



DISPOSAL of NASA ELV AREA SOILS

NASA is undertaking an Interim Source Removal Action (ISRA) to meet a California Water Code Section 13304 Order issued on December 3, 2008. This Order required Boeing, the holder of the permits for water that flows off the site, to protect surface water quality at SSFL by removing certain contaminated soils. The contaminants include dioxins and lead. NASA owns property that flows to the points where Boeing has permits, therefore NASA also has a responsibility to remove contaminated soils.

This fact sheet outlines the technical basis and supporting evidence for NASA's conclusion that the soils identified for cleanup and disposal (adjacent to the Expendable Launch Vehicle (ELV) Area) are hazardous and non-hazardous wastes. The soils with higher levels of lead and dioxin will be hazardous waste. The detections of cesium (Cs-137) in these soils, which will be classified as hazardous wastes due to the presence of lead, are consistent with background levels found across the United States from worldwide fallout, and are therefore not radiological waste.

NASA has identified out-of-state facilities that are appropriate for disposal of these hazardous and non-hazardous wastes. The US Ecology facility in Grand View, Idaho has agreed they can accept these wastes that contain some detections of Cs-137 above local background.

NASA is committed to protecting public health and the environment. Disposal of removed soil at these appropriate facilities will enable our continued cleanup of the soils to protect surface water quality to move forward.

KEY INFORMATION

- One area targeted for cleanup on NASA property is the soil south of the ELV Area and adjacent parking lot (ELV 1C and 1D). This soil contains lead and dioxin above background levels.
- After defining the area of soils to be cleaned up, further samples were collected and analyzed to ensure proper waste disposal. (For example, samples were analyzed for lead to determine whether sampled soil contained levels of lead requiring disposal at a hazardous waste facility). Nine of the 36 samples exceeded the site-specific background value of Cs-137 of 0.21 pCi/g as reported in the McLaren/Hart study (1993). Upon re-sampling eight spots that had detections above background to confirm

Cs-137 presence, five exceeded background. Three of the prior elevated Cs-137 spots did not show elevated levels upon resampling.

- The average Cs-137 concentration in the total 44 samples is 0.19 pCi/g. The 1993 McLaren/Hart study background value is 0.21 pCi/g. (McLaren/Hart 1993, p. 11-14.)
- Literature that documents studies of worldwide fallout shows that worldwide fallout concentrates through natural processes in runoff areas. Cs-137 concentrations in drainage areas (e.g., roof drip lines and drain spout locations) can have significantly higher concentrations than open areas. (Wallo 1994) Surface sample area average concentrations for fallout deposition in the U.S. are in the range of 0.3 to 3 pCi/g. (Wallo 1994)
- The highest Cs-137 level detected was 0.66pCi/g in one sample at the ELV area.
- The ELV area soils receive rainwater runoff from the parking lot and buildings that make up the ELV complex. Areas that collect rain water can have significantly higher concentrations of Cs-137 in soils than soils found in open areas. The geometric mean (area average) concentrations in drainage areas are typically three times higher than in nondrainage areas. (Wallo 1994)
- The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM Section 4.5, p. 4-13) recognizes that background variability may increase due to the concentration of fallout in low areas of parking lots where runoff water collects and evaporates. There is a great deal of variation in background even over small areas, so that there is a variation of a factor of five or more in the space of a few hectares. (Note: one hectare is 2.47 acres.)
- A review of the sampling locations in the 1993 McLaren/Hart study indicates that the study did not specifically identify or sample areas with runoff from parking lots and buildings where worldwide fallout naturally accumulates.



Photo: Soil removal area on right (south); paved area on left (north).

- The 1995 McLaren/Hart study discussed variability of background Cs-137 in section 6.3.1:

Cesium-137 in the 1994 background soil samples 10 of 11 Background Areas ranged from less than 0.03 picocuries per gram of soil dried [pCi/g(dry)] at several background locations to 0.213 ± 0.072 pCi/g(dry) at Santa Susanna Park (BG-02) with an arithmetic mean concentration of approximately 0.087 ± 0.062 pCi/g(dry). [Background cesium-137 concentrations at Wildwood Regional Park Ravine ranged from 0.215 ± 0.039 to 0.456 ± 0.052 pCi/g(dry), but were not included in the background statistical analysis.] Their exclusion resulted in the lowering of the Cesium-137 background and a bias toward a lower background concentration. Cesium-137 in all Background Areas was well within the background cesium-137 range from published reports, which range from 0.001 pCi/g(dry) (Layton, 1990) to 1.3 pCi/g(dry) (Ritchie and McHenry, 1977 and 1982).

- Based on the documented levels of Cs-137 reported in the literature for the U.S., the levels found at the ELV Area are consistent with and within the range of background found within the United States.

DISPOSAL

The waste has been accepted for disposal at two out-of-state waste disposal facilities. The wastes containing the soils with detection of Cs-137 at levels slightly higher than local background have been accepted by a US Ecology facility in Grand View, Idaho. The soils with Cs-137 below local background levels have been accepted for disposal at the US Ecology facility in Beatty, Nevada. This facility is permitted to receive hazardous and non-hazardous solid waste.

STATUS OF NASA CLEANUP AT ELV

NASA announced on April 14, 2010, that appropriate out-of-state disposal facilities had been obtained ([correspondence posted on NASA website](#)) and that NASA would commence this important soil removal cleanup. Following the announcement, a question was raised by an interested party regarding whether the soils would be disposed as low-level radioactive wastes. Upon request of the Regional Water Quality Control Board (RWQCB), NASA voluntarily suspended cleanup and contacted the California Department of Toxic Substances Control

(DTSC) to discuss the disposal. NASA looks forward to undertaking the ELV area cleanup and disposing of the soils at these appropriately identified facilities.

CONCLUSION

The levels of Cs-137 found in this area adjacent to a parking lot are consistent with background levels across the U.S., which are levels that would be expected in a natural accumulation area next to a parking lot. The soils from this area are not appropriate to classify as radiological waste. The waste disposal facilities that have agreed to receive these wastes are appropriate disposal facilities for these soils.

NASA is committed to protecting public health and the environment. Disposal of removed soil at these appropriate facilities will enable our continued cleanup of the soils to protect surface water quality to move forward.

REFERENCES

Wallo 1994: Wallo, A., M. Moscovitch, J.E. Rodgers, D. Duffey and C. Soares, 1994. "Investigations of Natural Variations of Cesium-137 Concentrations in Residential Soils" the Health Physics Society 39th Annual Meeting, June 28, 1994. McLean, Virginia: The Health Physics Society. (Copy available here: http://ssfl.msfc.nasa.gov/documents/technical/Natural_Variations_of_Cesium-137.pdf).

MARSSIM: Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), Rev. 1, Aug. 2000. NUREG-1575, Rev. 1, EPA 402-R-97-016, Rev. 1, DOE/EH-0624, Rev. 1 (Copy available on-line at: <http://www.epa.gov/rpdweb00/marssim/obtain.html>).

McLaren/Hart 1993: Multi-Media Sampling Report for the Brandeis-Bardin Institute and The Santa Monica Mountains Conservancy Vol. I, March 10, 1993. (Copy available on-line at: http://www.etec.energy.gov/Health-and-Safety/Documents/BrandeisBardin/MultMedSamRep_V1.pdf)

McLaren/Hart 1995: *Additional Soil and Water Sampling*: The Brandeis-Bardin Institute and Santa Monica Mountains Conservancy, Jan. 19, 1995. (Copy available on-line at: <http://www.etec.energy.gov/Health-and-Safety/Documents/BrandeisBardin/AddSoilandWaterSamp.pdf>)