



# HPNS

## More Information on Radiation

Hunters Point Naval Shipyard

Department of the Navy

Base Realignment and Closure (BRAC)

April 2015

One important part of the Navy's Radiological Cleanup Program at Hunters Point Naval Shipyard (HPNS) is to ensure that community members are provided with the resources to understand the cleanup activities that are being conducted at HPNS. Navy documentation locations are provided below, as well as several external resources for additional information on radiation.



### INTERNET RESOURCES

**American Nuclear Society**

[www.ans.org](http://www.ans.org)

**Health Physics Society:**  
*Specialists in Radiation Safety*

[www.hps.org](http://www.hps.org)

**U.S. Environmental Protection Agency**

[www.epa.gov](http://www.epa.gov)

**U.S. Nuclear Regulatory Commission**

[www.nrc.gov](http://www.nrc.gov)

**World Health Organization**

[www.who.int](http://www.who.int)

**Radiation Answers**

[www.radiationanswers.org](http://www.radiationanswers.org)

**American Council on Health and Science**

[www.acsh.org](http://www.acsh.org)



### NAVY RESOURCES

**San Francisco  
Main Public Library**

Government Information Center, 5th Floor  
100 Larkin Street  
San Francisco, CA 94102  
(415) 557-4500

**Hunters Point Naval Shipyard Site Trailer**

(near HPNS security entrance)  
690 Hudson Avenue  
San Francisco, CA 94124

**Navy's HPNS Website**  
[www.bracpmo.navy.mil](http://www.bracpmo.navy.mil)

- \* Click on "BRAC Bases"
- \* Click on "California"
- \* Select "Former Naval Shipyard Hunters Point"



### What is radiation?

Radiation is energy given off by atoms. You cannot see, smell, or taste radiation, but it is present all around us. Types of radiation include light waves, radio waves, x-rays, microwaves, and particles and energy rays emitted from an atom (alpha particles, beta particles, and gamma rays).

### Radiation is naturally present all around us.

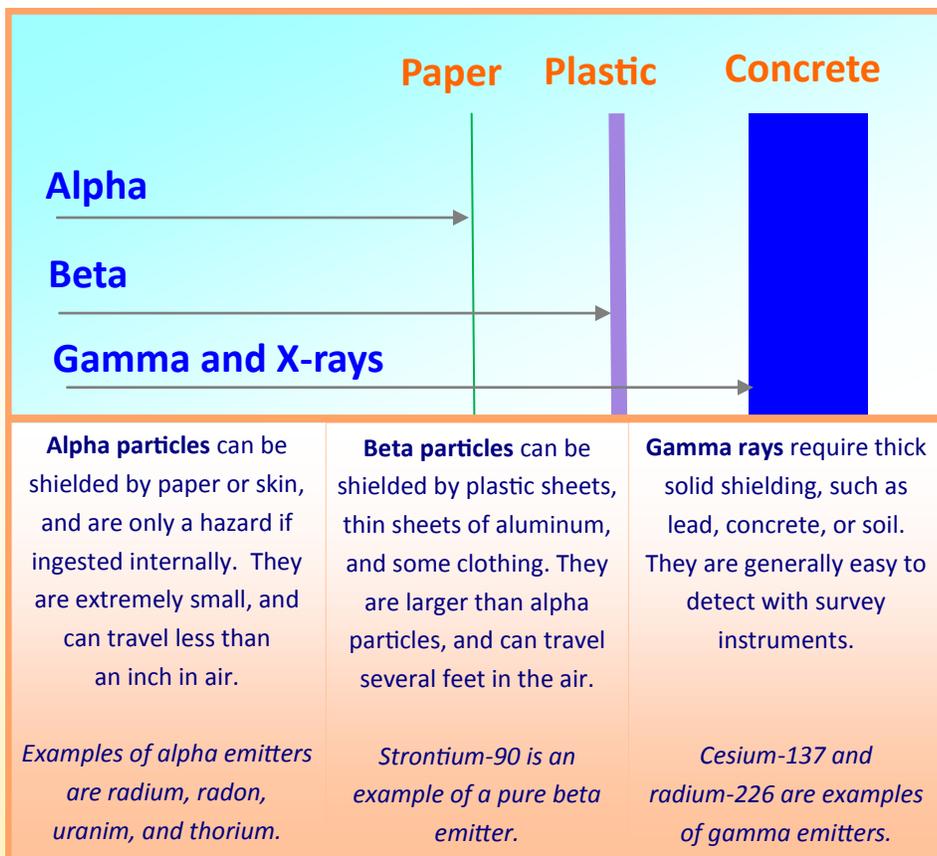
People are exposed to radiation every day from both natural and man-made sources, including medical x-rays and smoke detectors.

