REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8706300996 DOC. DATE: 86/12/31 NOTARIZED: NO DOCKET #
FACIL: 50-000 Generic Docket 05000000
50-250 Turkey Point Plant, Unit 3, Florida Power and Light C 05000250
50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co. 05000335
50-389 St. Lucie Plant, Unit 2, Florida Power & Light Co. 05000389
AUTH. NAME AUTHOR AFFILIATION
DICKEY, J. W. Florida Power & Light Co.
WOODY, C. O. Florida Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION

GRACE, J. N. Region 2, Office of Director

SUBJECT: "Performance Rept, 1986." W/870515 ltr.

DISTRIBUTION CODE: IE01D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 27
TITLE: General (50 Dkt)-Insp Rept/Notice of Violation Response

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-2 PD	1	1	McDONALD, D	2	2
	TOURIGNY, E	2	2			
INTERNAL:	AEOD	1	1	DEDRO	1	1
	ENF LIEBERMAN	1	1	NRR ROE, M. L	1	1
	NRR/DOEA DIR	1	1	NRR/DREP/EPB	1	1
	NRR/DREP/RPB	2	2	NRR/DRIS DIR	1	1
	NRR/PMAS/ILRB	1	1	OGC/HDS2	1	1
	REG FILE	1	1	RES DEPY GI	1	1
	RGN2 FILE 01	1	1			
EXTERNAL:	LPDR	2	2	NRC PDR	1	1
	NSIC	1	1			

TOTAL NUMBER OF COPIES REQUIRED: LTTR 23 ENCL 23

50-250
251
335
389

P. O. BOX 14000, JUNO BEACH, FL 33408-0420

FPL

May 15, 1987

Dr. J. N. Grace
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street Suite 2900
Atlanta, GA 30323

Dear Dr. Grace:

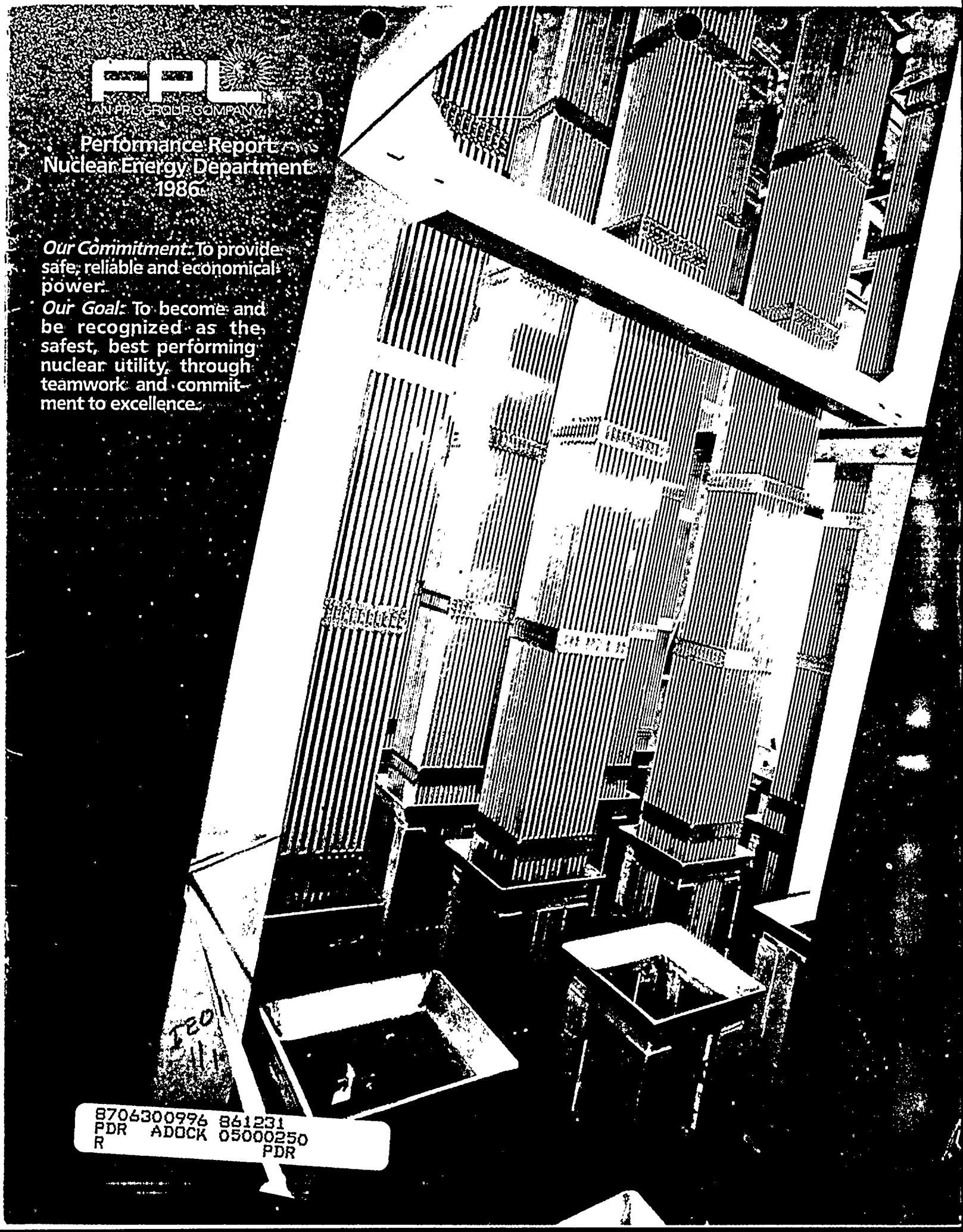
The enclosed "Nuclear Performance Report 1986" provides an overview of Florida Power & Light Company's (FPL) nuclear operations and performance for 1986. The utility and its customers depend on safe, reliable, economical power from our four nuclear units. Continued excellent overall performance enabled nuclear power to fill more than 32% of our customers' electrical energy demand.

During 1986, safety remained the primary goal of FPL's Nuclear Energy Department. Achievements in this and other strategic areas such as training, maintenance, and reliability came as a direct result of our Quality Improvement Program. We are proud of our accomplishments and confident of continued improvement.

Sincerely,

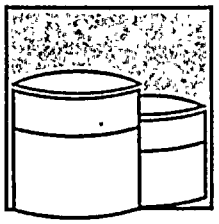
~~Enclosures: Kept in Region II docket files~~

C. O. Woody
Group Vice President
Nuclear Energy


FPL
AN FPL GROUP COMPANY
Performance Report
Nuclear Energy Department
1986
Our Commitment: To provide safe, reliable and economical power.
Our Goal: To become and be recognized as the safest, best performing nuclear utility, through teamwork and commitment to excellence.
IE01
8706300996 861231
PDR ADOCK 05000250
R PDR

Introduction

For the nuclear power industry in the United States, 1986 was a year of significant achievement.



Although overshadowed world-wide by the events at Chernobyl, the nation's growing number of nuclear facilities powered past the 1,000th reactor-year of safe operating experience. More than 16 percent of the country's electricity – approximately 405 billion kilowatt hours – was generated by nuclear energy in 1986.

It was the largest amount of nuclear generated electricity produced by any nation in the world.

Second only to coal as a source of electricity in the U.S., nuclear energy is a vital and growing component of power supply. During 1986, five additional nuclear plants achieved full commercial operation, bringing the number of U.S. plants currently licensed for operation to 106.

Nuclear power in the United States has saved the equivalent of more than 5.6 billion barrels of oil. Savings in fuel costs to utility customers during the past decade alone are estimated to be as much as $63 billion.

Along with providing such savings, the U.S. nuclear industry has maintained a total and ongoing obligation to safety – an obligation unmatched in scope and success by any other industry.

Contents

The FPL Commitment

When Florida Power & Light Company's first nuclear power plant began operation in 1972, the company's commitment to the use of nuclear energy was made clear and put in precise order: to provide safe ... reliable ... and economical power to its customers.

Fifteen years and 171 billion kilowatt-hours later – with a record of excellent safety, high reliability and indisputable economic savings – that commitment continues to be the focal point of FPL's nuclear operation.

During 1986, safety remained the overall goal of FPL's nuclear energy department. Driven by a program emphasizing quality in every aspect of its operations, the department's quest for improvement reached into other strategic areas as well. Achievements in training, maintenance, reliability, organizational development and regulatory interaction came as a direct result of the company's Quality Improvement Program.

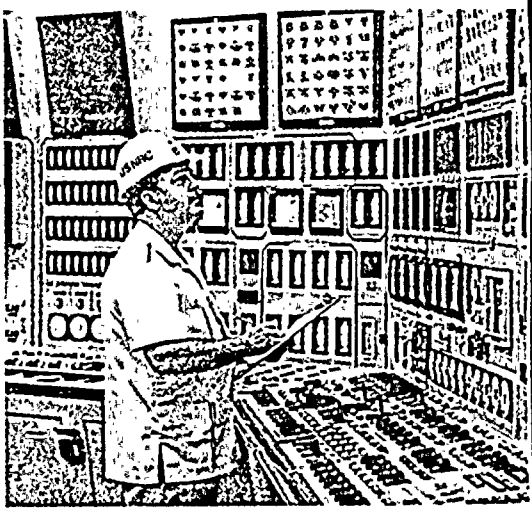
Performance is the final indicator of a successful program. Our increased use of data to monitor and measure virtually every detail of operations allows us to present an objective and documented view of our total performance.

It is performance, rather than programs, by which we seek to be measured. And when judged by performance, our success is clearly evident.

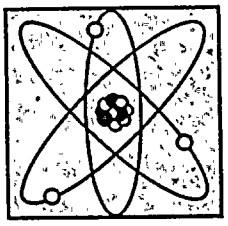
This report is a review of the 1986 activities of the nuclear energy department.

J.W. Dickey
Vice President
Nuclear Operations

THE NUCLEAR ROLE AT FPL



NRC Resident Inspector Perk Bibb checks plant status in the St. Lucie Unit 1 control room. Jack Crlenjak (not shown) is the NRC senior resident inspector.

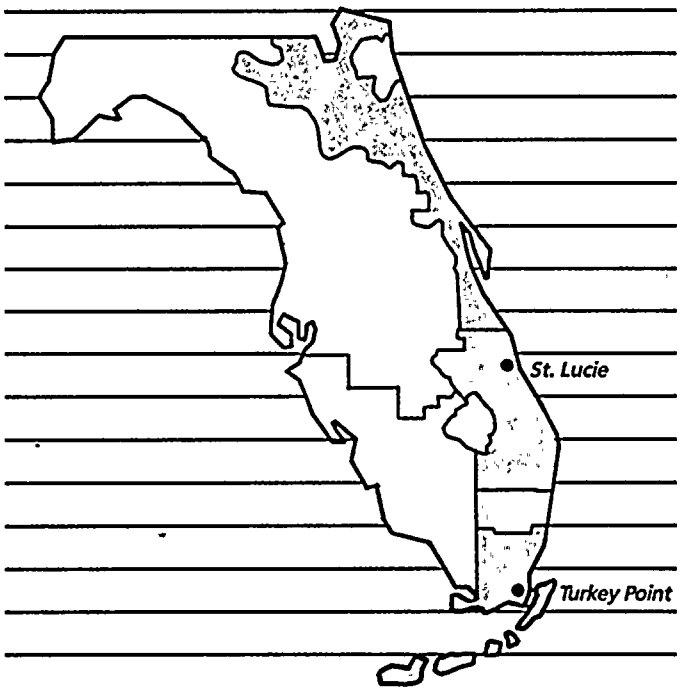


Nuclear power generation has become a key element in FPL's successful strategy of developing a dependable and diversified fuel mix to produce the most economical power for its 2.8 million customers.

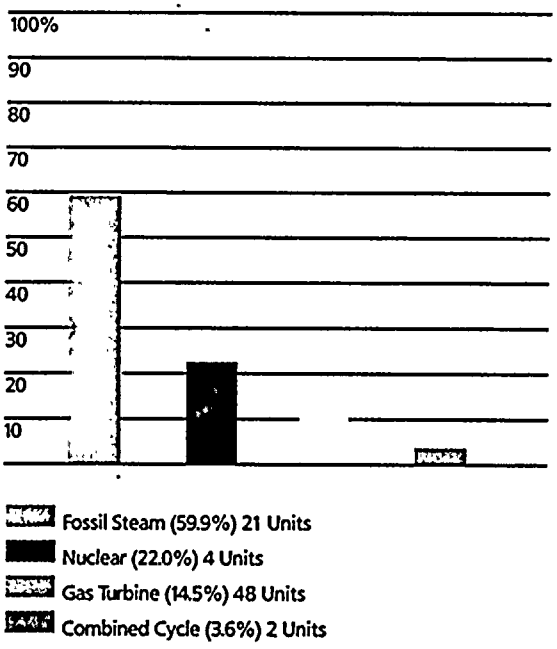
Among all the fuel options available to FPL – nuclear, oil, natural gas and purchased coal power – nuclear power is by far the most economical. Electricity generated by nuclear energy costs only about one-third as much as that generated by burning oil, despite recent lower oil prices.

FPL's nuclear facilities consist of two units at its Turkey Point plant in south Dade County, Florida and two units at the St. Lucie plant located on Hutchinson Island near Ft. Pierce, Florida. Turkey Point Units 3 and 4, which began operation in 1972 and 1973 respectively, are rated at 666 megawatts each. St. Lucie Units 1 and 2, which became operational in 1976 and 1983 respectively, have a rated capacity of 839 megawatts each.

