

insight

JANUARY 2000

Coming This Spring: A New, Tested Oversight Process

Objective Performance Thresholds Provide Link to Safety

This year, the agency that regulates nuclear power plants will begin using a new, objective oversight process that is more sharply focused on safety than ever before.

The new process includes objective performance thresholds based on insights from safety studies and 30 years of plant operating experience. It's more timely, moving from the 18- to 24-month time lag of the old process for assessing plant performance to a quarterly review. The agency also hopes the process will prove to be more "scrutable"—more accessible to, and readily understood by, the public.

After a year-long development phase, the agency pilot-tested the new oversight process last June-November. Eight nuclear plant sites, comprising 13 generating units, participated in the pilot.

Following the pilot project, the NRC, industry and other groups held workshops to discuss lessons learned. The workshops identified several keys to effective implementation of the new process at nuclear power

- plants: management leadership, company- and community-wide participation, and precise data collection and documentation.
- "About 90 percent of the new approach

- addressed—for example, ensuring the accuracy of performance data and the appropriate performance indicators for security—but he believes the new process will be ready for full implementation in April.



N.Y.'s FitzPatrick plant pilot-tested NRC's new oversight approach

"We have learned a great deal from the pilot project," he said, "but it's time to expand this process to all 103 nuclear power plants in the country."

Feedback from participants in the pilot project highlights the improved safety focus of the new process. As an executive from one of the pilot plants put it recently: "Now, when we talk to the NRC, it's all about safety. It's a

- works just fine," said Steve Floyd, senior director of regulatory reform at NEI, addressing the NRC workshop. "Overall, the structure and tools of the new approach support improvements in the objectivity, consistency and safety focus of the regulatory process."

- refreshing change."

The new oversight process uses about 20 indicators to gauge plant performance in three areas: plant safety, radiation safety and security. Performance in each indicator will be measured quarterly and will fall into one

Floyd said a few issues have to be

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of four color-coded bands:

- green: performance is within expected norms
- white: performance remains good, but it has declined somewhat in that particular area; the NRC will exercise increased oversight of corrective actions
- yellow: performance has further declined; though it's still acceptable for the plant to continue operating, the NRC will direct corrective actions by the company
- red: performance is unacceptable; the plant will shut down until the NRC is assured that concerns have been addressed.

The full-time resident NRC inspector at each plant will perform spot inspections to determine if utilities are reporting the data properly. In addition to using performance indicators, the agency will conduct inspections at each plant. The color-coded result for each of the indicators will be posted quarterly on the NRC's Web site, along with key inspection findings. This is inten-

"Now, when we talk to the NRC, it's all about safety. It's a refreshing change."

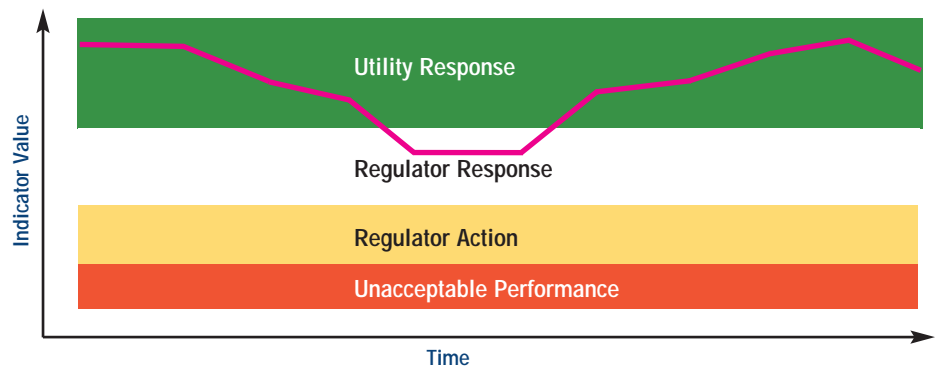
ded to provide the public with easily accessible information at several levels of detail.

While color-coding is intended as a quick reference point for plant performance, some question whether it will help public confidence.

"The colors provide somewhat of an artificial threshold," said Jill Lipoti, New Jersey director of radiation safety. "You may oversimplify things to the point where they may not increase public confidence." She also expressed concern about the fact that most performance indicators for the pilot plants were green, denoting high performance. Floyd said that was because plant performance has been outstanding, with no significant events.

He said the NRC's color-coding format tells only a small part of the story.

