CHAPTER 2
PROGRAM PERFORMANCE

Photo Courtesy of Florida Power and Light Company.

St. Lucie Nuclear Power Plant near Ft. Pierce, FL. This facility is run by the Florida Power and Light Company.

MEASURING AND REPORTING PERFORMANCE

This chapter presents information on the U.S. Nuclear Regulatory Commission's (NRC's) performance in achieving its mission during fiscal year (FY) 2008. The agency's mission is to license and regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.

This chapter also describes the NRC's achievements in accomplishing its two strategic goals of safety and security. The safety goal discussion addresses the NRC's key activities of reactor licensing, new reactor licensing, reactor inspection, fuel facilities, material users, high-level waste repository, decommissioning and low-level waste, and spent fuel storage and transportation. The security goal discussion addresses security activities in the Nuclear Reactor Safety and Nuclear Materials and Waste Safety Programs. Lastly, it describes information on data sources, data quality, and the completeness and reliability of performance data. The discussion focuses primarily on the NRC's methods for collecting and analyzing data, ensuring data security, and improving the agency's performance measures and the quality of its data during the current reporting period.

Chairman Dale E. Klein (center), tours Shearon Harris nuclear power plant near Raleigh, NC, with congressional staff members who represent Representative David Price, D-NC, and Senator Richard Burr, R-NC.

GOALS AND PERFORMANCE MEASURES

STRATEGIC GOAL 1: SAFETY

Ensure Adequate Protection of Public Health and Safety and the Environment

Strategic Outcomes

The NRC has five strategic outcomes associated with the safety goal that determine whether the agency has achieved its objective to ensure adequate protection of public health and safety and the environment. The following are the five strategic outcomes:

- Prevent the occurrence of any nuclear reactor accidents.
- Prevent the occurrence of any inadvertent criticality events.
- Prevent the occurrence of any acute radiation exposures resulting in fatalities.
- Prevent the occurrence of any releases of radioactive materials that result in significant radiation exposures.
- Prevent the occurrence of any releases of radioactive materials that cause significant adverse environmental impacts.

RESULTS: In FY 2008, the NRC achieved all of its safety goal strategic outcomes.

Performance Measures

The table on the next page lists the agency's annual performance measures and their outcomes over the past 6 years. The NRC uses these performance measures to determine its success in achieving the safety goal.

FY 2008 Safety Goal Performance Measures

Measure	2003	2004	2005	2006	2007	2008
1. Number of new conditions evaluated as red by the Reactor Oversight Process is ≤3.	1	1	0	0	0	0
2. Number of significant accident sequence precursors of a nuclear reactor accident is zero.	0	0	0	0	0	0
3. Number of operating reactors with integrated performance that entered the Manual Chapter 0350 process, or the multiple/repetitive degraded cornerstone column or the unacceptable performance column of the Reactor Oversight Process Action Matrix, with no performance exceeding Abnormal Occurrence Criterion I.D.4 is ≤4.	2	1	0	0	1	0
4. Number of significant adverse trends in industry safety performance with no trend exceeding the Abnormal Occurrence Criterion I.D.4 is ≤1.	0	0	0	0	0	0
5. Number of events with radiation exposures to the public and occupational workers that exceed Abnormal Occurrence Criterion I.A is:						
Reactors: 0	0	0	0	0	0	0
Materials: ≤3	0	0	1	0	0	0
Waste: 0	0	0	0	0	0	0
6. Number of radiological releases to the environment that exceed applicable regulatory limits is:						
Reactor: ≤3	0	0	0	0	0	0
Materials: ≤2	0	1	0	0	0	0
Waste: 0	0	0	0	0	0	0

Analysis of FY 2008 Results

1. **Reactor Oversight Process:** The NRC reactor inspection program monitors nuclear power plant performance in three broad areas—reactor safety, radiation safety, and security. Plant performance is analyzed based on many performance indicators and inspection findings. Each finding is then divided into one of four categories—red, yellow, white, green. Red findings indicate a finding of high safety significance. There were no red performance indicators or findings in FY 2008.
2. **Reactor significant precursors:** The second measure tracks significant precursor events. This statistical measure of risk determines the likelihood of an event impacting safety adversely. A significant precursor is an event that has a probability of 1 in 1000 (or greater) of leading to substantial damage to the reactor fuel. Based on screening reviews, the NRC has not identified any significant precursor events in FY 2008.
3. **Reactor performance:** The conditions in this measure indicate whether the NRC finds significant performance issues in a plant during an inspection or from performance indicators under the reactor oversight process. If any of the conditions in this measure are met, the NRC will take action to ensure that plant safety is improved. There were no reactors that met the conditions in this measure in FY 2008. Palo Verde Nuclear Generation Station in Toponah, AZ, met the conditions in this measure during FY 2007. The agency applied significant oversight for that plant in FY 2008 to ensure improved performance.
4. **Reactor safety trends:** This measure tracks trends for several key indicators of industry safety performance. These indicators provide insights into major areas of reactor performance, including reactor safety, radiation safety, and emergency preparedness. Statistical analysis techniques are applied to each indicator to calculate long-term trends. These trends represent industry averages rather than individual plant performance. No statistically significant adverse trends have been identified for any of the indicators in FY 2008.
5. **Nuclear material radiation exposures:** This measure tracks the number of radiation exposures to the public and occupational workers that exceed Abnormal Occurrence Criterion I.A.3, which is defined as those events that produce unintended permanent functional damage to an organ or a physiological system, as determined by a physician. This measure tracks both nuclear reactors and other nuclear material users, such as hospitals and industrial users. No radiation exposures exceeding Abnormal Occurrence Criterion I.A.3 occurred in FY 2008.
6. **Nuclear material releases to the environment:** This measure indicates the effectiveness of the NRC's nuclear material environmental regulatory programs. Exceeding the applicable regulatory limits is defined as a total effective radiation dose equivalent to individual members of the public that is attributable to a licensed user of nuclear materials but does not exceed 0.1 rem in a year, exclusive of dose contributions from background radiation. No nuclear material releases to the environment that exceeded regulatory limits occurred in FY 2008.

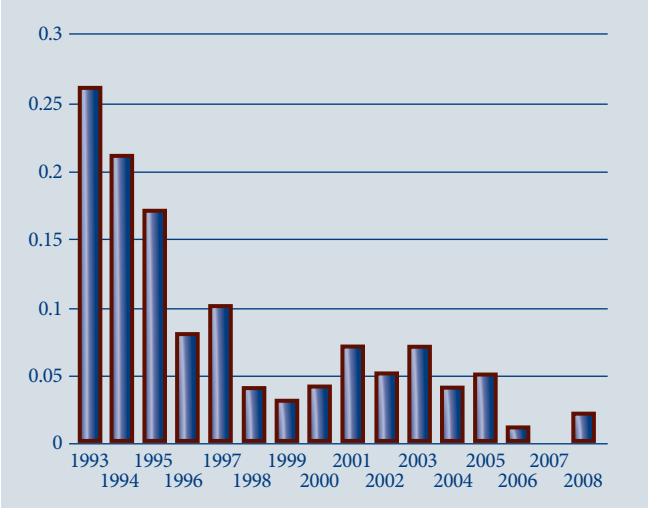
The Industry Trends Program

The NRC measures the effectiveness of its Nuclear Reactor Safety Program activities based on the continued safe operation of the Nation's nuclear power plants. The NRC compiles data on overall safety performance using several industry-level performance indicators, a number of which are addressed in the following pages. These indicators (except precursor occurrence rate) show significant improvement in the long-term trends for safety performance of nuclear power plants since 1988, the baseline year for the statistical analyses. Plant operating experience data have yielded a steady stream of improvements in the reliability of plant systems and components, plant operating procedures, training of power plant operators, and regulatory oversight. For ease of viewing, all the charts in this section display data since 1993.

The industry safety indicators are derived through engineering and scientific analyses by the NRC's Office of Nuclear Reactor Regulation and Office of Nuclear Regulatory

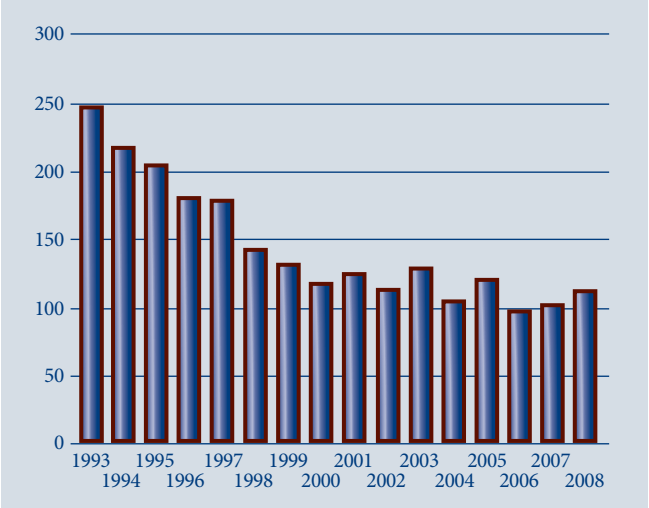
Research. The analyses of the events for FY 2008 are still ongoing. The performance indicator results are subject to minor variations as licensees submit revisions to the source data and may differ slightly from data reported in previous years as a result of refinements in data quality. The results of these analyses are reported annually both to the Commission and to Congress.

Figure 10
SIGNIFICANT EVENTS
(Per Reactor)



Significant events meet specific criteria such as degradation of important safety equipment. The agency reviews operating events and assesses their safety significance. The number of significant events has declined since 1993.

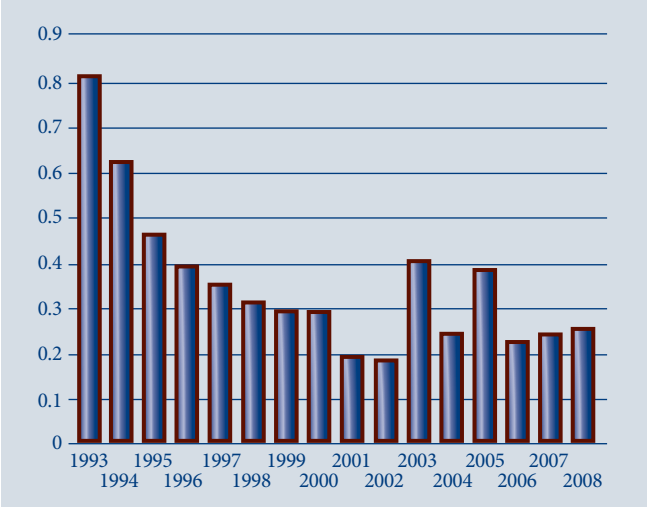
Figure 11
RADIATION EXPOSURE
(Exposure - Person cSv)



The total (collective) radiation dose received by workers is an indication of the radiological challenges of maintaining and operating nuclear power plants. The trend shows a reduction in collective dose since 1988 and demonstrates the effectiveness of the controls on radiation exposure.