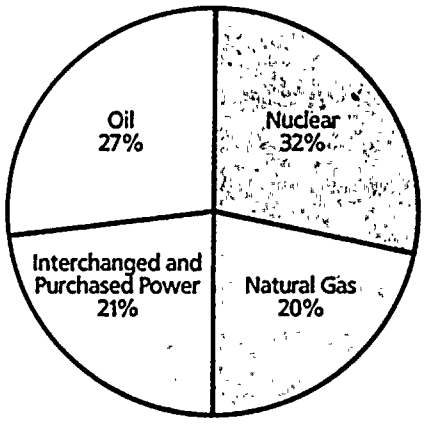
In 1986, the four nuclear units produced 32 percent of customers' electrical demand, saving an estimated $274 million in fuel costs. Each Turkey Point unit is capable of displacing about 28,000 barrels of oil per day, while the St. Lucie units can displace about 32,000 barrels each. Since 1972, the nuclear units have displaced the equivalent of more than 273 million barrels of oil, a savings of $4.6 billion in fuel costs. It is expected that nuclear power will continue to provide about one-third of customers' electrical needs during the next few years. Considering that the original cost of the four units was $2.5 billion, nuclear energy has proven to be a wise and prudent investment for FPL's customers.

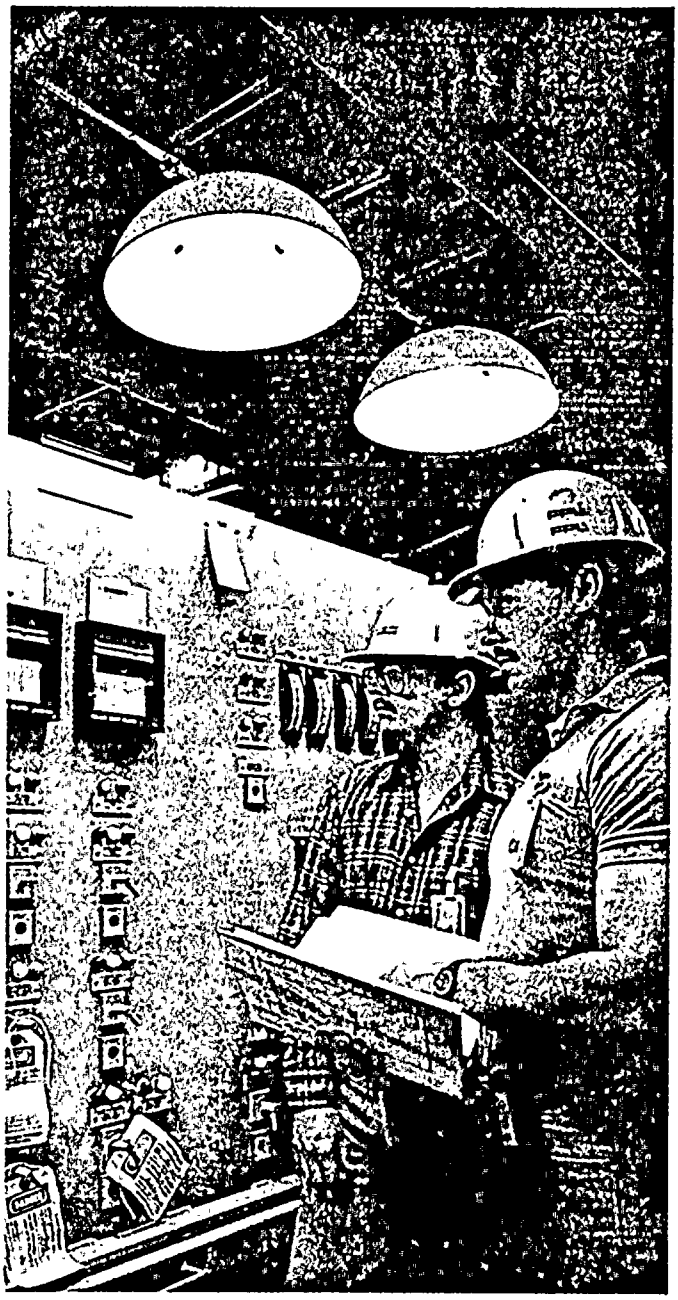


1986 Generating Capacity By Fuel Type
(Summer Capacity of 13,088 MW)



1986 Generation By Fuel Type
(Total Energy Sales – 54.3 Billion kwh)





Instrument and Control Supervisor Jorge Riveron (right) and Instrument and Control Specialist Bill Lazenby check the operation of the newly installed Unit 4 alternate shutdown panel at Turkey Point. The Unit 3 panel will be placed in service during the 1987 refueling outage.

The FPL Nuclear Energy Department

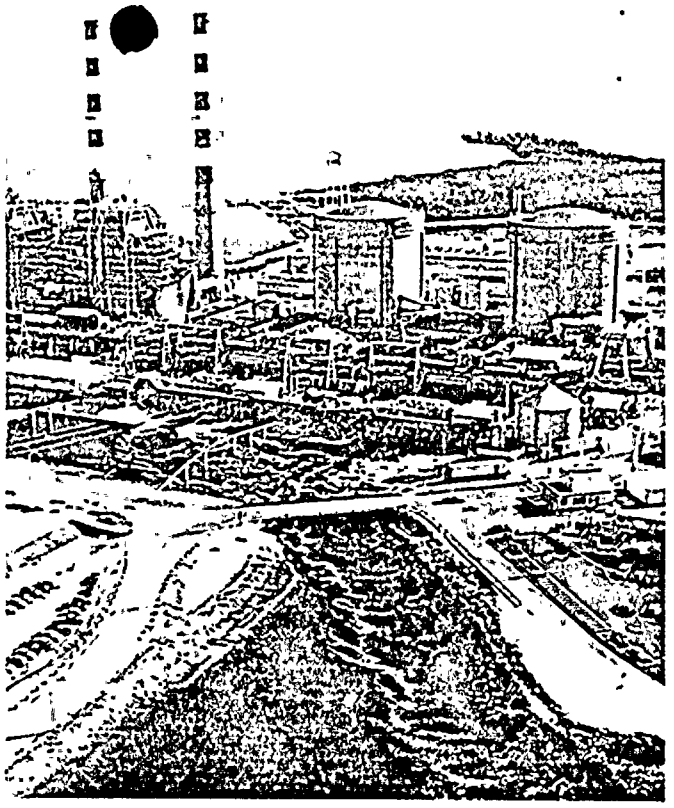
The nuclear energy department consists of 1,536 employees working under the guidance of a management team with outstanding credentials. (see back fold-out)

There are 662 plant employees at the St. Lucie plant, 695 at Turkey Point and 179 staff personnel at offices in Juno Beach, Florida.

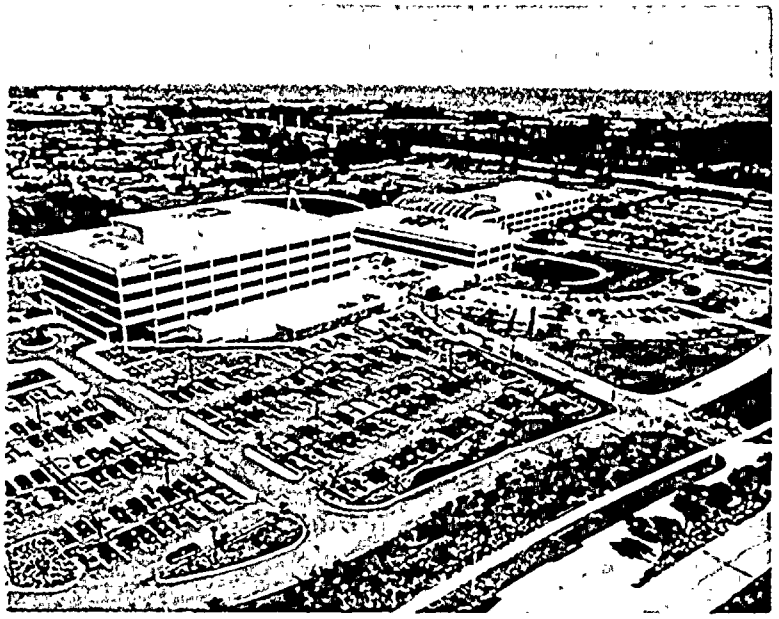
During 1986, FPL's four nuclear units achieved a combined average equivalent availability of 70.9 percent compared to a U.S. industry average of 60.3 percent.

Three of the units, Turkey Point 3 and both St. Lucie units, operated at an average equivalent availability of 84 percent. Turkey Point 4 was not in operation for a total of 240 days in 1986. During this period, many design modifications were installed. By implementing many of the lessons learned by the industry since original construction, these modifications will bring the plant nearer to today's standards.

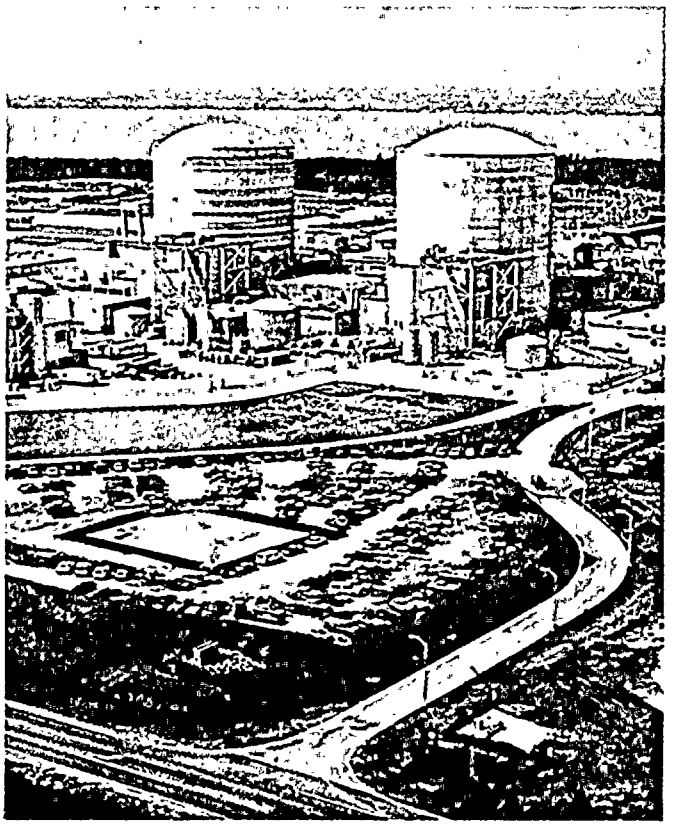
The four nuclear units produced 18.5 billion kilowatt-hours of electricity during 1986.



Turkey Point Plant (see page 9)



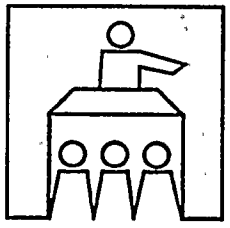
Juno Beach office complex – This is the site of the nuclear energy, power plant engineering, project management and power plant construction departments. These key staff departments support operation of the Turkey Point and St. Lucie nuclear units.



St. Lucie Plant (see page 10)

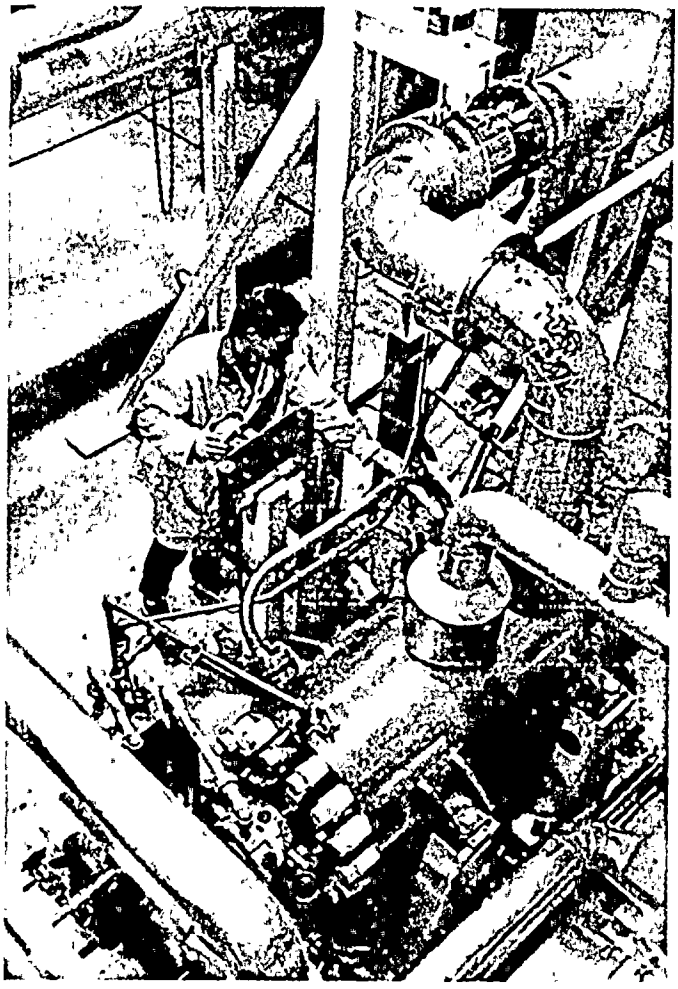
The health and safety of employees and the public is the top priority of the nuclear energy department. Since 1979, FPL has added more than $600 million in capital improvements to its nuclear plants. The majority of these additions were for new safety features required by the Nuclear Regulatory Commission (NRC) in such areas as fire protection and modifications related to lessons learned from the Three Mile Island accident.

Training

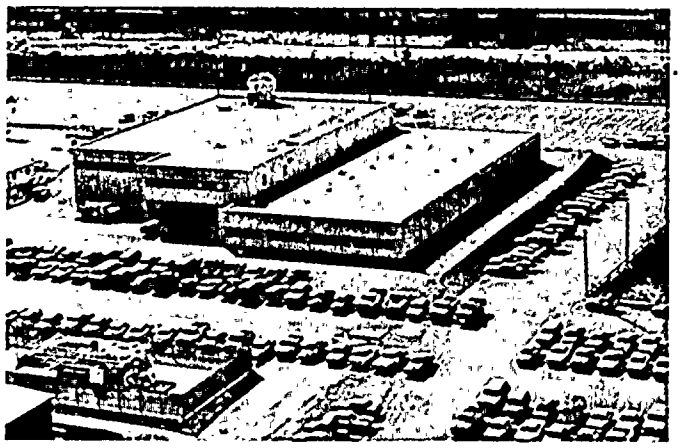


Professional training is especially significant to assure the highest margins of safety. In 1986, the department's operating and maintenance budget for technical training was $13.5 million, with a capital improvement commitment of $17.5 million for training centers and plant-specific simulators. More than 1,400 employees participated in these training programs in 1986, including 61 who passed NRC-administered examinations.

