U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

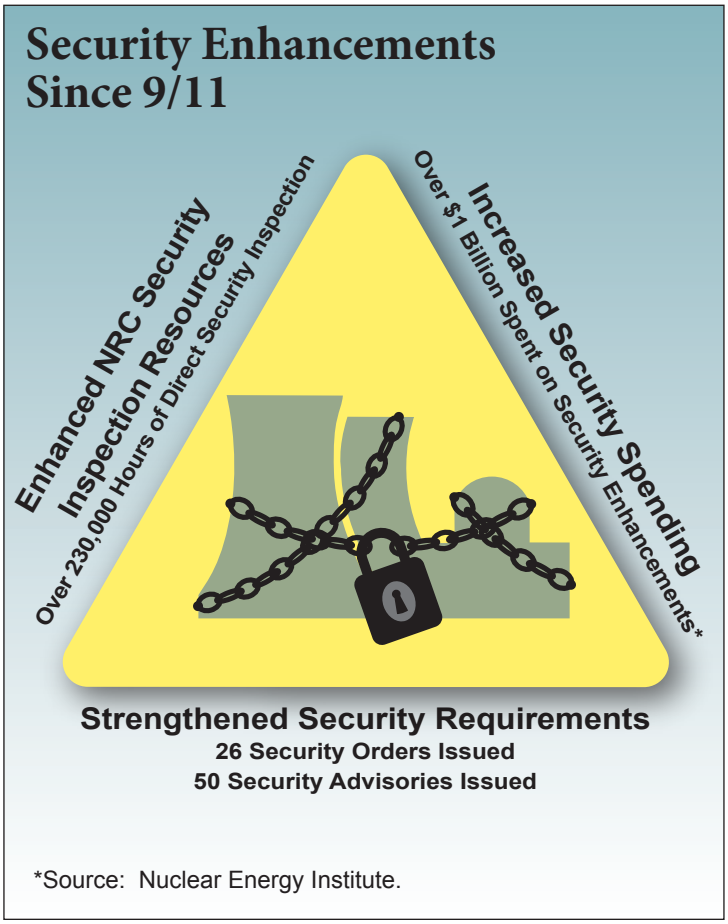
Security Spotlight

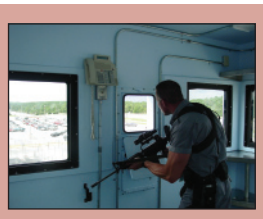
Overview

The NRC requires nuclear power plants to protect against threats. These plants are some of the most fortified civilian facilities in the country. After 9/11, the NRC used its independent regulatory authority to order the nuclear industry to implement new defensive capabilities, more rigorous guard training and many other security enhancements. In response, the industry has met the increased requirements regardless of cost. The process of upgrading security continues.

Safety and Security

The NRC requires that nuclear power plants be both safe and secure. Safety refers to operating the plant in a manner that protects the public and the environment. Security refers to protecting the plant—using people, equipment and fortifications—from intruders who wish to damage or destroy it in order to harm people and the environment.





"The NRC requires that nuclear power plants be both safe and secure."

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Layers of Defense

Protecting Against Aircraft

- A combination of factors protect nuclear power plants from air attacks, including the fact they are robust structures of steel and concrete, and relatively small targets. Cooperation with other federal agencies also reduces the risk of an aircraft attack.

Defending Against Adversaries

- There are many layers protecting a nuclear power plant from a ground or water attack, including well-trained and armed security officers, and defensive barriers. The NRC routinely tests the security of the plants through realistic exercises.

Securing Materials

- Thousands of industrial and medical devices safely use small amounts of radioactive material to improve our quality of life. Some of these materials must be licensed and tracked to prevent them from being misused.

Strengthening Regulations

- Enforcing regulations—also called rules—is how the NRC ensures the safety of the public and the environment. Three new or revised rules will further enhance the security of nuclear power plants.

