
ISRA 009, Area II
ELV-1C (California Hazardous, Radionuclides < LUT)
Soil Sampling for Radionuclides
and Waste Certification

Introduction

This data package provides the laboratory results of the eight samples taken at the ELV-1C (California Hazardous) site in Area II. Soil sample locations and the demarcated area (designated by the green shaded areas) are shown in Appendix 1. Soil sample results were compared to the draft provisional DTSC look-up table (LUT) values in order to determine if soil exceeds background as required for the NASA/DTSC Administrative Order on Consent (AOC)¹.

Methodology

These samples are a small subset of the total samples taken in ELV-1C and apply to the California hazardous waste with radionuclides less than the LUTs. One sample taken in 2009 for waste disposal characterization was analyzed for strontium-90, tritium and gamma emitting radionuclides by gamma spectroscopy, using an off-site laboratory². Minimum detectable concentrations (MDC) for cesium-137 and strontium-90 were 0.047 pCi/g and 0.038 pCi/g respectively. The gamma spectroscopy library also included the following contaminants-of-concern: Na-22, K-40, Mn-54, Co-60, Cs-134, Eu-152, Eu-154, Th-228, Th-232, U-235, U-238 and Am-241. Seven additional step-out samples were subsequently taken in 2012-2013 to ensure no cesium-137 contamination above background existed in the subject waste stream. Average MDC for these samples was 0.046 pCi/g.

NASA and DTSC have signed an AOC that requires soils on Area II and portions of Area I to be cleaned up to background³. The USEPA has characterized local radionuclide background⁴ in soil and has published preliminary radiological trigger levels (RTL) based on the higher of background threshold values (BTV) or minimum detectable concentrations (MDC)⁵.

On August 23, 2012, DTSC sent NASA a letter regarding excavation of ISRA soil⁶. In the letter, DTSC stated,

¹ "Administrative Order on Consent for Remedial Action (AOC)", December 6, 2010, signed by the National Aeronautics and Space Administration (NASA) and the Department of Toxic Substances Control (DTSC).

² Boeing, "ISRA Soil Management Plan", Attachment A, "ISRA Sampling for Radionuclides", July 2009.

³ Page 5, Section 2.1 of the AOC states, "The cleanup of soils at the Site [Area II and portions of Area I] shall result in the end state of the Site after cleanup to be consistent with "background." That is, at the completion of the cleanup, no contaminants shall remain in the soil above local background levels, with the exception of the exercise of the exemptions that are specifically expressed in the AIP. All response actions taken pursuant to this Order shall be performed so as to accomplish this objective, in full compliance with the terms and conditions detailed in the AIP, and in accordance with workplans that have been submitted to and approved by DTSC. Similarly, to the extent any radiological materials are determined to be present at this portion of the Site, the cleanup of soils at the Site contaminated with radiological materials shall result in no radiological contaminants remaining in the soil above local background levels, with the exception of the exercise of the same exemptions expressed in the AIP."

⁴ USEPA, "Final Radiological Background Study Report, Santa Susana Field Laboratory, Ventura County, California", October 2011.

⁵ USEPA, "Technical Memorandum, Radiological Trigger Levels, Santa Susana Field Laboratory Site, Area IV Radiological Study", December 12, 2011.

⁶ DTSC, "Management and Disposal of Radionuclide-impacted Soil Excavated for Interim Source Removal Actions on NASA Property, Santa Susana Field Laboratory, Ventura County, California", August 23, 2012

"DTSC agrees with using the December 2011 USEPA RTLs for all radionuclides as the values for disposal of the ISRA soils. DTSC has concluded that use of the RTLs will not be inconsistent with SSFL radiological Lookup Table values."

"ISRA radiological soil sample results that exceed the RTLs and that have not been re-sampled may be re-sampled to evaluate the initial RTL exceedance. Soil at locations characterized by initial and re-sample radiological results exceeding their respective RTLs will be removed and disposed of at a LLRW disposal facility, per Section 2.10 of the AOC."