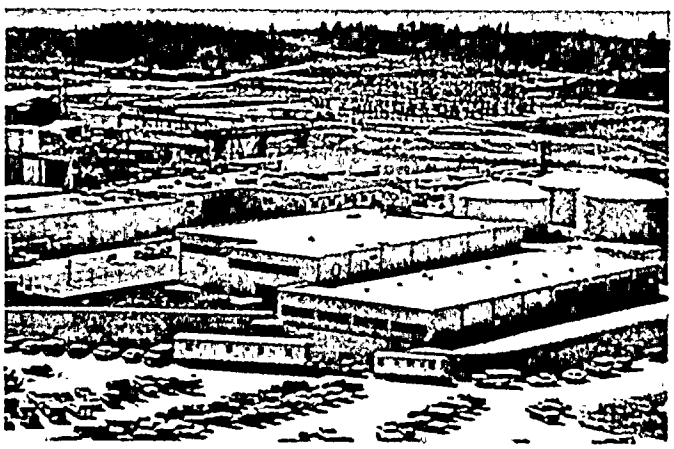
By the end of 1986, ten performance-based technical training programs at each plant had been developed to meet the criteria of the National Academy for Nuclear Training. Four of the programs at each plant were accredited by the National Nuclear Accrediting Board during the year and the remaining six programs at each plant are expected to be accredited by mid-1987. Both plants became branches of the National



Nuclear Operator Tommie Todd inspects a valve on a high pressure safety injection pump.



Turkey Point Training Building – Completed for occupancy Dec. 16, 1986, this 51,000-square-foot building was also a part of PEP. (See pg. 9.)



St. Lucie Training Building – This 51,000-square-foot building neared completion in 1986 with occupancy scheduled by February 1987.

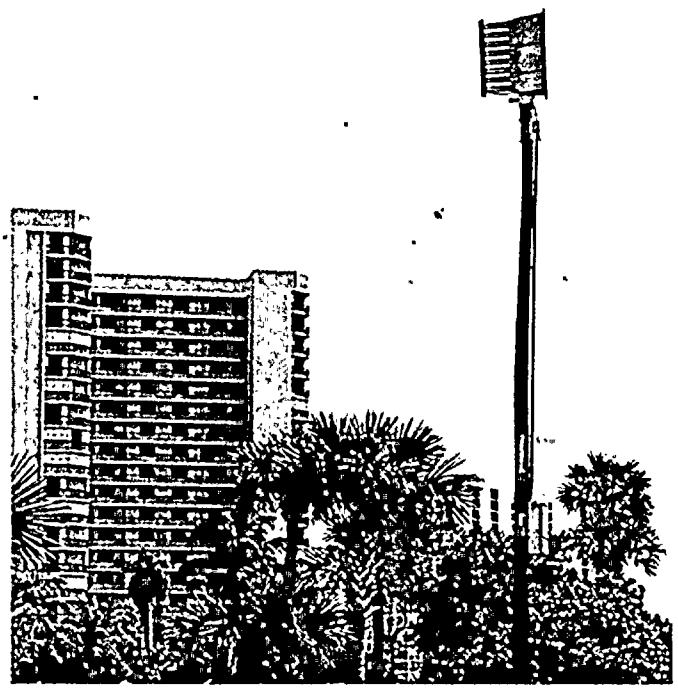
Safety (cont.)

Academy for Nuclear Training when the first programs were accredited.

New training facilities were constructed at both plants. The 51,000-square-foot buildings include classrooms, laboratories, libraries and offices for the training staff and will house full scale plant control room simulators to be delivered in 1987. The additional facilities allow for the expanded technical and skills training required by the ten performance-based technical training programs.

The first phase of the training information management system was implemented during 1986. The initial phase dealt with materials configuration control, designed to monitor and assist in the maintenance of over 15,000 training documents.

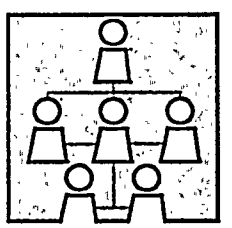
A four-level instructor certification program was also implemented in 1986. Level 1, on-the-job instructor/evaluator training, was completed by 135 plant supervisors and training staff members. This training focused on "how to" techniques for providing consistent, systematic and quality training in the plant environment. Levels 2 and 3, technical instructor and program coordinator, are scheduled for completion in 1987. Level 4, program supervisor, will follow in 1988.



This siren on Hutchinson Island was activated during the federal alert and notification system demonstration.

Radwaste Supervisor Lew LaGarde (right) and Senior Radiation Protection Man Chris Brevig inspect a spent resin container prior to shipment.

Organizational development



The nuclear energy management development program, begun in 1984, continued during 1986 with 20 senior employees placed in rotational positions. The purpose of the program is to maintain a succession plan and improve the overall effectiveness of the nuclear energy team.

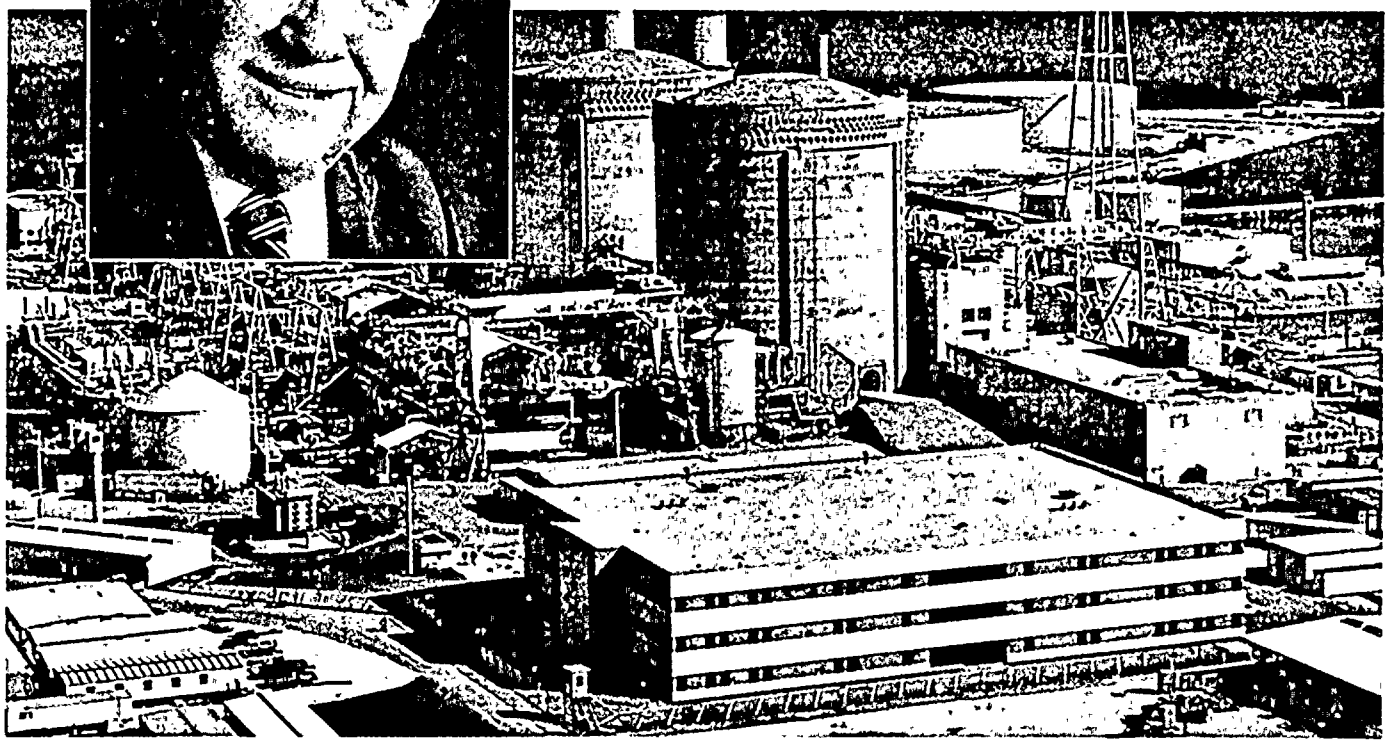
As an extension of the fitness for duty program, a two-phase drug testing policy was established in 1986.

Phase 1 included an initial mandatory drug screening test for all nuclear energy vice presidents, directors, managers and department heads.

Phase 2 included random drug screening tests for all salaried employees with authorized unescorted access to vital and radiological controlled areas at St. Lucie or Turkey Point. The testing also included all positions in the first phase of the program.

Cecil Wethy, Turkey Point plant site vice president:

"The age of the Turkey Point nuclear units presents us with a major challenge. Many of our projects involve upgrading the design of a number of systems to present requirements. In addition, equipment replacement to address plant aging and to employ new technology is necessary to ensure high reliability in the future. Our top priority job at Turkey Point, aside from safety, is to maintain effective interaction with our regulators. This is essential for success in implementing the many changes required."



During 1986, the Turkey Point plant produced its 100 billionth kilowatt-hour of electricity. Located on Biscayne Bay in south Dade County near Homestead, the plant has saved customers an estimated $2.7 billion in fuel costs since beginning operation in 1972.

The Turkey Point units have performed remarkably well during their 14 years of operation. They have a combined lifetime capacity factor of 66 percent compared to the industry average of 60.3 percent. In the key performance indicator of forced outage rate over the life of the plant, both units have been outstanding. The forced outage rate for Unit 3 is 8 percent, with Unit 4 at 6.7 percent. The current annual national average is 17.7 percent.

In 1984, the performance enhancement program (PEP) was established at Turkey Point to upgrade overall site operations and manage the changes and modifications necessary to bring the plant to current standards. Included in this continuing program are enhancements to:

- site facilities
- operations
- procedures
- configuration controls
- training
- management actions
- licensing programs
- quality programs
- maintenance
- technical specifications.
- operability of safety systems

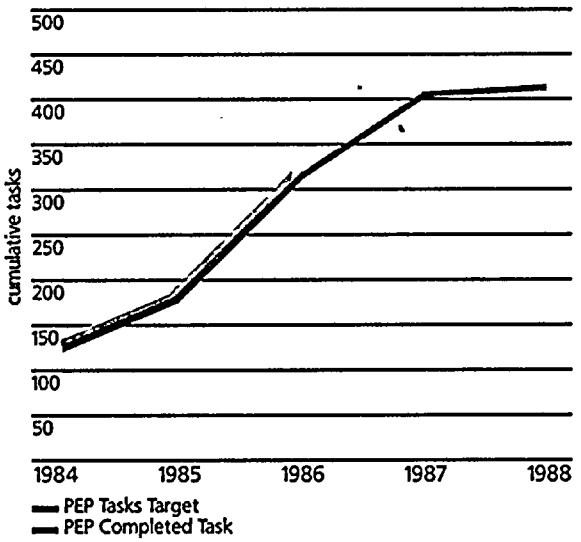
Turkey Point Plant

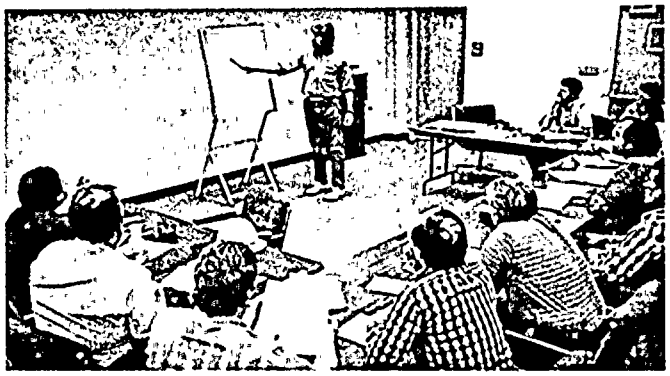
All PEP tasks continued to be completed on schedule during 1986. One project, procedure upgrade, has had a significant impact on improving operations and maintenance. Since 1984, 639 new procedures have been developed, bringing the total number to 1,164. Another project was an integrated schedule designed to address all planned plant modifications. With priorities assigned based on future safety impact and cost/benefit analysis, schedules are produced according to priority and the available resources. The system, when approved by the NRC, will provide an agreed-upon method to make scheduled commitments for safety-related modifications and efficiency improvements. The preliminary five-year integrated schedule now consists of about $200 million of work on almost 500 selected projects.

1986 improvements resulting from PEP

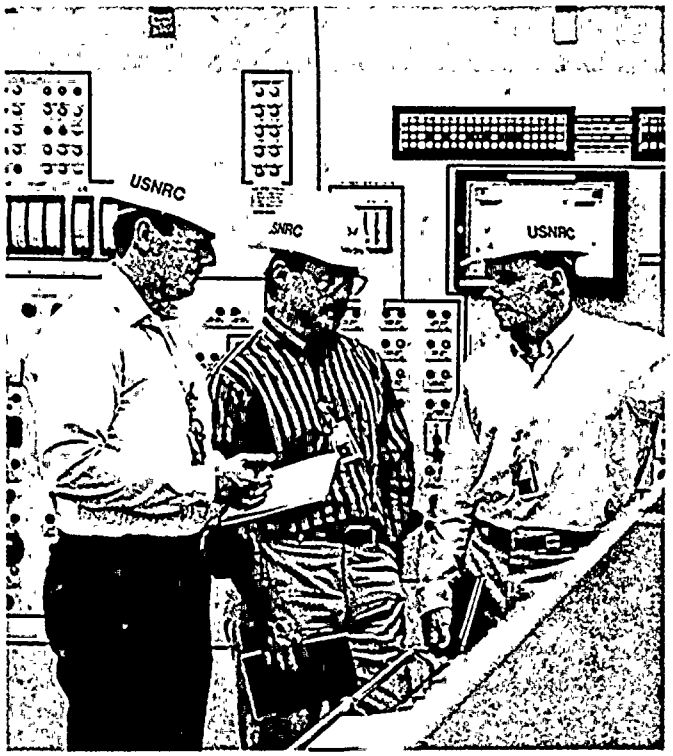
- auto trips reduced ..... 53 percent
- personnel exposure reduced ..... 25 percent
- radioactive waste shipped reduced ..... 47 percent
- plant changes and modifications completed 230
- procedures developed 180

Turkey Point Plant
Performance Enhancement Program Tasks





Turkey Point Unit 3 Outage Director Ron Hogue discusses detailed plans for comprehensive motor-operated valve maintenance scheduled for the Unit 3 outage in early 1987.