Figure 12

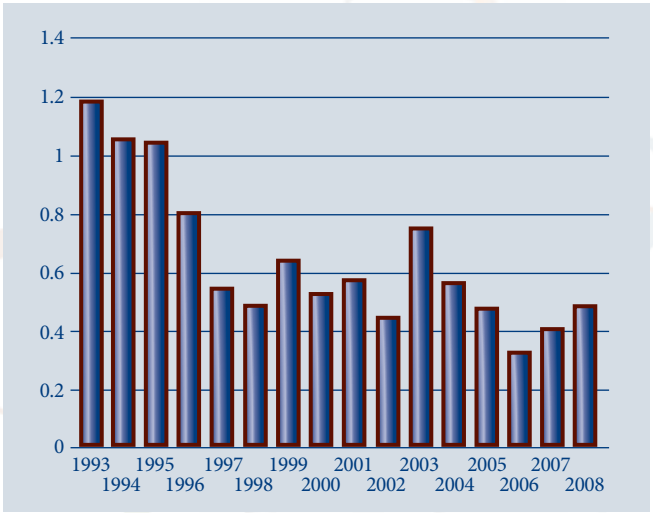
SAFETY SYSTEM ACTUATIONS
(Per Reactor)



Safety systems mitigate off-normal events, such as the widespread power blackout in August 2003, by providing reactor core cooling and water addition. Actuations of safety systems that are monitored include certain emergency core cooling and emergency electrical power systems. Actuations can occur as a result of "false alarms" (such as testing errors) or in response to actual events.

Figure 13

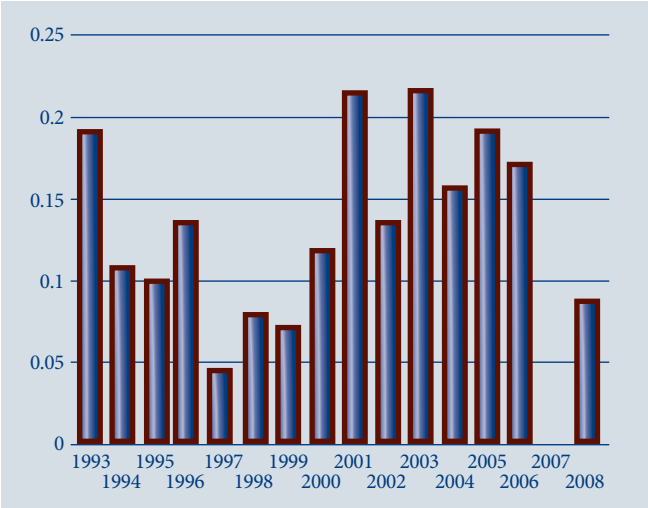
AUTOMATIC SCRAMS
(Per Reactor)



A scram is a basic reactor protection safety function that shuts down the reactor by inserting control rods into the reactor core. Scrams can result from events that range from relatively minor incidents to precursors of accidents. The massive power blackout in August 2003 accounts for most of the increase in FY 2003, but it has not affected the statistical trend for number of scrams, which has been declining steadily since 1988.

Figure 14

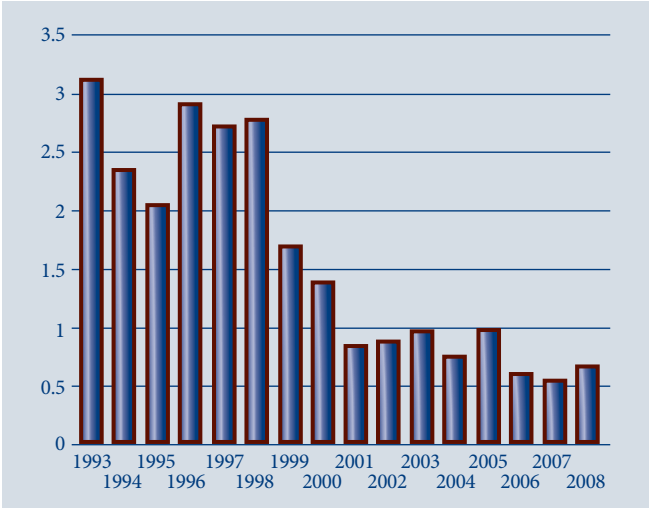
PRECURSOR OCCURENCE RATE
(Per Reactor)



A precursor event is an event that has a probability of greater than 1 in 1 million of leading to substantial damage to the reactor fuel. There is no statistically significant adverse trend in the occurrence rate of precursor events since 1993, the baseline year for the statistical analysis. Because of the complexities associated with evaluating precursor events, the data always lag behind other indicators.

Figure 15

SAFETY SYSTEM FAILURES
(Per Reactor)



Safety system failures include any events or conditions that could prevent a safety system from fulfilling its safety function. The statistical trend for the number of safety system failures across the industry has declined since 1988.

Nuclear Reactor Licensing Activity

The agency's nuclear reactor licensing activity ensures that civilian nuclear power reactors and test and research reactors are operated in a manner that adequately protects public health and safety and the environment while safeguarding special nuclear materials used in reactors. Safety at nuclear power plants has improved substantially over the past 20 years, as both the nuclear industry and the NRC have been proactive in identifying and correcting problems to improve the operation and maintenance of nuclear power facilities. The combined efforts of the nuclear industry and the NRC led to this improvement in the safety performance of nuclear power plants.

The NRC had completed 1,054 reactor licensing actions (see Figure 16). The Office of Nuclear Reactor Regulation has experienced a significant decrease in the number of licensing action submittals in the past 2 years. The agency received only 1,270 actions in 2007, compared with an average of 1,630 submittals since 2003

The NRC continues to complete licensing actions in a timely manner. The staff completed approximately 96 percent of the licensing actions in the agency's inventory within 1 year of receipt and 100 percent within 2 years (see Figure 17).

Figure 16
LICENSING ACTIONS COMPLETED
(Number of Actions)

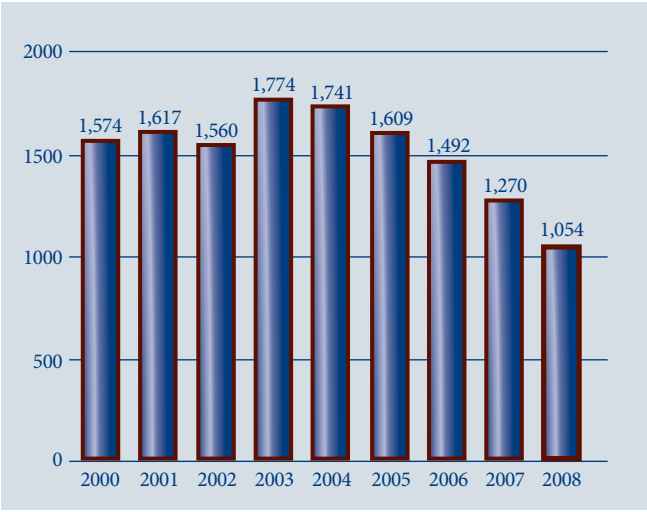
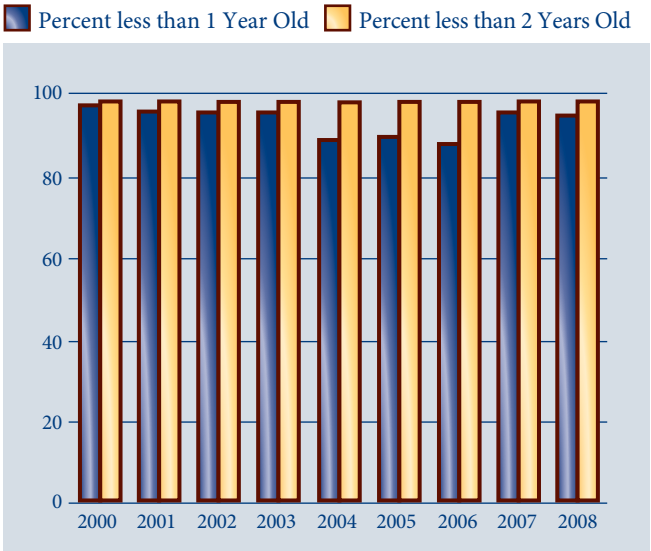


Figure 17
LICENSING ACTION AGE



The NRC also evaluates nuclear reactor power uprate applications, which allow licensees to increase the power output of their plants. The NRC reviews focus on the potential impacts of the proposed power uprate on overall plant safety and evaluate whether plant operation at the increased power level is safe. During FY 2008 , the NRC completed the reviews of 11 power uprate licensing actions, which will add about 740 megawatts electric to the grid. This brings the cumulative additional power from all power uprates approved since 1977 to about 5,640 megawatts electric. The NRC currently has five power uprates under review, which if approved, will add about 519 megawatts electric to the grid. The NRC expects to receive 23 new power uprate applications in the next 5 years, which if approved, will add about 1,712 megawatts electric to the grid.

During FY 2008, the NRC undertook several rulemaking activities to improve protection of public health and safety and the environment and to reduce unnecessary regulatory burden. The agency published a proposed rule on alternate fracture toughness requirements for protection against pressurized thermal shock events in reactor vessels using updated analysis methods. The agency also published a final rule on occupational exposure reporting and recordkeeping requirements that reduces regulatory burden to such an

extent that licensees will save more than $100 million each year.

New Reactor Licensing

The NRC published a major revision to Title 10, Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," of the *Code of Federal Regulations* (10 CFR Part 52). In addition, the NRC updated Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," and issued a major revision to NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants." To date, the NRC has received 17 combined license (COL) applications from the nuclear power industry for sites across the country. Of the applications received, 10 have been accepted and docketed and are currently under review. In addition, the industry has indicated that it will submit three more COL applications in CY 2009 and 2010.

The NRC is continuing to develop an effective and efficient construction inspection program for plants to be licensed under 10 CFR Part 52. These activities include (1) the creation of a working group on the closure of inspections, tests, analyses, and acceptance criteria (ITAAC) to resolve policy issues and develop resulting processes and procedures; (2) inspector development and training; (3) development of information technology systems to capture inspection results and track ITAAC closure; (4) issuance of inspection procedures; (5) development of generic inspection schedules, and (6) development of an assessment and enforcement program. Vendor inspections are already taking place to support increased fabrication activities domestically and internationally in response to new reactor construction plans. The NRC conducts these inspections to ensure the effective implementation of the high-quality standards set for components by the agency to protect the public.

