

Soil Background Levels Explained

Hunters Point Naval Shipyard | July 2020



What is background?

“Background” refers to the levels of chemicals and radiological elements that exist in the environment prior to the contamination that required Superfund site cleanup. These background levels can be the result of naturally-occurring elements or human activity. Natural levels of chemicals and radiological elements are found in soil and rock formations. Measuring background levels in soil is an important step for the Navy’s radiological retesting efforts at Hunters Point Naval Shipyard (HPNS). The radiological retesting efforts will help to ensure confidence in the current site conditions and assist with cleanup efforts for future transfer of the property.

Why is background needed as a baseline?

Background levels are important because federal environmental cleanup projects generally do not clean below background levels, in accordance with Navy and U.S. Environmental Protection Agency (EPA) policies. This is why background levels are used as a “baseline” to help determine whether or not the levels of radiological elements in soil are related to Navy operations and need to be addressed. Establishing background levels is a standard procedure for Superfund sites and is important to ensure appropriate actions are taken to address site contamination.

How were radiological background levels established for HPNS?

The Navy gathered soil samples from five different locations both on and off the Hunters Point Naval Shipyard in the fall of 2019. We refer to these five locations as “background reference areas.” The background reference areas were first scanned—using sensitive tools to measure Gamma radiation in the soil—before soil samples were collected to confirm the areas were not contaminated. The soil sampling included the collection of surface and sub-surface soil samples.

Soil sampling was done in accordance with the [Parcel G work plan](#) that included a process for gathering samples and ensuring regulatory oversight. The Navy also contracted with third parties to provide additional quality assurance during the entire process. In December 2019, the soil samples were analyzed by state-approved laboratories and the results were independently validated.

Soil sample results were reviewed by the Navy and regulatory agencies. The EPA suggested that the off-site data from the San Bruno Park location be used as the primary background reference area. The Navy agreed and implemented this approach.

Released in June 2020, the [final soil reference background report](#) establishes ranges of soil background levels which may be used for radiological retesting of Hunters Point.

What radiological elements will be measured?

For Parcel G, the Navy is testing for excess levels of the following:

- Cesium-137
- Cobalt-60
- Plutonium-239
- Radium-226
- Strontium-90
- Thorium-232
- Uranium-235

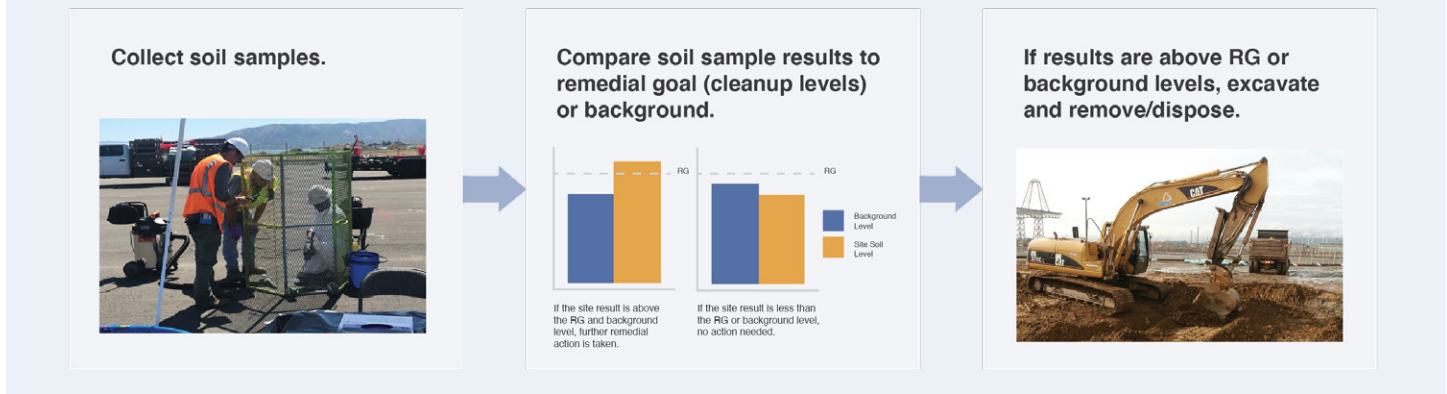
While the reference to these elements can sound concerning, it does not necessarily mean that they exist in the area or, if they do, are at levels significantly different from background. Retesting will determine two things:

- 1) How the results compare to background levels.
- 2) How the results compare with certain thresholds of risk so the cleanup results are protective of human health and the environment.

What are the next steps?

Now that the background is established, the Navy can proceed with retesting Parcel G this summer. The fieldwork will include radiological scanning, testing, and sampling the soil throughout Parcel G. Following fieldwork completion, the Navy will prepare a report for review by regulatory agencies to determine if additional remedial action (or cleanup) is needed. The Navy outlined this process in the Parcel G Work Plan.

Each step along the way follows federal standards set forth under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA aka Superfund):



In some situations, the radionuclide concentration in a soil sample result may be greater than the remedial goal (cleanup levels) or a background value, but still have the potential to be within the background range. In such cases, the Navy will work with the regulatory agencies on a sample-by-sample basis to determine if the result is due to background or site-related contamination. This process will include statistical analyses and graphical comparisons and consider information about where the sample was collected and what type of Navy activities occurred in that area. If site-related contamination is found, the soil will be excavated, properly handled, and disposed at a licensed off-site facility.

¹⁴“Remedial goal” refers to restoring an area to “beneficial use” “wherever practicable.”

A Closer Look at Cesium-137

For the element Cesium, the Navy found that the background level is actually higher than the remedial goal (cleanup levels) at Hunters Point. According to [EPA policy](#), site cleanup efforts under CERCLA guidelines generally do not clean up chemicals or radiological elements below background levels.

Cesium is found worldwide. It’s used in medical devices and gauges but is also created by nuclear power plants and nuclear weapons. Global air movement has distributed Cesium from atmospheric nuclear tests that started in the 1950s and subsequent accidents all over the world. Cesium readily dissolves in rainwater. When it rains, the Cesium in the rainwater binds strongly to surface soils. Over time, due to erosion, the Cesium in soils tends to build up in low-lying areas and may result in higher measured levels than at higher elevations.

Erosion is only one factor that results in varying Cesium levels. Land use also plays an important factor. Construction activities that move soil from one place to another can also change the Cesium distribution in surface soils. For this reason, background samples were collected from relatively undisturbed locations in a local San Francisco Bay Area park (San Bruno Park). The location selected in San Bruno Park is believed to have been undisturbed for over 75 years.

The levels of Cesium at San Bruno Park are higher than the HPNS remediation goal (or cleanup value). This is most likely due to years of atmospheric accumulation. Decisions regarding the need for additional remediation will take into account the background values of cesium. This process for decision-making will be documented as a non-significant change to the remedy. This will focus the Parcel G soil sampling results on identifying soils impacted by Navy operations.

