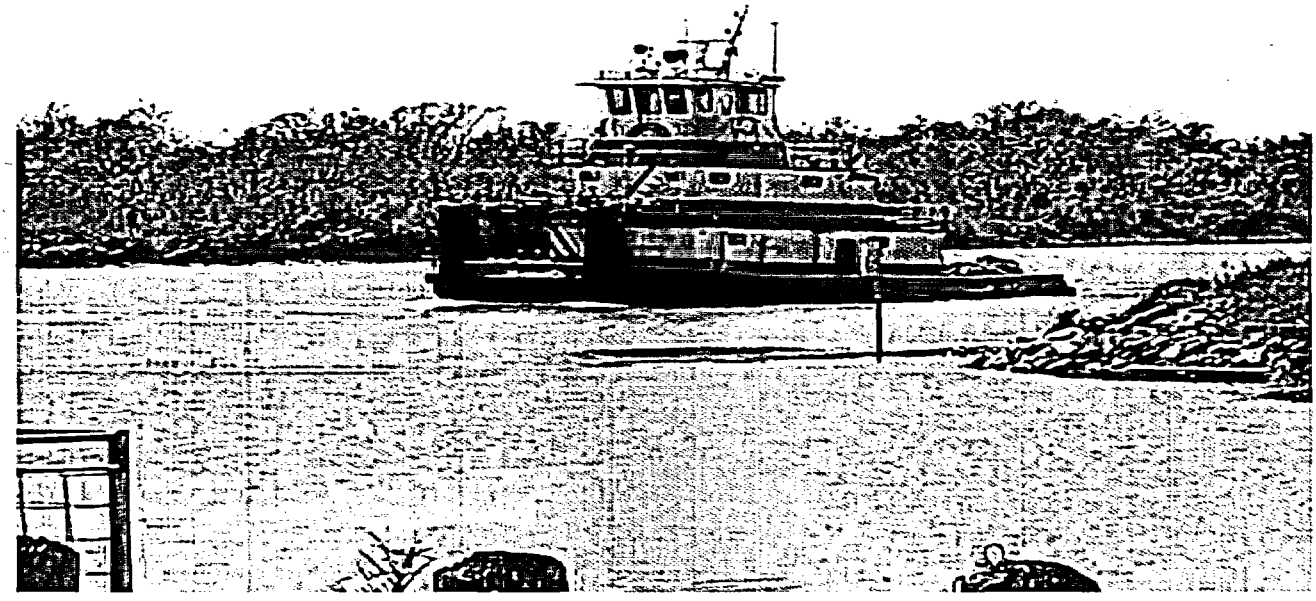

Photo By: Gwenna Kelton

Radiological Environmental

The minimum Radiological Environmental Monitoring Program is presented in Table 1. The table is organized by exposure pathway. Specific requirements like location, sampling method, collection frequency, and analyses are given for each pathway.

TABLE 1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE: DIRECT RADIATION — 40 TOTAL SAMPLING STATIONS

Sample Media, Number, Approximate Location and Distance of Sample Stations from Containment.	Routine Sampling Mode	Sampling and Collection Frequency	Analysis Type	Minimum Analysis Frequency
Exposure Media: TLD 16- Located in all 16 meteorological sectors, 0.2* to 4 miles. 16- Located in all 16 meteorological sectors, 2 to 7 miles. 6- Located in special interest areas (e.g. school, population centers), within 14 miles. 2- Control stations located in areas of minimal wind direction (WSW,ENE), 10-16 miles.	Continuously	Quarterly	Gamma dose	Quarterly

* The inner ring of stations in the southern sectors are located within 1 mile because of the main cooling reservoir

EXPOSURE: AIRBORNE — 5 TOTAL SAMPLING STATIONS

Sample Media, Number, Approximate Location, and Distance of Sample Stations from Containment.	Routine Sampling Mode	Nominal Collection Frequency	Analysis Type	Minimum Analysis Frequency
Charcoal and Particulate Filters 3- Located at the exclusion zone, N, NNW, NW Sectors, 1 mile. 1- Located in Bay City, 14 miles. 1- Control Station, located in a minimal wind direction (WSW), 10 miles.	Continuous sampler operations	Weekly or more frequently if required by dust loading	Radioiodine Canister: I-131 Particulate Sampler: Gross Beta Activity Gamma-Isotopic of composite (by location)	Weekly Following filter change Quarterly