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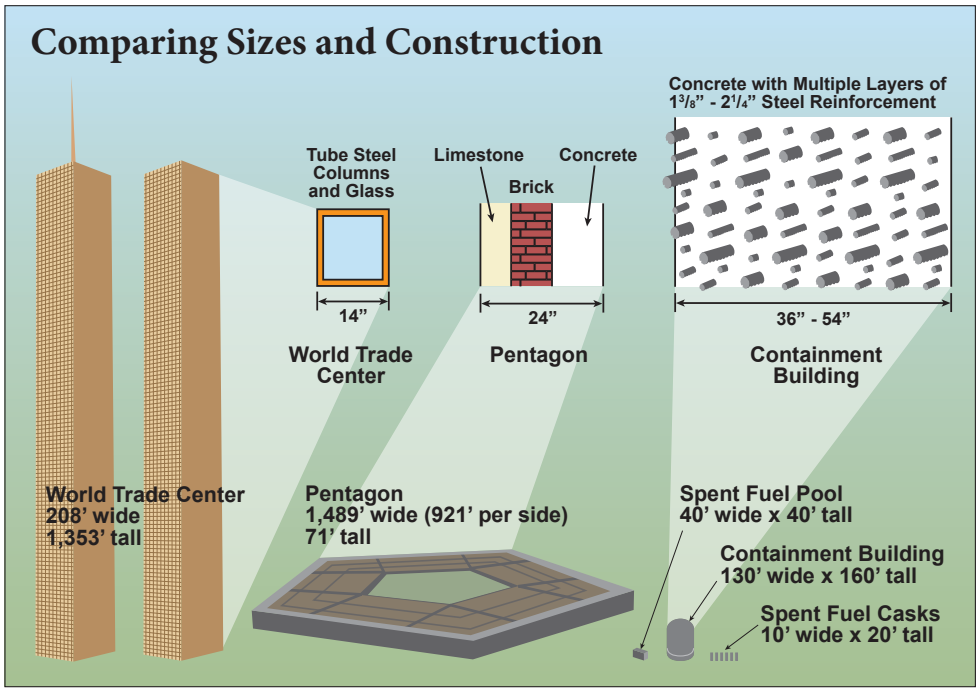
Protecting Against Aircraft

Since 9/11, the issue of an airborne attack on this nation's infrastructure, including both operating and potential new nuclear power plants, has been widely discussed. The NRC has comprehensively studied the effect of an airborne attack on nuclear power plants. Shortly after 9/11, the NRC began a security and engineering review of operating nuclear power plants. Assisting the NRC were national experts from Department of Energy laboratories, who used state-of-the-art experiments, and structural and fire analyses.



These classified studies confirm that there is a low likelihood that an airplane attack on a nuclear power plant would affect public health and safety, thanks in part to the inherent robustness of the structures. A second study identified new methods plants could use to minimize damage and risk to the public in the event of any kind of large fire or explosion. Nuclear power plants subsequently implemented many of these methods.

The NRC is now considering new regulations for future reactors' security. The goal is to include inherent safety and security features to minimize potential damage from an airborne attack.

Integrated Federal Response

It is the federal government and military's responsibility to protect the nation against an aircraft attack. To that end, the NRC works closely with its federal partners to identify and implement enhanced security programs, including:

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- Military and Department of Homeland Security program to identify and protect critical infrastructure
- Criminal history checks on flight crews
- Reinforced cockpit doors
- Checking of passenger lists against "no-fly" lists
- Increased control of cargo
- Random inspections
- Increased Federal Air Marshal presence
- Improved screening of passengers and baggage
- Controls on foreign passenger carriers
- Improved coordination and communication between civilian and military authorities.

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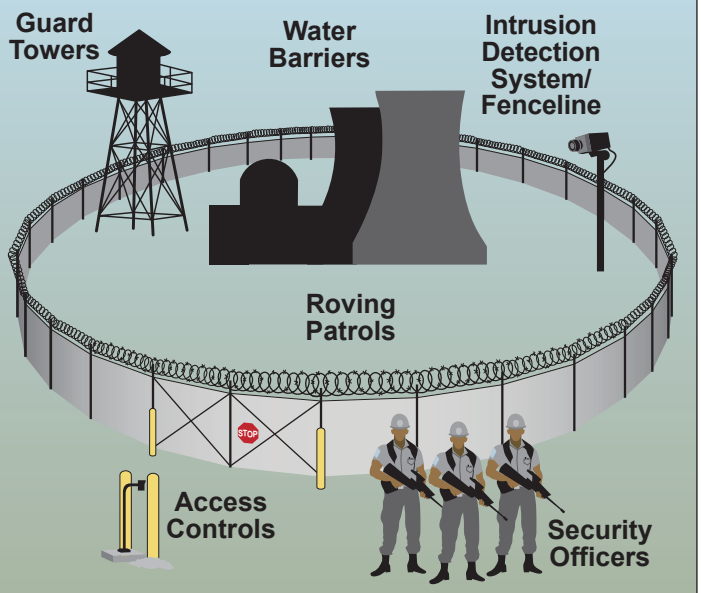
Defending Against Adversaries