NRC Resident Inspector Kurt Van Dyne (center), NRC Senior Resident Inspector Russ Brewer (left) and NRC Resident Inspector John McDonald conduct daily inspection in the Turkey Point control room.

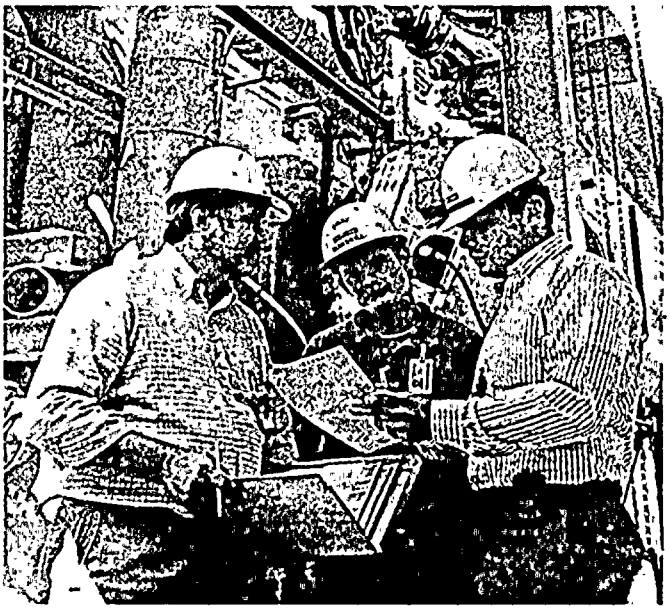
During 1986, a systematic review of selected safety systems and a changeover to modified standard technical specifications were initiated. These projects were developed to ensure conformance to current design requirements and regulatory criteria. In the overall facility evaluation in the systematic assessment of licensee performance (SALP) report, the NRC concluded that "... these initiatives are of far greater magnitude and scope than any similar initiatives at other utilities ... They not only benefit Turkey Point but are expected to serve as a model for other utilities."

Equipment modifications and design configuration issues were the dominant factors in extending the outage of Unit 4. In all, 230 plant changes and modifications were completed at Turkey Point during 1986. Significant changes and upgrades were made in emergency diesel generator loading, the component cooling water system and the auxiliary feedwater system.

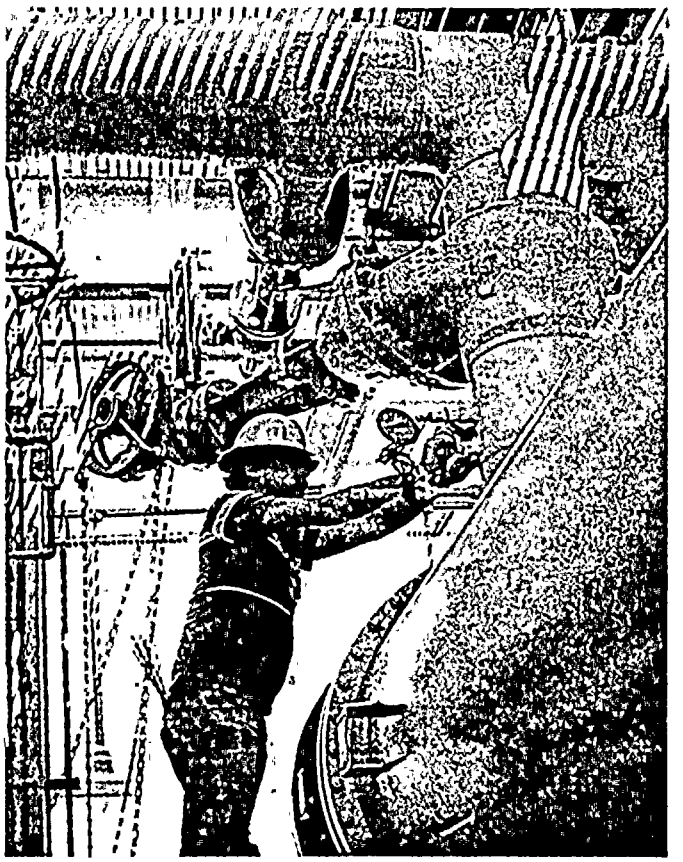
Designed to coexist with its environment, Turkey Point's 12,700-acre plant site continues to be the home for such rare and endangered species as the American crocodile and bald eagle. Most of the land is dominated by mangrove swamps maintained in their natural state to serve as a wildlife preserve. Additionally, 2,500 acres of the original site were deeded to the state of Florida in 1972 and that land today is part of the Biscayne National Park.

Mechanics Bob Skiner (kneeling), John Lewis (left) and Foreman Gary Sharpe inspect the diesel generator fuel and oil filters. Modification of the emergency diesel generator system was a major activity during the Turkey Point Unit 4 extended outage during 1986.

Turkey Point Plant Manager Chris Baker reviews progress of Unit 4 outage with Joe Kappes, maintenance superintendent.

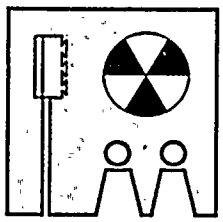


System Engineer Kent Clotfelter (left), Shift Technical Advisor Martin Bowskill (center) and Operations Support Group Supervisor Julio Balaguero inspect the component cooling water system in preparation for flow balancing tests. Expedited testing was required as part of the select safety system review prior to returning Turkey Point Unit 3 to operation. Unit 4 was off line for its refueling outage.



Senior Nuclear Plant Operator Charlie Cullop tags component cooling water system equipment. This plant-wide equipment identification and labeling program is part of the Turkey Point performance enhancement project.

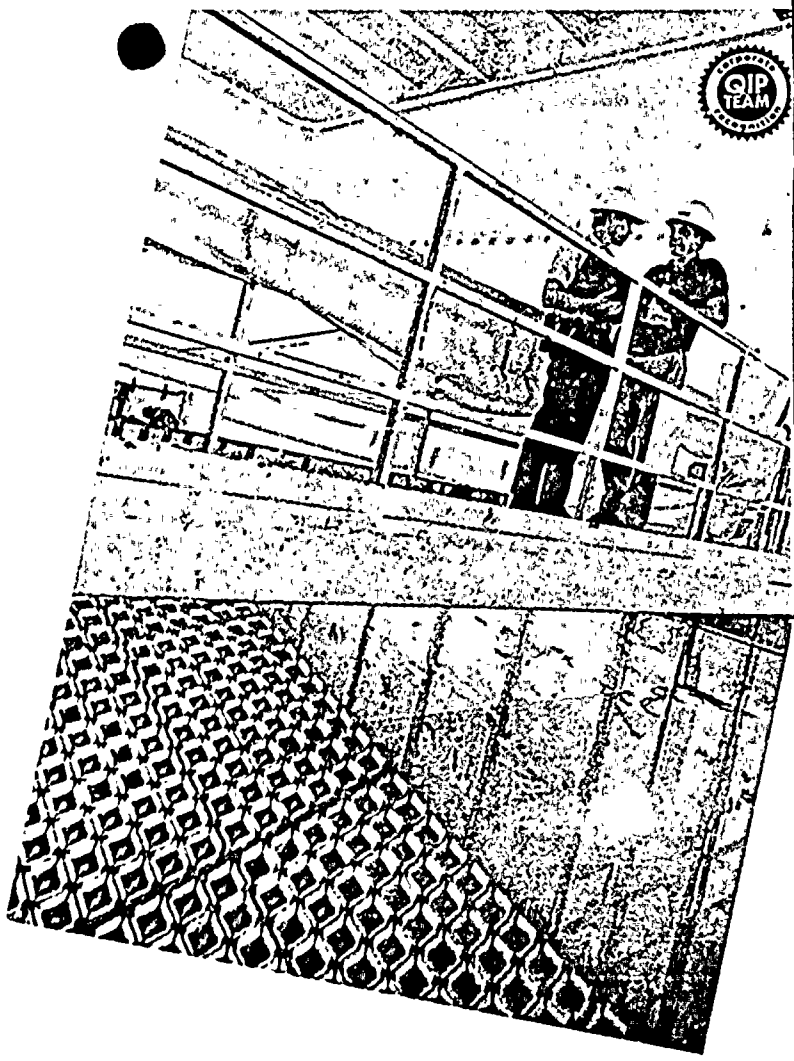
Radiological safety and emergency planning



FPL's overall radiological exposure has dropped 65 percent since 1983. Another measure of the department's radiological improvement is the continued reduction in low level radioactive waste shipped, which has been reduced 62 percent since 1983.

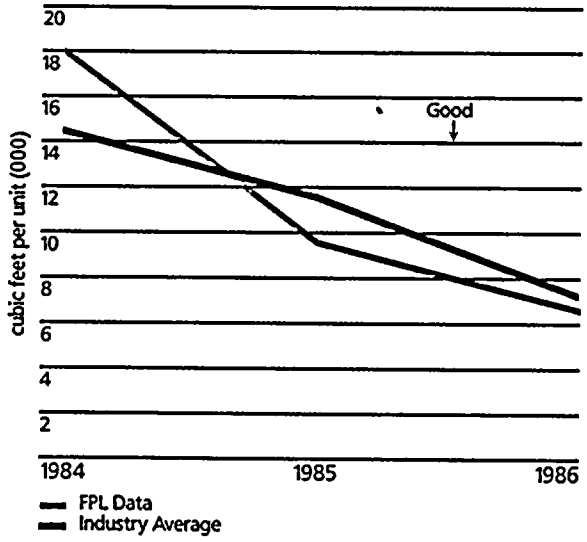
In 1986, the department's radiation dosimetry processing program was accredited by the U.S. Department of Commerce National Bureau of Standards, under the national voluntary laboratory accreditation program (NVLAP). Dosimetry is the process by which personnel exposure to radiation is carefully monitored. FPL is one of only 13 utilities accredited under NVLAP in all eight categories of consideration.

The emergency preparedness program continued to be effective as demonstrated by successful tests of emergency plans and favorable evaluations by the Federal Emergency Management Agency, the NRC and the Institute of Nuclear Power Operations (INPO).



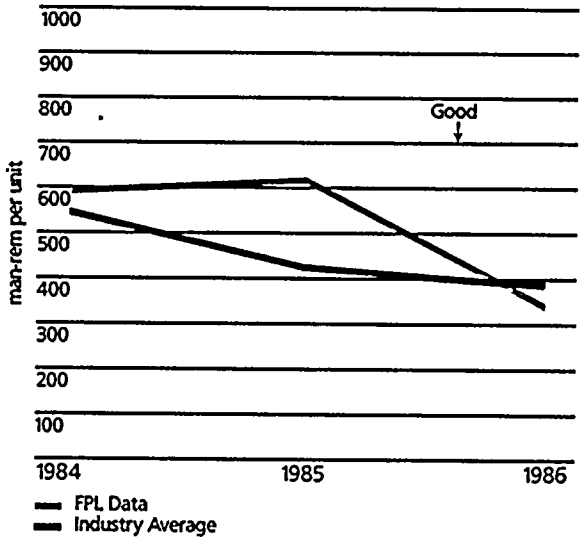
(Right) Startup department Instrument and Control Supervisor Milton Jordan (left) and technical department Engineer Art Martinez inspect the spent fuel pool area. As a result of a Quality Improvement Program team's decontamination program, the spent fuel area is now fully accessible without protective clothing. The team investigated the problem of areas of excessive contamination throughout the plant. As a result, a standardized decontamination program was created with established goals and priorities. In addition to Jordan and Martinez, team members included John Brooks, Pat Hughes, Dave Ingram, Don Vetromile and Virgil Wager.