EXPOSURE: WATERBORNE — 2 TOTAL SAMPLING STATIONS

Sample Media, Number And Approximate Location of Sample Stations	Routine Sampling Mode	Nominal Collection Frequency	Analysis Type	Minimum Analysis Frequency
Surface 1- Located in MCR at the MCR blowdown structure. 1- Located above the site on the Colorado River not influenced by plant discharge (control). 1- Located downstream from blow down entrance into the Colorado River.	Composite sample Over a 1 month period (grab if not available)	Monthly	Gamma-Isotopic Tritium	Monthly Quarterly Composite
Ground 1- Located at well down gradient in the shallow aquifer.	Grab	Quarterly	Gamma-Isotopic & Tritium	Quarterly

TABLE 1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE: WATERBORNE (CONTINUED)

Sample Media, Number And Approximate Location of Sample Stations	Routine Sampling Mode	Nominal Collection Frequency	Analysis Type	Minimum Analysis Frequency
Drinking Water				
1- Located on site. *	Grab	Monthly	Gross Beta & Gamma-Isotopic	Monthly
1- Located at a control station.				
			Tritium	Quarterly Composites
Sediment				
1- Located above the site on the Colorado River, not influenced by plant discharge.	Grab	Semi-annually	Gamma-Isotopic	Semi-annually
1- Located downstream from blowdown entrance into the Colorado River.				
1- Located in MCR.				

* No municipal water systems are affected by STP. This sample taken from deep aquifer supplying drinking water to employees while at work.

EXPOSURE: INGESTION — 7 TOTAL SAMPLING STATIONS

Sample Media, Number And Approximate Location of Sample Stations	Routine Sampling Mode	Nominal Collection Frequency	Analysis Type	Minimum Analysis Frequency
Milk				
*	Grab	Semi-monthly when animals are on pasture; monthly at other times.	Gamma-Isotopic and I-131	Semi-monthly when animals are on pasture; monthly at other times.
Broadleaf Vegetation**				
2- Located at the exclusion zone, N, NW, or NNW sectors.	Grab	Monthly during growing season (When available)	Gamma-Isotopic and I-131	As collected
1- Located in a minimal wind direction.				

* Limited source of sample in vicinity of the South Texas Project. (Attempts will be made to obtain samples when available.)

** Three different kinds of broadleaf vegetation are to be collected over the growing season, not each collection period.

EXPOSURE: INGESTION (continued)

Sample Media, Number And Approximate Location of Sample Stations	Routine Sampling Mode	Nominal Collection Frequency	Analysis Type	Minimum Analysis Frequency
Fish and Invertebrates (edible portions)				
1- Representing commercially or recreational important species in vicinity of STP that maybe influenced by plant operation.	Grab	Sample semi-annually	Gamma-Isotopic on edible portions	As collected
1- Same or analogous species in area not influenced by STP.				
1- Same or analogous species in the MCR.				
Agricultural Products	Grab	At time of harvest	Gamma-Isotopic Analysis in edible portion	As collected
*				
Domestic Meat				
1- Represents domestic stock fed on crops grown exclusively within 10 miles of the plant.	Grab	Annually	Gamma-Isotopic	As collected

* No sample stations have been identified in the vicinity of the site. Presently no agricultural land is irrigated by water into which liquid plant wastes will be discharged. Agricultural products will be considered if these conditions change.

Table 2
Sample Media and Location Description

AI	AIRBORNE RADIOIODINE	L5	CABBAGE
AP	AIRBORNE PARTICULATE	L6	COLLARD GREENS
B1	RESIDENT DABBLER DUCK	M1	BEEF MEAT
B2	RESIDENT DIVER DUCK	M2	POULTRY MEAT
B3	MIGRATORY DABBLER DUCK	M3	WILD SWINE
B4	MIGRATORY DIVER DUCK	M4	DOMESTIC SWINE
B5	GOOSE	M6	GAME DEER
B6	DOVE	M7	ALLIGATOR
B7	QUAIL	M8	RABBIT
B8	PIGEON	OY	OYSTER
CC	CRUSTACEAN CRAB	SO	SOIL
CS	CRUSTACEAN SHRIMP	S1	SEDIMENT - SHORELINE
DR	DIRECT RADIATION	S2	SEDIMENT - BOTTOM
F1	FISH - PISCIVOROUS	VB	L1, L2, L4, L5 or L6
F2	FISH - CRUSTACEAN & INSECT FEEDERS	VP	PASTURE GRASS
F3	FISH - PLANKTIVORES & DETRITUS FEEDERS	WD	DRINKING WATER
L1	BANANA LEAVES	WG	GROUND WATER
L2	CANA LEAVES	WS	SURFACE WATER
L4	TURNIP GREENS	WW	RELIEF WELL WATER