Commercial nuclear power plants are heavily fortified with well-trained and armed guards. They also have layered physical security measures, such as access controls, water barriers, intrusion detection and strategically placed guard towers. Together, these make up the plants' response to the Design Basis Threat – usually called the DBT. The DBT is developed from real-world intelligence information and describes the adversary force – coming from both ground and water – the plants must defend against. DBT specifics are not public in order to protect sensitive information that could aid terrorists. The NRC regularly reviews the DBT and adds new requirements when necessary.

Components of Security



Protecting nuclear facilities requires all the security features to come together and work as one.

Category I Fuel-Cycle Facilities

There are two NRC-licensed Category I Fuel-Cycle Facilities in the U.S. that make reactor fuel for nuclear plants. Since these plants handle nuclear material that could be targeted by adversaries, they also must defend against a DBT similar to that for nuclear power plants.

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Force-on-Force Exercises

- The NRC routinely tests the security at nuclear facilities with realistic exercises using a well-trained mock adversary force. These force-on-force exercises are designed to test a security force's ability to defend against the DBT. The NRC oversees every aspect of these exercises and evaluates them using rigorous standards. These exercises typically span several days. During the attack, the mock adversary force tries to reach and damage key safety systems. Any significant security problems are promptly identified, reviewed, and fixed prior to NRC's inspection team leaving the facility. The NRC tests every plant with a force-on-force exercise a minimum of every three years. The plants also must conduct their own yearly exercises.

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Preparedness and Response

No matter how small the risk, the NRC requires all nuclear power plants to have and periodically test emergency plans that are coordinated with federal, state and local responders. The goal of preparedness is to reduce the risk to the public during an emergency.

In an emergency, the NRC and the licensee would activate their Incident Response Programs. Licensee specialists would evaluate the situation and identify ways to end the emergency, while the NRC would monitor the event closely, keeping government offices informed. If a radiation release occurred, the plant would make protective action recommendations to state and local officials, such as evacuating areas around the plant.

The Team Approach

Effective preparedness and response requires cooperation among the federal government, state and local officials, the public, and the nuclear plants.

- **Emergency Planning Zones (EPZs)**

  Each nuclear power plant has two EPZs. Each EPZ considers the specific conditions and geography at the site, and the community. The first is the Plume Exposure Pathway EPZ, which has a radius of about 10 miles from the reactor. People living there may be asked to evacuate or "shelter in place" during an emergency, to avoid or reduce their radiation dose. The second is the Ingestion Exposure Pathway EPZ. This has a radius of about 50 miles from the reactor. Protective action plans for this area aim to avoid or reduce the radiation dose from consuming contaminated food and water.

"The goal of preparedness is to reduce the risk to the public during an emergency."

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Response Modes

The NRC uses these modes for responding to events:

- Monitoring - A heightened state of readiness for getting and accessing incident information.
- Activation - A team of Reactor and Preparedness specialists begin staffing the Headquarters Operations Center and Regional Incident Response Centers to respond to the event. Another team of specialists travels to the site, if needed.

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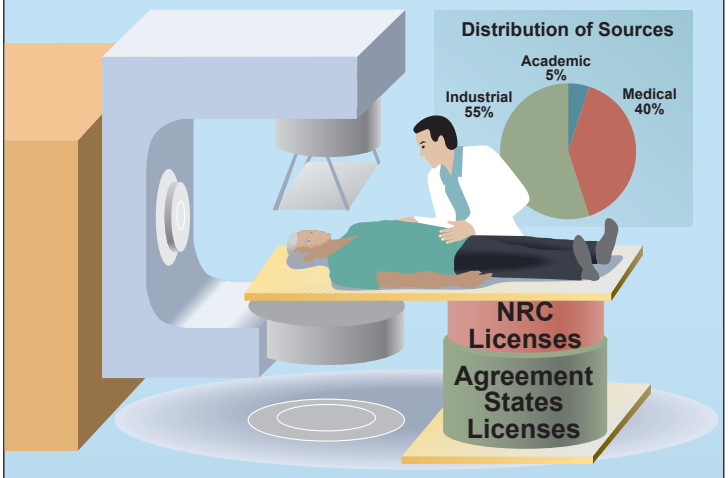
Securing Materials