On June 12, 2008, the agency issued Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning," which affects both design, certification and COL application reviews. This guide provides an acceptable method for minimizing contamination and radioactive waste generation over the total life cycle of a facility, from initial facility layout and design, through procedures for operation, and concluding with final decontamination and dismantling at the time of decommissioning.

COL Applications Accepted in FY 2008

Site Name (units)	State	Company	Date Submitted	Accepted
Calvert Cliffs (1 unit)	MD	UNISTAR	7/13/07 3/13/08	1/25/08[1] 6/3/08
South Texas Project (2 units)	TX	NRG Energy	9/20/07	11/29/07
Bellefonte (2 units)	AL	NuStart Energy	10/30/07	1/18/08
North Anna (1 unit)	VA	Dominion	11/27/07	1/28/08
William Lee Nuclear Station (2 units)	SC	Duke	12/13/07	2/25/08
Shearon Harris (2 units)	NC	Progress Energy	2/19/08	4/17/08
Grand Gulf (1 unit)	MS	NuStart Energy	2/27/08	4/17/08
Vogtle (2 units)	SC	Southern Nuclear Operating Co.	3/31/08	5/30/08
Summer (2 units)	SC	South Carolina E&G	3/31/08	7/31/08
Callaway (1 unit)	MO	AmerenUE	7/24/08	Pending
Levy County (2 units)	FL	Progress Energy	7/30/08	10/06/08
Victoria County (2 units)	TX	Exelon	9/03/08	Pending
Fermi (1 unit)	MI	Detroit Edison	09/18/08	Pending
Comanche Peak (2 units)	TX	Luminant Power	09/19/08	Pending
River Bend (1 unit)	LA	Entergy	9/25/08	Pending
Nine Mile Point (1 unit)	NY	Unistar	9/30/08	Pending
Bell Bond (1 unit)	PA	PPL Generation	10/10/08	Pending

[1] The Calvert Cliffs Combined Operating License application was received in two parts; the first part was accepted for review on January 25, 2008, and the second part was accepted on June 3, 2008.

For the licensing of new reactors, a proposed rule was published that would require applicants for new reactor designs to perform a design-specific assessment of the effect of the impact of a large commercial aircraft. Applicants would have to perform a rigorous assessment of the design to identify design features and functional capabilities that could provide additional inherent protection to avoid or mitigate the effects of an aircraft impact to the extent practicable with reduced reliance on operator actions.

New Reactor Designs

The NRC is actively reviewing several nuclear reactor designs and plans to conclude these reviews with a design certification rulemaking. By referencing a certified design, the license application review can proceed in a way that promotes safety and minimizes undue regulatory burden and delays.

The NRC is currently performing the design certification review of the General Electric Economic Simplified Boiling-Water Reactor (ESBWR), AREVA Evolutionary Power Reactor (EPR), and Mitsubishi's U.S. Advanced Pressurized-Water Reactor (USAPWR). The agency is also in the process of amending a design certification for the Westinghouse AP1000 design. In addition, vendors for four small reactors have requested preapplication discussions with the NRC. The NRC has had public preapplication meetings with these vendors to help the NRC staff understand the designs of the various reactors.

Early Site Permits

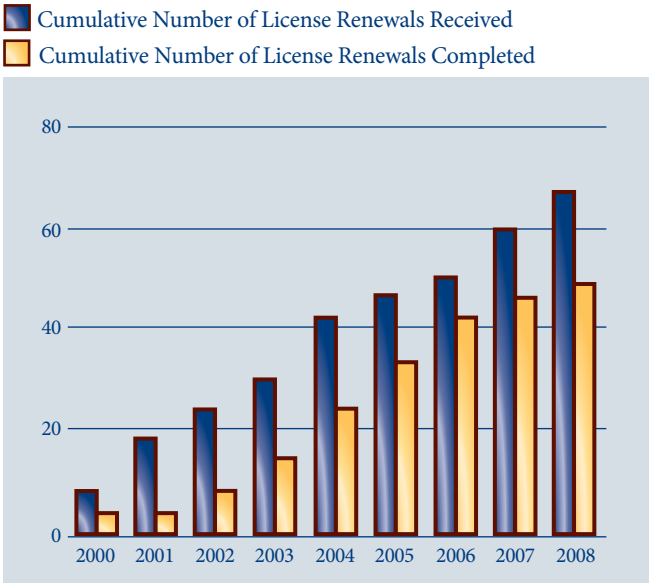
An early site permit is a permit for partial construction. Early site permits are valid for 10 to 20 years and can be renewed for an additional 10 to 20 years. The NRC review of an early site permit application addresses site safety issues, environmental protection issues, and plans for coping with emergencies, independent of the review of a specific nuclear plant design. The agency issued early site permits to the Clinton site in Illinois on March 15, 2007, the Grand Gulf site in Mississippi on April 5, 2007, and the North Anna site in Virginia on November 27, 2007. The NRC is currently reviewing the early site permit for the Vogtle site in Georgia.

License Renewal

Reactor operating licenses for nuclear reactors are granted for 40 years and can be renewed for an additional 20 years. The review process for renewal applications is designed to assess whether a reactor can continue to be operated safely during the extended period of operation.

To renew a license, the utility must demonstrate that the effects of aging will not adversely affect structures or components important to safety during the renewal period. Such structures and components include the reactor vessel, piping, electrical cabling, containment structure, and steam generators. For some structures or components, additional action may be needed to ensure adequate margins of safety. Additionally, the agency assesses the potential impacts of the extended period of operation on the environment to verify that the impacts are not so great as to preclude license renewal.

Figure 18
LICENSE RENEWAL APPLICATIONS



The NRC has received applications to renew the licenses for 67 units at 40 sites since the license renewal program began in 2000 and has renewed licenses for 49 units at 27 sites during that time (see Figure 18). The NRC is currently reviewing applications to renew the licenses for 18 units at 13 sites. The agency expects that almost all of the licensees for currently licensed units will ultimately apply to renew their licenses.

Nuclear Reactor Inspection

The NRC's Reactor Oversight Process outlines the agency's actions to verify that nuclear plants are being operated safely and in accordance with the NRC's rules and regulations. The NRC has full authority to demand that a licensee take immediate action for any conditions that result

in excess risk to the public, including requiring a plant to shut down if necessary. The agency evaluates inspection findings and performance indicators to assess the safety performance of each operating nuclear power plant. The NRC performs a rigorous program of inspections at each plant and may perform supplemental inspections and take additional actions to ensure that the plants address significant safety issues. The results of NRC inspection findings for each plant are available to the public at http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/pim_summary.html. The NRC also conducts public meetings with licensees to discuss the results of the NRC's assessments of its safety performance.

In FY 2008, all of the Nation's nuclear power plants were operated within NRC safety requirements. The safety indicators for nuclear plants as a whole showed no adverse trends, and more than 99 percent of plant safety indicators were rated green in FY 2008.

The NRC continued to improve the Reactor Oversight Process in FY 2008. Agency assessments confirm that the Reactor Oversight Process has resulted in a more objective, risk-informed, and predictable regulatory process that focuses NRC and licensee resources on aspects of plant performance that have the greatest impact on safe plant operations.

Investigations and Enforcement

Compliance with NRC requirements plays an important role in giving the agency confidence that reactor safety is being maintained. NRC policies deter noncompliance and encourage prompt identification and timely, comprehensive corrections. Licensees, contractors, and their employees who do not achieve the high standard of compliance expected by the NRC are subject to enforcement sanctions. Each enforcement action depends on the circumstances of the case. The NRC will not permit licensees to continue to conduct licensed activities if they cannot achieve and maintain adequate levels of safety. In FY 2008, there were 37 escalated enforcement actions with $1,053,000 in fines assessed. Allegations of reactor-related wrongdoing are referred to the Office of Investigation for evaluation and recommendations regarding further enforcement action.

Fuel Facilities

The NRC licenses and inspects all commercial nuclear fuel facilities that process and fabricate uranium ore into reactor fuel. This fuel is the manufactured material that powers the Nation's nuclear reactors. Licensing and inspection activities include detailed health, safety, safeguards, and environmental licensing reviews, as well as inspections of licensee programs, procedures, operations, and facilities to ensure safe and secure operations.

The NRC conducted several significant fuel cycle licensing reviews in FY 2008. The agency completed the process of recognizing the transfer of ownership of General Electric nuclear power plants to General Electric-Hitachi. To ensure that the fuel facilities are operating safely and securely, the agency reviewed, among other issues, safety analyses for controlling hazardous materials and the engineered and human performance barriers relied on to control hazardous materials. The NRC also conducted comprehensive reviews of fuel cycle licensees, including a review of licensees' integrated safety analyses (ISA). The ISA describes the management measures to ensure that the selected controls are available and reliable. The ISA allows a licensee to use risk information to identify hazards and to develop the engineered and human performance barriers relied on to control and mitigate hazards. The NRC completed ISA summary and environmental reviews for Areva Richland and Global Nuclear Fuels-America. The NRC also completed a review of the annual ISA updates for all fuel facilities.

The NRC received applications from the United States Enrichment Corporation (USEC) for the renewal of certificates of compliance for gaseous diffusion plants located near Paducah, KY, and Piketon, OH. Gaseous diffusion is a technology used to produce enriched uranium by forcing gaseous uranium hexafluoride through semipermeable membranes. By use of a large cascade of many stages, high separations can be achieved. Gaseous diffusion was the first economical enrichment process to be developed successfully. The gaseous diffusion plant certificates were renewed in 2003 and expire in 2008. USEC has requested renewal for a 5-year

period. The NRC held public meetings near both of the facilities to allow for public input on the certificate renewal process.

To support growing industry interest in potential recycling or reprocessing of spent nuclear fuel, the NRC began analyzing existing regulations during FY 2008 to address changes that must be made for these types of plants to ensure adequate protection of the public and the environment. The purpose of the agency's activity is to establish an effective regulatory framework for licensing a spent nuclear fuel recycling facility that considers technology-neutral regulatory approaches, innovative designs, and an advanced fuel cycle.

The Conference Report for the Consolidated Appropriations Act, 2008 directed the NRC to review the regulatory process for the U.S. Department of Energy (DOE) Hanford Waste Treatment Plant. In most cases, the regulations and requirements that DOE has in place are similar to those of the NRC. The NRC has determined that the DOE program, if properly implemented, is adequate to ensure the protection of public health and safety. Nevertheless, based on its review, the NRC made several suggestions in a report for DOE consideration. The NRC delivered the report to the Secretary of Energy and the House and Senate Committees on Appropriations in August 2008. The NRC suggested that DOE evaluate the way its requirements are implemented and consider improving the transparency of its decisions and actions regarding the plant. The NRC also suggested that DOE consider the list of issues identified in a table in the report and the specific safety and regulatory issues in an appendix to the report. Finally, the NRC suggested that DOE explore ways to gain and maintain more independence between regulatory oversight and project management functions.