Table 2
Sample Media and Location Description

MEDIA CODE	STATION CODE	VECTOR (Approximate)	LOCATION DESCRIPTION
DR AI AP VB VP SO	001	1 mile N	FM 521
DR	002	1 mile NNE	FM 521
DR	003	1 mile NE	FM 521
DR	004	1 mile ENE	FM 521
DR	005	1 mile E	STP Visitor Center on FM 521
DR AI AP SO	006	3.5 miles ESE	Site near Reservoir Makeup Pumping Facility
DR	007	3.5 miles SE	MCR Dike
DR	008	0.25 mile SSE	MCR Dike
DR	009	0.25 mile S	MCR Dike
DR	010	0.25 mile SSW	MCR Dike
DR	011	0.5 mile SW	MCR Dike
DR	012	1.5 mile WSW	MCR Dike
DR	013	1.5 mile W	FM 521
DR	014	1.5 mile WNW	FM 521
DR AI AP VB SO VP	015	1 mile NW	FM 521
DR AI AP VB SO VP	016	1 mile NNW	FM 521
DR	017	6.5 miles N	Buckeye - FM 1468
DR AI AP SO	018	5.5 miles NNE	Celanese Plant - FM 3057
DR	019	5.5 miles NE	FM 2668
DR	020	5 miles ENE	FM 2668 & FM 2078
DR	021	5 miles E	FM 521& FM 2668
DR	022	7 miles E	Equistar Chemical Plant
DR	023 *	16 miles ENE	Intersection of FM 521 and FM 2540

MCR-STP Main Cooling Reservoir
STP-South Texas Project
Media codes typed in bold satisfy collection requirements described in Table 1.
* Control Station

Table 2
Sample Media and Location Description

MEDIA CODE	STATION CODE	VECTOR (Approximate)	LOCATION DESCRIPTION
DR	024	4 miles SSE	MCR Dike
DR	025	4 miles S	MCR Dike
DR	026	4 miles SSW	MCR Dike
DR	027	2.5 miles SW	MCR Dike
DR	028	5 miles WSW	FM 1095 & Ellis Road
DR SO	029	4.5 miles W	FM 1095
DR	030	6 miles WNW	Tres Palacios Oaks, FM 2853
DR	031	5.5 miles NW	Wilson Creek Road
DR	032	3.5 miles NNW	FM 1468
DR AI AP SO	033	14 miles NNE	Microwave Tower at end of Kilowatt Road in Bay City
DR	034	7.5 miles ENE	Wadsworth Water Supply Pump Station
DR AI AP SO	035	8.5 miles SSE	Matagorda
DR	036	9 miles WSW	College Port
DR AI AP VB VP SO	037*	10 miles WSW	Palacios CP&L Substation
DR	038	10.5 miles NW	CP&L Substation on TX 71 near Blessing
DR AI AP SO	039	9 miles NW	TX 35 under High Voltage Power lines near Tidehaven High School
DR	040	4.5 miles SW	Citrus Grove
DR	041	2.0 miles ESE	MCR Dike
DR	042	8.5 miles W	FM 459 at Tidehaven Intermediate School
DR	043	4.5 miles SE	Site boundary at blowdown outlet
WS	209	2 miles ESE	Kelly Lake
WD	210	On Site	Approved drinking water supply from STP
WS S1	211	3.5 miles S	Site, E. Branch Little Robbins Slough

MCR-STP Main Cooling Reservoir
STP-South Texas Project
Media codes typed in bold satisfy collection requirements described in Table 1.
* Control Station