"The colors, taken alone, give the public a snapshot of plant safety performance. But the color coding reflects the compilation of a tremen-



dous amount of data," he said. The NRC looks at the actual performance data from the plant and compares those data against established levels for safe plant operation. The actual data—and the thresholds—are posted on the agency's Web site.

"As an industry, our goal is for all indicators to be green," Floyd said. "We hope that's the way it turns out. The more open the process is, the more motivated plant operators will be to correct what needs correcting. And that's a good thing."

Planning Propels U.S. Nuclear Power Plants Smoothly Into the Year 2000

All U.S. nuclear power plants continued to operate safely and reliably during the rollover to the Year 2000.

Ninety-eight of 103 generating units were online New Year's Eve, and none of them experienced a Y2K-related computer problem that compromised safety systems or disrupted power production.

"Nuclear power plants are continuing to supply one-fifth of the nation's electricity needs," said Ralph Beedle, senior vice president and chief nuclear officer at NEI. "The Y2K computer bug has been rendered harmless. America can continue to rely on nuclear power—our nation's largest source of emission-free electricity—to meet the nation's economic and environmental goals."

The nuclear energy industry's smooth transition into the new millennium is the result of a coordinated, cooperative industrywide readiness program begun 2½ years ago. Nuclear operating companies voluntarily adopted the same standard process and freely shared information. The industry fixed and re-tested some 10,000 computer systems and components out of 200,000 that were examined for problems. In addition, the industry developed emergency response strategies and drilled rigorously over the past six months.

During the rollover itself, every nuclear plant in the United States had above-normal staffing in place to ensure safety and reliability.

Yucca Mountain: 'From Science to Compliance'



DOE's scientific testing of Yucca Mountain leads soon to a site suitability decision

After spending almost \$6 billion to study the suitability of a Nevada site for storing used nuclear fuel and waste from the nation's weapons program, the Department of Energy in 2001 must decide whether to recommend the site—or not.

The framework for the national debate on what this decision should be will be established by DOE's draft "site recommendation consideration report" on Yucca Mountain, which is due Nov. 13.

Between now and then, the department must check off a substantial to-do list, including wrapping up results of years of in-depth scientific study, finalizing site suitability guidelines, finalizing its environmental impact statement, and discussing results with the Nuclear Regulatory Commission and Nuclear Waste Technical Review Board.

THE SITE STUDY WRAPS UP

The Department of Energy since the late 1970s has been studying a ridge in the Nevada desert known as Yucca Mountain, the site selected by Congress for study in the 1987 Nuclear Waste Policy Act.

With the deadline nearing for determining suitability, DOE is concentrating on translating the results of an impressive body of scientific research into documents to be reviewed by regulators and decision makers. Says Abraham van Luik, DOE senior technical adviser for performance assessment: "We're going from science to compliance."

Key studies to be finalized focus on water—how it travels through the mountain and how it will affect the used fuel stored there.

In one study, scientists put heaters in the underground openings to the tunnels where the waste will be placed to learn how water moves in response to the heat.

In another study, water has been put into the rock to see how it falls into an opening. Says van Luik: "We're pleasantly surprised at how badly water wants to stay in the rock."

Scientists also have been studying the effects of dripping water on the waste packages, which will be designed to last tens of thousands of years, van Luik said.

DOE PREPARES FOR NRC REVIEW

DOE will incorporate the results of its most recent studies in these areas into its November site recommendation report. This report will bring together all the studies in the latest and most advanced version of an analysis—called the "total system performance assessment"—that examines the effects of repository features and design processes on the repository's performance.

By law, this draft report must go to the Nuclear Regulatory Commission for review to determine if the studies—and the quality of the work—are "sufficient" to support site selection.

Not just the natural features of the repository site will be considered. DOE also has included a number of proposed engineered barriers in the repository that complement the capabilities of Yucca Mountain's natural features to isolate waste.

"The system as a whole needs to protect public health and safety," van Luik says, "and it will do that just fine. The geological environment will protect the engineered system."

ALSO ON DOE'S TO-DO LIST...

■ *Bringing up to date the guidelines for determining site suitability.* The old guidelines—based on some 40 criteria for comparing various proposed repository sites—were written before Yucca Mountain was selected as the only site to be studied and before the total system performance assessment approach was developed. DOE says that the outdated guidelines need to be replaced with new decision-making criteria, based on today's more advanced scientific methods. Comments on this proposed rule are due Feb. 28.