Investigations and Enforcement

Compliance with NRC requirements plays an important role in giving the agency confidence that safety of fuel-cycle facilities is being maintained. NRC policies deter noncompliance and encourage prompt identification and timely, comprehensive corrections. Licensees, contractors, and their employees who do not achieve the high standard of compliance expected by the NRC are subject to enforcement sanctions. Each enforcement action depends on the circumstances of the case. The NRC will not permit licensees to continue to conduct licensed activities if they cannot achieve and maintain adequate levels of safety. In FY 2008, there were four escalated enforcement actions with $48,750 in fines assessed.

Nuclear Materials Users

The NRC licenses and inspects the commercial use of nuclear material for industrial, medical, and academic purposes. Commercial uses of nuclear materials include medical diagnosis and therapy, medical and biological research, academic training and research, industrial gauging and nondestructive testing, production of radiopharmaceuticals, and fabrication of commercial products (such as smoke detectors) and other radioactive sealed sources and devices. The NRC and 35 Agreement States regulate more than 22,000 specific materials licensees and 150,000 general materials licensees. The NRC currently regulates and inspects approximately 3,750 specific licensees for the use of nuclear byproduct and other radioactive materials.

Detailed health and safety reviews of license applications, as well as inspections of licensee procedures, operations, and facilities, provide reasonable assurance of safe operations and the production of safe products. The NRC routinely inspects nuclear materials licensees to ensure that they are using nuclear materials safely, maintaining accountability of those materials, and protecting public health and safety. The agency also analyzes operational experience from NRC and Agreement State licensees and regularly evaluates the safety significance of events reported by licensees and Agreement States.

In FY 2008, the NRC completed reviews of 2,952 materials licensing actions and 1,229 materials program inspections. From 2003 through 2008, the NRC maintained the timeliness of its reviews of nuclear materials license renewals and sealed source and device designs. In addition, the NRC completed 94 percent of the requests for license renewal and sealed source and device design reviews within

180 days of receipt and 98 percent of new applications and license amendments within 90 days.

The NRC worked with DOE to recover unwanted or orphaned radioactive sources. The source recovery program removes radioactive sources and aids in preventing inadvertent source melts or malevolent uses of sources. Since the inception of this program in 1997, more than 17,700 radioactive sources have been recovered from more than 690 sites within the United States.

The NRC is assisting U.S. Customs and Border Protection in fulfilling its congressional mandate to verify the legitimacy of radioactive material shipments coming into the United States through established ports of entry. The NRC regularly provides U.S. Customs and Border Protection with information on the licensing of radioactive materials, including import and export licensing data, and has established processes to provide around-the-clock technical support for the verification of the licensing status for materials in transit.

The NRC completed an update of the inventory of high-risk sources, defined as International Atomic Energy Agency (IAEA) Category 1 and Category 2 sources. The NRC also used the inventory to enhance the safety, security, and control of radioactive sources, including the issuance of increased control orders.

In addition to continuing to evaluate the need to enhance security at byproduct material licensees in FY 2008, the NRC is inspecting licensee compliance with these safety and security measures and coordinating with Agreement States to identify and resolve any implementation issues. The NRC also issued security orders to irradiator facilities, manufacturer and distributor facilities, and licensees shipping IAEA Category 1 quantities, including orders requiring this group of licensees to implement a program to fingerprint and conduct a criminal history check for access to safeguards information and access to material. The NRC and the Agreement States issued orders and legally binding agreements to licensees subject to increased controls that require fingerprinting and criminal history checks for access to material. The NRC and Agreement States will continue to inspect these licensees to ensure the proper implementation of the increased control orders and other associated requirements. The NRC revised its screening process for new license applications to increase assurance that the material will be used as intended.

The NRC also works with international counterparts, both bilaterally and through multilateral organizations, to enhance the safety and security of radioactive sources. Examples of these activities include participating in ongoing meetings of countries implementing the IAEA Code of Conduct on the Safety and Security of Radioactive Sources to ensure harmonized national approaches, developing and implementing a memorandum of understanding with Canada for coordinated export and import licensing of sources, and bilateral work with countries of the Commonwealth of Independent States to support regulatory control over high-risk sources of concern. The section on international activities (pages 42-43) contains additional details.

Rulemaking Activities

In FY 2008, the NRC undertook several rulemaking activities to allow the use of radioactive materials while protecting public health and safety and the environment. These activities included publishing several rules that certify the safety of casks for the storage of spent nuclear fuel and implementing improvements to the licensing and distribution of byproduct materials. The agency also published a rule ensuring that its database of special nuclear materials contains the most accurate information possible for each licensee.

NRC is updating 10 CFR Part 110 , "Export and Import of Nuclear Equipment and Material," to revise the definition of radioactive waste, incorporate changes to Appendix P, "Category 1 and 2 Radioactive Material," based on experience gained in 2005-2008, and rewrite or clarify Part 110.23 "General License for the Export of Byproduct Material."

Investigation and Enforcement

Out of approximately 929 inspections, 77 resulted in escalated actions, including the issuance of civil penalties. Violations included exporting licensed material in nonconforming packages, failing to maintain a minimum of two independent controls to secure a portable gauging device, transferring a portable gauging device containing radioactive

material to a company not licensed to receive the material, and failing to secure licensed material from unauthorized access. The NRC issued associated civil penalties in the amount of $124,000. Allegations of materials-related wrongdoing are referred to the Office of Investigation for evaluation and recommendation regarding further enforcement action.

High-Level Waste Repository

The NRC formally docketed the U.S. Department of Energy (DOE) license application for the proposed high-level nuclear waste repository at Yucca Mountain, NV. The decision to docket the application follows the NRC staff's determination that the application, submitted June 3, 2008, is sufficiently complete for the staff to begin its full technical review. Docketing the application triggers a 3-year deadline, with a possible 1-year extension, set by Congress for the NRC to decide whether to grant a construction authorization.

After reviewing the DOE environmental impact statement and its supplements, the NRC staff determined that it would be practicable for the agency to adopt the DOE report. However, the staff is requesting that DOE supplement some aspects of its ground water analyses.

The U.S. Department of Energy's license application for the proposed Yucca Mountain high-level waste repository is formally presented by DOE's Edward Sproat (front, right), Director of the Office of Civilian Radioactive Waste Management, to Michael F. Weber (front, left), Director of NRC's Office of Nuclear Material Safety and Safeguards.

A subsequent *Federal Register* notice, to be published in early FY 2009, will provide an opportunity for interested parties to seek an adjudicatory hearing before the NRC's Atomic Safety and Licensing Board regarding the NRC's adoption of the environmental impact statement or the substance of the license application. This will include allegation processing, investigations of wrongdoing, and inspections and field reviews. The NRC also conducted public outreach activities and meetings during FY 2008 to make the regulatory process accessible to interested stakeholders.

The NRC continued to interact with DOE to assess technical and regulatory issues related to its spent fuel management program, which will use standardized transportation, aging, and disposal (TAD) canisters. In June 2007, DOE issued final performance specifications for the disposal canister, and in May 2008, DOE awarded two contracts for the design, licensing, and demonstration of the TAD canister system. The TAD canister will be the primary means for packaging spent nuclear fuel for interim storage and for transportation to and disposal in the proposed repository at Yucca Mountain, NV.

Decommissioning and Low-Level Waste

The NRC oversaw decommissioning activities at 15 power and early demonstration reactors, 11 research and test reactors, 32 uranium recovery sites, and 28 complex material and fuel cycle facilities that are undergoing decommissioning in FY 2008. Decommissioning removes radioactive contamination from buildings, equipment, ground water, and soil, achieving levels that permit the release of the property, with or without restrictions on its future use by the public. The NRC terminates the licenses for decommissioned facilities after the licensees demonstrate that the residual onsite radioactivity is within regulatory limits and sufficiently low to protect the health and safety of the public and the environment. In addition to the uranium recovery sites undergoing decommissioning, the NRC conducts regulatory oversight at five operational uranium recovery sites.

In FY 2008, the NRC reviewed the applications for seven new, expanding, or restarting uranium recovery facilities, including initiating four environmental reviews. The NRC also reviewed the DOE remedial action plan for the Moab uranium tailings pile. Additionally, the NRC conducted a number of regulatory activities to help ensure the safe management and disposal of the low-level radioactive waste generated by users of radioactive materials, nuclear power plants, and other NRC licensees.

The NRC has overseen decommissioning activities at numerous complex materials sites and power reactor sites. In FY 2008, the NRC terminated the licenses or completed regulatory oversight activities at one power reactor, one research and test reactor, and six complex materials sites. Completion of decommissioning, environmental, and performance assessment activities enables sites to return to productive use while ensuring that residual radioactivity does not pose an unacceptable risk to the public. The agency completed NUREG-1888, "Environmental Impact Statement for the Reclamation of the Sequoyah Fuels Corporation Site in Gore, Oklahoma."

In FY 2008, the NRC initiated an Annual Waste Incidental to Reprocessing Monitoring Report. The agency performed the first Savannah River Site (SRS) Saltstone facility monitoring visit and issued an SRS monitoring report. The NRC also worked with DOE, the U.S. Department of State, and the U.S. Environmental Protection Agency (EPA) to develop an enhanced consultation process for future waste determinations at SRS. In FY 2008, the staff issued the Commission paper on the low-level waste strategic assessment.

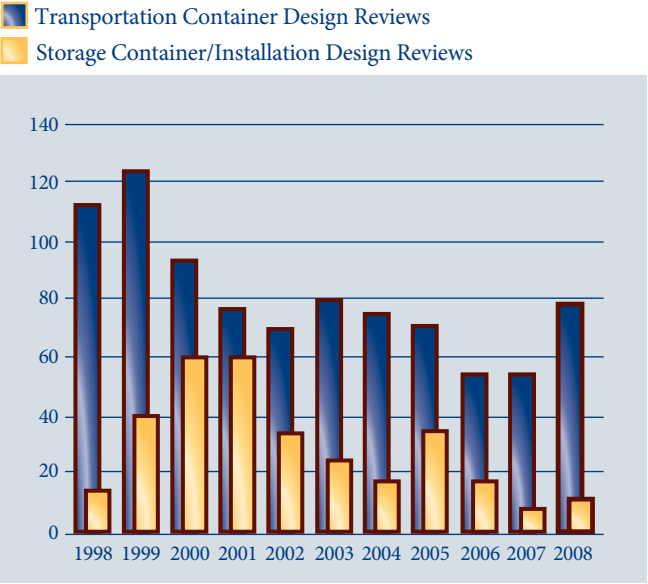
Spent Fuel Storage and Transportation

The NRC ensures that reactor spent fuel is safely stored to support continued reactor operations and is safely transported when necessary. The NRC conducts licensing and certification reviews to ensure (1) the compliance of storage designs with NRC regulations for the storage of reactor spent fuel and (2) the safe transport of domestic and international shipments of nuclear reactor spent fuel and other risk-significant radioactive materials.