Table 2
Sample Media and Location Description

MEDIA CODE	STATION CODE	VECTOR (Approximate)	LOCATION DESCRIPTION
WS S1	212	4 miles S	Little Robbins Slough
WS S1	213	4 miles SE	West Branch Colorado River
F (1,2, or 3) CC	214	2.5 miles SE	MCR at Makeup Water Discharge
S2	215	0.5 mile SW	MCR at Circulating Water Discharge
WS S2	216	3.5 miles SSE	MCR at blowdown structure
F (1, 2, or 3) CC CS OY	222	>10 miles	West Matagorda Bay
WS S(1 or 2)	227	5-6 miles SE	West bank of Colorado River downstream of STP across from channel marker #22
WD	228*	14 miles NNE	Le Tulle Park public water supply
WS S1	229	2-3 miles ESE	Drainage ditch north of the reservoir that empties into Colorado River upstream of the reservoir makeup pumping facility
S(1 or 2)	230	3.5 miles ESE	Colorado River at point where drainage ditch (#229) empties into it
S(1 or 2) WS	233	4.5 miles SE	Colorado River where MCR blowdown discharge channel empties into it.
WG	235	3.8 miles S	Well B-3 directly south from MCR
B8	236	N/A	STP Protected Area
WS	237	3.7 miles SSE	Blowdown discharge channel from MCR
S(1 or 2) WS	242*	>10 miles N	Colorado River where it intersects Highway 35
WS	243*	>10 miles N	Colorado River upstream of Bay City Dam at the Lower Colorado River Authority pumping station
WS	247	<1 mile E	Essential Cooling Pond
F(1,2, or 3)	249*	N/A	Control sample purchased from a local retailer
SO	250	0.75 miles NW	Sewage sludge land farming area
WG	251	4.0 miles SSE	Test Well B-4, upper aquifer
F(1,2,or 3) CC S2	300	S	STP Main Cooling Reservoir
WW	701	4 miles S	MCR Relief Well # 440
WS	Q01	N/A	Quarterly composite of station #227 and/or alternate #233
WS	Q02	N/A	Quarterly composite of station #243 and/or alternate #242

MCR-STP Main Cooling Reservoir
STP-South Texas Project
Media codes typed in bold satisfy collection requirements described in Table 1.
* Control Station

Radiological Environmental

2004 Radiological Environmental Monitoring Program Analysis Summary

An analysis summary for all of the required samples is given in Table 3. The table has been formatted to resemble a United States Nuclear Regulatory Commission industry standard. Modifications have been made for the sole purpose of reading ease. Only positive values are given in this table.

Media type is printed at the top left of each table, and the units of measurement are printed at the top right. The first column lists the type of radioactivity or specific radionuclide for which each sample was analyzed. The second column gives the total number of analyses performed and the total number of non-routine analyses for each indicated nuclide. (A non-routine measurement is a sample whose measured activity is greater than the reporting levels for Radioactivity Concentrations in Environmental Samples.) The "LOWER LIMIT OF DETECTION" column lists the normal measurement sensitivities achieved which were more sensitive than specified by the Nuclear Regulatory Commission.

A set of statistical parameters is listed for each radionuclide in the remaining columns. The parameters contain information from the indicator locations, the location having the highest annual mean, and information from the control stations. Some sample types do not have control stations. When this is the case, "no samples" is listed in the control location column. For each of these groups of data, the following is calculated:

- The mean value of positive real values.
- The number of positive real measurements / the total number of analyses.
- The lowest and highest values for the analysis.

The data placed in the table are from the samples listed in Table 1. Additional thermoluminescent dosimeters were utilized each quarter for quality purposes. The minimum number of other analyses required by Table 1 were supplemented in 2004 by six surface water samples, two groundwater samples, two drinking water samples, four rainwater samples and one shoreline sediment sample. Fish and vegetation samples vary in number according to availability but also exceeded the minimum number required by Table 1.

Photo By: Gwenna Kelton

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Direct Radiation — Units: MilliRoentgen/Standard Quarter

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Gamma	172/0	---	1.4E+01 (162/ 162) (1.2E+01 - 2.0E+01)	1 mile W (#013)	1.9E+01 (4 / 4) (1.8E+01 - 2.0E+01)	1.6E+01 (10 / 10) (1.3E+01 - 1.8E+01)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Airborne Radioiodine — Units: PicoCuries per Cubic Meter

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Iodine-131	260/ 0	9.0E-03	--- (0 / 208)	---	---	--- (0 / 52)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Airborne Particulate — Units: PicoCuries per Cubic Meter