"Validated radiological sample concentrations below the sample MDC can be treated as "non-detects" and the associated soil is not subject to the Section 2.10, AOC soil disposal conditions."

USEPA issued revised RTLs⁷ in December 2012 which were, in general, higher than the original RTLs. USEPA also issued laboratory specific radiological reference concentrations (RRC) in December 2012⁸. Subsequently, DTSC issued draft provisional LUTs⁹ for 16 radionuclides in January 2013, which in general matched the revised RTLs for those radionuclides whose RTLs were derived from BTVs¹⁰ (for example cesium-137 and uranium-238). The draft provisional LUTs subset also matched exactly the lower of the two lab-specific RRCs. Consistent with DTSC's intent in issuing draft provisional LUTs for interim remedial action implementation, ELV-1C data is compared to draft provisional LUTs and sample MDCs to determine compliance with the DTSC/NASA AOC.

Results

Appendix 2 shows the soil radionuclide data for the samples taken at the ELV-1C California hazardous area compared to the draft provisional LUTs and sample MDCs. All concentrations are below the draft provisional LUTs and therefore comply with the NASA/DTSC AOC and are classified as not contaminated above background.

Conclusions

Excavated soil from the ELV-1C (California hazardous area) area is released for disposal with no radiological restrictions.



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⁷ USEPA, "Attachment A – Original and Corrected Radiological Trigger Levels - Development and Use of Radiological Reference Concentrations", Appendix K of "Final Radiological Characterization of Soils - Area IV and Northern Buffer Zone", December 21, 2012.

⁸ USEPA, "Attachment B - Radiological Reference Concentrations - Development and Use of Radiological Reference Concentrations", Appendix K of "Final Radiological Characterization of Soils - Area IV and Northern Buffer Zone", December 21, 2012.
















⁹ DTSC, "Development of the Draft Provisional Radiological Look-Up Table", DTSC Public Meeting, Chatsworth, California, January 30, 2013.

¹⁰ A notable exception was strontium-90 with a BTV of 0.075 pCi/g, an original RTL of 0.485 pCi/g, a revised RTL of 0.645 pCi/g, lab specific RRCs of 1.07 and 0.117 pCi/g and a draft provisional LUT of 0.117 pCi/g.