■ *Finalizing the environmental impact statement.* The draft, issued last August, concludes that the near-term impacts of a Yucca Mountain repository would be small and that over the long term, the benefits to society would be greater than leaving the used nuclear fuel where it is at 77 locations in 36 states. DOE is concluding 20 public meetings on the draft and is accepting comments until Feb. 9. The department is expected to issue the final statement in 2001.

"DOE has a great body of science," said Steve Kraft, NEI's director of used fuel management. "Good science inevitably raises new questions for every answer gained. So decision makers will always be faced with uncertainty. DOE has given us every reason to expect that these uncertainties can be adequately addressed in their schedule."

Yucca Mountain Countdown

November 13, 2000

DOE issues site recommendation report for comment by the public,

NRC, and Nuclear Waste Technical Review Board

July 27, 2001

Secretary of energy submits final report to president

January 2002

President makes final decision on suitability of site

March 2002

DOE files repository license application with NRC

Two More Acquisitions Signal Vibrant Nuclear Plant Marketplace

AmerGen Energy Co. last month advanced its strategic plan for acquiring nuclear generation assets when it closed on the purchase of its first two U.S. nuclear power plants: Clinton in Illinois and Three Mile Island in Pennsylvania.

A joint venture of Philadelphia-based PECO Energy and U.K.-based British Energy, AmerGen was formed in 1997 to build a portfolio of U.S. nuclear generation assets.

The company announced its first purchase, GPU Nuclear's Three Mile Island Unit 1, in July 1998. It signed an agreement with Illinois Power for the Clinton plant less than six months ago. Before the two sales could close, AmerGen had to obtain approvals from both federal and state regulators.

Clinton "is a superior plant with an outstanding operating team," said Michael Egan, senior vice president, finance, and chief financial officer of

PECO, and chairman of AmerGen. He noted the "effective and efficient review of the regulatory authorities that enabled us to complete the transition in excellent time."

PECO has been operating the plant under contract for almost two years.

AmerGen paid \$20 million for the 930-megawatt Clinton plant and property. Illinois Power will transfer to AmerGen the existing decommissioning trust funds of \$98 million and is making additional payments sufficient to cover the actual decommissioning in 2026, when the plant's initial operating license is scheduled to expire.

Illinois Power will purchase at least 75 percent of Clinton's electricity output through 2004.

AmerGen paid \$23 million for the Three Mile Island reactor and will pay \$77 million over five years for the plant's fuel. GPU will purchase the

energy and capacity from the unit for three years at fixed prices. AmerGen will be responsible for decommissioning the unit, which GPU has pre-funded at \$320 million.

Said Jerry Rainey, PECO Nuclear president and chief nuclear officer, and CEO of AmerGen: "TMI Unit 1 has an excellent operating and safety record and a fine, experienced staff. It has the potential to remain as one of the nation's top nuclear plants for many years to come."

The 870-megawatt unit holds the world record for the longest continuous run by a light water reactor, completing a 688-day run last Sept. 10. Over the past 10 years, it has averaged a 92.4 percent capacity factor—the measure of a plant's actual electrical output vs. its potential output. The industry average for 1998 was 79.5 percent.

Ownership of the shutdown TMI Unit 2 will remain with GPU.

Calvert Cliffs and Oconee Move Step Closer to 60-Year Operation

Is there life after 40? The answer appears to be yes for the Calvert Cliffs two-unit nuclear power plant, which Dec. 10 passed its last milestone on the road to a 20-year license extension. That milestone came in the approval from the Advisory Committee on Reactor Safeguards of its license renewal application.

The Calvert Cliffs plant, together with the three-unit Oconee Nuclear Station in South Carolina, are the first U.S. plants to navigate the Nuclear Regulatory Commission's new license renewal process.

In a report to NRC Chairman Richard Meserve, ACRS Chairman Dana Powers noted that the NRC staff had "performed a comprehensive and thorough review" of the Baltimore Gas and Electric application.

The ACRS report said that adequate programs

had been established to manage the effects of aging so that the two units "can be operated safely...for the period of the extended license."

The report fulfills the requirement that each license renewal application be referred to the ACRS for review. The NRC has scheduled final determination for early April.

Meanwhile, the NRC staff has concluded—in the final environmental statement, published Dec. 22—that the benefits outweigh environmental impacts of renewing Duke Power's Oconee licenses.

The Oconee license renewal application is on schedule for final action next July.

If the commission meets its published schedule, each of the first two license renewal applications will have been completed in exactly 24 months.



Competition Heats Up Over New York Nuclear Power Plant

AmerGen Energy Co. announced last summer an agreement to buy Nine Mile Point Unit 1 near Scriba, N.Y., as well as a controlling interest in Unit 2.