Nuclear Energy
Solid Radioactive Waste Shipped



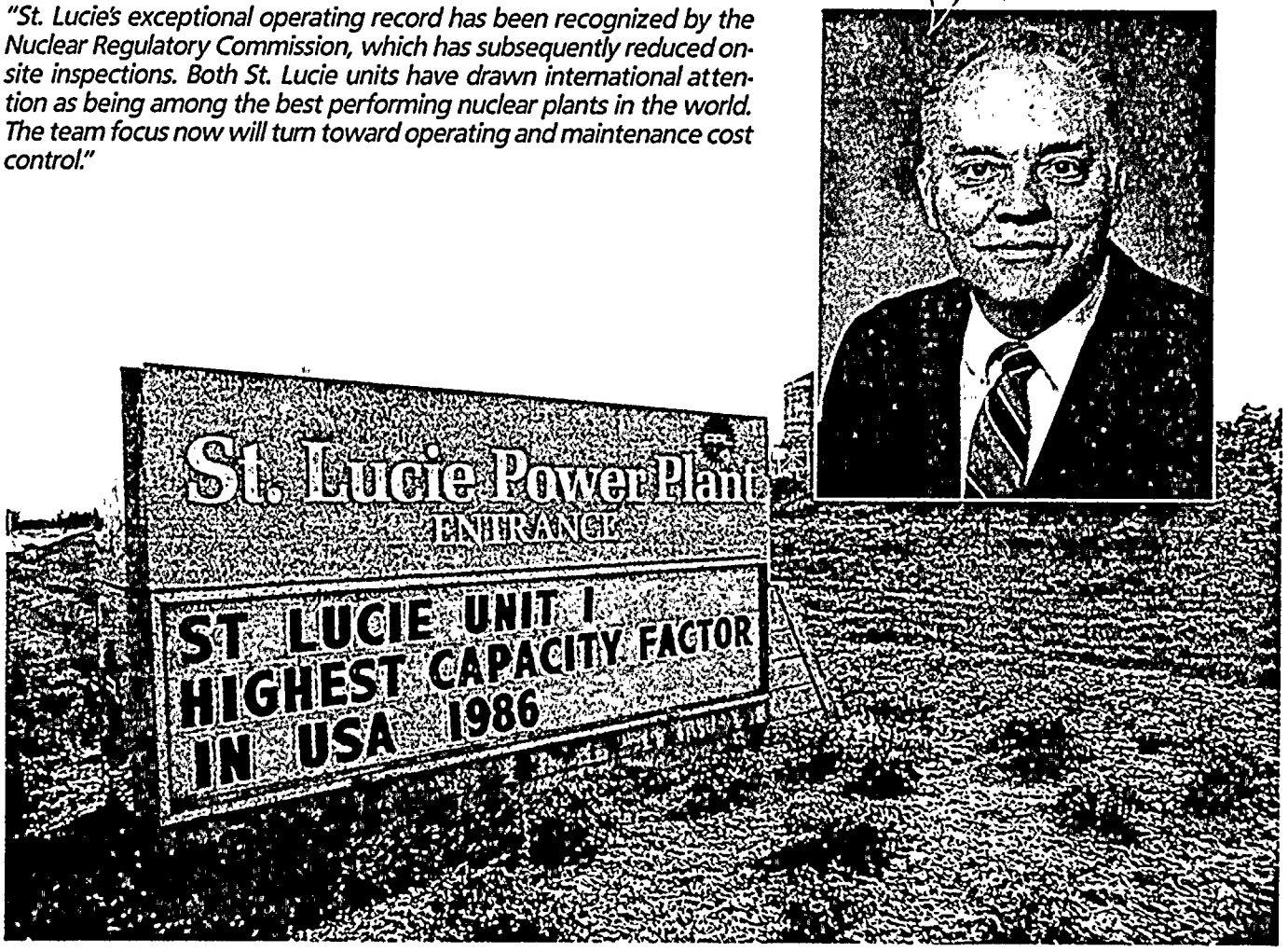
NOTE: Industry Average represents waste generated

Nuclear Energy
Collective Exposure Per Unit (PWR Only)



Ken Harris, St. Lucie plant site vice president:

"St. Lucie's exceptional operating record has been recognized by the Nuclear Regulatory Commission, which has subsequently reduced on-site inspections. Both St. Lucie units have drawn international attention as being among the best performing nuclear plants in the world. The team focus now will turn toward operating and maintenance cost control."



At the end of 1986, the St. Lucie plant marked 10 years of record-setting commercial operation.

Since the startup of St. Lucie 1 in 1976 (Unit 2 began service in 1983 following an industry record construction schedule of six years), the plant has generated more than 68 billion kilowatt-hours of electricity. In displacing the equivalent of more than 109 million barrels of oil, the units have saved FPL customers an estimated $1.9 billion in fuel costs.

St. Lucie 1 achieved a capacity factor for 1986 of 97 percent and was listed by the publication *Nucleonics Week* as the best performing unit in the country. According to Utility Data Institute, both St. Lucie units were among the ten lowest in cost of generating units in the nation. A report by the NRC office of analysis and evaluation of operational data rated St. Lucie 2 as the best of 19 new units to come on line during the 1983-85 period. Even though this unit had a refueling outage during 1986, it still finished the year with an 84 percent capacity factor.

In recognition of the plant's exceptional operating record, the NRC in 1986 named St. Lucie as one of only two nuclear facilities in an 11-state southeast region – and one of only five in the country – eligible for reduced on site inspections.

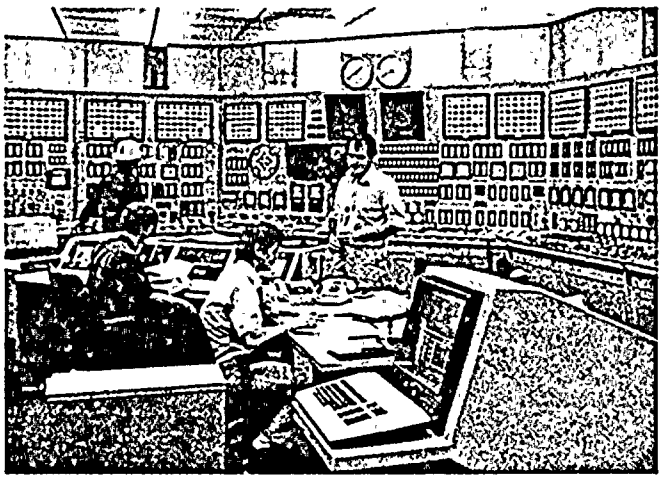
In the NRC systematic assessment of licensee performance (SALP), the level of performance at St. Lucie was graded as "high" with major strengths identified in areas of plant operations, maintenance, surveillance, licensing activities and training and qualifications effectiveness. No major weaknesses were identified.

St. Lucie Plant

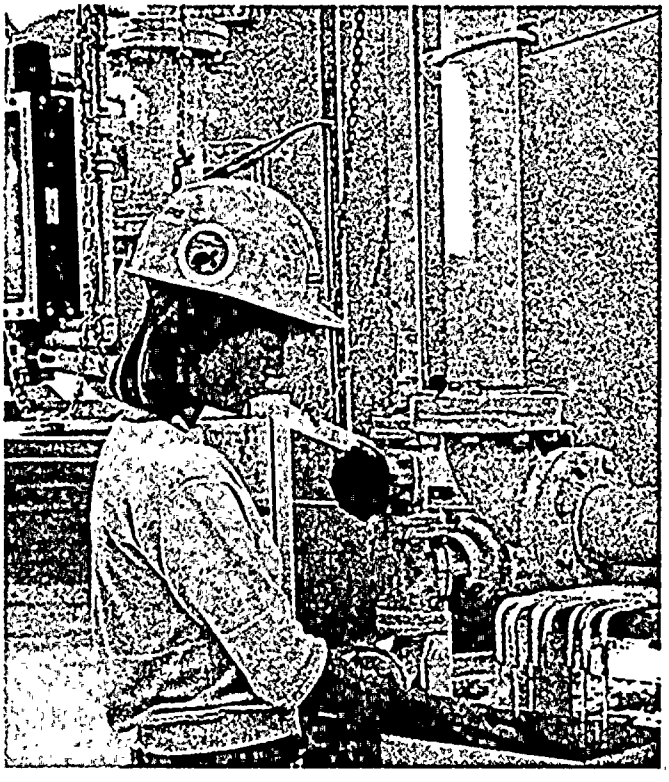
During 1986, 286 plant changes and modifications were completed. These were necessary to meet changing regulatory requirements and to ensure continued high equipment reliability in the future.

Key performance indicators included a 46 percent reduction in automatic trips since 1984, a reduction in personnel exposure of 63 percent from the previous year and a reduction of 17 percent in radioactive waste shipped. There was just one equipment related trip during 1986.

In addition to its performance records, St. Lucie has also become noted for its environmental contributions. About one-fourth of the 1,132-acre property is used for plant facilities, transmission lines and canals. The remaining mangrove swamps, marshlands and beaches are maintained in their natural state. Some 160 species of birds and 25 different kinds of animals live at St. Lucie and are regularly monitored by the utility. Two parks are maintained for use by the public and the site's landscaping complements its natural surroundings. Conservation activities include "turtle walks" that offer the public a chance to view the nighttime nesting rituals of giant loggerhead, leatherback and green sea turtles.

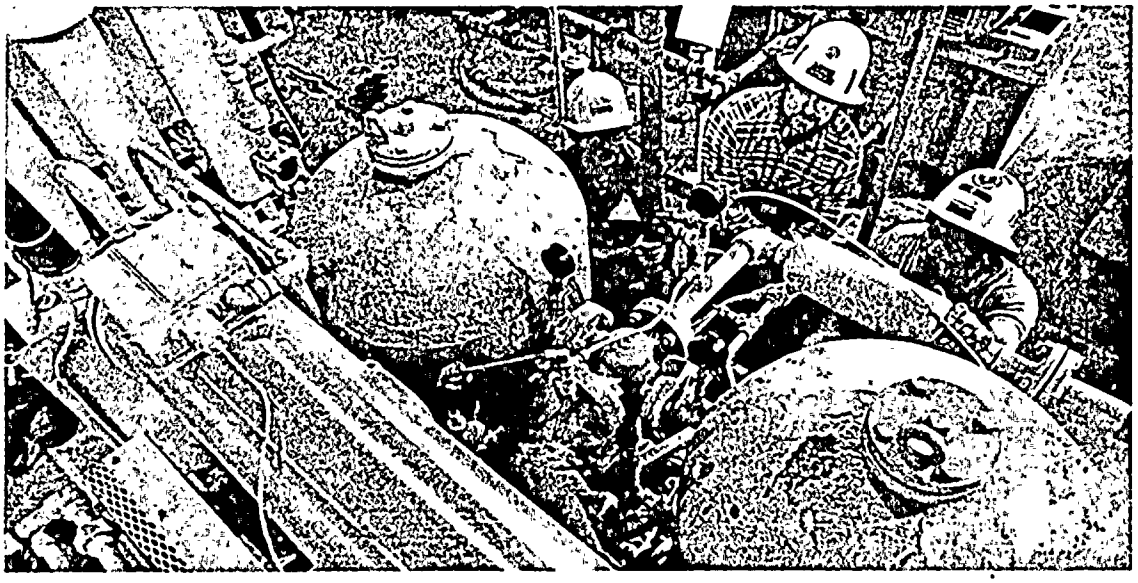


Assistant Nuclear Plant Supervisor Earl Libby (left), Reactor Control Operators John Hauger (center) and John Giles review upcoming shift activities in the St. Lucie Unit 2 control room.



St. Lucie Plant Technician Sue Bromstrup draws a sample from the water treatment plant.

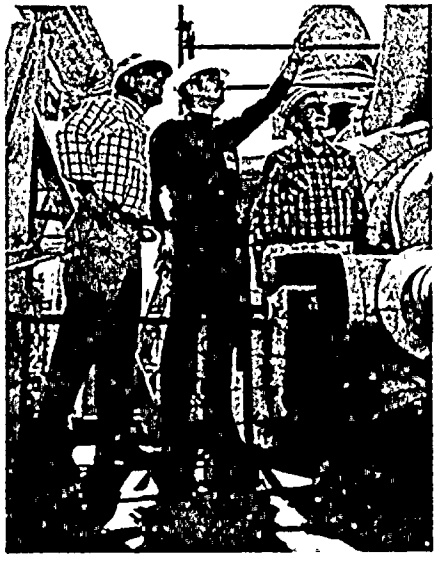
St. Lucie Plant Manager Dave Sager (left) confers with Site Vice President Ken Harris.



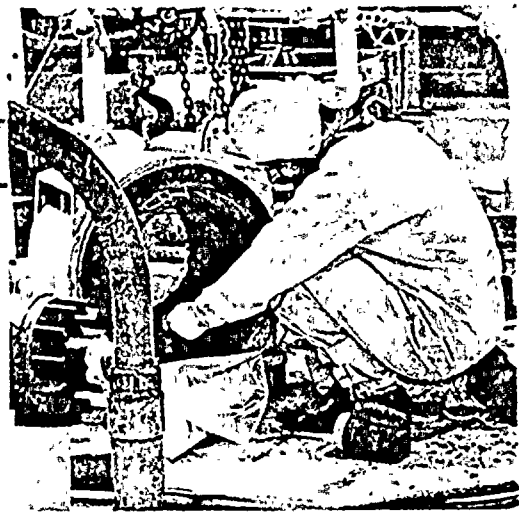
Turbine Operator Elliott Sumner (left), Foreman Roger Thomas (center) and Mechanic Eugene Floyd prepare for the 18-month preventive maintenance on the instrument air dryer during the 1986 refueling outage at St. Lucie Unit 2.

St. Lucie Plant Manager Dave Sager (seated) and Operations Superintendent John Barrow review plant performance data.

Plant Security Coordinator Bill White (left), Wackenhut Lieutenant Jim Wampler (center) and Wackenhut Captain Frank Finch review the St. Lucie site security system changes which will result from the installation of the intake area intrusion detection sonar system.

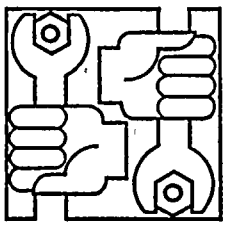


FPL Construction Supervisor Gordon Olson (left), Catalytic engineer John Whitney (center) and Pipe Fitter Foreman Bob Morgan plan piping work for the moisture reheater tube bundle replacement during the St. Lucie 1 refueling outage scheduled for February 1987.



In the charging pump room, Electrician Aldo Ramirez checks the Turkey Point Unit 4B charging pump motor in preparation for reassembly.

Maintenance



The role of maintenance is vital in nuclear plant reliability and among 1986 achievements in that area was the development of an analytically-based preventive maintenance program at the Turkey Point plant.

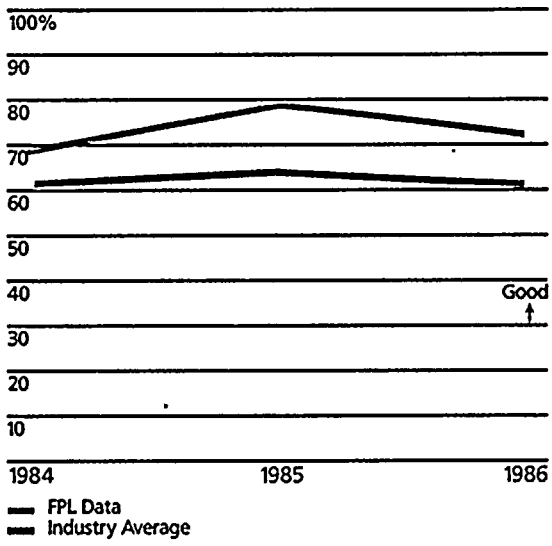
The goal of the program is to improve plant safety and availability through high-tech analysis to allow for preventive rather than corrective maintenance. New techniques include thermography, vibration analysis, computer data bases, statistical quality control and analysis related to component aging.