Shipments of radioactive materials are safely and securely transported each year within the United States. Several Federal agencies share responsibility for regulating the safety and security of those shipments. The NRC closely coordinates its transportation-related activities with those of the U.S. Department of Transportation (DOT) and, as appropriate, DOE. To help ensure the safety and security of both spent fuel storage and transportation, the NRC inspects vendors, fabricators, and licensees using transport container packages, spent fuel storage casks, and interim storage of spent fuel both at and away from reactor sites.

In FY 2008, the NRC completed 78 transport package design reviews and 11 storage container and installation design reviews. The NRC review of transportation and interim storage licensing requests ensures that shipments are made in NRC-approved packages that meet rigorous performance requirements and verifies that spent fuel is safely stored, thereby enabling continued reactor and decommissioning operations. The NRC also conducted 18 inspections of activities related to material package certificate holders, spent

Figure 19
STORAGE AND TRANSPORTATION DESIGN REVIEWS COMPLETED



fuel storage container certificate holders, and preoperational activities and initial operations at independent spent fuel storage facilities to ensure that casks are being fabricated according to approved safety requirements.

The NRC, DOE, and DOT cosponsored the 15th International Symposium on Packaging and Transportation of Radioactive Materials (PATRAM) in October 2007. PATRAM is an international symposium held to exchange information on all aspects of the packaging and transportation of radioactive materials. This conference brought together representatives of the domestically and internationally regulated communities.

In addition, the NRC will broaden the scope of the license term rulemaking related to 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste."

This expanded-scope of this rulemaking will provide a streamlined process to resolve noncompliance issues for general licensees who have implemented new procedures for casks already in service.

In February 2008, the NRC staff from several offices presented topics and participated in discussions as part of an internal workshop on burnup credit. Burnup credit is the use of the reduced reactivity of spent fuel in criticality safety analyses. At the February workshop, the following was discussed: (1) criticality and isotopic validation, including examining available data to support the validation, (2) alternatives to burnup measurements for spent nuclear fuel, and (3) the risk related to the transport of spent nuclear fuel. In March 2008, the staff briefed the Advisory Committee on Nuclear Waste and Materials (ACNW&M) on the status of burnup credit. Additionally, the staff updated the Commission on its activities to expand the technical basis for burnup credit in spent fuel transportation packages in July 2008.

Research Activities

The NRC's safety research program evaluates and resolves safety issues for nuclear power plants and other facilities regulated by the NRC; provides the basis for regulatory changes and improvements; develops technical bases and tools to address emerging issues and new and advanced reactor designs; coordinates NRC activities related to consensus and voluntary standards for agency use; and assesses operational events to identify accident precursors. The agency conducts its research program to evaluate existing and potential safety issues; supply independent expertise, information, and technical judgments to support timely and realistic regulatory decisions; reduce uncertainties in risk assessments; and develop technical regulations and standards. When possible, the NRC engages in cooperative research with other Government agencies, the nuclear industry, universities, and international partners.

During the past year, the NRC research program has addressed key areas that support the agency's safety mission, including verification and validation of fire safety models for nuclear power plant applications, completion of the development of a licensing strategy for the next generation nuclear plant, a proactive material degradation assessment of reactor system and pressure boundary components and their susceptibility to known and potential degradation mechanisms, research to support the licensing of new digital instrumentation and control systems, and research on seismic hazard issues to support the evaluation of new reactor sites and of the seismic safety of existing nuclear facilities.

Fire Safety

The NRC's fire safety research program supports regulatory activities related to fire protection and fire risk analysis. During FY 2008, this program focused on risk-informed fire protection activities such as the fire protection rule, 10 CFR 50.48(c), "National Fire Protection Association Standard NFPA 805," and the fire protection inspection significance determination process. Work has also continued on fire modeling activities, including a fire modeling phenomena identification and ranking table issued in the summer of 2008 and a fire modeling users' guide for nuclear power plant applications, scheduled to be released in FY 2009. The NRC also issued the final NUREG/CR-6931,

"Cable Response to Live Fire (CAROLFIRE)," which provides research results on cable configurations that were identified as needing further study and gives the necessary data to develop a cable response model to reduce the uncertainty in predicting electrical cable damage in the performance of fire modeling analyses. The NRC, in partnership with Electric Power Research Institute, has been developing human reliability analysis methodology to determine operator performance during fire events. The NRC's fire safety research in FY 2008 has also focused on fuel cycle issues, including potential "red oil" fire hazards in the proposed mixed-oxide facility, and the performance of spent nuclear fuel transportation cask seals in beyond-design-basis fires, such as the Harbor Tunnel fire in Baltimore, MD.

Licensing of the Next Generation Nuclear Plant

The Energy Policy Act of 2005 (EPAct) specifies that the Secretary of DOE and the NRC Chairman must jointly submit a licensing strategy for the next generation nuclear plant (NGNP) project within 3 years of enactment of the EPAct. The NGNP project consists of research, development, design, construction, licensing, and operation of a very-high-temperature prototype nuclear plant, which can be used to generate electricity, hydrogen, or both. In addition, the EPAct provides that the NRC shall have licensing and regulatory authority for any reactor authorized under the EPAct.

The jointly developed Report to Congress, submitted in August 2008, summarizes the licensing strategy developed by DOE and the NRC for the NGNP.

Materials Degradation

The NRC continues to conduct research on materials degradation to identify susceptible materials and components in light-water reactors. The NRC developed advanced fracture mechanics tools to demonstrate the adequate structural integrity of reactor coolant system pressure boundary components. The NRC performed extensive nondestructive and destructive examination of some examination of some of these components in decommissioned nuclear reactors to assess the progression of stress-corrosion damage mechanisms and to validate the advanced fracture mechanics models. The research was directly applied to demonstrate adequate safety margins in operating plants.

Digital Instrumentation and Control

The NRC's research supports the licensing of new digital instrumentation and control systems planned for retrofits in operating reactors and for use in new reactors. The NRC is also actively engaged in ongoing cyber research to ultimately provide regulatory guidance and tools for evaluating digital systems for cyber vulnerabilities, including potential vulnerabilities in digital electrical protection relaying that may affect the electrical grid.

Seismic Research (Earth Sciences)

The NRC is conducting research on seismic hazard issues to support the siting of new reactors and the evaluation of the seismic safety of existing nuclear facilities. The agency is performing research to develop the next generation of probabilistic seismic hazard assessment methods for the central and eastern United States. In cooperation with academic institutions, other Federal and State agencies, and industry, the NRC has initiated a program to develop ground motion propagation and earthquake source zone models. The NRC has also undertaken a study of the potential tsunami hazards for the east and gulf coasts, in cooperation with the U.S. Geological Survey and the National Oceanographic and Atmospheric Administration.

State-of-the-Art Reactor Consequence Analysis

The NRC is developing a method to estimate more accurately the offsite consequences from hypothetical severe accidents for operating commercial nuclear power plants in order to provide the public with more realistic information regarding the risk associated with commercial nuclear power plants.

The NRC, the U.S. nuclear industry, and the international nuclear community have performed extensive severe accident research to improve their understanding of the phenomena of severe accidents; the performance of the plants' systems and components under these conditions; the timing, magnitude,

and composition of the fission product release; and the effectiveness of different design and mitigative measures, including emergency preparedness.

The Commission directed the staff to produce a policy paper for a Commission decision regarding how guidance from the EPA's Protection Action Guides manual could be incorporated into an improved economic consequence model. The Commission directed staff to use the Commission decision resulting from this policy paper to update a computer code with an improved economic consequence model. The resulting economic consequence model may be applied to the State-of-the-Art Reactor Consequence Analyses (SOARCA) results if so directed by the Commission.

Emergency Preparedness and Incident Response

The NRC emergency preparedness and incident response activities ensure that the agency can respond effectively to events at its licensees' sites and that adequate protective measures can be taken to mitigate plant damage and to minimize possible radiation doses to members of the public. The agency is currently engaged in a rulemaking effort that will update 11 areas in the emergency preparedness regulations.

In FY 2008, the NRC worked with States to address replenishment of potassium iodide supplies as a supplement to public protective action plans within the 16 kilometers (10-miles) emergency planning zones around nuclear power plants.

In FY 2008, the NRC completed the first phase of the Emergency Response Data System modernization effort. This phase involved conversion from proprietary server and client software to a commercial off-the-shelf system that can be accessed using a Web browser. The agency worked with affected States to ensure that the modernization effort did not adversely affect their ability to access data from facilities for which they have responsibility. The agency is currently negotiating memoranda of understanding to provide additional interested States with access to the Emergency Response Data System.

The agency completed numerous improvements to its Headquarters Operations Center, including installation of additional audiovisual equipment and the replacement of all computer workstations. The agency continues to pursue a strategy of modernization that incorporates lessons learned from use of the facility, as well as best practices from other agencies.

In FY 2008, NRC emergency responders participated in 14 exercises with licensee sites, 6 of which involved the NRC Headquarters response team, including 1 fuel cycle facility exercise and 1 unannounced exercise. In addition, the NRC participated in two Governmentwide interagency exercises and one intraagency tabletop drill. The NRC has also attended six hostile-action-based emergency preparedness drills hosted voluntarily by nuclear power plants to demonstrate responses to the unique challenges posed by security-based events.

International Activities

The NRC's international responsibilities involve participation in activities that support U.S. Government compliance with international treaties and agreements; export and import licensing of nuclear facilities, equipment and materials; programs of bilateral nuclear cooperation and assistance; and support for multinational nuclear safety organizations such as the IAEA and the Organization for Economic Cooperation and Development's Nuclear Energy Agency (NEA).

Notable accomplishments in FY 2008 in the area of international treaties and agreements include high-level NRC participation in the April 2008 Review Meeting of Contracting Parties to the Convention on Nuclear Safety, preparations for the April 2009 Review Meeting of Contracting Parties to the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management, and Commission review of U.S. Government agreements for peaceful uses of nuclear energy with Turkey, Russia, India, and the United Emirates. The Commission also approved the proposed adherence of the United States to the Protocol Additional to the Agreement between the

United States of America and the IAEA and is working with NRC licensees and through rulemaking to prepare for new reporting requirements.

