DOH/320-049

Environmental Radiation Monitoring and Assessment Program

DOH and PNNL Split Sampling at the McGee Ranch and Riverlands

March 2008

Division of Environmental Health

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Introduction

In December of 1942, U.S. Army General Leslie Groves selected the Hanford area as the site for the then still theoretical large scale production of plutonium, as part of the Manhattan Project. Groves selected 586 squares miles of Columbia Basin shrub steppe (roughly equivalent to half the land area of Rhode Island) because of its relative isolation and the availability of water and electrical power. The land was purchased from approximately 1300 local citizens who were then required to quickly relocate. Prior to the Hanford Site, this area was an agricultural area, with two town sites, Hanford and White Bluffs, both on the Columbia River.

In 1945, Hanford plutonium was successfully used in the Trinity test detonation in New Mexico, proving the concept of a nuclear weapon. That summer two bombs were dropped on Japan, one in Hiroshima and the other, made from Hanford plutonium, was dropped on Nagasaki, which effectively ended the war with Japan.

After the war, Hanford continued to supply the Department of Defense with plutonium for America's nuclear stockpile, until the end of the cold war.

As a result of decades of security and isolation, the Hanford Site has become one of the best preserved areas of arid shrub steppe in the United States. Likewise, the portion of the Columbia River adjacent to the Hanford Site was maintained as the last free flowing section of the river. Because of the uniqueness of the area, President Clinton, on June 8, 2000, signed a proclamation declaring portions of the Hanford Site as the Hanford Reach National Monument. The Hanford Reach National Monument (HRNM) includes the Fitzner-Eberhardt Arid Lands Ecology Reserve, the Columbia River corridor, Saddle Mountain National Wildlife Refuge, the Waluke Slope, and the McGee Ranch and Riverlands.

Before the U.S. Department of Energy (DOE) can release the lands which make up the Hanford Reach National Monument to U.S. Fish and Wildlife, DOE has to ensure that the land is free of radioactive and chemical hazards. As a result, DOE has developed, through its contractors and in cooperation with the local stakeholders, a sample and analysis plan that should reveal the presence of any contaminates of concern.

DOH QA Oversight Role

The Washington State Department of Health (DOH) receives a grant each year from DOE to perform quality assurance oversight of the DOE environmental surveillance programs. Each year, DOH splits and co-samples hundreds of routine environmental samples with DOE, and the analytical results of these samples are compared and published in the DOH Hanford Environmental Oversight Data Report.

Occasionally DOH will provide oversight of non-routine samples for DOE, as in the case of the HRNM samples. In June of 2005, DOH was requested to split four soil samples

from the McGee Ranch Riverlands Area for QA purposes. These samples were collected and analyzed at the Public Health Laboratory in Shoreline, Washington.

Fig. 1. McGee Ranch, which is indicated by the red dot near the center of the map

Sampling Procedure

Samples were collected per PNNL soil sampling procedure with DOH participation. The actual sites selected were in the Riverlands area, as it was believed this was the most likely to be contaminated. Formerly this area had been a rail yard where contaminated materials were loaded and unloaded from rail cars (see Table 1.).

Sample Name	Latitude	Longitude
MCG-13	46.62174	-119.73333
MCG-14	46.62195	-119.73367
MCG-15	46.62180	-119.73399
MCG-16	46.62205	-119.73412
MCG-17	46.62173	-119.73446

