

Naval & Maritime

Screen vessels, cargo, and crews for gamma and neutron sources across the harbor and the open water, with rugged, sealed, GPS-mapped Berkeley Nucleonics instruments built for spray, shock and long shifts.



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

The Mission

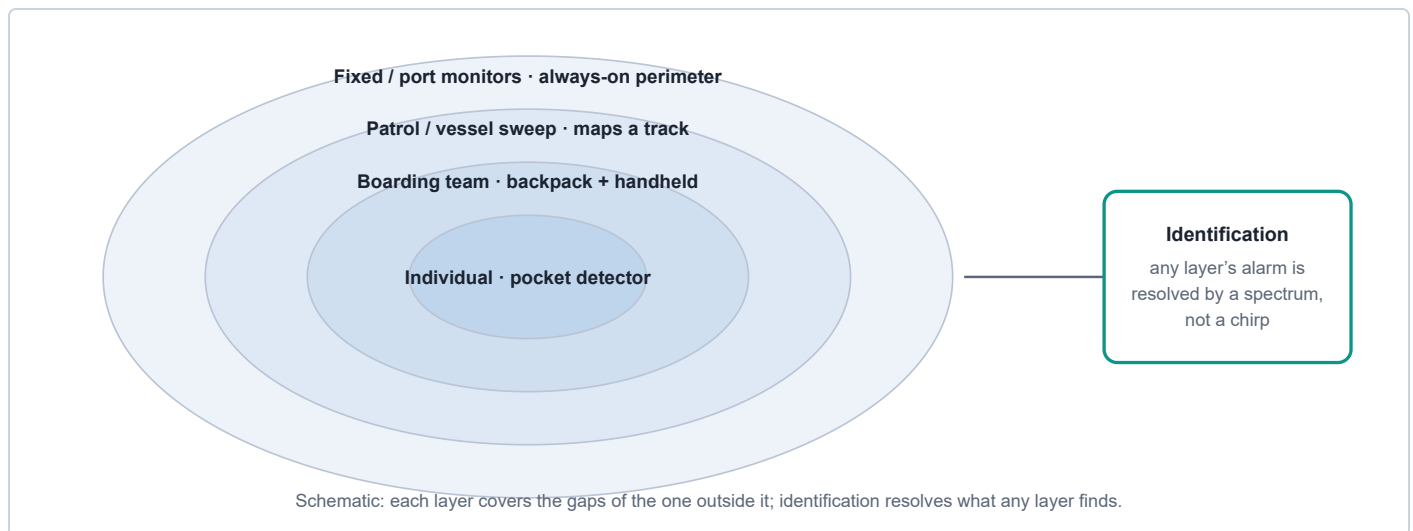
The maritime domain is wide, crowded, and hard to control. A port handles thousands of containers a day, a coastline runs for miles, and a single vessel can carry a hidden source past a fixed monitor before anyone reacts. Naval and maritime security teams have to cover all of it: screening arriving ships and cargo, sweeping hulls and holds during boarding operations, protecting crews from radiation hazards aboard their own vessels, and running wide-area searches when intelligence points to a threat moving by water.

Each of those jobs has a different rhythm. A boarding team moving fast across a deck needs something light on the back and hands-free. A patrol boat sweeping a harbor needs a fixed, always-on system that maps what it sees. A radiation safety officer aboard ship needs a quiet alarm in a pocket. The instruments have to identify what they find, not just chirp, because the difference between a medical isotope in a shipment and special nuclear material decides whether a vessel sails or gets held.

The Challenge

Salt water is the first problem. Spray, humidity, and the occasional full immersion will end an instrument that was never built for it, and a sealed enclosure is not optional at sea. Shock is the second: decks pitch, boats slam, and gear gets dropped onto steel. Beyond ruggedness, maritime search adds a geometry problem. Sources move, platforms move, and a single reading means little without a track. Teams need directionality to point toward a source and GPS so that every detection lands on a map a command center can read.

Then there is scale and coverage. A handheld is the right tool on a deck and the wrong tool for a freeway of container trucks or a stretch of open water. The maritime answer is a layered one: fixed and vehicle or marine mounted detection for wide-area coverage, portable systems for boarding and search, and personal detectors so every crew member is a sensor. Berkeley Nucleonics builds for each of those layers.



■ **SCHEMATIC** **Figure 1.** The four maritime detection layers. Each layer covers the gaps of the one outside it, and an identification-capable instrument resolves whatever any layer finds.