The Earth's crust contains small amounts of uranium, thorium, and radium which are naturally present in both native soil and rock formations.

The foods we eat also contains radioactive compounds. Potassium is present in bananas, sea salt, red meat, and beer. Brazil nuts contain potassium, thorium and uranium.

Radiation is also present in some man-made sources, including cigarettes, ceramics and granite

## Radiation Penetrating Power



materials, medical procedures, and microwave ovens.

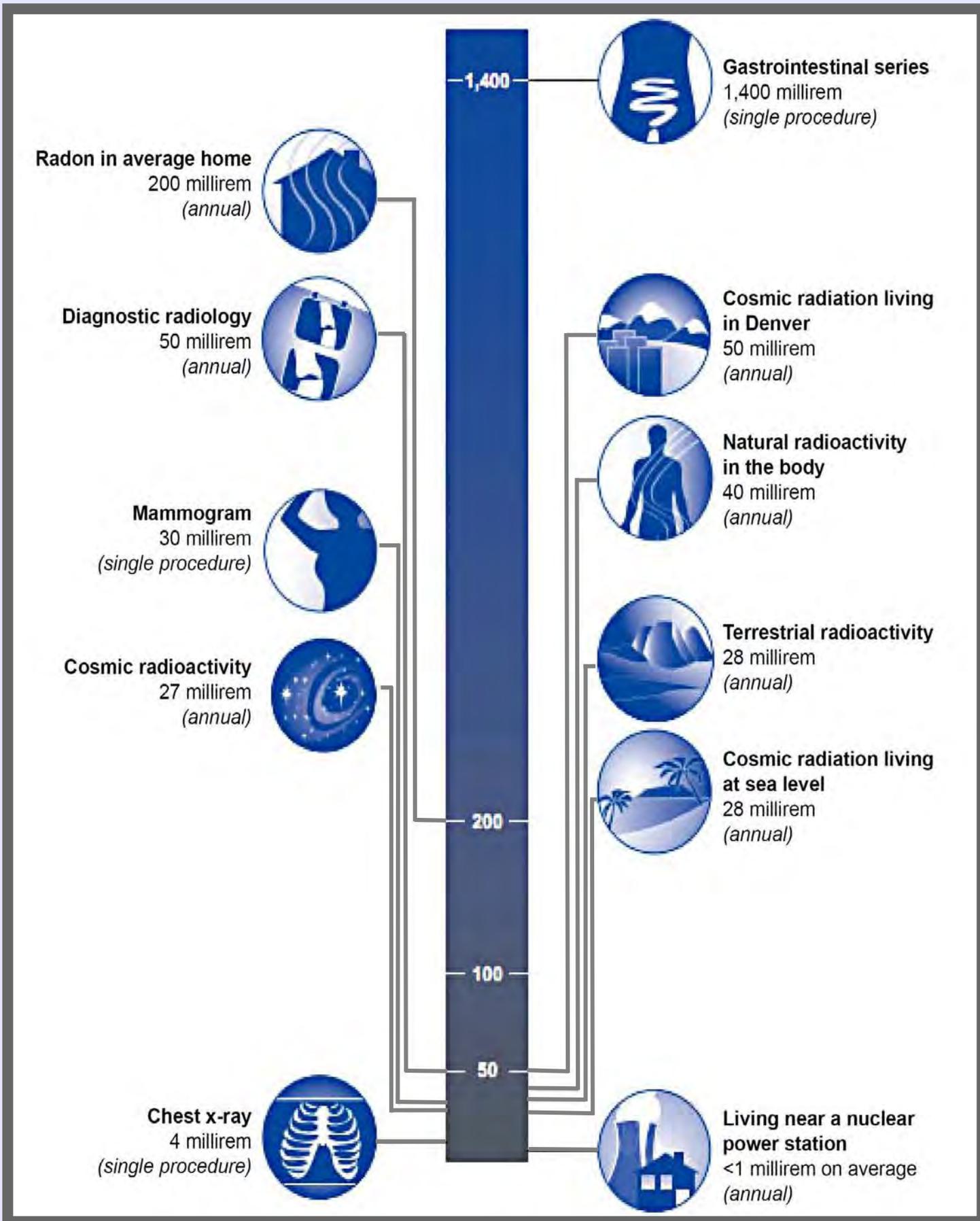
The chart on Page 2 of this document shows the relative doses that we are exposed to from radiation sources.