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Gross Beta	260/ 0	1.4E-03	2.1E-02 (208 / 208) (8.7E-03 - 3.9E-02)	14 miles NNE (#033)	2.2E-02 (52 / 52) (8.7E-03 - 3.9E-02)	2.0E-02 (52 / 52) (8.8E-03 - 3.7E-02)
Cesium-134	20/ 0	3.0E-04	--- (0 / 16)	---	---	--- (0 / 4)
Cesium-137	20/ 0	2.6E-04	--- (0 / 16)	---	---	--- (0 / 4)
Manganese-54	20/ 0	3.0E-04	--- (0 / 16)	---	---	--- (0 / 4)
Iron-59	20/ 0	1.6E-04	--- (0 / 16)	---	---	--- (0 / 4)
Cobalt-58	20/ 0	4.2E-04	--- (0 / 16)	---	---	--- (0 / 4)
Cobalt-60	20/ 0	3.0E-04	--- (0 / 16)	---	---	--- (0 / 4)
Zinc-65	20/ 0	7.0E-04	--- (0 / 16)	---	---	--- (0 / 4)
Zirconium-95	20/ 0	7.9E-04	--- (0 / 16)	---	---	--- (0 / 4)
Niobium-95	20/ 0	7.5E-04	--- (0 / 16)	---	---	--- (0 / 4)
Lanthanum-140 Barium-140	20/ 0	4.0E-03	--- (0 / 16)	---	---	--- (0 / 4)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Surface Water — Units: PicoCuries per Kilogram

ANALYSIS TYPE	TOTAL ANALYSES NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Hydrogen-3	12/0	2.6E+02	9.6E+03 (4/ 8) (8.9E+03 - 1.1E+04)	3 miles SSE (#216)	9.6E+03 (4/ 4) (8.9E+03 - 1.1E+04)	--- (0/ 4)
Iodine-131	42/0	8.1E+00	--- (0/ 29)	---	---	--- (0/ 13)
Cesium-134	42/0	1.7E+00	--- (0/ 29)	---	---	--- (0/ 13)
Cesium-137	42/0	1.6E+00	--- (0/ 29)	---	---	--- (0/ 13)
Manganese-54	42/0	1.6E+00	--- (0/ 29)	---	---	--- (0/ 13)
Iron-59	42/0	4.9E+00	--- (0/ 29)	---	---	--- (0/ 13)
Cobalt-58	42/0	1.7E+00	--- (0/ 29)	---	---	--- (0/ 13)
Cobalt-60	42/0	1.6E+00	--- (0/ 29)	---	---	--- (0/ 13)
Zinc-65	42/0	3.3E+00	--- (0/ 29)	---	---	--- (0/ 13)
Zirconium-95	42/0	3.0E+00	--- (0/ 29)	---	---	--- (0/ 13)
Niobium-95	42/0	2.0E+00	--- (0/ 29)	---	---	--- (0/ 13)
Lanthanum-140 Barium-140	42/0	4.0E+00	--- (0/ 29)	---	---	--- (0/ 13)

* (f) Number of positive measurements / total measurements at specified locations

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Drinking Water — Units: PicoCuries per Kilogram

ANALYSIS TYPE	TOTAL ANALYSES NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Gross Beta	26/0	1.2E+00	2.6E+00 (13/ 13) (1.5E+00 - 3.8E+00)	14 miles NNE (#228)	3.0E+00 (13/ 13) (1.7E+00 - 4.6E+00)	3.0E+00 (13/ 13) (1.7E+00 - 4.6E+00)
Hydrogen-3	8/0	2.6E+02	--- (0/ 4)	---	---	--- (0/ 4)
Iodine-131	26/0	3.5E+00	--- (0/ 13)	---	---	--- (0/ 13)
Cesium-134	26/0	2.0E+00	--- (0/ 13)	---	---	--- (0/ 13)
Cesium 137	26/0	1.9E+00	--- (0/ 13)	---	---	--- (0/ 13)
Manganese-54	26/0	1.8E+00	--- (0/ 13)	---	---	--- (0/ 13)
Iron-59	26/0	5.1E+00	--- (0/ 13)	---	---	--- (0/ 13)
Cobalt-58	26/0	1.8E+00	--- (0/ 13)	---	---	--- (0/ 13)
Cobalt-60	26/0	1.9E+00	--- (0/ 13)	---	---	--- (0/ 13)
Zinc-65	26/0	4.1E+00	--- (0/ 13)	---	---	--- (0/ 13)
Zirconium-95	26/0	3.3E+00	--- (0/ 13)	---	---	--- (0/ 13)
Niobium-95	26/0	2.2E+00	--- (0/ 13)	---	---	--- (0/ 13)
Lanthanum-140 Barium-140	26/0	3.2E+00	--- (0/ 13)	---	---	--- (0/ 13)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Sediment-Shoreline — Units: PicoCuries per Kilogram dry weight