Rochester Gas and Electric Corp. (RG&E) announced Dec. 22 that it planned to match AmerGen's offer and acquire the units for itself—contracting with Entergy Nuclear to lease, operate and maintain the plants.

RG&E said its action was based on its legal right-of-first-refusal for both units under its contract as a nonoperating partner in Unit 2. The contract among the Unit 2 owners provides that any of the original co-owners of the plant may purchase another owner's share by matching a bona fide offer from a third party.

But spokesman Bill Jones said AmerGen plans to fight the RG&E decision. "We disagree with their interpretation of the right of first refusal, and we remain committed to aggressively pursue our agreement for Nine Mile," he said.

By early January, New York's Department of

Two potential buyers are competing for the Nine Mile Point plant

Public Service had weighed in with the view that neither suitor had offered enough for the plant, and called for settlement negotiations to begin Jan. 10.

AmerGen Energy, a joint venture of PECO Energy and British Energy, had offered \$72 million for Nine Mile Point 1 and \$91 million for the 59 percent share of Nine Mile Point 2 owned by Niagara Mohawk Power Corp. and New York State Electric and Gas, for an aggregate purchase price of \$163 million.

RG&E would continue to own the rights to its original 160 megawatts of Nine Mile Point 2 and acquire the rights to an additional 670 megawatts of capacity from that unit. It would acquire all 615 megawatts of capacity from Unit 1. Niagara Mohawk and New York State Electric and Gas



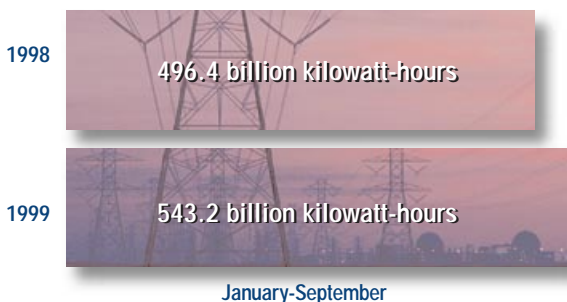
would purchase the power produced by their previous ownership shares in Nine Mile Point from RG&E under a long-term contract. These terms are the same as the offer made by AmerGen.

The Long Island Lighting Co., which is wholly owned by the Long Island Power Authority, and Central Hudson Gas & Electric Corp. are the other nonoperating owners. They will retain their respective interests in the plant. Niagara Mohawk currently operates the plants.

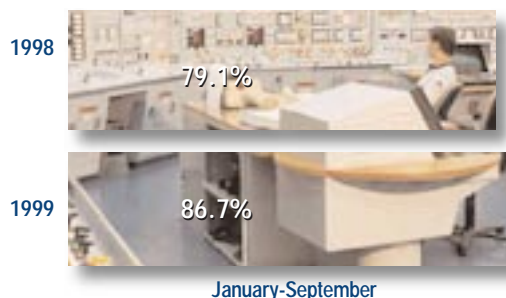
Skyrocketing Performance

U.S. nuclear power plants turned in record performance during the first nine months of 1999, both in electrical output and in capacity factor (a measure of a plant's actual electrical output vs. its potential output).

Nuclear Plant Output
Up 9.4 percent



Nuclear Plant Capacity Factors
Up 7.6 percentage points





Powered by the atom, the Galileo spacecraft just keeps going

After surviving two close encounters with the intense radiation field of Io—one of Jupiter's moons—the unmanned Galileo craft is going back for more. It will fly by the volcanic moon again in February to gather more pictures and data.

Launched in 1989, Galileo has spent the last four years orbiting Jupiter and its moons, sending unprecedented images and other information to Earth. The craft gets the power for its computers and other equipment from two radioisotope thermoelectric generators, or RTGs. The RTGs—which are reliable, long-lived and safe—use the heat from plutonium-238 to generate electricity.

Three Advanced Nuclear Plant Designs Now Ready for Market

The Nuclear Regulatory Commission on Dec. 15 certified Westinghouse Electric's AP600 advanced nuclear power plant design. The 600-megawatt design becomes the third standardized design certified and available for construction in the United States.



In 1997, the NRC certified ABB Combustion Engineering's System 80+ and General Electric's Advanced Boiling Water Reactor. All certifications are valid for 15 years.

The AP600 is a simplified, modular design, which can be largely built in established shops and shipyards. The modular design reduces potential construction costs and enhances quality control during construction.