Examples of common, everyday items that contain radiation are pictured to the right.



# DOSES FROM RADIATION SOURCES

(millirem doses)





# HPNS

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## Radiation Sources

April 2015

Hunters Point Naval Shipyard (HPNS) provided critical ship maintenance to the Pacific Fleet during both World War I and World War II.

Services provided to the ships at HPNS included repair, maintenance, decontamination, and disposal of radioactive equipment, which included items like radioluminescent (glow-in-the-dark) deck markers, dials or paint, and gauges.



In addition, the Naval Radiological Defense Laboratory (NRDL) conducted research at HPNS on the effects of radiation from 1948 to 1969.

The NRDL developed instrumentation and evaluated the effects of radiation on living organisms and

equipment, including the decontamination of ships involved in atomic testing.

### How are we exposed to radiation at HPNS?

Radiation is energy given off by atoms as rays, waves, or particles. It can be in the form of light, sound, or heat. Humans are exposed to radiation every day from natural sources, such as the sun, x-rays, and smoke detectors.

Historical activities at HPNS resulted in potential radiological contamination in soil, the sanitary sewer and storm drain lines, and in some buildings.

Typical items that could have been present at HPNS during that period

in history included switches, volt meters, deck markers, and safety ropes.



Switch



Volt Meter



Deck Marker



Safety Rope

**Radium** was used to cause items to glow in the dark and accounts for 99% of the radiological contamination found at HPNS.

In addition, **Strontium** and **Cesium** were used at HPNS in the decontamination of ships that participated in OPERATION CROSSROADS weapons tests and as a result of research performed by the NRDL.

Strontium and radium were used in radioluminescent deck markers that glow in the dark.



# HPNS

## Hunters Point Naval Shipyard

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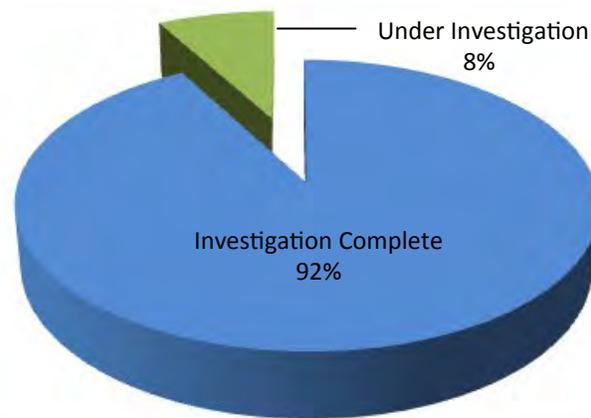
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# Locations of Radiation

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A **Historical Radiological Assessment (HRA)** of Hunters Point Naval Shipyard (HPNS) was released by the Navy in 2004. The HRA evaluated historical operations by interviewing former sailors and employees, conducting a detailed historic document review, and identifying areas to focus on for future investigations.