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Cesium-134	5/ 0	2.6E+01	--- (0/ 3)	---	---	--- (0/ 2)
Cesium-137	5/ 0	2.1E+01	2.5E+01 (1/ 3) (2.5E+01 - 2.5E+01)	6 miles SE (#227)	2.5E+01 (1/ 3) (2.5E+01 - 2.5E+01)	1.8E+01 (1/ 2) (1.8E+01 - 1.8E+01)
Manganese-54	5/ 0	2.1E+01	--- (0/ 3)	---	---	--- (0/ 2)
Iron-59	5/ 0	7.9E+01	--- (0/ 3)	---	---	--- (0/ 2)
Cobalt-58	5/ 0	2.2E+01	--- (0/ 3)	---	---	--- (0/ 2)
Cobalt-60	5/ 0	2.4E+01	--- (0/ 3)	---	---	--- (0/ 2)
Zinc-65	5/ 0	5.2E+01	--- (0/ 3)	---	---	--- (0/ 2)
Zirconium-95	5/ 0	4.5E+01	--- (0/ 3)	---	---	--- (0/ 2)
Niobium-95	5/ 0	4.0E+01	--- (0/ 3)	---	---	--- (0/ 2)
Lanthanum-140 Barium-140	5/ 0	1.1E+02	--- (0/ 3)	---	---	--- (0/ 2)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Ground Water *(On site test well)* — Units: PicoCuries per Kilogram

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Hydrogen-3	6/ 0	2.6E+02	5.9E+02 (5/ 6) (2.8E+02 - 1.0E+03)	3.8 miles S (#235)	5.9E+02 (5/ 6) (2.8E+02 - 1.0E+03)	no samples
Iodine-131	6/ 0	9.0E+00	--- (0/ 6)	---	---	no samples
Cesium-134	6/ 0	2.0E+00	--- (0/ 6)	---	---	no samples
Cesium-137	6/ 0	1.9E+00	--- (0/ 6)	---	---	no samples
Manganese-54	6/ 0	1.9E+00	--- (0/ 6)	---	---	no samples
Iron-59	6/ 0	5.2E+00	--- (0/ 6)	---	---	no samples
Cobalt-58	6/ 0	1.8E+00	--- (0/ 6)	---	---	no samples
Cobalt-60	6/ 0	1.9E+00	--- (0/ 6)	---	---	no samples
Zinc-65	6/ 0	4.5E+00	--- (0/ 6)	---	---	no samples
Zirconium-95	6/ 0	3.3E+00	--- (0/ 6)	---	---	no samples
Niobium-95	6/ 0	2.5E+00	--- (0/ 6)	---	---	no samples
Lanthanum-140 Barium-140	6/ 0	4.6E+00	--- (0/ 6)	---	---	no samples

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Sediment-Bottom — Units: PicoCuries per Kilogram dry weight

ANALYSIS TYPE	TOTAL ANALYSES NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Cesium-134	7/0	3.0E+01	--- (0/ 7)	---	---	no samples
Cesium-137	7/0	2.0E+01	8.8E+01 (4/ 7) (3.7E+01 - 1.5E+02)	3 miles SSE (#216)	8.8E+01 (4/ 4) (3.7E+01 - 1.5E+02)	no samples
Manganese-54	7/0	2.3E+01	--- (0/ 7)	---	---	no samples
Iron-59	7/0	8.5E+01	--- (0/ 7)	---	---	no samples
Cobalt-58	7/0	2.5E+01	--- (0/ 7)	---	---	no samples
Cobalt-60	7/0	2.4E+01	8.1E+01 (4/ 7) (3.4E+01 - 1.5E+02)	3 miles SSE (#216)	8.1E+01 (4/ 4) (3.4E+01 - 1.5E+02)	no samples
Zinc-65	7/0	5.8E+01	--- (0/ 7)	---	---	no samples
Zirconium-95	7/0	5.2E+01	--- (0/ 7)	---	---	no samples
Niobium-95	7/0	4.2E+01	--- (0/ 7)	---	---	no samples
Lanthanum-140 Barium-140	7/0	1.1E+02	--- (0/ 7)	---	---	no samples

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Banana Leaves — Units: PicoCuries per Kilogram wet weight