The newly certified design also uses enhanced safety systems that rely on natural forces such as gravity, natural circulation, convection, evaporation and condensation. It was designed to have a 60-year operating life.

The AP600's simplified design requires 50 percent fewer valves, 80 percent less piping, 70 percent less control cable, and 35 percent fewer pumps than traditional nuclear power plants. As a result, Westinghouse estimates construction time, from first concrete to commercial operation, of 36 months or less.

Charles Pryor, president and CEO of Westinghouse, called the AP600 "a licensed technology, representing a significant leap forward in terms of constructability, safety and economics, that will substantially enhance the long-term viability of our industry while helping to reduce greenhouse gases associated with fossil plants."

Design certification is the culmination of a 10-year, multi-million-dollar effort by the NRC staff, the Department of Energy, the Electric Power Research Institute and supporting utilities, as well as Westinghouse and its subcontractors and partners.

The certification allows a company or consortium wishing to build and operate a new reactor to reference the AP600 in a license application.

No Health Risks From U.S. Radiation Levels Scientists, Policy Leaders Confirm Safety of Regulated Levels

More than 70 scientists, radiation safety experts and policy leaders agree: Current regulated levels of radiation pose no discernible health risks to the public. That's the conclusion reached at a five-day conference held Dec. 1-5 at the Airlie Conference Center in Warrenton, Va. The objective of the conference was to discuss scientific and policy issues regarding public exposure to low levels of radiation.

Attendees concluded that the lowest level of radiation exposure at which there is a statistically significant radiation risk is 10,000 millirem. The

Nuclear Regulatory Commission requires much less than that around nuclear facilities.

Former NRC Commissioner Gail de Planque noted that the conclusion "on low-level dose health effects again confirms that we are regulating radiation at levels where actual detrimental health effects have not been demonstrated.

"Our conclusion is based on the results of numerous epidemiological studies conducted over the past 50 years of adult populations exposed to radiation from medical, occupational and military sources," de Planque said.

Conference attendees noted the need for continued research into the health effects of low levels of radiation at the molecular and cellular levels. They also noted the need for continued studies of populations that have been exposed to radiation.

Attendees labeled studies that attempt to measure very small radiation exposure over long periods of time a misapplication of science. They concluded that "the effects of low-level radiation below 100 millirem per year above background [levels of radiation] cannot currently be distinguished from those of everyday natural health hazards."

Small Plant, Big Output

In late October, Minnesota's Prairie Island 2 nuclear power plant became the world's smallest nuclear generating unit to top the 100 billion kilowatt-hour mark. Unit 1 hit the same mark in June.

The 560-megawatt Unit 2 "has generated enough power to run one million refrigerators for 140 years" since 1974, said Joel Sorensen, Prairie Island site general manager.

The record surpasses the 1998 record set by another Northern States Power plant, the 580-megawatt Monticello nuclear plant in Minnesota.

PECO Energy Named Utility of the Year

Electric Light and Power magazine selected PECO Energy as its Utility of the Year.



In granting the award, the magazine noted PECO's "aggressive approach to purchasing nuclear reactors" as part of its vision to become the world's leading provider of clean energy. The magazine also cited the utility's exemplary performance in finance, investor

relations, operating efficiency and reliability, and market competitiveness.

Said the magazine's editor, Michael Burr: "PECO has emerged as one of the most ambitious utilities in the United States."

PECO owns four nuclear units in Pennsylvania. AmerGen, its joint venture with British Energy, recently acquired the Three Mile Island plant in Pennsylvania and the Clinton plant in Illinois. It has agreements to buy the Oyster Creek plant in New Jersey and the Vermont Yankee plant.

Electric Light and Power has selected a Utility of the Year each year since 1969.