Recommended Berkeley Nucleonics Solutions

The line covers the maritime mission from the pier to the open sea. The models below map to the roles a naval or port security program has to fill.

Wide-area and platform-mounted search

The **SAMmobile 150 (RD-150)** is a mobile radiation detection system that installs in a response vehicle or a vessel space, with its detector modules positioned for the lane, the pier or the deck it watches. It runs large NaI(Tl) detectors (2 x 4 x 16 inch standard, 4 x 4 x 16 inch optional, up to two per unit), detects gamma and neutron radiation, identifies nuclides per ANSI N42.34, and plots GPS-tagged readings on a route map with left or right directionality to the source. Its lithium-ion battery runs for more than eight hours, the enclosure is IP65 rated, and the system is RadResponder enabled for reachback. For a harbor patrol or a cargo terminal, this is the wide-area workhorse.

Boarding teams and rapid search

The **SAMpack 120 (RD-120)** is a human-portable backpack that detects and identifies gamma radiation, with an optional neutron detector, while leaving both hands free. It is IP65 rated, dust proof, spray resistant and rated to a 1 meter drop, which matters when a pack comes off a working deck. A two-detector configuration gives left or right direction to the source, and automatic reachback streams GPS location, radiation level and spectrum to a command center in ANSI N42.42 XML. For a boarding party crossing to an unknown vessel, it is the quiet, capable search tool.

Identification in the hand

The **SAM 950** is the ruggedized, sealed handheld RIID: IP65 rated, water and shock resistant, and sprayable for decontamination. It supports NaI(Tl) detectors in 1.5 x 1.5, 2 x 2 and 3 x 3 inch sizes, 1.5 inch LaBr3 and 1.5 or 2 inch CeBr3, with optional solid-state or 3He neutron detection, automatic real-time stabilization with no external source, and one-click ANSI N42.42-2012 reachback over WiFi, Bluetooth or USB with built-in GPS. When a boarding team or a port inspector needs an isotope call in hand on a wet deck, the SAM 950 is the instrument for it.

Personal protection for the crew

Every crew member can carry a detector. The **Model 951 nukeALERT** is a watertight, pager-sized personal radiation detector that responds to gamma in under a second, runs more than two years on two AA cells at 48 hours of use per week, and signals with audio, vibration, a color-changing LED, and a 1 to 9 intensity readout. It needs no training and passes a 3

foot drop test on concrete. The adds neutron sensitivity and dose measurement in a shockproof, hermetic IP65 case with two-button operation and 2,000 stored data points for later download. Issued to deck crews and inspectors, these turn every person aboard into part of the screen.

When a detector alarms during a boarding

1. Note the reading and the position on the vessel, then step back and repeat the count. 2. Identify with the SAM 950 from the nearest safe standoff and record the spectrum, category and confidence. 3. Treat a high-confidence NORM or medical result that matches the manifest as resolved for the boarding, and log it. 4. Send any SNM, IND, neutron or low-confidence result to reachback and hold the vessel pending the answer. The boarding officer holds; the reachback analyst adjudicates.

Why It Works

The maritime case rewards a layered fit, and this line was built to layer. Wide-area coverage comes from the SAMmobile 150 on a boat or a crane. Search and boarding come from the SAMpack 120 and the SAM 950. Personal protection comes from the Model 951 and the PM1703GNA-II. The same RadResponder reachback path runs through the larger systems, so a detection on the water reaches the same command picture as a detection on the pier.

The housings are rugged and specified for the deck. The SAM 950 is IP65 rated, water and shock resistant and sprayable for decontamination; the SAMpack 120 is IP65 rated and drop tested to 1 meter; the Model 951 is watertight and drop tested on concrete. Directionality and GPS turn raw counts into a track and a map, which is what a maritime search needs. And because the identifying systems report an isotope and a category rather than only an alarm, a team can tell a medical or industrial source from a genuine threat before it makes an operational call.

Getting Started

Berkeley Nucleonics can help you build a layered maritime program, from a SAMmobile 150 installed on a patrol platform to SAMpack 120 packs for boarding teams, SAM 950 identifiers for inspectors, and personal detectors for every crew member. Tell us your platforms, your screening points, and your reachback requirements, and we will match the configuration.

Call **800-234-7858** or email info@berkeleynucleonics.com. To compare detectors and review the full set of datasheets and guides, visit the Isotope ID & Radiation Detection documentation library.

Berkeley Nucleonics Corp.

Test, Measurement and Nuclear Instrumentation since 1963
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Application Brief

Isotope Identification & Radiation Detection | dc-62022201