Implementation of a nuclear job planning system was also completed during 1986. The computerized network provides a centralized location for all information regarding plant work orders. The system is interfaced with a total equipment data base that contains information on components at each plant site.

A maintenance self assessment, using the Institute for Nuclear Power Operations (INPO) maintenance guideline document as a reference, was completed at both plants in 1986. In addition, a tracking system to monitor action items was installed as part of the program. FPL was the first utility in the country to complete the self assessment.

Unit scrams, or automatic shutdowns of the reactor, decreased substantially in 1986. This was accomplished through the formation of quality improvement teams which analyzed all unit reactor scrams since 1980 and then developed countermeasures for prevention. As a result, the average number of scrams per unit decreased from 5.1 to 3.5.

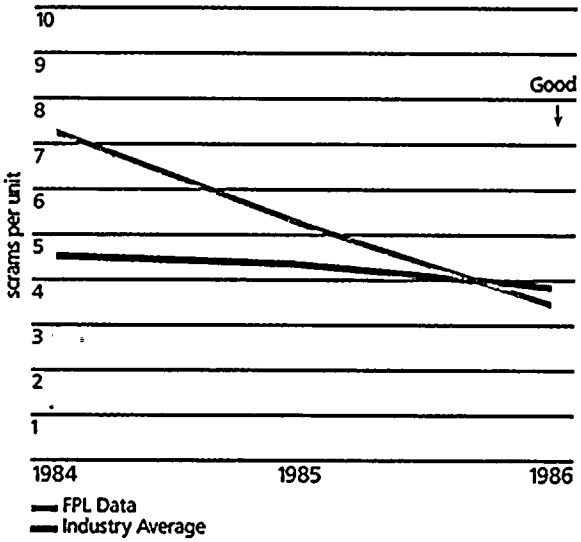
Nuclear Energy
Equivalent Availability

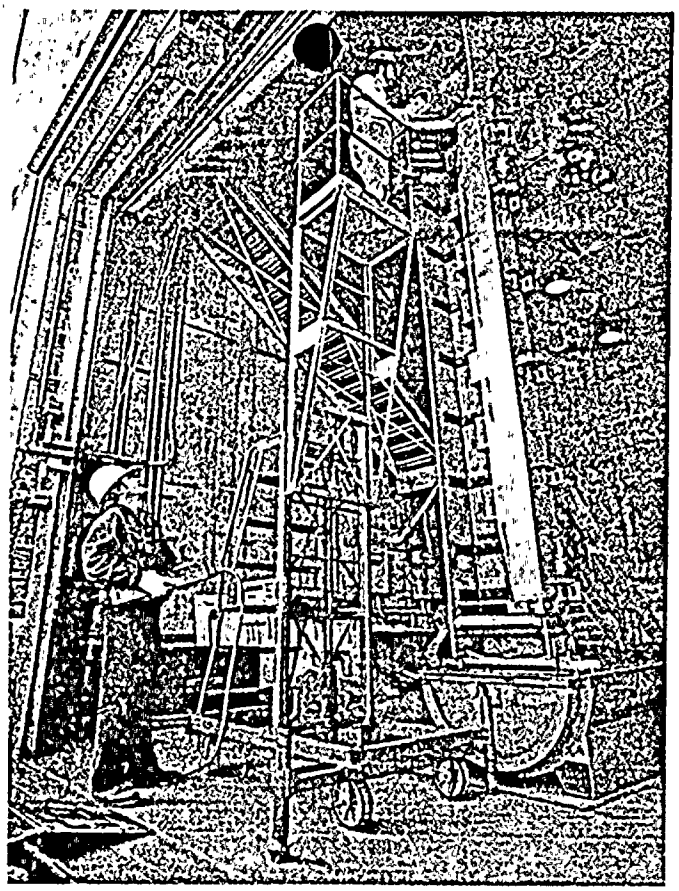


EQUIVALENT AVAILABILITY – Equivalent availability is the ratio of the total power a unit could have produced, considering actual equipment and regulatory limits, to its rated capacity expressed as a percentage.

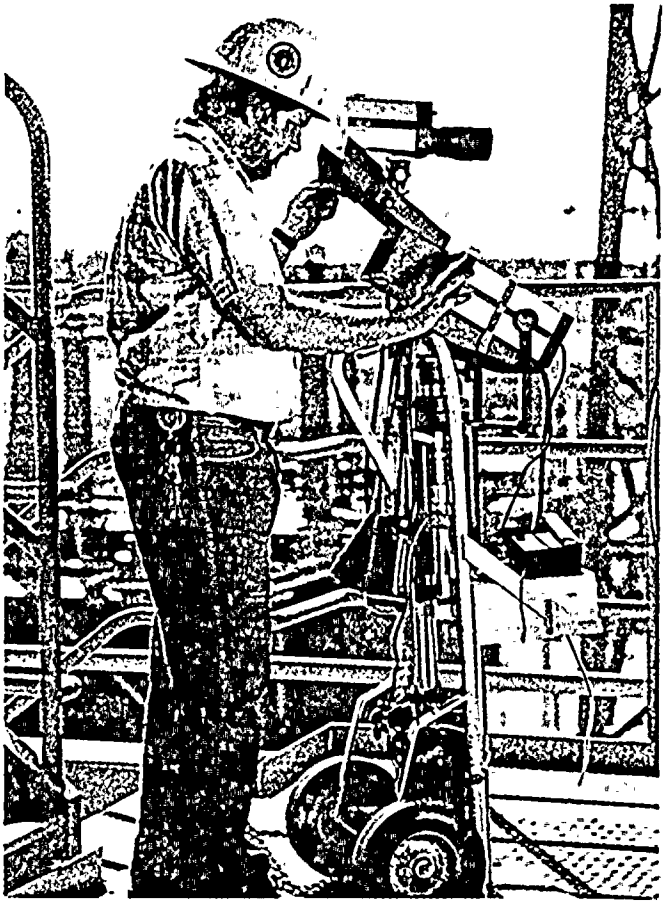
Senior Plant Technician Jeff Cook (standing) and Electrician Mike Waters conduct vibration analysis on the St. Lucie Unit 1B steam generator feed pump motor. Such analysis is a key component of the new analytically-based preventive maintenance program.

Nuclear Energy
Unplanned Auto Scrams



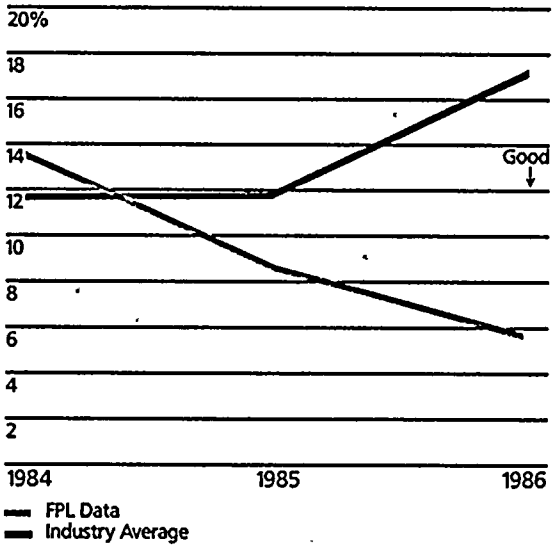


Reactor Operators Dave Kern (on ladder) and Bruce Poole perform receipt inspection of fuel for the Unit 2 refueling outage. A Quality Improvement Program team has been formed to improve the overall fuel cycle from receipt to operation and final storage in the spent fuel pool.

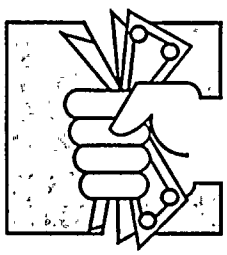


Senior Plant Technician Ralph Akerman conducts thermographic analysis on the St. Lucie Unit 1 isolated phase bus duct. Such high technology analysis is a part of the increased emphasis on analytically-based preventive maintenance.

Nuclear Energy
Forced Outage Rate



FORCED OUTAGE RATE – Forced outage figures reflect the percentage of time units are off line due to forced events when they could otherwise be producing power. Forced events are unplanned equipment failures or other conditions that result in units being taken off line on short notice.

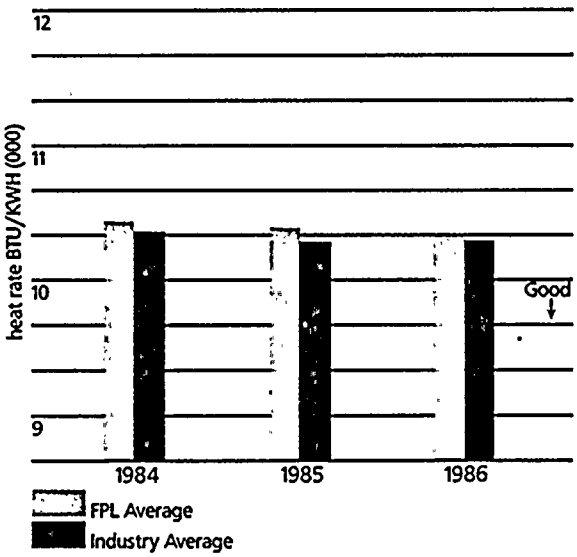


The performance of the nuclear energy department contributed significantly to FPL's overall financial performance during 1986.

The total nuclear non-fuel operation and maintenance expenses in 1986 were approximately $183 million. FPL's 1986 average total nuclear production costs including fuel was 20.9 percent less than the 1985 industry average. Industry data for 1986 was unavailable at the time of this printing.

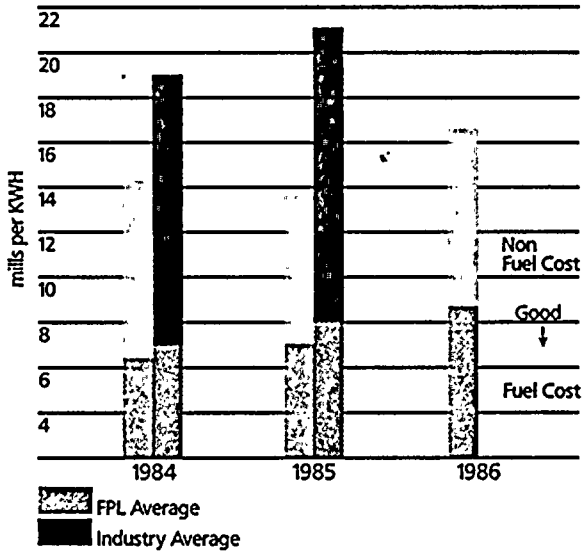
The Florida Public Service Commission (PSC) also allowed recovery of $216 million in jurisdictional costs associated with the replacement of the Turkey Point steam generators during 1981 to 1983. During two days of hearings held by the PSC, testimony showed that the events requiring the replacement of the steam generators were beyond FPL's control. The commission determined that the costs were prudently incurred for the benefit of the company's customers.

Thermal Performance

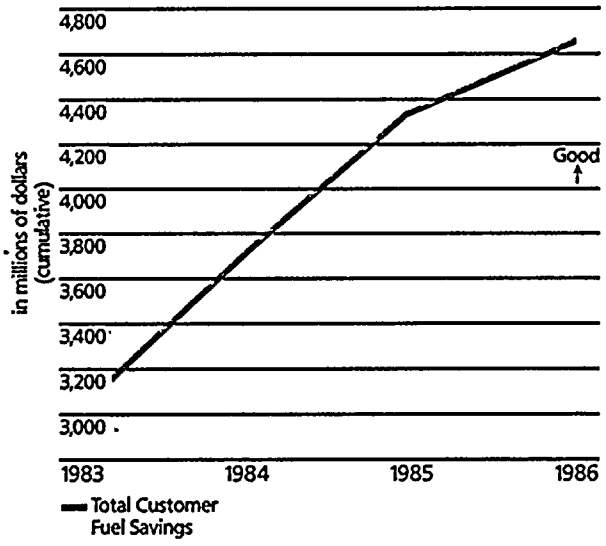


THERMAL PERFORMANCE – Thermal performance is usually measured by heat rate, or Btu per kilowatt-hour. A low heat rate reflects emphasis on thermal efficiency and attention to detail in maintenance. An efficient or "well-tuned" plant enables operators to detect abnormal trends and correct them early. The minimum heat rates attainable are also a function of plant design.

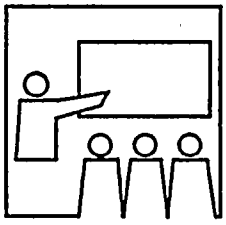
Total Nuclear Production Costs
(FPL to Industry Average Comparison)



FPL Nuclear Fuel Savings



In 1981, FPL launched a company-wide Quality Improvement Program (QIP) designed to provide the tools necessary to help produce innovative solutions to complex problems.



The program's quality concepts have been especially valuable to the nuclear energy department, where higher standards have been ongoing goals. The application of statistical quality control techniques, as emphasized in the quality improvement process, has become essential to the everyday operations of the nuclear program.