Historical radiological activities conducted on HPNS included ship repair and maintenance, storage of radioactive materials, and disposal of paint in drains across HPNS. The HRA also reviewed the activities performed in support of OPERATION CROSSROADS, a series of nuclear weapon tests conducted in 1946 at the Bikini Atoll. These tests were some of the first used to help determine the effects of atomic bombs. Further, the historical operations of the Navy Radiological Defense Laboratory (NRDL), which



To date, the Navy has completed investigation of 92% of the sites at HPNS that were identified as potentially contaminated with radiological compounds.

operated at HPNS from 1948 to 1969, were reviewed. The NRDL provided the Navy with a location to develop instrumentation and evaluate the effects of radiation on living organisms and equipment, including the decontamination of ships involved in atomic testing.



Concrete, soil, and sediment

### Areas Investigated for Radiation at HPNS

The HRA identified 91 sites/areas with potential radiological contamination. Since that time, the Navy has been evaluating and cleaning up these sites, which include:

- ◆ Buildings associated with the NRDL
- ◆ Activities or buildings associated with radium paint application
- ◆ Sanitary sewer and storm drain lines
- ◆ Former disposal or burial areas
- ◆ Piers or ship berths used after OPERATION CROSSROADS



Sanitary sewer / storm drain lines



Building interiors



# HPNS

# Radiological Cleanup Process

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## Radiological Cleanup Steps

### INVESTIGATE

#### Scoping or Characterization Surveys

- ◆ Surface scans of soil, building surfaces, and cement/asphalt using hand-held instruments and monitors
- ◆ Soil sampling (both random and biased)
- ◆ Swipes to identify loose contamination on surfaces (dust)

### REMEDiate

#### Excavation / Off-site Disposal and/or Soil Cover

- ◆ The majority of sanitary sewer and storm drain lines and surrounding soil are being excavated and disposed of off-site
- ◆ Surface contamination on concrete floors and walls inside buildings is removed by mechanical scraping and/or excavation and taken off-site for disposal
- ◆ Contain in-place is required in a limited number of areas where low levels of contamination will remain after cleanup; these areas will be covered by several feet of clean soil and/or land use controls to prevent future contact

### CONFIRM

#### Confirmation Sampling / Surveying Results and Development of Reports Documenting the Findings

- ◆ Resampling/surveys to confirm removal of contamination
- ◆ Review/confirmation of field data and procedures by the Navy
- ◆ Concurrence with State Regulatory Agencies throughout process, including collection of independent confirmation samples

### When is a site free from radiation?

A site is free from radiation when all the non-naturally occurring radiological material is removed from an area.

“Unrestricted Free-Release” describes when a site is free from the non-naturally occurring radiological contamination. To achieve this, sites must be characterized by performing surveys and laboratory tests; regulatory oversight agencies must review the site results; and a letter must be submitted to document final approval. When a site receives Unrestricted Free-Release, the land is available for any future use without restrictions.

In some cases, low-level radiological contamination cannot be removed. To prevent contact with it, the Navy uses radiological controls, such as covering residual contamination with several feet of clean soil (containment) and/or land use controls, to prevent contact. These areas will obtain “Restricted Release” status, which restricts certain land uses and activities at the site to ensure the containment remedy remains protective.