ANALYSIS TYPE	TOTAL ANALYSES NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Iodine-131	20/0	7.8E+00	--- (0/ 14)	---	---	--- (0/ 6)
Cesium-134	20/0	2.7E+00	--- (0/ 14)	---	---	--- (0/ 6)
Cesium-137	20/0	2.2E+00	--- (0/ 14)	---	---	--- (0/ 6)
Manganese-54	20/0	2.5E+00	--- (0/ 14)	---	---	--- (0/ 6)
Iron-59	20/0	1.0E+01	--- (0/ 14)	---	---	--- (0/ 6)
Cobalt-58	20/0	2.6E+00	--- (0/ 14)	---	---	--- (0/ 6)
Cobalt-60	20/0	4.2E+00	--- (0/ 14)	---	---	--- (0/ 6)
Zinc-65	20/0	7.5E+00	--- (0/ 14)	---	---	--- (0/ 6)
Zirconium-95	20/0	4.6E+00	--- (0/ 14)	---	---	--- (0/ 6)
Niobium-95	20/0	3.0E+00	--- (0/ 14)	---	---	--- (0/ 6)
Lanthanum-140 Barium-140	20/0	4.0E+00	--- (0/ 14)	---	---	--- (0/ 6)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Cana Leaves — Units: PicoCuries per Kilogram wet weight

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Iodine-131	6/0	1.3E+01	--- (0/ 4)	---	---	--- (0/ 2)
Cesium-134	6/0	2.1E+00	--- (0/ 4)	---	---	--- (0/ 2)
Cesium-137	6/0	1.7E+00	--- (0/ 4)	---	---	--- (0/ 2)
Manganese-54	6/0	2.0E+00	--- (0/ 4)	---	---	--- (0/ 2)
Iron-59	6/0	9.7E+00	--- (0/ 4)	---	---	--- (0/ 2)
Cobalt-58	6/0	2.3E+00	--- (0/ 4)	---	---	--- (0/ 2)
Cobalt-60	6/0	3.4E+00	--- (0/ 4)	---	---	--- (0/ 2)
Zinc-65	6/0	6.1E+00	--- (0/ 4)	---	---	--- (0/ 2)
Zirconium-95	6/0	4.0E+00	--- (0/ 4)	---	---	--- (0/ 2)
Niobium-95	6/0	2.8E+00	--- (0/ 4)	---	---	--- (0/ 2)
Lanthanum-140 Barium-140	6/0	4.8E+00	--- (0/ 4)	---	---	--- (0/ 2)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Collard Greens — Units: PicoCuries per Kilogram wet weight

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Iodine-131	6/0	8.2E+00	--- (0/ 4)	---	---	--- (0/ 2)
Cesium-134	6/0	1.2E+00	--- (0/ 4)	---	---	--- (0/ 2)
Cesium-137	6/0	9.8E-01	--- (0/ 4)	---	---	--- (0/ 2)
Manganese-54	6/0	1.1E+00	--- (0/ 4)	---	---	--- (0/ 2)
Iron-59	6/0	5.5E+00	--- (0/ 4)	---	---	--- (0/ 2)
Cobalt-58	6/0	1.3E+00	--- (0/ 4)	---	---	--- (0/ 2)
Cobalt-60	6/0	1.9E+00	--- (0/ 4)	---	---	--- (0/ 2)
Zinc-65	6/0	3.4E+00	--- (0/ 4)	---	---	--- (0/ 2)
Zirconium-95	6/0	2.3E+00	--- (0/ 4)	---	---	--- (0/ 2)
Niobium-95	6/0	1.7E+00	--- (0/ 4)	---	---	--- (0/ 2)
Lanthanum-140 Barium-140	6/0	2.7E+00	--- (0/ 4)	---	---	--- (0/ 2)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Fish - Piscivorous — Units: PicoCuries per Kilogram wet weight

