

Nuclear Power Facilities

Health physics, contamination control, outage support, and environmental monitoring depend on instruments that survey, identify, and quantify radiation across the plant and the lab.

APPLICATION BRIEF · ISOTOPE IDENTIFICATION & RADIATION
DETECTION · dc-62022201



The Mission

A nuclear power facility runs on radiation safety. The health physics team protects workers, controls contamination, supports outage work in high-dose areas, and monitors what leaves the site through effluent and environmental pathways. Every one of those jobs is a measurement problem. The mission is to know, at all times and across the whole plant, where radiation is, what isotopes are present, and how much.

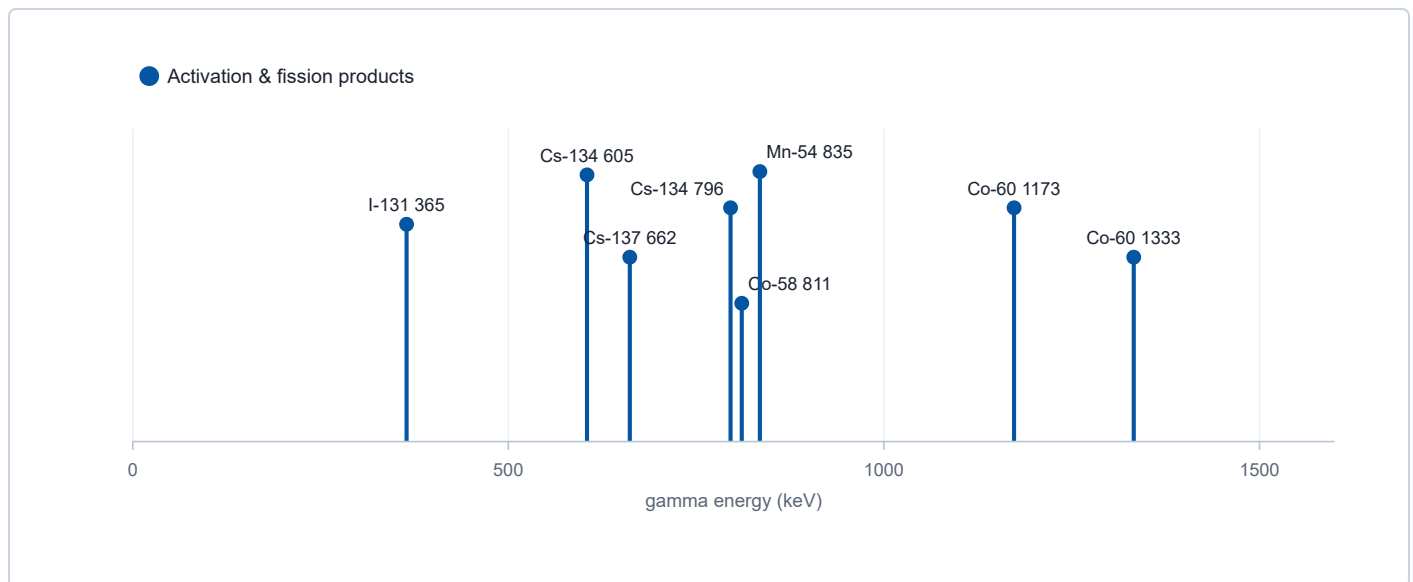
Berkeley Nucleonics supplies instruments across that full range, from pocket survey meters to portable spectroscopy, so a radiation protection program can standardize on one source for the field, the screening bench and the fixed monitoring point.

The Challenge

Plant radiation work spans a wide range of measurement tasks that no single instrument covers. A radiation protection technician needs a simple, rugged, pocket-sized survey meter for routine rounds and contamination checks. A health physicist tracking a specific isotope needs identification, not just a dose rate. An effluent or environmental program needs to quantify low-level activity in a sample with enough resolution to separate one isotope from another. Outage support adds the pressure of high-dose, time-critical work where instruments have to be reliable and fast.

The isotopes of interest are specific and well known: activation and fission products such as Co-60, Cs-137, and I-131, among others. Distinguishing them, and quantifying them at low concentrations in an effluent or environmental sample, demands more than a survey meter. It calls for spectroscopy and a multichannel analyzer with the resolution to resolve closely spaced peaks.

