



El Verde, Puerto Rico, Site

An MED/AEC legacy site

This fact sheet provides information about the **El Verde site**. Records for the government-sponsored research conducted at these facilities are maintained by the **U.S. Department of Energy Office of Legacy Management** as a **Manhattan Engineer District/Atomic Energy Commission Legacy Site**.

Site Information and History

The El Verde site is located in the El Yunque National Forest, in northeastern Puerto Rico, about 9 miles southwest of the town of Luquillo and 22 miles southeast of San Juan. The forest occupies approximately 28,000 acres of upland rainforest with elevations to 3,539 feet above sea level. El Verde site is situated in Study Area 4 of a facility known as El Verde Field Station, a research facility that occupies 173 acres at elevations of 1,100 to 1,400 feet above sea level. The University of Puerto Rico Institute of Terrestrial Ecosystem Studies administers the facility.

The El Verde Field Station began operations as El Verde Rainforest Project in 1963. The U.S. Atomic Energy Commission, a predecessor agency of the U.S. Department of Energy (DOE), sponsored the project through the Puerto Rico Nuclear Center, later renamed the Center for Energy and Environmental Research, at the University of Puerto Rico. The project emphasized research on forest ecosystem processes, such as nutrient cycling, energy flow, and response to gamma radiation. Radioactive isotopes were applied to soil and vegetation at El Verde during the next several years to conduct a variety of projects related to the effects of gamma radiation on rainforest vegetation, measurement of the cycles of radioactive fallout elements in the rainforest system, and metabolic processes of forest ecosystems. After 1970, the only documented event involving the use of radioisotopes at El Verde facility was a 1972 injection of an unknown amount of phosphorus-32 into a giant tree fern.

El Verde continued to provide support for research projects throughout the 1970s and 1980s. In 1988, the National Science Foundation established the Luquillo Long-Term Ecological Research Program, and El Verde Field Station became a principal residence for research in the program. Current research at El Verde focuses on forest dynamics, stream ecology and hydrology, and ecosystem processes. Most research is conducted by the Luquillo Long-Term Ecological Research Program and by scientists from the University of Puerto Rico and universities in the mainland United States.

Radiological surveys conducted at El Verde in the 1980s and 1990s identified areas of elevated radioactivity that remained from earlier research. By 1996, decontamination and cleanup efforts had removed all contamination from the site except for a tree in Study Area 4. The tree, a *Matayba domingensis*, had been injected with 0.46 millicurie of cesium-137 in 1968 and required periodic monitoring and access controls. Radioactivity in the tree is concentrated at the base of the trunk and in the root system. During the radiological surveys, the University of Puerto Rico removed about 43 kilograms of contaminated soil from around the roots of the *Matayba* and disposed of the material off-site.

The surveys indicated that the cesium-137 in Study Area 4 is limited to a radius of about 10 feet around the injected tree. The radioactive half-life of cesium-137 is about 30 years, and currently more than half of the original cesium has decayed away. Dose calculations performed for a worst case scenario (residential and farming uses, following clearing and grading of the surface) indicated that radiation doses in Study Area 4 are well below regulatory limits, even assuming conservative site conditions that were likely to overestimate the dose.

Today, the El Verde Field Station continues to be a major resource for research on tropical ecology. The station has housing for 25 visiting researchers and staff in addition to

office and laboratory space. Research facilities include long-term plots, a 40-acre vegetation grid, walk-up towers, and long-term climate stations.

Regulatory Setting

In February 1993, the U.S. Nuclear Regulatory Commission (NRC) renewed License 52 19434-02 and amended it to allow for “storage” of the cesium-137 in the tree in Study Area 4.

DOE transferred the El Verde facility to the U.S. Department of Agriculture/U.S. Forest Service (USFS) in September 1996. USFS administers the El Yunque National Forest for the Commonwealth of Puerto Rico. The University of Puerto Rico Institute for Terrestrial Ecosystem Studies operates the El Verde facility through a special use agreement with USFS.

DOE transferred the El Verde site pursuant to the National Environmental Policy Act implementing procedures in Title 10 *Code of Federal Regulations*, Part 1021. Appendix A to Subpart D of Part 1021 allows transfer of the site under a categorical exclusion, which applies to activities that individually or cumulatively will not have a significant effect on the environment.

Legacy Management Activities

In 2005, the DOE Office of Environmental Management Oak Ridge Operations Office in Tennessee, officially transferred all of its responsibilities for the cesium-injected tree in Study Area 4 of the El Verde site to the DOE Office of Legacy Management (LM). LM assumed responsibility for developing and implementing site-specific long-term surveillance and maintenance requirements for Study Area 4, accepting the transfer of records, managing site records, and interacting and working with regulators, the USFS, and stakeholders of the Commonwealth of Puerto Rico.

After reviewing site documentation and verifying risk calculations, LM found that the cesium-injected tree meets criteria for license termination without restrictions. In 2005, with the concurrence of the University of Puerto Rico (the licensee), LM prepared an application to amend the NRC license. The basis for the application is the finding that the total effective dose equivalent for the area of elevated gamma activity around the tree, using a worst-case scenario (residential and farming uses), was less than 25 millirems per year. In 2008, the radioactive materials license for the tree in Study Area 4 was terminated. Termination was based on radiological conditions meeting criteria for protectiveness. The tree is no longer regulated and has been released for unrestricted use. No monitoring, maintenance or site inspection are required for the site. LM is responsible for managing site records and responding to stakeholder inquiries.



CONTACT INFORMATION

**IN CASE OF AN EMERGENCY AT THE SITE,
CONTACT 911**

**LM TOLL-FREE EMERGENCY HOTLINE:
(877) 695-5322**

Site-specific documents related to the **El Verde, Puerto Rico, Site** are available on the LM website at www.energy.gov/lm/el-verde-puerto-rico-site

For more information about LM activities at the **El Verde, Puerto Rico, Site** contact:

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