QIP consists of three distinct and separate areas:

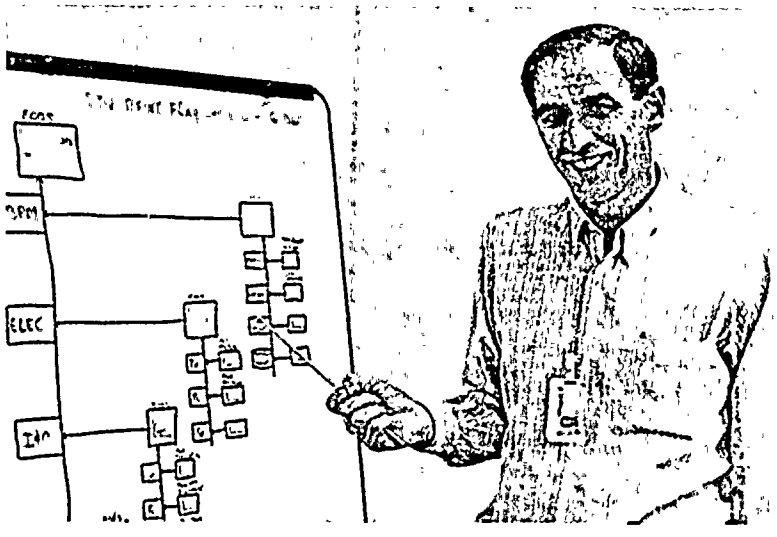
Teams

During 1986, the nuclear energy department had 141 teams dealing with a wide variety of problem and opportunity areas. Utilizing problem solving techniques taught in extensive training programs, more than 850 department employees participated on teams. By determining the root causes of problems and formulating corrective actions, team members continually improve performance.

An example of one such team success during 1986 was the development of a new, simplified control rod split pin replacement operation at Turkey Point 4. Through vendor and FPL team efforts, the reactor's 102 guide tube split pins were replaced in 18 days – nearly five days ahead of schedule, under budget and with no rework, a first in the industry.

Other quality team achievements during 1986 included new emergency operations procedures, significant radwaste reductions, improved electrical power availability for refueling activities and enhanced refueling outage planning.

A QIP team, the "QKT's," increased the efficiency of the method of communicating with plant operations and support personnel during off-work hours. The Turkey Point team included (left to right) Dru Tennell, Pat Boyd, Margie Ottilige, Gyneth Rhodes and Dawn Costa. Connie Herd was also a member of the team.



Turkey Point Plant Manager Chris Baker reviews the "quality in daily work" flag system with his staff.

The Quality Program

The nuclear energy staff QIP team satisfied the national voluntary laboratory program requirement for dosimetry accreditation. The team developed quality control training programs, dose algorithms and required procedures. The benefit was immediate assessment of worker radiation exposure measured at the highest standards of accuracy. Team members were Nuclear Energy Analyst Mike Fedotowsky (left), Technician Patti Tims (center) and Senior Specialist Sandy Perle. Also on the team was Regina Belcher.

Policy deployment

As FPL's corporate "roadmap," policy deployment requires that each department concentrate on a few select areas of performance improvement. Success in these priority areas is achieved by a corporate-wide focus geared to providing solutions and developing opportunities. With an emphasis on data gathering, the policy deployment process demands that improvement actions be constantly monitored and measured with follow-up corrective action taken when necessary.

The policy deployment goals of the nuclear energy department are to: (1) improve regulatory performance (2) improve unit reliability (3) plan and manage operating and maintenance expenses within approved budgets. Specific plant and staff annual plans then are supported by projects aimed at accomplishing the mid-term plans. (see policy deployment diagram)

Quality in daily work (QIDW)

Emphasizing continually improving work performance, this component of the quality program begins with a thorough identification of job responsibilities for each individual. Standards to measure performance and to set goals are then developed for each position. Once the work process has been shown to meet its objectives, the process may be standardized for the entire work unit.

The QIDW process promotes systematic control and improvement in any task to which it is applied. A process is established for day-to-day work performance which requires that day-to-day work be planned, done, checked, and if the objectives have not been met, acted upon.

FPL's quality improvement efforts are based on a respect for people in the work place, customer satisfaction, the use of data for management direction and quality performance on a daily basis. The quality program has emerged as the single most important element in the way FPL operates as a company.

The use of quality improvement principals to achieve significant savings in operations costs, increase customer satisfaction and improve communication and cooperation among employees has attracted international attention. To date, more than 500 organizations in the U.S. and Europe – including 24 electric utilities – have attended special seminars held at FPL to learn more about the program.

The St. Lucie QIP "INPO" team promoted a concentrated plant-wide effort to raise the overall St. Lucie INPO rating of plant processes and procedures. The 1986 INPO evaluation found ten "good practices," a significant improvement over previous evaluations. Team members included (front row, left to right) Chris Burton, Russ Cox, Bill Alfera, Rick Wagoner (back row, left to right), Lamar McLaughlin, Doc Mercer, Harry Bishop, Dennis Wyatt, Bob Mayhew and Ed Burgess. Other team members were Alan Hill and Andy Pauley.

1987 POLICY DEPLOYMENT

CORPORATE VISION

During the next decade, we want to become the best managed electric utility in the United States and an excellent company overall and be recognized as such.

NUCLEAR ENERGY VISION

To become and be recognized as the safest, best performing nuclear utility, through teamwork and commitment to excellence.

CORPORATE MIDTERM PLAN

- Achieve customer satisfaction
- Shape the environment
- Strengthen organizational effectiveness
- Effective utilization of resources

NUCLEAR ENERGY STAFF MIDTERM PLAN

- Improve regulatory performance
- Improve unit reliability
- Plan and manage operating and maintenance expenses within the approved budget

CORPORATE SHORT-TERM PLAN

- Improve reliability of electric service
- Improve public confidence in our safety programs
- Strengthen FPL's effectiveness in dealing with special interest groups, governmental bodies and regulatory agencies
- Effective deployment of resources (capital and operating expenses)
- Continue to emphasize the safe, reliable and efficient operation of nuclear power plants

NUCLEAR ENERGY STAFF ANNUAL PLAN

- Reduce INPO findings to 61
- Reduce NRC findings to 47
- Reduce SCRAMS to 12
- Reduce unplanned days off line to 119
- Maintain operating and maintenance expenditures to within + 4% to − 5%

ST. LUCIE ANNUAL PLAN

- Improve safety system availability/reliability
- Improve INPO relationships
- Reduce plant outages
- Limit operating and maintenance variances to + 4% to − 5% of budgeted amount
- Reduce skin and clothing contaminations

TURKEY POINT ANNUAL PLAN

- Reduce NRC findings
- Reduce INPO findings
- Reduce forced outage days
- Reduced unplanned outages
- Reduce capital and O&M budget variances

NUCLEAR ENERGY STAFF PROJECTS

- Instructor development and certification project
- Improve the quality assurance department's ability to provide FPL with effective self regulation of its nuclear program
- Health physics improvement program
- Engineering degree program for licensed operators
- Reduce number of unusual events
- Enhance QCPS baseline to ensure commitments are included in procedures and instructions
- Improve handling of non-radiological environmental issues
- Steam generator reliability project
- Improve corrosion environment of secondary system
- Submit Technical Specification amendments to increase instrumentation surveillance intervals
- Reduce number of automatic reactor trips
- Improve productivity utilization of plant maintenance workers through improved job planning
- Reanalysis and relicense PTN to low concentration boric acid
- Seismic hazard/alternate load methodology
- Manpower planning system
- Daily cost accounting system

ST. LUCIE PROJECTS

- Reduce the number of auxiliary feedwater system faults by 50% from 1986 level
- Reduce the number of diesel generator faults by 25% from 1986 levels
- Training program accreditation project
- QIP team to prepare for and coordinate INPO evaluation
- QIP team to analyze data, find and correct causes of contaminations (skin and clothing)
- Reduce automatic trips to three per unit
- Reduce outage extensions
- Control selected EAC's to + 4% to − 5%

TURKEY POINT PROJECTS

- Implement quality instructions throughout administrative procedures
- Procedure upgrade program
- Analytically based preventive maintenance
- Implement human performance evaluation system
- INPO team
- NIS reliability
- Equipment labeling
- On-line secondary chemistry monitor
- Integrated outage management and revised NSSS vendor relationship
- Oxygen ingress reduction
- RCS valve upgrades
- RCP seal upgrade
- Budget control and planning
- AFW Engineering Program
- Design Basis Reconstitution

Simply stated, our job is to provide safe, reliable and least cost energy to our customers.

These three goals are not mutually exclusive. They must be achieved in concert and while they present formidable challenges, we are demonstrating that superior performances are possible in each area.

A part of our Quality Improvement Program concentrates on always bringing performance into proper focus. Part of such a focus is the need to track performance and communicate openly and effectively with fellow employees. The demands of a flawless performance call for an increased awareness on the part of each employee in every area of operation – anything short of this is not meeting our personal commitment to quality.

During 1986, Florida became the nation's fifth most populous state as 113,000 new customers joined the FPL system. The state is projected to become the fourth largest in 1987.

To meet such growing demands, the nuclear energy department must continue to build on its quality-conscious philosophy and efficiency-oriented operation. As a vital component of the FPL power system, we must continue to find ways to improve as we are called upon to generate the needs of a new generation of customers.

We must use the considerable accomplishments of 1986 to springboard to new and unprecedented heights in nuclear performance, for while we are proud . . . we are not yet satisfied.

C.O. Woody
Group Vice President
Nuclear Energy

Group Vice President Nuclear Energy

C. O. Woody, 30 years FPL, experience in fossil and nuclear operations and management; U.S. Army – Corp of Engineers; MBA, University of Miami; Management Development Program – Harvard University; Brookings Institute; Levinson Institute; Overall responsibility for all Nuclear Energy functions, St. Lucie and Turkey Point nuclear plant operations, and compliance with NRC License.

Vice President Nuclear Operations

Joseph W. Dickey, 19 years FPL, experience in fossil and nuclear plant operations and management, including Plant Manager; BS Chemical Engineering and MS Civil Engineering, Massachusetts Institute of Technology; University of Virginia; Brookings Institute; Levinson Institute; and Stone & Webster executive programs; Professional Engineer, Florida; Responsible for the overall operation, maintenance and administration of two nuclear plants.

Executive Assistant

John S. Odom, 13 years FPL; experience in nuclear quality assurance, corporate contracts, and project management for 2 new coal plants; 9 years prior experience, U.S. Navy Nuclear Submarine Program; BS Engineering, US Naval Academy; MBA, Harvard University; responsible for assisting in the overall operation and maintenance of two nuclear plants.

On Special Rotation Assignment

David A. Sager, 11 years FPL, experience in nuclear plant operations and management; 7 years prior experience, U.S. Navy Nuclear Submarine Program; SRO License (past); BS and MS Mechanical Engineering, U.S. Naval Academy; MBA, Florida Institute of Technology; University of Virginia, Executive Program; St. Lucie Plant Manager on special rotation assignment.

Site Vice President St. Lucie

Kenneth N. Harris, 17 years FPL, experience in nuclear operations, includes Plant Manager and Site Vice President, Turkey Point; 11 years prior experience, in nuclear plant engineering, operations, and training; MBA, University of Miami; Executive Program, Stanford University; Levinson Institute; SRO License (past); Responsible for Operations, Maintenance, Backfit, Construction, and Engineering.

Manager Nuclear Maintenance

Henry E. Yaeger, 40 years FPL, experience in fossil and nuclear operations, maintenance and management, including Site Manager, Turkey Point nuclear plant; Southeast Electric Exchange Utility Management School; Levinson Institute; Responsible for technical support to the nuclear plants in maintenance procedures and programs to meet regulatory requirements.

Manager Nuclear Energy Service

Harry N. Paduano, 14 years FPL, experience in nuclear management; 9 years prior experience, U.S. Navy Nuclear Program and PWR fluid system design; BS Chemical Engineering, University of Virginia; University of Virginia – Executive Program; Southeast Electric Exchange Utility Management School; Responsible for health physics, emergency planning, non-destructive testing, chemistry and radio chemistry, and plant support.

Manager Nuclear Training

William J. Waylett, Jr., 16 years FPL, experience in nuclear and fossil plant start-up, maintenance and operations; 5 years prior experience, U.S. Navy Nuclear Submarine Program; BS and Masters in Chemical Engineering, Cornell University; MBA, Nova University; Professional Engineer, Florida; Directs Technical Training programs for both nuclear plants.

Site Vice Turke

Cecil M. Wet
experience in
Including Plant
prior experienc
Mechanical Engi
University of Mia
tute, Leadersh
License (past);
neer, Florida; Res
tions, ' Mainte
Construction and

Plant Manager St. Lucie

Gilbert J. Boissy, 17 years FPL, experience in nuclear plant maintenance, Quality Assurance, operations, and start-up; completed SRO Training-St. Lucie; 7 years prior experience, U.S. Navy Nuclear Submarine Program; Bachelor Engineering Technology, Florida International University; University of Virginia, Executive Program; responsible for Operations, Maintenance, Training, QC and Technical Support.

Services Manager St. Lucie

Richard Sipos, 3 years FPL, 12 years prior experience in nuclear plant engineering and construction; BS Mechanical and Civil Engineering Degrees, University of Mississippi; MBA, Florida Institute of Technology; Professional Engineer, Florida; Directs and coordinates Administration, Outage Management, Fire Protection, Budget and Cost Control, and Security.

Site Project Manager

Richard D. Parks, 13 years FPL, experience in project management for nuclear and fossil power plants; 17 years prior experience, including construction and engineering of nuclear submarines; BS Textile Engineering, North Caroline State University; Responsible for implementing and controlling construction related activities at St. Lucie.

Engineering Site Manager

David A. Chaney, 10 years FPL, experience in nuclear construction and licensing, 7 years prior experience, U.S. Navy Nuclear Submarine Program; BS Systems/Nuclear Engineering, U.S. Naval Academy; MBA and Law Degree, University of Miami; SRO Certification; responsible for on-site engineering activities.

Site Project Manager

H. Thomas Young, 14 years FPL, experience in nuclear project management; 2 years prior experience, nuclear plant construction; BBA, Wittenberg University; Responsible for implementing and controlling construction related activities at Turkey Point.

Services Manager Turkey Point

Jorge P. Mendieta, 15 years FPL, experience in nuclear plant operations and maintenance; 3 years prior experience, U.S. Army; BS Electrical Engineering, Florida Atlantic University; Southeast Electrical Exchange Management School; Directs and coordinates Administration, Outage Management, Fire Protection, Budget and Cost Control, and Security.