In the area of export and import licensing, the NRC continued to work both domestically and internationally to enhance nuclear safety and security through the regulatory oversight of radioactive sources (see the section on nuclear materials users for specific examples). In May 2008, the NRC attended an IAEA open-ended meeting of technical and legal experts for sharing of information on lessons learned from States' implementation of the Supplementary Guidance on Import and Export of Radioactive Sources. The United States and 36 other States provided papers and six States provided presentations on their experiences at this meeting, which was attended by 167 experts from 88 IAEA member states.

Accomplishments in the area of bilateral activities during FY 2008 include an information exchange agreement that the NRC concluded with the National Nuclear Safety Administration of China. This arrangement is the first to include provisions with the Intellectual Property Rights (IPR) with China. The NRC also concluded an information exchange arrangement with the Vietnam Agency for Radiation and Nuclear Safety and Control (VARANSAC). Under this arrangement, the NRC will help VARANSAC develop its regulatory structure, exchange nuclear safety information, and assist in training technical staff. Additionally, the NRC signed a memorandum of cooperation (MOC) with the Canadian Nuclear Safety Commission (CNSC) for the Import and Export of Certain Radioactive Sources. This MOC was the first of its kind for both the United States and Canada. It resolves regulatory differences between the NRC and the CNSC regarding the implementation of the IAEA Code of Conduct. The MOC is expected to be used as a model for other countries interested in entering into an agreement with the NRC regarding the import and export of certain radioactive sources. The NRC developed pilot reactor licensing-related assistance projects that focus on helping select countries of the Commonwealth of Independent States establish the nuclear safety and security regulatory infrastructure needed for the design, construction, and operation of new nuclear power plants. The NRC supported State Department-led efforts to discuss their intentions and plans for developing nuclear power programs with countries of the Middle East.

The NRC continues to support the development and implementation of programs focused on leveraging the knowledge and resources within the international regulatory community in the licensing of new reactor designs. In the multilateral context, the NRC continues its leadership role in the Multinational Design Evaluation Program (MDEP), through which regulatory authorities in over a dozen countries share expertise and resources in reviewing new and future reactor designs. The Nuclear Energy Agency (NEA) serves as secretariat for the multilateral MDEP activities. At its meeting in March 2008, the MDEP Policy Group approved continuation of the program, merging the current three stages into a single program. Some key accomplishments over the year include: the performance of the first joint vendor inspection; initiation of a project with the code organizations to compare the pressure boundary codes of four member countries; and the establishment of the MDEP library to collect and share regulatory documents of common interest that describe design requirements and guidance, review process and inspection program of new reactors.

The NRC has worked both domestically and internationally to enhance nuclear safety and security through the regulatory oversight of radioactive sources. For FY 2008, the NRC received a significant budget increase from Congress to support these efforts, which enabled the NRC to expand ongoing or planned radioactive-source-related assistance efforts for the regulatory authorities of the Commonwealth of Independent States, expand assistance provided to the Iraqi Radioactive Source Regulatory Authority, establish initial assistance efforts for select regulatory authorities in Africa, and enhance support for and coordination with sources-related assistance activities conducted by the IAEA. The NRC has also worked with the Executive Branch agencies and the IAEA to develop international security guidance documents for materials control, accounting, and physical protection.

The NRC participated in a working group with representatives of DOT and the CNSC to develop draft NUREG-1886, "Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages," which was issued for comment in May 2008. This NUREG will provide the framework for U.S. and Canadian cooperation and acceptance of each country's Type B(U) and fissile materials transportation package design approvals for export and import. The NRC expects to publish a final regulation in FY 2009, after parallel review and comment in the United States and Canada.

Considerable effort has gone into bilateral inspection training activities, especially with regard to actions in Finland, Japan, South Korea, and Taiwan. In Finland, an NRC inspector spent two months observing at the Olkiluoto 3 construction site and participated in a technical exchange concerning quality assurance. The NRC participated in a dual vendor inspection of Dousan Heavy Industries while in South Korea in May 2008. Also in May, the vendor inspection team performed a vendor inspection at Mitsubishi Heavy Industries in Japan. Additionally, an NRC inspector observed the Lungmen Nuclear Power Plant construction project for 1 month in Taiwan. Future cooperation with these countries' regulatory bodies is expected as more vendors become active in the nuclear market.

STRATEGIC GOAL 2: SECURITY

Ensure Adequate Protection in the Secure Use and Management of Radioactive Materials

Strategic Outcome

The NRC has the following strategic outcome associated with the agency's goal to ensure the secure use and management of radioactive materials. Prevent any instances where licensed radioactive materials are used domestically in a manner hostile to the security of the United States.

RESULTS: In FY 2008, the NRC achieved its security goal strategic outcome.

PERFORMANCE MEASURES

The table on the following page lists the agency's annual performance measures and their outcomes for the past 6 years. The performance measures are used to determine the agency's success in achieving its security goal. The NRC met all of the FY 2008 security goal performance measure targets.

Analysis of FY 2008 Results

1. **Unrecovered losses or thefts:** This measure includes any loss or theft of radioactive nuclear sources that the NRC has determined to be risk significant. The measure tracks the NRC's performance in ensuring that those radioactive sources that the agency has determined to be risk significant for the public health and safety are accounted for at all times. The ability to account for these sources is vital to securing the Nation's critical infrastructure from "dirty bomb" attacks or other means of radioactive material dispersal. There was no loss or theft of radioactive nuclear material that the NRC determined to be risk significant during FY 2008.

2. **Thefts or diversion:** This measure includes the ability of NRC-licensed facilities to maintain adequate protective capabilities to prevent theft or diversion of nuclear material or sabotage that could result in harm to the public health and safety. There were no substantiated cases of theft or diversion of licensed, risk-significant radioactive sources or formula quantities of special nuclear material or attacks that resulted in radiological sabotage during FY 2008.

3. **Loss or inventory discrepancy:** This measure includes ensuring that special nuclear material is accounted for at all times and that no losses of this material occur that could lead to the creation of an improvised nuclear device or other type of nuclear device. Furthermore, the measure tracks whether the systems in place at NRC-licensed facilities maintain accurate inventories of special nuclear material that the facilities process, use, or store. There were no substantiated losses of formula quantities of special nuclear material or substantiated inventory discrepancies

FY 2008 Security Goal Performance Measures

Measure	2003	2004	2005	2006	2007	2008
1. Number of unrecovered losses or thefts of risk-significant radioactive sources is zero.	0	0	0	0	0	0
2. Number of substantiated cases of theft or diversion of licensed, risk-significant radioactive sources or formula quantities of special nuclear material, or attacks that result in radiological sabotage is zero.	0	0	0	0	0	0
3. Number of substantiated losses of formula quantities of special nuclear material or substantiated inventory discrepancies of formula quantities of special nuclear material that are judged to be caused by theft or diversion or by substantial breakdown of the accountability system is zero.	0	0	0	0	0	0
4. Number of substantial breakdowns of physical security or material control (i.e., access control containment or accountability systems) that significantly weaken the protection against theft, diversion, or sabotage is less than one.	0	0	0	0	0	0
5. Number of significant unauthorized disclosures of classified and/or safeguards information is zero.	0	0	0	0	0	0

of formula quantities of special nuclear material that were caused by theft or diversion or by substantial breakdown of the accountability system during FY 2008.

4. **Substantial breakdowns of physical security:** This measure includes any breakdowns in access control, containment, or accountability systems that significantly weakened the protection against theft, diversion, or sabotage for nuclear materials that the Commission has determined to be risk significant. There were no substantial breakdowns of physical security during FY 2008.

5. **Significant unauthorized disclosures:** This measure includes significant unauthorized disclosures of classified or safeguards information that cause damage to national security or public safety. This measure tracks whether information that can harm national security (classified information) or cause damage to the public health and safety (safeguards information) has been stored and used in such a way as to prevent its disclosure to the public, terrorist organizations, other nations, or personnel without a need to know. There were no significant disclosures that caused damage to national security or public safety during FY 2008.

Security Activities

Security Inspections

The NRC continued to maintain vigilant oversight of security in the nuclear industry and to implement the agency's security procedures. There were no substantial breakdowns of physical security at any commercial nuclear power plant. This was determined by the NRC's implementation of its baseline security inspection program. This inspection effort resides within the "security cornerstone" of the agency's Reactor Oversight Process. The security cornerstone focuses on the following five key licensee performance attributes: access authorization, access control, physical protection systems, material control and accounting, and response to contingency events. Through the results obtained from all

oversight activities, including baseline security inspections and performance indicators, the NRC determines whether licensees comply with requirements and can provide high assurance of adequate protection against the design-basis threat for radiological sabotage.

The NRC regularly carries out force-on-force inspections at commercial operating nuclear power plants as part of its comprehensive security program. The agency uses these inspections to evaluate and improve the effectiveness of plant security programs to prevent radiological sabotage. The agency conducts force-on–force inspections at least once every 3 years at each commercial nuclear power plant and fuel facility.

Force-on-force inspections assess a nuclear power plant's ability to defend against the design-basis threat, which characterizes the adversary against which plant owners must design appropriate defenses, such as physical protection systems and response strategies. A full force-on-force inspection, spanning 2 weeks, includes both tabletop drills and simulated combat between a mock commando-type adversary force and the nuclear plant's security force. During the attack, the adversary force attempts to reach and damage key safety systems and components that protect the reactor's core (containing radioactive fuel) or the spent nuclear fuel pool, potentially causing a radioactive release to the environment. The nuclear power plant's security force seeks to stop the adversaries from reaching the plant's equipment. In FY 2008, the agency completed 24 force-on-force inspections and submitted its third annual Report to Congress on the results of the security inspection program.

The agency also pursued recommended enhancements to its allegation and inspection programs based on a lessons-learned review that followed an agency investigation into reports of inattentive security officers at the Peach Bottom nuclear power plant in Pennsylvania.

Security Rulemaking

During FY 2008, the NRC continued security rulemaking activities to increase the stability of the security requirements that it has placed on its licensees. The proposed security rulemakings are intended to make security practices generically applicable and generically acceptable security practices. The rulemakings address the lessons learned from requirements imposed by Orders on licensees following the events of September 11, 2001, as well as addressing lessons learned from operating experience and force-on-force exercises. The NRC has nearly completed the rulemakings for 10 CFR Part 73, "Physical Protection of Plants and Materials," on security requirements and the requirements for new reactors to assess aircraft impact. The agency is developing draft regulatory guides to support these rulemakings.