Soil Sampling



Sanitary Sewer/Storm Drain Line Removal



Confirmation Scans in Buildings



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# Extent of Radiological Cleanup

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## Historical Radiological Assessment

In 2004, a Historical Radiological Assessment (HRA) of Hunters Point Naval Shipyard (HPNS) was completed, which identified 91 sites and areas that had possible radiological contamination. Since that time, the Navy has been evaluating and cleaning up these sites. *To date, investigation at 92% of the sites has been completed.*

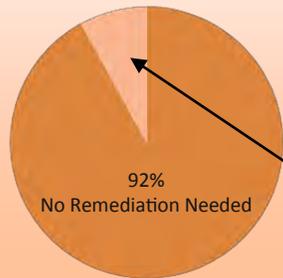
## Building Investigations

Buildings associated with the Naval Radiological Defense Laboratory (NRDL) activities or buildings associated with radium paint application were identified as areas or sites for further investigation



under the HRA.

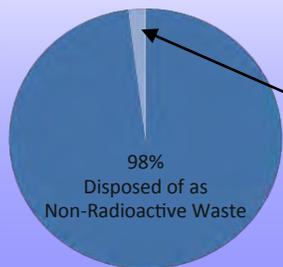
Only 33 of 420 investigation areas required remediation for radiological contamination.



Only 8% (about 80 square feet) of surveyed units contained contamination requiring remediation

## Sanitary Sewer and Storm Drain Line Investigations

The Navy has removed 28 miles of pipe in support of the investigation of radiological contamination at HPNS. All piping was evaluated and any material that was determined to contain radiological waste was placed in sealed bins for offsite disposal at an approved facility.

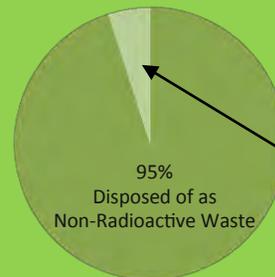


Only 2% of piping required disposal as radioactive waste

## Soil Investigations

Approximately 300,000 cubic yards of soil have been excavated and tested in support of sanitary sewer and storm drain line removal. Following removal, the areas are re-surveyed to make sure that all

radiological contamination has been removed and that cleanup goals have been met.



Only 5% of soil required disposal as radioactive waste

## Contain in-Place

The contain in-place site remedy has been selected at Installation Restoration (IR) Sites 01/21, IR-02, and IR-7/18 and includes a clean soil cover which will be managed long-term. These sites will obtain "Restricted Release," which means that certain land uses (e.g., residential) and activities (e.g., digging below certain depths) will be restricted at the site to ensure the contain in-place remedy remains protective.



A clean soil cover was installed and planted at IR-7/18 as a contain in-place remedy



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# Radiological Cleanup Achievements

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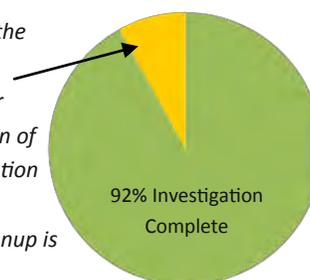


## Radiological Cleanup at HPNS

The Navy's Radiological Cleanup Program at HPNS has made significant progress at the former Shipyard, including evaluation and remediation of most of the buildings, soil, sanitary sewer and storm drain lines identified as having potential contamination.

A status update by Parcel is provided below.

*Of the 91 sites/areas identified in the 2004 Historical Radiological Assessment, only 8% remain under investigation. Following completion of investigation at each site, remediation and confirmation sampling are conducted before radiological cleanup is documented as "complete".*



## Status of Radiological Cleanup at HPNS by Parcel

Parcel	Buildings and Soil Areas	Piers and Ship Berths	Storm and Sewer Line Removal	Contain in Place
B	Completed	Completed	Completed	Completed
C	In Progress (2015)	Completed	In Progress (2015)	N/A
D-1	In Progress (2015)	Completed	Completed	N/A
D-2	Completed	N/A	Completed	N/A
E	N/A	N/A	In Progress (2016)	Upcoming (2020)
E-2	In Progress (2015)	N/A	Upcoming (2016)	Upcoming (2019)
F	N/A	Upcoming (2018)	N/A	N/A
G	Completed	N/A	Completed	N/A



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# Radiation Management and Disposal

April 2015



*Disposal bins are transported for disposal off-site*

To date, more than 4,300 bins of low-level radiological waste, including soil, piping, and construction debris, have been removed from Hunters Point Naval Shipyard (HPNS).

