U.S. DEPARTMENT OF ENERGY | Legacy Management

BONUS, Puerto Rico, Decommissioned Reactor

FACT SHEET

This fact sheet provides information about the Defense Decontamination and Decommissioning Program Boiling Nuclear Superheater (BONUS) reactor located northwest of Rincón, Puerto Rico. The site is jointly managed by the Puerto Rico Electric Power Authority and U.S. Department of Energy Office of Legacy Management.

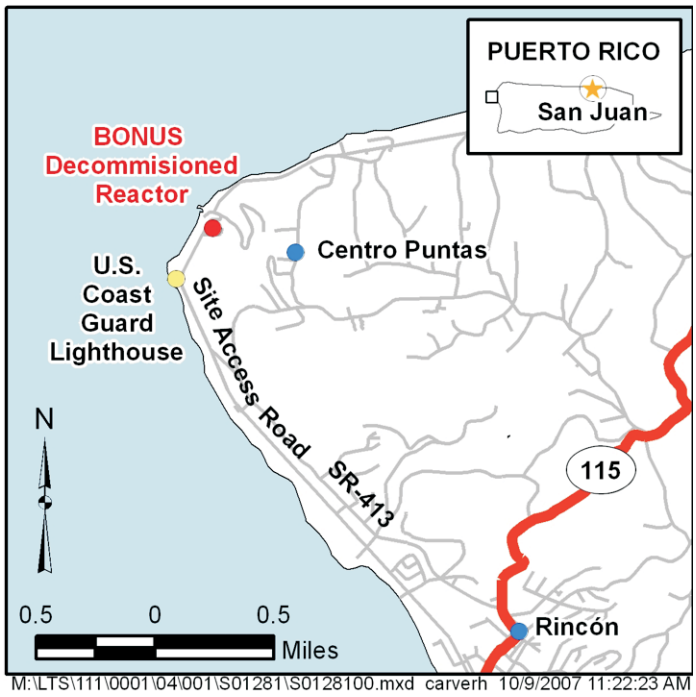
Site Description and History

The decommissioned Boiling Nuclear Superheater (BONUS) reactor, located northwest of Rincón, Puerto Rico, was developed as a prototype nuclear power plant to investigate the technical and economic feasibility of the integral boiling-superheating concept. This small-scale nuclear reactor produced saturated steam in the central portion of the reactor core, superheated it in four surrounding "superheater" sections of the same core, and then used the superheated steam in a direct loop to drive a turbine generator.

It was one of only two boiling-water superheater reactors ever developed in the United States. The reactor was designed to be large enough to evaluate the major features of the integral boiling-superheating concept realistically without the high construction and operating costs associated with a large plant.

Construction of the reactor began in 1960 through a combined effort of the U.S. Atomic Energy Commission and Puerto Rico Water Resources Authority. The reactor first achieved a controlled nuclear chain reaction on April 13, 1964. It underwent a series of criticality tests and then was operated experimentally at various power levels, first as a boiler and later as an integral boiler-superheater. Operation at full power (50 megawatts of thermal energy) and full temperature (900 °F [482 °C] steam) was achieved in September 1965, and tests demonstrated satisfactory operation at 10 percent over power in November 1965.

Operation of the BONUS reactor was terminated in June 1968 because of technical difficulties and the ensuing need for high-cost modifications. The Puerto Rico Water Resources Authority decommissioned the reactor between 1969 and 1970. During decommissioning, all special nuclear materials (fuel) and certain highly activated components (e.g., control rods and shims) were removed to the mainland, all piping systems were flushed, the reactor vessel and associated internal components within the biological shield were entombed in concrete and grout, and systems external to the entombment were decontaminated. Many contaminated and activated materials were placed in the main circulation pump room beneath the pressure vessel and entombed in concrete.



Location of the BONUS, Puerto Rico, Decommissioned Reactor

General decontamination of the reactor was performed with the goal of meeting unrestricted use criteria in all accessible areas of the building. Residual radioactive materials remaining in the structure were isolated or shielded to protect site visitors and workers. During subsequent years, more radioactive contamination was identified in portions of the building, and additional cleanup and shielding activities were conducted in the 1990s and early 2000s.

Regulatory Setting

The U.S. Department of Energy (DOE), as the successor agency to the U.S. Atomic Energy Commission, and in accordance with the Atomic Energy Act of 1954, holds title to and is responsible for the radioactive materials that remain at the BONUS site. The Puerto

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Rico Electric Power Authority (PREPA), as the successor agency to the Puerto Rico Water Resources Authority, owns the land, buildings, and other improvements. Responsibilities for the long-term surveillance and maintenance of the site are established for DOE and PREPA through a *Memorandum of Understanding between the U.S. Department of Energy Office of Legacy Management and the Puerto Rico Electric Power Authority for the Use, Maintenance, and Control of the Boiling Nuclear Superheater Reactor Facility in Rincón, Puerto Rico* (pending). Legacy management activities (explained below) and other responsibilities assigned to DOE will be conducted by the DOE Office of Legacy Management.

DOE, as the authorized custodian of the radioactive materials remaining at the BONUS site, will comply with the following regulation and guidance. Title 10 *Code of Federal Regulations (CFR)* Part 835 establishes radiation protection standards, limits, and program requirements for protecting workers from ionizing radiation resulting from the conduct of DOE activities. DOE Order 5400.5, *Radiation Protection of the Public and the Environment,* establishes standards and requirements for DOE operations with respect to protection of the environment and members of the public from risk of radiological exposure.

PREPA, in accordance with the Memorandum of Understanding, shall maintain compliance with applicable portions of Title 10 CFR Part 835 and DOE Order 5400.5 through its annual and quarterly monitoring of the BONUS site to ensure worker and public safety.

Legacy Management Activities

DOE and PREPA are responsible for ensuring that the BONUS site continues to be protective of human health and the environment. These agencies will also preserve site information.

DOE will conduct independent inspections of the site and may accompany PREPA personnel during regularly scheduled inspections. DOE will evaluate radiological and structural monitoring results and procedures and will publish its findings annually. DOE will maintain copies of site records that document radioactive materials and their disposition.

PREPA will conduct quarterly and annual surveys to assess radiological conditions throughout the BONUS site. Results of the surveys will be available to the public and government agencies. PREPA also will conduct quarterly visual inspections to evaluate the structural adequacy of the buildings and entombment structure and the condition of the areas open to public access. PREPA will maintain site records pertaining to BONUS design, construction, operation, decommissioning, and post-decommis-sioning monitoring.

Public Involvement

DOE encourages public participation in the surveillance and maintenance process at the BONUS site. DOE will accomplish this by making site information available through its website at http://www.LM.doe.gov and responding to citizens' requests.

PREPA intends to open the main floor of the BONUS building as a museum, in which numerous displays will recount the history of the site as well as the development of electric power and nuclear energy. DOE completed an environmental assessment in 2003 that indicated no unacceptable risk to human health or the environment if the main floor is used as a museum.

Contacts

Site-specific documents related to the BONUS reactor are available on the DOE Legacy Management website at http://www.LM.doe.gov/land/sites/pr/bonus/bonus.htm.

For more information about the DOE Legacy Management activities at the BONUS site, contact

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