Maintenance Superintendent

Theodore A. Dillard, 14 years FPL, experience in nuclear maintenance, including project manager, thermal shield repairs; 8 years prior experience as a field service specialist, turbine generators; BS Mechanical Engineering, Letourneau College; Responsible for Mechanical, Electrical and I&C Maintenance Departments.

Training Superintendent

Pat L. Fincher, 16 years FPL, experience in nuclear plant start-up, operations and training; 7 years prior experience, U.S. Navy Nuclear Submarine Program; SRO License (past); Responsible for the training, retraining and qualifications of plant maintenance and operations personnel.

Operations Superintendent

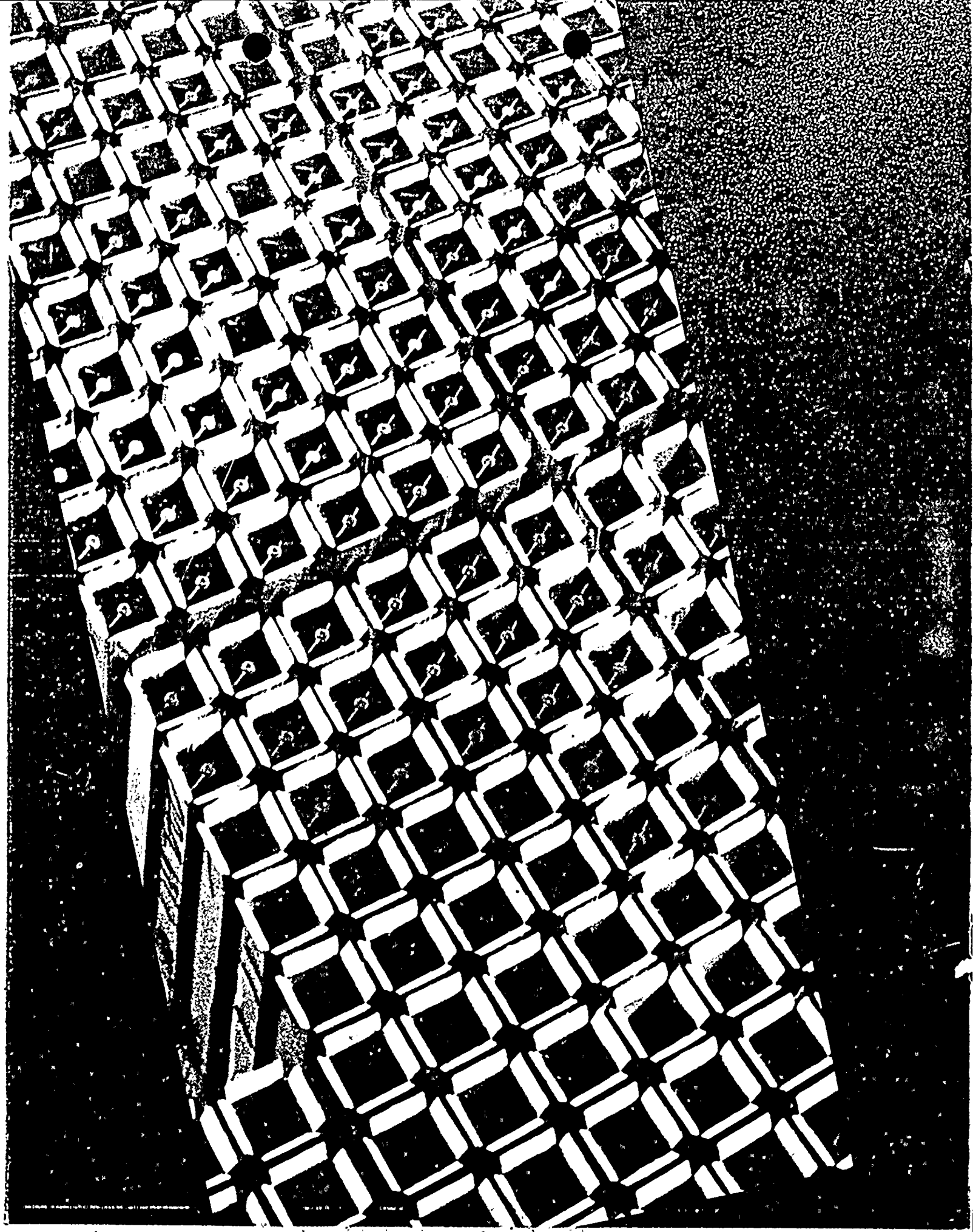
John H. Barrow, 28 years FPL, experience in nuclear plant engineering, operations, and management; BS Mechanical Engineering, Auburn University; SRO License (past); Responsible for overall plant operations, including Chemistry, Health Physics, Reactor Engineering, and Operations.

Maintenance Superintendent

Finis H. Southworth, 10 years FPL, experience in nuclear analysis, fuels and core design; 3 years prior experience as Professor, Nuclear Engineering, University of Illinois; BS, MS, and Ph.D. Nuclear Engineering, University of Florida, SRO Certification; responsible for mechanical, electrical and I&C Maintenance Departments.

Training Superintendent

William C. Miller, 17 years FPL, experience in engineering, operations and training; BS Mechanical Engineering, University of Miami; MBA, Florida International University; SRO License (past); Responsible for the training, retraining and qualifications of plant maintenance and operations personnel.



NUCLEAR ENERGY DEPARTMENT ORGANIZATION

April, 1987

resident Point

4, 36 years FPL, int operations, anager; 3 years U.S. Navy; BS ering and MBA, t Levinson Insti- Program; SRO ofessional Engi- nsible for Opera- nce, Backfit, ngineering.

Manager Planning and Control

John C. Velotta, 15 years FPL; 4 years prior experience, U.S. Navy Nuclear Submarine Program; BS Electrical Engineering and Computer Science, University of California and MBA, University of Miami. Professional Engineer, Florida; Responsible for budget and Cost Control, Personnel, Administration, Systems, Rate Regulating Interface, and Security.

Director Nuclear Licensing

Jack K. Hays, 31 years FPL, experience in start-up testing, operations and management of fossil and nuclear units; 3 years prior experience, USAF; BS Mechanical Engineering, University of Florida; University of Virginia, Executive Program; SRO License (past); Directs operational and generic nuclear regulatory issues.

Director Quality Assurance

Robert J. Acosta, 12 years FPL experience in reactor engineering, core performance, steam generators, performance enhancement, and quality assurance; 7 years prior experience fossil plant testing and nuclear technical support; BS Mechanical Engineering, University of South Florida; Professional Engineer, Florida; directs Quality Assurance activities within Nuclear Energy and at both nuclear sites.

Manager Performance Enhancement Program

Joseph W. Kappes, 13 years FPL, nuclear experience in I&C and maintenance management; 8 years prior experience, U.S. Navy; Navigation Supervisor in nuclear submarine; BBA and MBA, University of Miami; Responsible for the Turkey Point Performance Enhancement Project.

Plant Manager Turkey Point

Christopher J. Baker, 13 years FPL, experience in nuclear plant operations and management; 10 years prior experience; U.S. Navy Nuclear Submarine Program; SRO License (past); BS Management, Barry University; Management Development Program, Harvard University; Responsible for Operations, Maintenance, Training, QC, and Technical Support.

Manager Nuclear Licensing

John A. DeMastry, 14 years FPL, experience in nuclear licensing; 21 years prior experience in research/engineering, including 4 years U.S. Army; BS Chemistry and work towards Masters, Metallurgical Engineering, Ohio State University; Southeast Electric Exchange Utility Management School; Brookings Institute; Responsible for interfaces with NRC and regulatory issues.

Manager Quality Assurance Services

Robert F. Engimeier, 13 years FPL; 19 years prior experience in Quality Assurance/Engineering, including 4 years USAF, pilot; BS Mechanical Engineering, Virginia Polytechnic Institute; MBA, University of Miami; Professional Engineer, Florida; Coordinates QA Systems, Procurement, and Programs to assure compliance within Nuclear Energy.

QA Superintendent St. Lucie

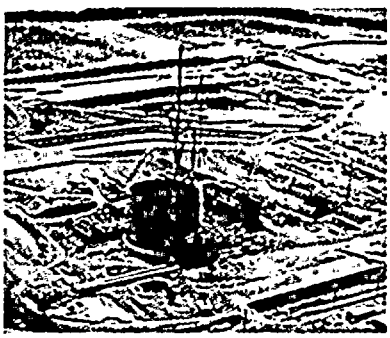
James B. Harper, 16 years FPL, experience in Quality Assurance, District operations; B.S. Engineering, University of South Florida; MBA, Florida International University; FPL Nuclear Power Engineering Program; Responsible for on-site development, implementation, and administration of the Quality Assurance Program.

QA Superintendent Turkey Point

L. Wesley Bladow, 20 years FPL, 7 years experience in Quality Assurance, 13 years experience in Engineering; B.S. Industrial Technology, Florida International University; responsible for on-site development, implementation and administration of the Quality Assurance Program.

Operations Superintendent

Donald D. Grandage, 18 years FPL, experience in nuclear operations, engineering and management; BS Mechanical Engineering, University of Florida; SRO License (present); Responsible for overall plant operations, including Chemistry, Health Physics, Reactor Engineering and Operations.



World Nuclear Milestones

1951 First nuclear power generation began in the United States (experimental breeder reactor BR-1, 100 megawatts).

1954 First nuclear power plant began commercial operation in USSR (5 megawatts).

1956 First British nuclear power plant began commercial operation (Calder Hall, 35 megawatts).
First Asian nuclear reactor constructed in India.

1957 International Atomic Energy Agency established.
First U.S. Nuclear power plant began commercial operation (Shippingport, 60 megawatts).
First Japanese nuclear power plant began operation (JRR-1, 50 megawatts).

1958 U.S. nuclear-powered submarine Nautilus crossed the Arctic Ocean underwater.

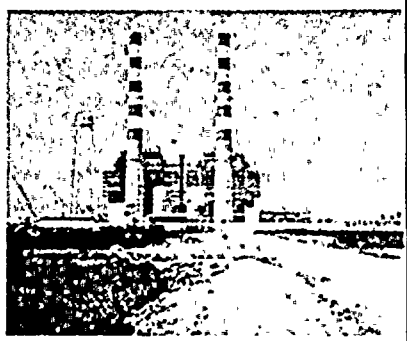
1959 First nuclear-powered commercial ship, the Savannah, was launched.

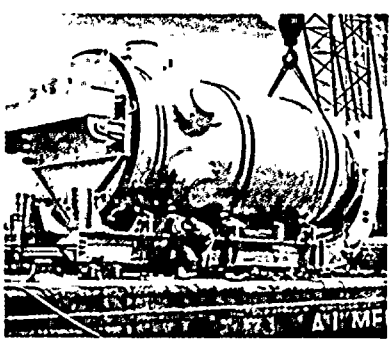
1960 Dresden Nuclear Plant began operation (U.S., 180 megawatts).
Yankee Nuclear Plant began operation (U.S., 134 megawatts).

1965 FPL President McGregor Smith announces that a nuclear power plant will be built at Turkey Point.

1967 First French nuclear power plant began operation (Chooz A, 310 megawatts).

1969 First Federal Republic of Germany nuclear power plant began operation (Obrigheim KWO, 340 megawatts).





Turkey Point Facts and Milestones

Nuclear steam supply systems, designed by Westinghouse Electric Corporation, have pressurized water reactors (PWR) with three steam generators.
Secondary plants, designed by Bechtel Power Corporation, use six stages of feedwater heaters.
Turbine generators, designed by Westinghouse, have one high pressure and two low pressure turbines.

Turkey Point construction permit received ..... April 27, 1967

Turkey Point 3 operating license received ..... July 19, 1972

Start of commercial operation ..... Dec. 4, 1972

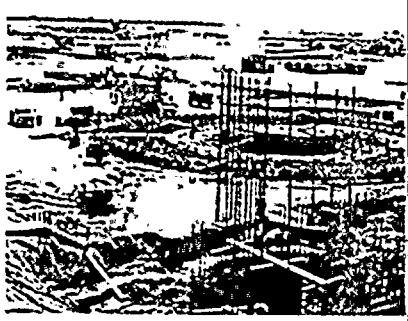
Turkey Point 4 operating license received ..... April 10, 1973

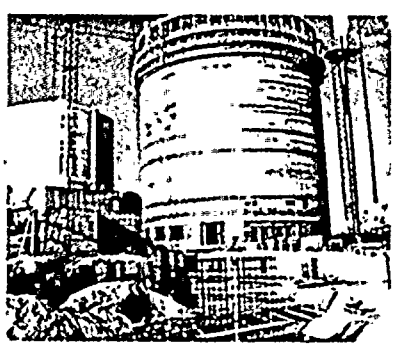
Start of commercial operation ..... Sept. 7, 1973

Turkey Point steam generators replaced ..... May 16, 1983

Turkey Point generates 100 billionth kilowatt-hour ..... Aug. 30, 1986

Fuel cycles: Unit 3, 10th cycle; Unit 4, 11th cycle





St. Lucie Facts and Milestones

Nuclear steam supply systems, designed by Combustion Engineering, have pressurized water reactors (PWR) with two steam generators.
Secondary plants, designed by Ebasco Services, use five stages of feedwater heaters.
Turbine generators, designed by Westinghouse Electric Corporation, have one high pressure and two low pressure turbines.

St. Lucie 1 construction permit received ..... July 1, 1970

Operating license received ..... March 1, 1976

Start of commercial operation ..... Dec. 21, 1976

St. Lucie 2 construction permit received ..... May 2, 1977

Operating license received ..... April 6, 1983

Start of commercial operation ..... Aug. 8, 1983

St. Lucie 1 named as top nuclear generating performer in the free world ..... Oct. 21, 1985

Fuel cycles: Unit 1, 7th cycle; Unit 2, 3rd cycle