The Navy follows an established set of requirements for the disposal of radiological waste at HPNS. In accordance with these procedures, all materials that have been determined to have radiological contamination are sealed in hard top-covered, water-tight steel bins that are stored in a controlled area. Each bin is properly marked and labeled, stating that it

contains radioactive material. Bins are prepared for storage and transportation to disposal sites following strict U.S. Department of Transportation (DOT) regulations for the transportation of radioactive material. State policy does not allow radiological waste to be disposed of in California; therefore all bins are taken to facilities outside of California that are licensed to accept this type of waste.

## Radiation Testing

During the cleanup process, all materials in radiologically contaminated areas, are surveyed and/or sampled to determine the levels of radiation

Soil and materials from areas with suspected radiological contamination are separated and placed in specialized radiological storage bins before being moved to RSY pads.

The soil or material is placed in 6-inch lifts and scanned for radiological contamination. If contamination is found, it is removed and containerized in a radiological storage bin for off-site disposal. Following removal, the RSY pad is re-scanned to confirm that there is no radiological contamination remaining in the surrounding soil/material.

Radiological storage bins are transported for disposal at a licensed radiological landfill facility outside of California.

present. Potentially radiologically contaminated soil is placed in 6-inch lifts on a Radiological Screening Yard (RSY), made up of several 1,000-square-meter screening pads constructed to prevent cross-contamination with the ground beneath. A radiation scan is conducted over 100 percent of the soil surface, and soil samples are collected.

Thousands of soil samples have been analyzed for radiological contamination at HPNS. Radiation air monitoring samples are collected and analyzed daily. Every air sample has been below action levels.



*Survey of excavated soil from trench on RSY Pad*



# HPNS

# Protecting the Public

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The Navy implements several on-site controls and procedures at HPNS to ensure the public stays safe. In addition to the strategies listed below, individual oversight agencies monitor the cleanup and the California Department of Public Health collects its own confirmation samples from radiological cleanup sites for independent verification.

### Radiologically Controlled Areas



Public access to all work areas is restricted. Only specially trained personnel with radiation monitoring equipment are permitted to access Radiologically Controlled Areas (RCAs). All

radiologically impacted areas are secured with locks and warning signs are posted. All RCA boundaries are routinely monitored to ensure radiation is at background levels, and all personnel, equipment, and materials are screened for radiation before they leave the RCA.

### Air Monitoring



The Navy conducts daily monitoring for air quality, both upwind and downwind. On-site monitoring equipment tests for both particulates (such as dust) and radiological contamination.

### Dust Control Measures

In compliance with HPNS' Base-wide Dust Control Plan, dust in RCAs is controlled to contain contamination within these areas.



Misting systems are used to wet down work areas and roads, and stockpiles of soil are coated with a biodegradable polymer to minimize windblown dust. A 15-mile-per-hour (mph) speed limit is enforced base-wide, and it is reduced to 5 mph in active work areas. All truck beds containing soil (even clean soil) are required to be covered. Raised strips to vibrate truck tires and loosen soil caught in the treads to loosen soil, known as rumble strips, are placed at the exits of the RCAs. A tire wash station also helps remove excess dirt and dust from truck

tires as they leave the site. In addition, a Navy contractor provides daily street sweeping, and operations are shut down when conditions become too windy.



### Portal Monitor for Truck Screening

Trucks entering and leaving HPNS must pass through a portal monitor which screens for radiation. If elevated radiation is detected, the monitor will sound an alarm, and a more thorough screening using



hand-held devices to determine the cause is conducted. To date, it has been reported that the majority of alarms have been caused by naturally occurring radiation, rather than from HPNS soil contamination.