Radioactive materials are used in many beneficial ways, including medical, academic and industrial uses. Cancer treatment is just one way that radioactive materials benefit the public. Despite these benefits, some materials can potentially harm people and the environment if misused. For these reasons, their security, including use and handling, is strictly regulated in the United States by the NRC.

"Dirty bombs"

A "dirty bomb," also called a "radiological dispersal device" (RDD), combines explosives, such as dynamite, with radioactive material. A dirty bomb is NOT a nuclear weapon. Most dirty bombs would not be highly destructive and would not release enough radiation to kill people or cause severe illness. Instead, a dirty bomb is a "Weapon of Mass Disruption" that could cause panic and fear, and require costly cleanup. Some materials licensed by the NRC could possibly be used in a dirty bomb, which is why they are strictly regulated.

Securing Radioactive Materials



The NRC and Agreement States have issued about 22,000 licenses for radioactive material. Through the Agreement State Program, the NRC shares its regulatory authority to license and oversee the use of certain types of radioactive material. The NRC regularly reviews the programs set up by the states to verify that they can effectively protect public health and safety.

National Source Tracking System (NSTS)

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- The NRC will implement the NSTS in 2008 to enhance controls for certain radioactive materials considered to be of the greatest concern from a safety and security standpoint. Until the NSTS is deployed, the NRC and Agreement States perform an annual inventory of these sources. The tracking system is being developed with other federal and state agencies, and international partners.

The NSTS will require licensees to report the manufacture, transfer, receipt, disassembly, and disposal of nationally tracked sources. The NSTS is an important component of the NRC's effort to enhance the control of radioactive material and prevent its use by the nation's adversaries. There are approximately 54,000 of these sources in use in the United States.

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Research and Test Reactors

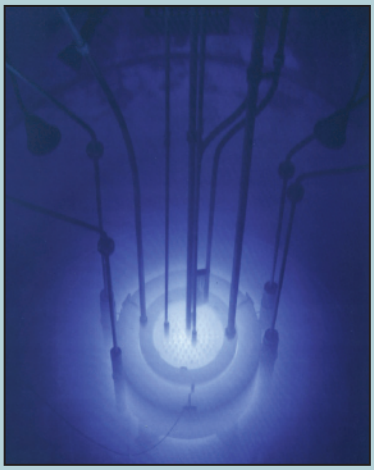
Research and Test Reactors – also called RTRs or "non-power" reactors – are low-power nuclear reactors that are primarily used for research, training and development. There are 32 operating NRC-licensed RTRs around the country that are used to study almost every field of science. Regulating the safety and security of RTRs is one of NRC's jobs.

Safe and secure RTRs are an important part of campus landscapes around the country, providing education and training to the next generation of scientists and engineers.

RTRs are designed and operated so that material is not easily handled or dispersed. This protects the public and environment against potential radiological exposure or theft of the material. RTRs are licensed to have only small amounts of radioactive material on site. The NRC evaluates and inspects each RTR's security plans, procedures and systems to verify that effective security measures are in place to protect the reactors.

Size Matters

NRC-licensed RTRs range in size from 20 Megawatts (MW) to 5 Watts (about the size of a child's nightlight). In comparison, the typical operating nuclear power plant is 3,000MW and can power over 1 million homes.



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Rules of Regulation

Because NRC-licensed RTRs operate at significantly lower power levels than their power plant cousins and have a limited amount of radioactive material on site, the standard for regulating these reactors is different. In fact, the NRC is federally mandated to apply the minimum regulation needed to protect the public health and safety at RTRs so they can effectively conduct education and research.

After 9/11, the NRC established additional security measures and inspected RTRs to ensure the measures were followed. The NRC identified several potential enhancements and RTRs around the country voluntarily implemented many of the improvements. With these security measures in place, the NRC has determined that these reactors pose minimal risk to public health and safety.