Underlying all of it is documentation. A nuclear facility operates under regulatory oversight, so measurements have to be traceable and repeatable. The instruments feed records that are reviewed by the plant's own program and by its regulator.



■ **DERIVED** **Figure 1.** From standard nuclear data: the principal gamma lines of the common activation and fission products. Cs-134 at 605 keV is 57 keV from Cs-137 at 662 keV, which a 7 percent NaI(Tl) detector separates only marginally and a 3 to 4 percent LaBr3 or CeBr3 detector resolves. Co-58 at 811 keV and Mn-54 at 835 keV are 24 keV apart, which calls for a high-resolution scintillator at least and HPGe for a clean quantity.

Recommended Berkeley Nucleonics Solutions

A plant radiation program needs survey, identification, monitoring, and laboratory analysis, and Berkeley Nucleonics covers each tier.

Survey and routine rounds

The Model 907 survey meter is the everyday instrument for radiation protection rounds and contamination checks. Its Geiger-Müller tube detects alpha, beta, gamma, and X-ray radiation in a pocket-sized meter, which makes it practical for the high volume of routine surveys a plant runs every day.

Isotope identification

When a survey finds something that needs a name, the SAM 940+ handheld identifier supplies it, detecting gamma and neutron radiation and identifying across the ANSI, SNM, IND, MED, NORM, and custom categories from 20 keV to 10 MeV. It lets a technician resolve an unexpected reading in the field rather than carrying an unknown back to the lab.

Portable sample spectroscopy

For screening samples and unknowns beyond what a handheld settles, the Model 970 portable multichannel analyzer pairs with practically any detector, from NaI(Tl) to CeBr3 and LaBr3, and runs MCA software with a fully editable 387-isotope library, peak search and identification, and quantification by region of interest. It runs four hours on its internal batteries and plugs into a vehicle. Regulatory effluent and environmental quantification at low activity remains laboratory HPGe work; the Model 970 screens samples before they go there and resolves the unknowns that come up during an outage. Berkeley Nucleonics previously offered the Model 971 sample kit around the same analyzer; that kit is discontinued. Contact Berkeley Nucleonics for current sample-screening options.

Fixed-point monitoring

For continuous gamma monitoring at an area or access-control point, Berkeley Nucleonics configures fixed monitors on request; tell us the location, the alarm thresholds and the networking the plant requires.

Why It Works

The program works because each instrument is matched to a tier of the measurement task, and the tiers cover the plant end to end. The Model 907 handles the high volume of routine survey work where a dose rate is the answer. The SAM 940+ steps in when a reading needs an isotope identity in the field. The Model 970 brings portable spectroscopy to samples and unknowns, where naming Co-60, Cs-137 and I-131 and estimating each from its region of interest is the point. A fixed monitor holds a continuous watch at the points that matter so nothing changes unnoticed.

Standardizing the field, the screening bench and the fixed monitor on one manufacturer keeps training, calibration and support coherent across the program. Spectroscopy with a calibrated multichannel analyzer is what turns a survey reading into a traceable record: a spectrum, a peak identification and a quantity, saved with the date and the geometry.

When a survey reading is unexpected

1. Record the dose rate and the location. 2. Identify with the SAM 940+ from the survey distance and save the event. 3. Compare the isotope against the plant's expected activation and fission products; the plant health physicist adjudicates anything outside that list. 4. Pull a sample for the Model 970, or for the laboratory HPGe when the identification or the quantity has to go on the record.

Getting Started

Berkeley Nucleonics can help your health physics program match survey meters, identifiers, monitoring systems, and spectroscopy to your plant and your regulatory requirements. Call **800-234-7858** or email info@berkeleynucleonics.com.

To compare models and detector options, see the Isotope ID & Radiation Detection documentation and selection guide.

Berkeley Nucleonics Corp.

Test, Measurement and Nuclear Instrumentation since 1963
For details: info@berkeleynucleonics.com or 800-234-7858

Application Brief

Isotope Identification & Radiation Detection | dc-62022201