This proposed rule was published in the *Federal Register* in October 2006 (71 FR 62664). The final rule will fulfill the Commission's intent to complete a thorough review of physical protection program requirements and orders issued after September 11, 2001, and make them generically applicable security requirements. The agency completed the fitness-for-duty rule, proposed revisions to the access authorization and physical protection rule, published a final rule revising the design-basis threats, and published a proposed rule for Nuclear Materials Management and Safeguards System database reporting. The agency also implemented interim fingerprinting requirements. Other significant additions to the security regulations include requirements for cyber security, mitigative strategies and response procedures for potential or actual aircraft attacks, and assessment and management of the interface between safety and security.

In addition, the agency made significant progress in the development of security infrastructure for new reactor licensing. The infrastructure includes the development of standard review plans for early site permits, design certification, and combined operating licenses as well as security assessment format and content guides. The NRC continued interactions with the U.S. Department of Homeland Security (DHS) on security infrastructure through periodic meetings. The NRC also completed its initial security review for the design certification of the General Electric ESBWR, provided technical support for a draft combined operating license regulatory guide, and completed its security review of the early site permit for the Vogtle plant.

The NRC continued to improve and formalize its working relationships with other Federal agencies. These activities

included the development of a memorandum of agreement between the NRC and the U.S. Department of Energy on the harboring of transport vehicles at NRC-licensed sites. The NRC recognizes the importance of a coordinated approach to security among the agencies in the Federal Government charged with homeland security responsibilities.

Control of Radioactive Sources

In FY 2008, the NRC maintained its efforts to identify and mitigate the risk of terrorist threats through enhanced security and controls for the use, storage, and transportation of byproduct materials and spent nuclear fuel. In collaboration with the DHS, DOE, and other Federal, State, and local agencies, the NRC continued to assess the potential use of risk-significant sources in radiological dispersal devices and to coordinate efforts to enhance radioactive source protection and security.

The NRC worked with Agreement States to implement requirements imposed on licensees that enhance the security and control of risk-significant radioactive material, including development of an inspection program to verify the implementation of these measures. In FY 2008, the NRC and Agreement States issued orders or other regulatory requirements to these licensees to require fingerprinting for those persons with unescorted access to risk-significant radioactive material. The NRC also continued activities to implement the National Source Tracking rule, which requires licensees to report information that will be maintained in a database for tracking possession of risk-significant radioactive sources. The rule requires NRC and Agreement State licensees to report transactions involving the manufacture, transfer, receipt, and disposal of nationally tracked sources (i.e., Category 1 and 2 sources from the IAEA Code of Conduct for the Safety and Security of Radioactive Sources). In response to two U.S. Government Accountability Office (GAO) reports recommending the development of a tracking system for radioactive sources, the NRC developed and annually updates an interim database of nationally tracked sources. In response to a GAO investigation of the ease of obtaining a new license for radioactive sources, the NRC and Agreement States have implemented a process to screen new license applications or applicants to determine, with reasonable assurance, that the requested materials will be used as intended.

Gary Holahan, Deputy Director, Office of New Reactors, participating in an emergency preparedness exercise at the Waterford Nuclear Power Plant near New Orleans, LA.

The NRC continued its significant participation in implementing portions of the International Atomic Energy Agency Code (IAEA) of Conduct on the Safety and Security of Radioactive Sources, as well as its participation in IAEA committees that are developing guidance documents for the security of radioactive sources during use, storage, and transport. The NRC's involvement in these committees enhances security and public safety and contributes to international and domestic regulatory consistency. Under 10 CFR Part 110, which was revised in December 2005, the NRC issued 50 licenses for the export of Category 1 and 2 materials as defined by the Code. The NRC is also developing plans to expand the National Source Tracking System to include Category 3 sources.

In FY 2008, the agency conducted an operational readiness review of the Enrichment Technology U.S., Inc., (ETUS) location at the Louisiana Energy Services (LES) site in Eunice, NM. The purpose of the readiness review was to determine if ETUS's program for the protection of classified matter was consistent with its NRC-approved Standard Practice Procedures Plan (SPPP) for the protection of

classified matter. Based on the results of the review, the NRC determined that the ETUS classified matter program was in compliance with its approved SPPP. Therefore, the NRC issued a facility security clearance for the use and storage of classified matter up to and including confidential-restricted data. The agency also conducted a protection of classified matter review of the LES International Standards Organization Container Storage (ISO) Pad in order to determine if the ISO Pad was sufficient for the temporary storage of classified matter and participated in an accreditation of the LES classified CROON Training network with the Department of Energy. The ISO Pad was built and added to the LES SPPP after NRC granted LES its initial facility security clearance. Therefore, the NRC performed an on site review of the LES ISO Pad to determine if it met the requirements for the protection of classified matter as described in the LES SPPP. Based on the ISO Pad review, the NRC notified LES that the Pad was approved for the temporary storage of classified matter. The agency also conducted an operational readiness review of General Electric-Hitachi's Separation of Isotopes by Laser Excitation (Silex) Test Loop Facility in Wilmington, NC, and Textron Defense Systems, a contractor to General Electric-Hitachi, who will be milling and refurbishing classified parts. In both cases, the agency granted facility security clearances for the use and storage of classified matter up to and including secret-restricted data.

In addition to operational readiness reviews that were conducted in support of classified storage programs for FY 2008, the agency also conducted safeguards information program reviews in support of the four advanced reactor vendors. The NRC conducted hands-on inspections at six different facilities operated by the four vendors in Virginia, Pennsylvania, North Carolina, and Japan and accredited the day-to-day safekeeping and storage practices for safeguards information. The safeguards information program reviews are intended to ensure compliance capabilities exist as directed by NRC information security standards. An engineering company in North Carolina was also visited by the NRC to evaluate its request for a safeguards information program.

Spent Fuel

In FY 2008, the agency completed six security plan reviews for proposed independent spent fuel storage installations and issued security orders to five new independent spent fuel storage installation licensees. The NRC also reviewed and approved five spent fuel transportation routes.

ORGANIZATIONAL EXCELLENCE OBJECTIVES

Openness, Effectiveness, and Operational Excellence

The agency's Organizational Excellence objectives of Openness, Effectiveness, and Operational Excellence and their associated performance measures are shown below, as well as descriptions of agency actions that will be undertaken to address those measures that did not meet their targets. This will be the last year these objectives and performance measures will be reported in the Performance and Accountability Report since they are being discontinued after FY 2008.

Openness Objective measures not met and actions to resolve problem.

1b. & 1c. The requirements were not met. The agency continues to review internal procedures to improve agency timeliness in providing documents to the public. Internal processes are currently being reviewed, and improvements are being implemented to meet the timelines measure.

Effectiveness Objective measures not met and action to resolve problem.

1.a. There has been an increasing trend in the number of complex licensing action requests, reduced number of lower complexity actions such as orders, and reductions in efficiency caused by new staff and loss of experienced staff to attrition and movement within the agency. NRR did not see expected results of process enhancements because of the trend in more complex safety reviews.

Operational Excellence Objective measures not met and actions to resolve problems.

1.a. The agency has experienced a large growth in FTEs within the last year due to the New Reactor Program ramping up to receive applications from licensees to develop and construct new reactors. As a result, additional budget staff was hired to manage the program, which resulted in the agency exceeding the target for this measure. However, the Office of the Chief Financial Officer is currently developing a new budget process as directed by the Commission.

1.b. The NRC has initiated several actions to improve this measure. The Office of Human Resources has published "Staffing Process Enhancements" to speed up the hiring process. Additionally, a new element and standard covering the 45-day measure has been created for all Senior Executive Service positions.

Another significant issue in meeting the standard was the high volume of NRC hiring. For FY 2008, 521 new employees were hired.

Organizational Excellence Objectives and Associated Performance Measures

Measure	2003	2004	2005	2006	2007	2008
Objective 1: Openness						
1. Eighty-eight percent of selected openness output measures (below) achieve performance targets.	New measure in FY 2006			50%	66%	80%
a. Ninety percent of stakeholder formal requests for information receive an NRC response within 60 days of receipt.	New measure in FY 2006			100%	100%	100%
b. Ninety percent of nonsensitive, unclassified regulatory documents generated by the NRC and sent to the agency's Document Processing Center are released to the public by the 6th working day after the date of the document.	New measure in FY 2006			63%	75%	82%
c. Ninety percent of nonsensitive, unclassified regulatory documents received by the NRC are released to the public by the 6th working day after the document is added to the ADAMS main library.	New measure in FY 2006			77%	87%	66%
d. The NRC achieves a 71% user satisfaction score for the agency's public Web site greater than or equal to the Federal Agency Mean score based on results of the yearly American Customer Satisfaction Index for Federal Web sites.	New measure in FY 2006			70%	71%	71%
e. Complete 50% of Freedom of Information Act requests in 20 days (median).	New measure in FY 2006			61%	67%	71%
f. Issue ninety percent of Director's Decisions under 10 CFR 2.206, "Requests for Action under this Subpart," within 120 days.	New measure in FY 2006			100%	100%	100%
g. Make 90% of final significance determination process determinations within 90 days for all potentially greater-than-green findings.	New measure in FY 2006			92%	100%	100%
h. Ninety percent of stakeholders believe they were given sufficient opportunity to ask questions or express their views.	New measure in FY 2006			90%	96%	97%

Measure	2003	2004	2005	2006	2007	2008
i. At least 90% of Category 1, 2, and 3 meetings on regulatory issues for which public notices are issued at least 10 days in advance of the meeting.	New measure in FY 2006			92%	93%	90%
j. Complete all of the key stakeholder and public interactions for the reactor performance assessment cycle.	New measure in FY 2008					Met
Objective 2: Effectiveness						
1. Seventy percent of selected processes deliver efficiency improvements.	New measure in FY 2006			25%	60%	80%
a. Reduce the average age at closure for licensing actions by 2.5%.	New measure in FY 2008					Not Met
b. At the rate of one per year, Category III license renewal applications will be considered for a 40-year license.	New measure in FY 2006			Not Met	Not Met	Met
c. Improve the timeliness of the review process for nuclear power reactor License Termination Plans by at least 30% over 3 years (FY 2006-FY 2008) as compared to the historical average.	New measure in FY 2006					38%
d. Implement process enhancements to permit improvement for the reactor rulemaking petition timeliness by 2.5%.	New measure in FY 2007				5%	Met
e. Reduce the staff cost for letters to DOE by 5%.	New measure in FY 2008					40%
2. No more than one instance per program where licensing or regulatory activities unnecessarily impede the safe and beneficial uses of radioactive materials.	New measure in FY 2006			0	0	0
Objective 3: Operational Excellence						
1. Ninety percent of selected support processes deliver efficiency improvements.	New measure in FY 2006			50%	0%	0%
a. Five percent reduction of agency FTE used to develop and submit the FY 2008 and FY 2009 performance budgets.	New measure in FY 2006			0%	2%* increase	6% increase
b. Issue offer letter 80% of the time within 45 work days of the closing date of the announcement.	New measure in FY 2006			67%	31%	56%
2. Eighty percent of selected NRC management programs deliver intended outcomes.	New measure in FY 2005		60%	80%	100%	100%
a. Infrastructure management program: 80% of activities achieve their targets.	New measure in FY 2005		100%	100%	100%	100%
b. Financial Management & Budget and Performance Integration program: 70% of activities achieve their targets.	New measure in FY 2005		67%	67%	88%	100%
c. Expanded electronic government program: 75% of activities achieve their targets.	New measure in FY 2005		50%	75%	75%	75%
d. Management of Human Capital program: 80% of activities achieve their targets.	New measure in FY 2005		80%	100%	80%	100%