Today, the NRC continues to monitor RTR security through our regulatory processes. If threat conditions change, such that they could potentially affect public health and safety, the NRC will act promptly to further enhance security at RTRs.

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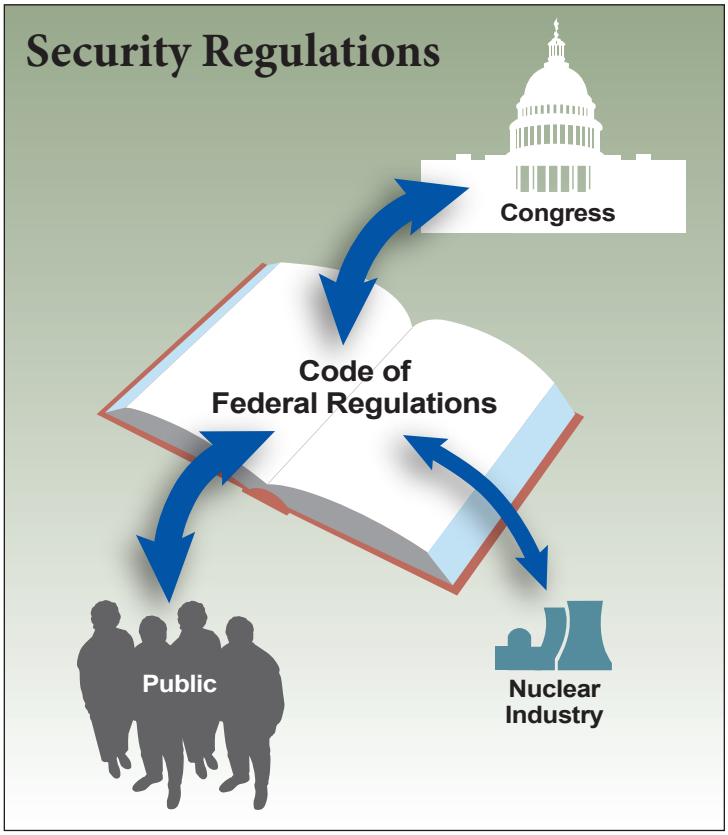
Rulemaking Overview



Immediately after the 9/11 terrorist attacks, the NRC advised nuclear facilities to go to the highest level of security. After that, the NRC issued a series of mandates – called Orders – to further strengthen security. The NRC is taking a multifaceted approach to security enhancements in the post-9/11 threat environment. The NRC has raised the security of existing nuclear power plants while also requiring new security features in the design of new reactors that may be built in coming years.

Most recently, three new rulemakings provide additional security enhancements.

- One rule, issued by the NRC in March 2007 after extensive public comment, modifies and enhances the Design Basis Threat.
- A second rule, which was issued for public comment in 2006, proposes enhancements to the physical security at nuclear power plants. Among other things, the proposed rule addresses access controls, event reporting, security personnel training, safety and security activity coordination, contingency planning, cyber and radiological sabotage protection.
- A third rule, still in the early stages, will propose additional aircraft impact assessments for new power reactor designs.

How Rulemaking Works

- Rules – or regulations – and their enforcement are how the NRC protects people and the environment. Nuclear power plants must adhere to the rules or risk serious repercussions – up to closing a plant down. A new rule may be proposed by the NRC's five-member Commission, because of a petition from the public or as suggested by the NRC staff based on research or actual events. Once developed, a proposed rule is published in the *Federal Register* for a public comment period, usually 75 to 90 days. Once the comment period has closed, the NRC staff analyzes the comments, makes any needed changes, and forwards the final rule to the NRC Commissioners for approval. If approved, the final rule is published in the *Federal Register* and usually becomes effective in 30 days.

