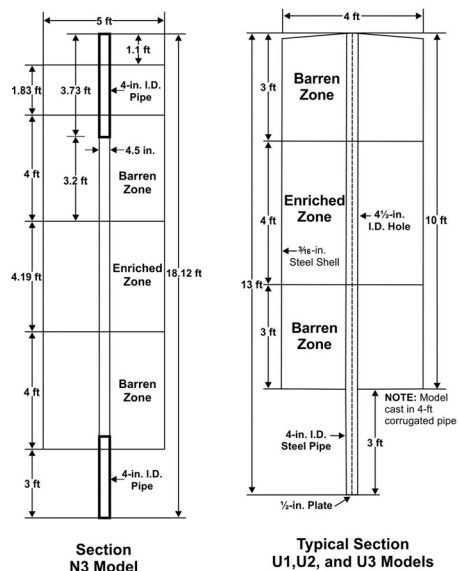
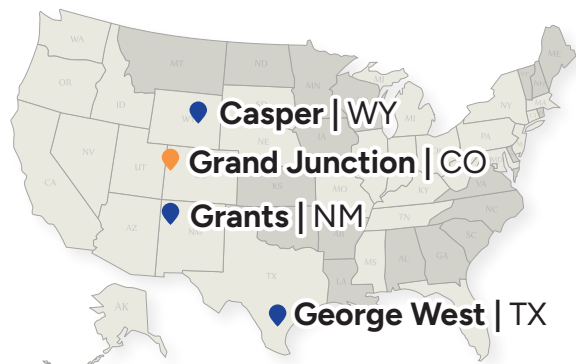


Grand Junction N3, U1, U2 and U3 Models



Secondary Calibration Facilities

Three secondary calibration facilities were constructed near major uranium production areas. These sites in Casper, Wyoming; Grants, New Mexico; and George West, Texas, contain borehole models for gross gamma ray, spectral gamma ray, and fission-neutron well-logging detectors. The secondary sites have small surface pads used for handheld detectors. Unlike the primary facility in Grand Junction, secondary facilities do not have water-factor or casing-correction models.



- Primary Calibration Facility
- Secondary Calibration Facility

Uranium Mine Remediation Support

The Grants, New Mexico, facility is used to support remediation of abandoned uranium mines on public lands by providing a nearby calibration source for handheld detectors. Proper calibration ensures elevated radioactive materials are identified accurately so their response to the environment they are monitoring is accurate and correct. The DOE Defense-Related Uranium Mines program uses spectral gamma instruments calibrated at the large area pads located at the Grand Junction Regional Airport for this purpose.

User Requirements

Users may access the facilities, but must first sign a hold-harmless agreement stating that they operate under their own safety requirements. If users carry a sealed well-logging source, they must comply with the conditions of their radioactive materials license and contact the Radiological Control Manager at the DOE office in Grand Junction. Visitors who are foreign nationals must complete and submit the Unclassified Foreign National Visits and Assignments Questionnaire 30 days before accessing the facilities, available on the website link below.

All facilities are available to users free of charge, but usage must report to the DOE office in Grand Junction. Please call to request access or more information. Additional information and technical documents are posted on the DOE Office of Legacy Management website.



U.S. DEPARTMENT
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www.energy.gov/lm/services/calibration-facilities

Radiation Detector Calibration Facilities



U.S. DEPARTMENT
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Office of Legacy Management



AEC geophysical well-logging truck, early 1960s

History of Calibration Facilities

The uranium boom of the 1950s necessitated a consistent method of conducting radiation surveys.

To standardize survey methods, the U.S. Atomic Energy Commission (AEC) constructed various types of calibration models. These facilities — now managed by the U.S. Department of Energy (DOE) — are located in Grand Junction, Colorado; Grants, New Mexico; Casper, Wyoming; and George West, Texas.

Borehole and Surface Pad Models

There are two types of calibration models: boreholes and pads.

- ➡ Borehole models are used for downhole geophysical well-logging equipment.
- ➡ Pads are used for portable meters, as well as vehicle- or aircraft-mounted systems.

Borehole models and pads were constructed by blending known amounts of naturally occurring radioactive materials with concrete. Radioactive source materials used included uranium ore, monazite sand, and feldspar, which provided sources of uranium, thorium, and potassium. Both radiometric and chemical assays were used to verify the final properties after the mixtures were placed. Radiation detectors are calibrated by verifying instrument response in zones where the exact radionuclide content is known.

What Are These Facilities Used For?

Uses include uranium exploration and production, remediation of sites contaminated by radioactive materials, and homeland security.



Borehole calibration facility in Grand Junction, CO

Calibration Standards for Multiple Methods

The borehole facilities include multiple models for calibration of different types of radiation detectors, including gross count and spectral gamma ray systems. Gross count systems quantify all gamma rays, depending on equipment threshold limits. Gamma spectroscopy instrument measures and then presents the radioactivity of the gamma emitting isotope(s) associated with the gamma decay progeny of thorium 232, uranium 238, uranium 235 and of the potassium 40 isotope. Fission-neutron models are available for methods where a downhole neutron generator is employed to determine in-situ uranium concentrations. Because borehole effects, such as washouts, can cause the amount of water or drilling fluid to impact the gamma ray count rate, the Grand Junction facility includes borehole models of various sizes to determine water-correction factors. Steel pipe sections of varying thicknesses are also available in Grand Junction to determine casing-correction factors. Bedrock density and porosity models are situated only at the Grand Junction site.

How are DOE Calibration Facilities Unique?

The DOE calibration facilities are recognized internationally for providing well-characterized, stable, and traceable radiation sources. Federal ownership also provides the independence for impartial calibration of gamma detectors, which is required for defensible ore-reserve estimates. The value of publicly traded uranium companies is based on their ore reserves, which are determined from gamma ray well logs used to delineate ore deposits. Calibrations performed at DOE facilities provide the standardization required by financial markets.

U.S. Environmental Protection Agency aircraft calibration



Large-Area Calibration Pads

Numerous sites with elevated radioactivity have been surveyed using radiation detectors mounted on aircraft or ground vehicles. A facility is available at the Grand Junction Regional Airport to calibrate these detectors. Five 30-foot by 40-foot concrete pads containing known concentrations of potassium, uranium, and thorium are available for vehicular-systems calibration. These pads also provide a wide area radiation field suitable for calibration of handheld detectors. This facility is aircraft accessible and located within the Transportation Security Authority perimeter; therefore, an escort is required for access. New technology that uses sensors mounted on drones has been tested over two pads stored at the Grand Junction disposal site.