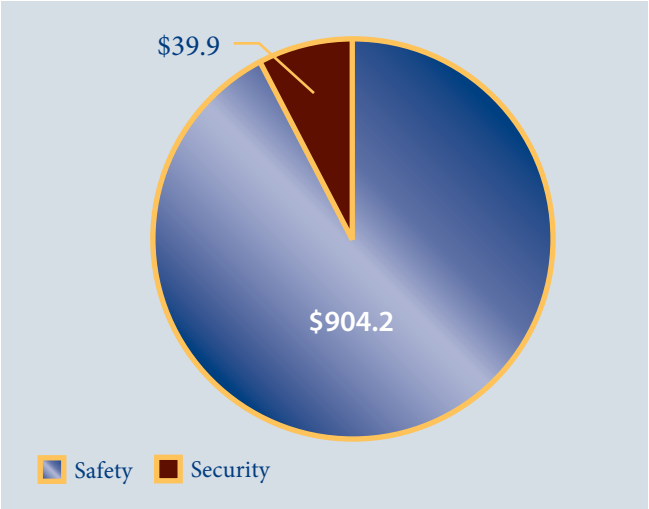
* FY 2007 PAR showed 12%. The data were error and recalculated to be 2%.

COSTING TO GOALS, PART REVIEWS, AND PROGRAM EVALUATIONS

Costing to Goals

The NRC is working to improve its cost management capabilities to better align its costs with desired outcomes. This year's Performance and Accountability Report presents the full cost of achieving the safety and security goals for two of the agency's programs, Nuclear Reactor Safety and Nuclear Materials Safety. The cost of achieving the agency's safety goal was $904.2 million, and the cost of achieving the agency's security goal was $39.9 million (see Figure 20).

Figure 20
NRC SAFETY AND SECURITY COSTS
(In Millions)



Program Assessment Rating Tool

The Office of Management and Budget (OMB) has conducted joint reviews with the NRC using the program assessment rating tool (PART) for all seven of the agency's major activities. The Office of Management and Budget has scored six of the programs as effective, the highest rating available, and one as moderately effective. There were no PART reviews in FYs 2006 and 2008. The following table shows the results of the NRC PART reviews:

NRC PART REVIEW RESULTS

Program	Year	Part Rating
Reactor Inspection and Performance Assessment	FY 2003	Effective
Fuel Facilities Licensing and Inspection	FY 2003	Effective
Nuclear Materials Users Licensing and Inspection	FY 2004	Effective
Reactor Licensing	FY 2005	Moderately Effective
Spent Fuel Storage and Transportation Licensing and Inspection	FY 2005	Effective
Decommissioning and Low-Level Waste	FY 2007	Effective
High-Level Waste Repository	FY 2007	Effective

Program Evaluations

The NRC conducted a number of important self-assessments of its regulatory operations in FY 2008. The Office of Nuclear Reactor Regulation performed evaluations on operating licensing program, Reactor Oversight Process, and management work planning process.

Operator Licensing Program

A NRC review team evaluated the overall effectiveness of the Region II and Region III operator licensing programs and their adherence to the guidance contained in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and other policy documents. The operator licensing programs are broken down into seven functional areas that are rated as "significant strength," "satisfactory," or "needs improvement." Overall, the operator licensing program in both Region II and Region III are being conducted in accordance with the examination standards. For both regions, six functional areas were assessed as satisfactory; one area—licensing assistant activities—was evaluated as a significant strength. The review team also commended the

regions' efforts to improve the quality of their Agencywide Documents Access and Management System examination packages.

Reactor Oversight Process

The NRC completed the 2007 Reactor Oversight Process (ROP) self-assessment in April 2008. The report, SECY-08-0046, "Reactor Oversight Process Self-Assessment for Calendar Year 2007," is available through the NRC public Web site.

The results of the CY 2007 self-assessment indicated that the ROP met its program goals and achieved its intended outcomes. The staff found the ROP objective, risk informed, understandable, and predictable, and the ROP met the agency goals of ensuring safety, openness, and effectiveness as listed in the NRC's Strategic Plan for Fiscal Years (FY) 2004–2009. The NRC staff maintained its focus on stakeholder involvement and continued to improve various aspects of the ROP. The staff implemented several ROP improvements in CY 2007 to address issues raised by the Commission, recommended by independent reviews, or obtained from internal and external stakeholder feedback.

The NRC inspection and assessment program independently verified that nuclear power plants were operated safely and securely. During the year, the staff made several improvements to the ROP, including the timeliness of significance determination process results, implementing enhancements to more fully address safety culture and oversight of licensees with performance problems, realigning inspection resources to improve effectiveness, and making changes to some performance indicators to better identify declining safety performance. However, the staff recognizes the need for further enhancements to the ROP and will continue to actively solicit input from the NRC's internal and external stakeholders. For example, the staff plans to explore ways in which substantive cross-cutting issues, traditional enforcement actions, and other insights could be used more effectively in the ROP.

Management Work Planning Process

In July 2007, the NRC engaged an independent management consulting firm to help assess its centralized work planning (CWP) efforts and make recommendations to improve the effectiveness of those efforts. The CWP is a significant initiative to implement CWP and project support within the Office of Nuclear Reactor Regulation (NRR). Its initial inception in 1999 changed the way many projects were initiated and managed in the NRR. The CWP effort was established with the following goals:

- Provide clear and consistent expectations and accountability for NRR work processes and products.
- Provide up-to-date, accessible workload information for planning, budgeting, and measuring work and organizational performance.
- Optimize the efficiency of NRR work processes by reducing process variances.
- Establish objective means of allocating and tracking the workload so that NRR resources are fully leveraged.

The consultants concluded that while the CWP effort has had a positive impact on project quality and execution, the agency can improve the quality of work and project planning, tracking, and management within NRR. The consultants recommended that the agency expand the organizational capacity of the CWP by adding additional project management support and business intelligence capabilities. In addition, the consultant recommended the agency migrate from its current information technology systems to an enterprise project management team.

DATA SOURCES AND QUALITY

The NRC's data collection and analysis methods are driven largely by the regulatory mandate that Congress entrusted to the agency. Specifically, the NRC's mission is to regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, protect the environment, and promote the common defense and security. In undertaking this mission, the NRC oversees nuclear power plants, nonpower reactors, nuclear fuel facilities, interim spent fuel storage, radioactive

material transportation, disposal of nuclear waste, and the industrial and medical uses of nuclear materials. Section 208 of the Energy Reorganization Act of 1974, as amended, requires the NRC to inform Congress of incidents or events that the Commission determines to be significant from the standpoint of public health and safety. To comply with the Energy Reorganization Act and to determine which events should be considered significant, the NRC developed the abnormal occurrence criteria. Based on those criteria, the NRC prepares the annual NUREG-0090, "Report to Congress on Abnormal Occurrences," which is available on the agency's public Web site at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0090.

One important characteristic of this report is that the data presented normally originate from external sources such as Agreement States and NRC licensees. The NRC finds these data credible because (1) agency regulations require Agreement States, licensees, and other external sources to report the necessary information; (2) the NRC maintains an aggressive inspection program that, among other activities, includes auditing licensee programs and evaluating Agreement State programs to ensure that they are reporting the necessary information as required by the agency's regulations; and (3) the agency has established procedures for inspecting and evaluating licensees. The NRC employs multiple database systems to support this process, including the Licensee Event Report Search System, the Accident Sequence Precursor Database, the Nuclear Materials Events Database, and the Radiation Exposure Information Report System. In addition, nonsensitive reports submitted by Agreement States and NRC licensees are available to the public through the NRC's Agencywide Documents Access and Management System accessible through the agency's public Web site http://www.nrc.gov.

As stated above, the NRC has established procedures for the systematic review and evaluation of events reported by both NRC and Agreement State licensees. The NRC's objective is to identify events that are significant from the standpoint of public health and safety, based on criteria that include specific thresholds. The NRC verifies the reliability and technical accuracy of event information reported to the agency. The NRC periodically inspects licensees and reviews Agreement State programs. In addition, the NRC headquarters, regional offices, and Agreement States hold periodic conference calls to discuss event information. Events identified as meeting the abnormal occurrence criteria are validated and verified before being reported to Congress.

Data Security

Data security is ensured by the agency's automated information security program, which provides administrative, technical, and physical security measures to protect the agency's information, automated information systems, and information technology infrastructure. Specifically, these measures include the policies, processes, and technical mechanisms used to protect classified information, unclassified safeguards information, and sensitive unclassified information that is processed, stored, or produced on the agency's automated information systems. Data security for information maintained outside the NRC's infrastructure is provided by the hosting contractor or organization.

Performance Data Completeness and Reliability

To manage for results, it is essential for the agency to assess the completeness and reliability of the NRC performance data. Comparisons of actual performance with the projected levels are possible only if the data used to measure performance are complete and reliable. Consequently, the Reports Consolidation Act of 2000 requires the Chairman of the NRC to assess the completeness and reliability of the performance data used in this report. The process for ensuring the data is complete and reliable is that offices are required to complete a template for submission to the Chief Financial Officer for every performance measure, certifying the data submitted has been approved by the applicable Office Director.

Data Completeness

The agency considers data to be complete if the agency reports actual performance data for every performance goal and indicator in the annual plan. Actual performance data include preliminary data if those are the only data available when the agency sends its report to the President and Congress. The NRC has reported actual or preliminary data for every strategic and performance goal measure; consequently, the data presented in this report meet these requirements for data completeness.

Data Reliability

The agency considers data to be reliable when agency managers and decisionmakers do not demonstrate either a refusal or a marked reluctance to use the data in carrying out their responsibilities. The data presented in this report meet this requirement for data reliability, since NRC managers and senior leaders regularly use the reported data in the course of their duties.

Photo Courtesy of the NRC Photo Library.

Waterford Nuclear Power Plant in St. Charles Parish, Killona, LA.