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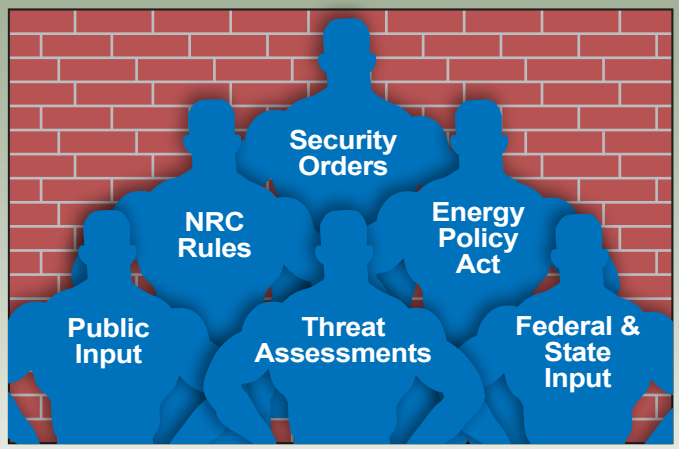
Design Basis Threat Rulemaking

The revised Design Basis Threat (DBT) rule was issued in March 2007. The rule describes general adversary characteristics that nuclear power plants must defend against. All existing nuclear power plants and Category I Fuel Cycle Facilities – and any built in the future – must adhere to this rule. The new rule also reflects insights gained by the NRC since 9/11, the latest threat information and a strengthened cyber threat component, as suggested by Congress and the public. In all, the NRC received and considered over 900 public comments on the rule.

Strengthening Security Regulations



By incorporating new threat information and Congressional and public input, the NRC has strengthened the DBT against which all nuclear power plants must defend.

- **Chairman Dale Klein:**

"This rule is an important piece, but only one piece, of a broader effort to enhance nuclear power plant security. Overall we are taking a multifaceted approach to security enhancements in this post 9/11 threat environment, and looking at how best to secure existing nuclear power plants and how to incorporate security enhancements into design features of new reactors that may be built in coming years."

"Overall we are taking a multifaceted approach to security enhancements..."

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Energy Policy Act of 2005

In this legislation, Congress outlined 12 factors that the NRC considered when developing the new DBT rule. Among those factors were:

- An assessment of physical, cyber, biochemical, and other terrorist threats;
- The potential for attack on facilities by multiple coordinated teams of a large number of individuals and several insiders;
- The potential for suicide attacks;
- The potential for water-based and air-based threats;
- The potential use of explosive devices of considerable size and other modern weaponry;
- The potential for attacks by persons with a sophisticated knowledge of facility operations;
- The potential for possibly long-lived fires.

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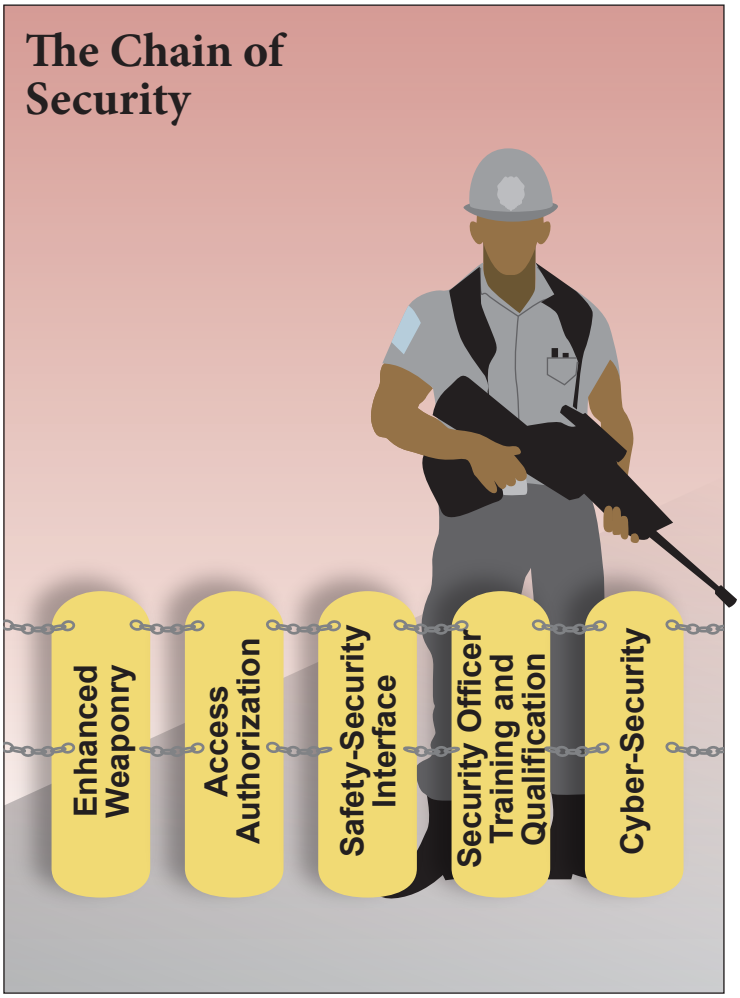
Physical Protection Rulemaking

