National Park Service
U.S. Department of the Interior

Gateway National Recreation Area
210 New York Avenue
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May 2013

Great Kills Park Information on Radium Contamination

This fact sheet includes information on the discovery, investigation, and removal of radioactive materials, in the form of radium, found in the ground in areas of Great Kills Park. The purpose is to provide information on what was found, the potential health effects associated with this material, what the National Park Service continues to do to ensure that the Park remains a safe place for NPS staff and Park visitors, and that the environment is protected. Additional information and updates will be provided as they become available.

What was Found?
In 2009, small sources of radium were found in discrete areas at Great Kills Park. These radium sources, found buried more than a foot below the ground surface, have been removed. Additional areas exhibiting above background radiation readings have been identified within the area of Great Kills Park that was filled with sanitary waste in the late 1940's.

What is Radium?
Radium is a naturally occurring element that is radioactive. It is constantly formed by the decay of two elements, uranium and thorium, which exist naturally in rock and soil. The amount of a radioactive element present is reduced naturally by the decay process, measured as the length of time it takes for half of the quantity to decay, also known as a "half-life". Radium's half-life is quite long (on the order of 1,600 years). During the radium decay process, radiation is released as x- and gamma rays, as well as alpha and beta particles.

Naturally-occurring radium is found in relatively low levels in soil and rock throughout the environment. Small quantities of naturally-occurring radium are also present in building materials such as granite, cement, and clay brick. Radium can be taken up by plants and can also be found in groundwater. The human body contains traces of radium associated with naturally-occurring uranium which may be present in the foods we eat.

In the United States, we are exposed to many sources of radiation every day. On average, we each receive a radiation dose of approximately 1 millirem per day (a unit of measure for radiation dose) from naturally-occurring radioactive elements in our bodies and the environment, from cosmic (sun) rays, as well as from man-made exposures, primarily from medical diagnosis (like x-rays) and treatment. Exposure from cosmic rays increase with altitude above sea level. Thus a person in the Rocky Mountains receives more radiation exposure than a person at sea level. On average, radiation from natural sources is responsible for about eighty percent of the radiation U.S. residents receive annually.

Can Radium be Harmful?
Exposure to radiation can cause cancer. Radium has been responsible for causing cancer in workers who painted watch dial faces. They wetted their paint brush tips by mouth to make a fine point to apply the paint; by doing so, they ingested radium. Additionally, a potentially harmful decay product from radium is radon gas, which is suspected to cause lung cancer in uranium miners, and can become concentrated in homes in certain areas of the country. While these conditions do not exist at the Park, improper handling and disposal of radium sources can be harmful to the public. This is why the Park Service is

restricting access to portions of Great Kills Park until the matter is thoroughly investigated and any appropriate cleanup is implemented.

How Did Radium End up at Great Kills?
Investigation into the source of the radium contamination is ongoing. Based on the limited information we have at this time, it is believed that the radium came from discarded materials brought to the site. Radium present in these items has caused contamination of the soil directly surrounding the sources.

What is Being Done?
The National Park Service is following the process detailed in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to address the contamination at this site. Technical support is being provided through the US Army Corp of Engineers and contractors. The primary goal of the CERCLA process is to determine the nature and extent of contamination and select the preferred alternative to clean up the site.
On Monday, January 14, 2013, field work began to identify and clean up the radiological contamination at Great Kills Park. This project will include conducting a gamma survey of approximately 220 acres encompassing the entire area of the park that was filled in with sanitary waste in order to locate the radioactive contamination. Radiation experts will then remove those radioactive contaminants which present an imminent and substantial danger for proper storage and disposal at an out-of-state facility. The National Park Service will then determine what follow up actions are needed in order to ensure the park is safe for visitors.

Am I at Risk from Exposure to Radium at Great Kills?
The areas that are open to visitation are considered safe. In the closed areas exposure, and ultimately risk, depends on the amount of time and how close you are to the actual source of the radiation.
In order to protect the health and safety of our visitors and employees, the affected sections of Great Kills Park are closed to vehicles and pedestrians.

Where Can I Obtain More Information about Radium and Radiation?
Information about radiation and radium in general can be found from the following sources:

- Agency for Toxic Substances and Disease Registry (ATSDR)- http://www.atsdr.cdc.gov/tfacts144.html
- The National Institutes of Health http://www.nih.gov/health/chip/od/radiation/
- Argonne National Laboratory http://www.ead.anl.gov/pub/doc/NaturalDecaySeries.pdf,
- Health Physics Society http://hps.org/publicinformation/asktheexperts.cfm

For more information and updates on this project please go to:
www.nps.gov/gate/parkmgmt/greatkillscleanup.htm or email greatkillscleanup@nps.gov