ANALYSIS TYPE	TOTAL ANALYSES NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Cesium-134	9/0	3.2E+01	--- (0/ 5)	---	---	--- (0/ 4)
Cesium-137	9/0	3.0E+01	--- (0/ 5)	---	---	--- (0/ 4)
Manganese-54	9/0	3.0E+01	--- (0/ 5)	---	---	--- (0/ 4)
Iron-59	9/0	9.5E+01	--- (0/ 5)	---	---	--- (0/ 4)
Cobalt-58	9/0	3.2E+01	--- (0/ 5)	---	---	--- (0/ 4)
Cobalt-60	9/0	3.4E+01	--- (0/ 5)	---	---	--- (0/ 4)
Zinc-65	9/0	6.6E+01	--- (0/ 5)	---	---	--- (0/ 4)
Zirconium-95	9/0	5.8E+01	--- (0/ 5)	---	---	--- (0/ 4)
Niobium-95	9/0	3.8E+01	--- (0/ 5)	---	---	--- (0/ 4)
Lanthanum-140 Barium-140	9/0	7.5E+01	--- (0/ 5)	---	---	--- (0/ 4)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Crustacean Shrimp — Units: PicoCuries per Kilogram wet weight

ANALYSIS TYPE	TOTAL ANALYSES NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Cesium-134	5/0	2.8E+01	--- (0/ 3)	---	---	--- (0/ 2)
Cesium-137	5/0	2.7E+01	--- (0/ 3)	---	---	--- (0/ 2)
Manganese-54	5/0	2.7E+01	--- (0/ 3)	---	---	--- (0/ 2)
Iron-59	5/0	7.6E+01	--- (0/ 3)	---	---	--- (0/ 2)
Cobalt-58	5/0	2.6E+01	--- (0/ 3)	---	---	--- (0/ 2)
Cobalt-60	5/0	2.9E+01	--- (0/ 3)	---	---	--- (0/ 2)
Zinc-65	5/0	5.8E+01	--- (0/ 3)	---	---	--- (0/ 2)
Zirconium-95	5/0	4.7E+01	--- (0/ 3)	---	---	--- (0/ 2)
Niobium-95	5/0	3.0E+01	--- (0/ 3)	---	---	--- (0/ 2)
Lanthanum-140 Barium-140	5/0	5.3E+01	--- (0/ 3)	---	---	--- (0/ 2)

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Fish - Crustacean & Insect Feeders — Units: PicoCuries per Kilogram wet weight

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Cesium-134	3/0	3.3E+01	--- (0/ 3)	---	---	no samples
Cesium-137	3/0	2.9E+01	--- (0/ 3)	---	---	no samples
Manganese-54	3/0	2.9E+01	--- (0/ 3)	---	---	no samples
Iron-59	3/0	1.0E+02	--- (0/ 3)	---	---	no samples
Cobalt-58	3/0	3.2E+01	--- (0/ 3)	---	---	no samples
Cobalt-60	3/0	3.3E+01	--- (0/ 3)	---	---	no samples
Zinc-65	3/0	6.8E+01	--- (0/ 3)	---	---	no samples
Zirconium-95	3/0	5.8E+01	--- (0/ 3)	---	---	no samples
Niobium-95	3/0	4.0E+01	--- (0/ 3)	---	---	no samples
Lanthanum-140 Barium-140	3/0	9.8E+01	--- (0/ 3)	---	---	no samples

* (f) Number of positive measurements / total measurements at specified locations.

TABLE 3

2004 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANALYSIS SUMMARY

Medium: Beef Meat — Units: PicoCuries per Kilogram wet weight

ANALYSIS TYPE	TOTAL ANALYSES /NONROUTINE MEASUREMENTS	LOWER LIMIT OF DETECTION	INDICATOR LOCATIONS MEAN (f)* RANGE	LOCATION WITH HIGHEST ANNUAL MEAN LOCATION INFORMATION	MEAN (f)* RANGE	CONTROL LOCATIONS MEAN (f)* RANGE
Cesium-134	2/0	2.4E+01	--- (0/ 2)	---	---	no samples
Cesium-137	2/0	2.2E+01	--- (0/ 2)	---	---	no samples
Manganese-54	2/0	2.3E+01	--- (0/ 2)	---	---	no samples
Iron-59	2/0	1.1E+02	--- (0/ 2)	---	---	no samples
Cobalt-58	2/0	2.9E+01	--- (0/ 2)	---	---	no samples
Cobalt-60	2/0	2.7E+01	--- (0/ 2)	---	---	no samples
Zinc-65	2/0	5.6E+01	--- (0/ 2)	---	---	no samples
Zirconium-95	2/0	5.5E+01	--- (0/ 2)	---	---	no samples
Niobium-95	2/0	4.6E+01	--- (0/ 2)	---	---	no samples
Lanthanum-140 Barium-140	2/0	2.1E+02	--- (0/ 2)	---	---	no samples

* (f) Number of positive measurements / total measurements at specified locations.

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