A significant rulemaking on physical protection of nuclear power plants is currently underway. Originally published for public comment in the *Federal Register* on October 26, 2006, the proposed rule enhances requirements for access controls, event reporting, security personnel training, safety and security activity coordination, contingency planning and radiological sabotage protection. It would also add requirements related to background checks for firearms users and authorization for enhanced weapons to fulfill certain provisions in the Energy Policy Act of 2005.



- **Safety/Security Interface Requirements**

  The proposed rule's safety/security requirements define how nuclear power plants are to minimize potential adverse interactions between security activities and other plant activities. The goal is to ensure that neither plant security nor plant safety is compromised.

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Amended Regulations - 10 CFR Part 73 "Physical Protection"

- 73.55 "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage"
- 73.56 "Personnel access authorization requirements for nuclear power plants"
- 73.71 "Reporting of safeguards events"
- Part 73 Appendix B "General criteria for security personnel"
- Part 73 Appendix C "Licensee safeguards contingency plans"
- Part 73 Appendix G "Reportable safeguards events"

New Regulations

- 73.18 "Firearms background checks for armed security personnel"
- 73.19 "Authorization for preemption of firearms laws and use of enhanced weapons"
- 73.58 "Safety/security interface requirements for nuclear power reactors"

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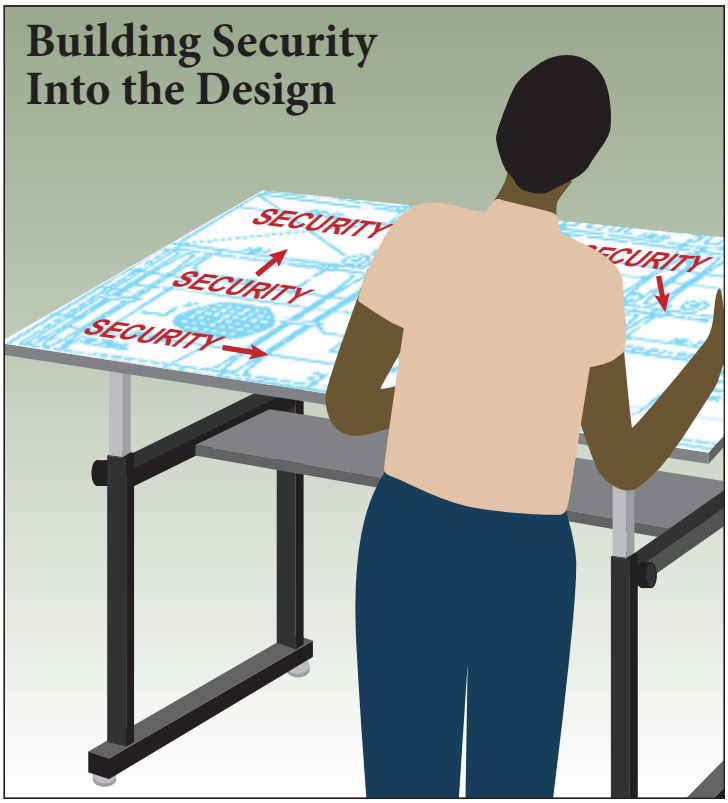
New Reactor Rulemaking

Although the NRC has not received an application to construct a new reactor for nearly 30 years, there is growing interest in nuclear power in the U.S. – some have called it a nuclear renaissance. Based on conversations with energy companies, the NRC expects to receive at least 19 applications for new reactors in the coming years.

Many of the new reactors would be built based on designs the NRC has already approved. These "next generation" nuclear plant designs have benefited from the current plants' decades of operating experience. The new designs are inherently more safe and secure, using many "passive" systems that ensure safety without operator action.



Current Activities

In 2005, the NRC Commission directed its staff to review and propose changes to the regulation of new nuclear power plants. The purpose is to integrate the expectations for security and preparedness with the current expectations for safety. The Commission has also directed the staff to develop a proposed rule that would require the assessment of a commercial aircraft impact on new reactor designs. New reactor designs will be required to include an evaluation of their specific features, capabilities, and strategies that can prevent or lessen the effect of an impact. The NRC will publish this rule for public comment.