Nuclear Plant Efficiency Up, Production Costs Down in 1998

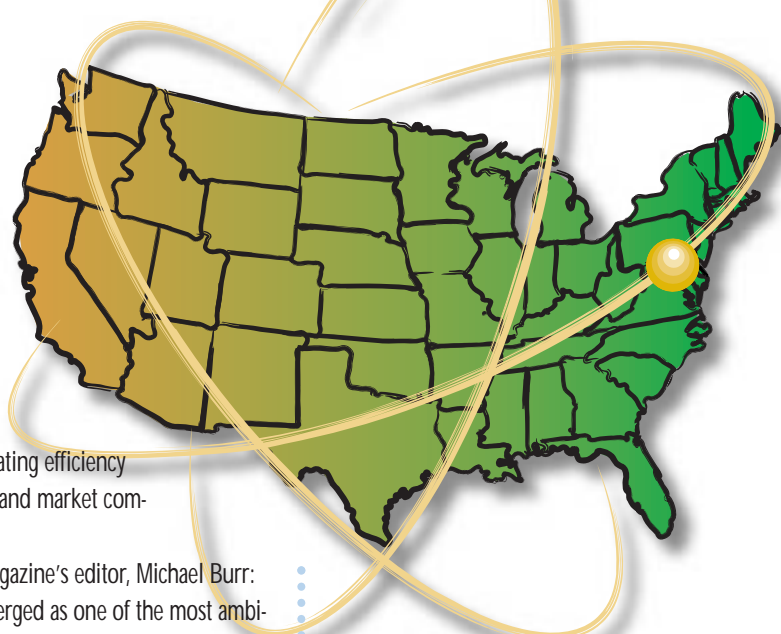
The production cost to generate a kilowatt-hour of electricity at a U.S. nuclear power

plant dropped in 1998 to 2.13 cents, down from 2.31 cents/kWh in 1997. Production costs include operating and maintenance costs plus fuel.

Coal-fired power plants averaged 2.07 cents/kWh, down from 2.12 cents/kWh the previous year.

Natural gas and oil-fired plants also saw a decrease, but both remained significantly higher than nuclear and coal-fired plants. Natural gas plants averaged 3.30 cents/kWh, while oil-fired plants averaged 3.24 cents/kWh.

NEI converted all numbers to 1998 dollars, based on data from the Utility Data Institute.



Foreign Affairs Sees 'Need for Nuclear'

Nuclear power is essential to a safe, diverse and secure world energy economy. That is the primary conclusion of noted author Richard Rhodes, writing in the January/February *Foreign Affairs* magazine. Denis Beller of the Los Alamos National Laboratory co-authored the article entitled, "The Need for Nuclear Power."

Citing burgeoning energy demand, international development needs and the imperative of national security, Rhodes and Beller see the massive investment in—and government subsidies of—renewable energy as a bankrupt approach. "Despite this [\$16 billion in financial

support], renewables remain stubbornly uncompetitive and contribute only marginally to U. S. energy supply," they write.

The article notes that nuclear energy is "fully competitive" with other forms of electrical generation. And it has distinct environmental advantages. "[A] nuclear plant releases no noxious gases or other pollutants and much less radioactivity per capita than is encountered from airline travel, a home smoke detector or a television set," say Rhodes and Beller.

Another cited advantage of nuclear energy is its ability to wrest enormous energy from a small volume of fuel. Rhodes and Beller see

the impasse over used fuel disposal as a political rather than an engineering problem. They note that "because of its small volume and the fact that it is not released into the environment [but] meticulously sequestered behind multiple barriers," concerns over disposal are disproportionate to the reality of the risk.

The authors believe that nuclear energy's already competitive nature would be enhanced if all generation types had to meet the same rigorous waste disposal standards.

"Nuclear power is environmentally safe, practical and affordable. It is not the problem—it is one of the best solutions," they conclude.

South Texas Leads Nation in Bird Count

Hundreds of species spotted in area of nuclear power plant

For the 100th straight year, birders came out in force for the National Audubon Society Christmas Bird Count. In Texas' Mad Island Marsh counting area, more than 100 birders spent Dec. 20 identifying 228 different species of birds and water fowl—many of them spotted on the teeming South Texas Project nuclear power plant site.

The species count in Mad Island Marsh was the highest in the United States in 1997 and 1998, and could claim the honor again for 1999, says STP spokesman Edward Conaway.

Birders spotted herons, loons, pelicans, eagles, falcons, storks, cranes, owls, hummingbirds, and more than 30 species of ducks and geese.

The diversity of habitats in the counting area is "a major contributing factor" to the diversity of



White Heron at South Texas nuclear power plant

birds, says Mark Dumesnil, Coastal Texas land steward for the Nature Conservancy. He cites the reservoir and the wetlands that have been created on the nuclear power plant site, as well as the bottomland hardwoods, coastal uplands, grasslands and coastal salt marsh.

Conaway notes that the plant's cooling water reservoir covers more than half of the 12,220-acre plant site. "Filled with fish, it brings in thousands of birds and water fowl to feed," he says.

The plant site constitutes some 10 percent of the Mad Island Marsh area, called a

"counting circle." This was the seventh year the area took part in the Christmas Bird

Count. The nuclear plant's visitors center each year plays a role as a staging area, and provides refreshments to the bird counters.

in sight

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