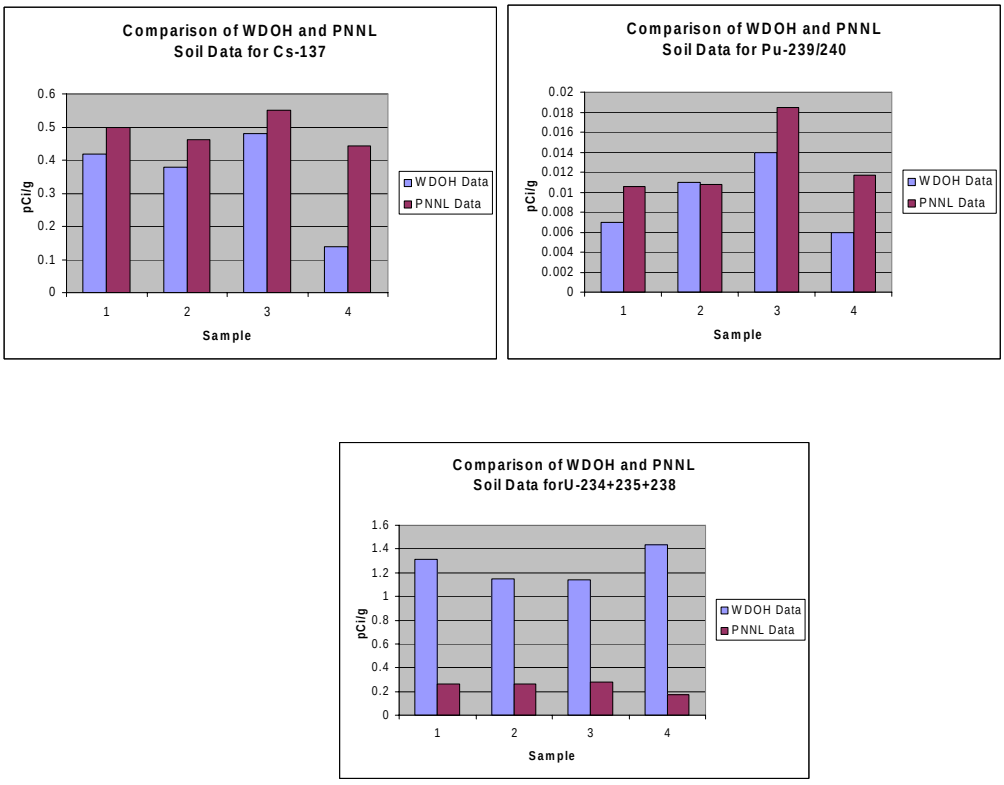
Table 1. Sample Locations

As a result, some contamination had been found there. This area had been remediated in the early 1990s, and was believed to be releasable. Once collected, the samples were then split by PNNL personnel and delivered to DOH personnel in the Richland Field Office. The samples were then stored while funding was allocated for analysis. Insufficient funding was allocated to analyze all the samples. MCG-16 was archived, should further analysis be necessary, and MCG-13, 14, 15, and 17 were sent to the Public Health Lab in Shoreline for analysis.

Results

As the below graphs (Fig. 2) show, there is good agreement between DOH and PNNL samples, with the exception of the Uranium samples. While both laboratories are internally consistent, the analytical difference is due to different laboratory procedures (DOH totally dissolves the sample and PNNL uses a leaching process.)

Fig. 2. Comparison of WDOH and PNNL Soil Data



Conclusion

DOH and PNNL sample analytical results (see Table 2) compare well, with the exception of uranium. The variation in uranium results is explained by different laboratory procedures, and is consistent with historical differences between the agencies.

Table 2. Sample Data

DBID	Collected	Type	Analyte	DOH	Error	PNNL	Error
37179	6/28/2005	SOIL	Co-60	0.008	0.009	-0.0277	0.024
37179	6/28/2005	SOIL	Cs-137	0.42	0.03	0.499	0.078
37179	6/28/2005	SOIL	K-40	14.8	0.6	14.9	2.3
37179	6/28/2005	SOIL	Pu-238	0.001	0.003	-0.000164	0.0013
37179	6/28/2005	SOIL	Pu-239/240	0.007	0.003	0.0106	0.0048
37179	6/28/2005	SOIL	Sr-90	0.075	0.008	0.0541	0.049
37179	6/28/2005	SOIL	U-234	0.66	0.08	0.125	0.073
37179	6/28/2005	SOIL	U-235	0.04	0.02	0.00563	0.0072
37179	6/28/2005	SOIL	U-238	0.61	0.08	0.132	0.1
37180	6/28/2005	SOIL	Co-60	0.005	0.008	0.0257	0.022
37180	6/28/2005	SOIL	Cs-137	0.38	0.03	0.461	0.072
37180	6/28/2005	SOIL	K-40	14	0.6	14.5	2
37180	6/28/2005	SOIL	Pu-238	0.002	0.004	0.000212	0.00021
37180	6/28/2005	SOIL	Pu-239/240	0.011	0.005	0.0108	0.0021
37180	6/28/2005	SOIL	Sr-90	0.06	0.007	0.037	0.046
37180	6/28/2005	SOIL	U-234	0.58	0.08	0.125	0.072
37180	6/28/2005	SOIL	U-235	0.02	0.01	0.00295	0.0068
37180	6/28/2005	SOIL	U-238	0.55	0.08	0.135	0.097
37181	6/28/2005	SOIL	Co-60	0	0.009	-0.0101	0.019
37181	6/28/2005	SOIL	Cs-137	0.48	0.03	0.55	0.078
37181	6/28/2005	SOIL	K-40	13.6	0.5	14.2	2
37181	6/28/2005	SOIL	Pu-238	0.002	0.003	0.000334	0.00027
37181	6/28/2005	SOIL	Pu-239/240	0.014	0.005	0.0185	0.0032
37181	6/28/2005	SOIL	Sr-90	0.081	0.008	0.0547	0.049
37181	6/28/2005	SOIL	U-234	0.57	0.09	0.138	0.073
37181	6/28/2005	SOIL	U-235	0.03	0.02	0.00528	0.0073
37181	6/28/2005	SOIL	U-238	0.54	0.08	0.137	0.098
37182	6/28/2005	SOIL	Co-60	0	0.008	-0.000183	0.016
37182	6/28/2005	SOIL	Cs-137	0.14	0.02	0.443	0.066
37182	6/28/2005	SOIL	K-40	16	1	13.8	2.6
37182	6/28/2005	SOIL	Pu-238	-0.001	0.003	-0.0000422	0.00034
37182	6/28/2005	SOIL	Pu-239/240	0.006	0.003	0.0117	0.0033
37182	6/28/2005	SOIL	Sr-90	0.039	0.006	0.0662	0.048
37182	6/28/2005	SOIL	U-234	0.7	0.08	0.0929	0.069
37182	6/28/2005	SOIL	U-235	0.02	0.01	0.00246	0.0063
37182	6/28/2005	SOIL	U-238	0.72	0.08	0.0748	0.094