Certified Reactor Designs

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There are currently four certified reactor designs that can be referenced in an application for a combined license. A design certification is good for 15 years. The certified designs and their date of approval are:

- Advanced Boiling Water Reactor design by GE Nuclear Energy (May 1997);
- System 80+ design by Westinghouse (May 1997);
- AP600 design by Westinghouse (December 1999); and
- AP1000 design (pictured) by Westinghouse (February 2006).

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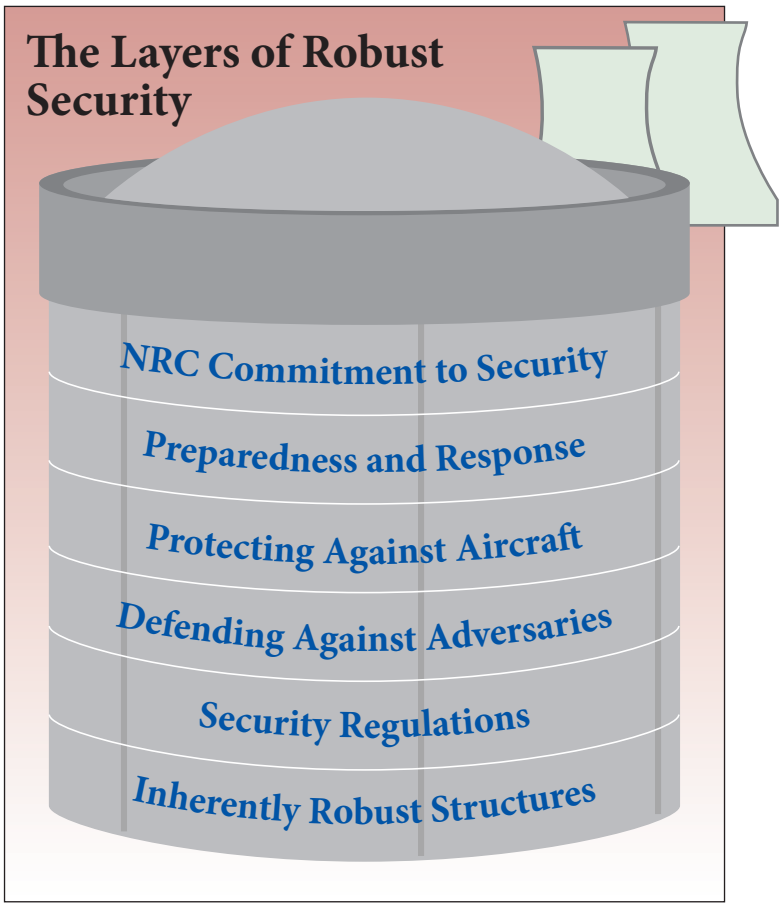
Conclusion

While security of the nation's nuclear power plants has always been a top priority, the NRC has responded to today's threat environment with heightened scrutiny and increasingly stringent requirements. NRC-regulated nuclear facilities are, in fact, considered among the most secure of the nation's critical infrastructure.

The key is layers of defense. As a first layer, nuclear power plants are inherently robust structures, built to withstand hurricanes, tornadoes and earthquakes. Additional security measures as previously explained are then layered on top. A final layer of protection is NRC's close coordination with the Department of Homeland Security (DHS), intelligence agencies, the Department of Defense and local law enforcement. This coordination is focused on building an integrated federal, state and local response to protect the public. The NRC Operations Center, at NRC headquarters in Rockville, Md., provides an around-the-clock conduit for information and coordinated response.



Together, these layers make a formidable defense – they provide a level of security second to none in the commercial power sector.

"NRC-regulated nuclear facilities are considered among the most secure private facilities."

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NRC's Security Highlights

- The NRC's budget for nuclear security has increased more than ten-fold since 9/11;
- The defenses of nuclear plants are being tested through the force-on-force program nearly three times as often as before and in a much more realistic fashion;
- A NRC-DHS review of the nuclear sector has yielded additional improvements in plant security; and
- The nation has substantially enhanced its system to secure risk-significant radioactive material.

– *NRC Commissioners' letter to DHS Secretary Michael Chertoff, August 28, 2006*