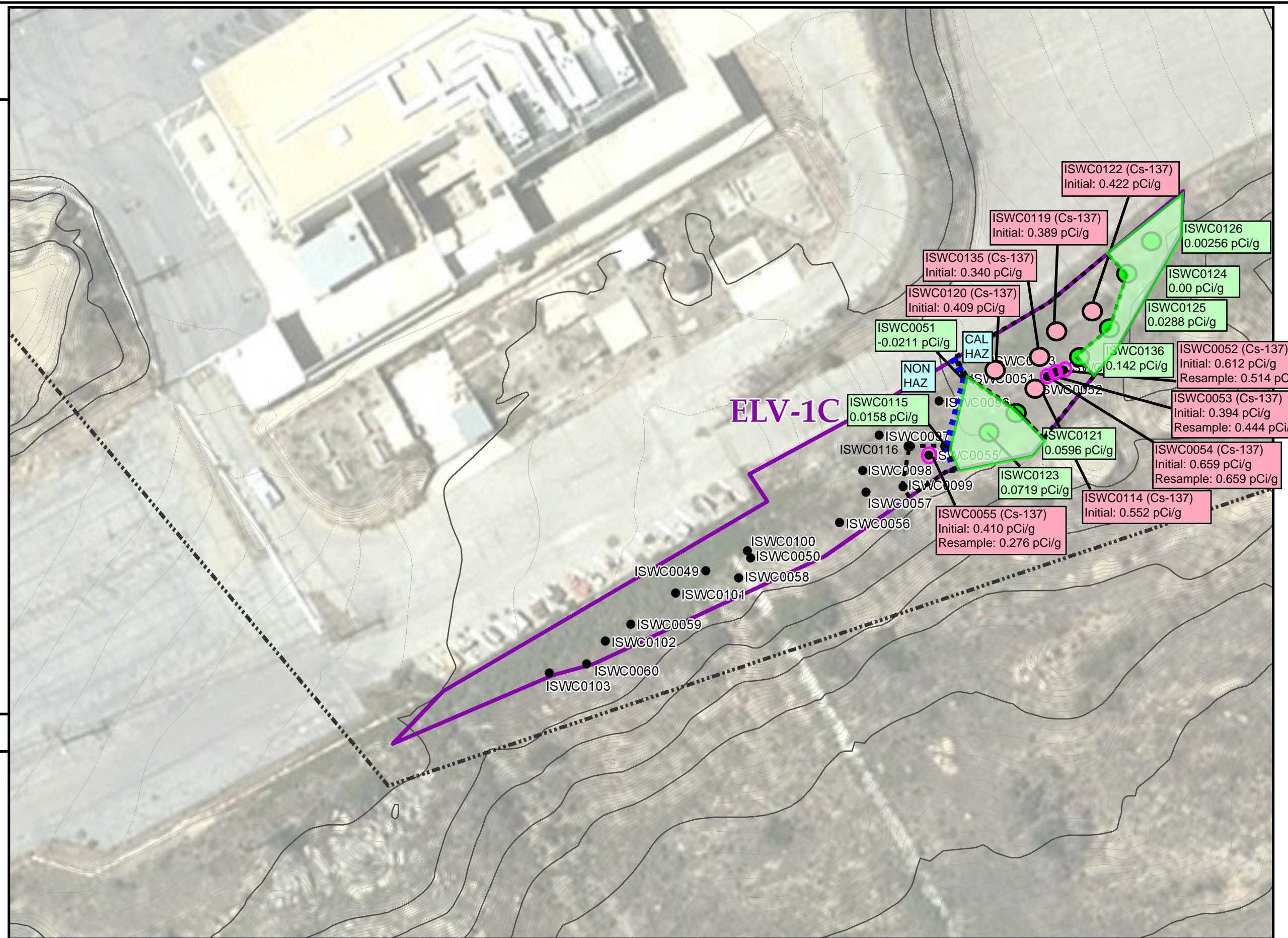
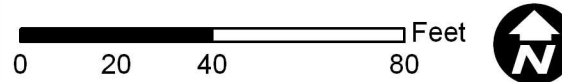
Appendix 1
ELV-1C Sampling Locations

Outfall 009 ELV-1C Waste Characterization Sample Location

Base Map Legend

-  Administrative Area Boundary
-  RFI Site Boundary
-  Excavation Area
-  Surface Water Drainage
-  Surface Water Divide
-  Outfall Water Divide
-  NPDES Outfall
-  Elevation Contour
-  Waste Characterization Sample Location
- January 2013 LUT Value**
Cs-137 = 0.225 pCi/g
-  Sample with confirmed result above LUT value.
-  Stepout sample; cs-137 result above LUT value; resampling not performed.
-  Stepout sample; cs-137 result below LUT value.
-  Non-Haz / Cal Haz (Pb) Boundary
-  Boundary of soils with results above LUT value
-  Boundary of California hazardous soil to be disposed of without radiological restrictions.

DRAFT



Appendix 2

ELV-1C (California Hazardous, Below LUT) Radionuclide Results

ELV-1C NASA ISRA - CALIFORNIA HAZARDOUS - RADIOLOGICAL < LUT

| Sampling Date | Sampling Location (General) | Sampling Location (Specific) | Sample Serial Number | Media Type | Isotope | Activity | Error (+/-) | MDC | DTSC LUT | LUT Source | Activity > LUT ? | Activity > MDC ? | Detected Activity | Detected Activity > LUT ? | Non-detect Activity | Non-detect Activity > LUT ? | MDC > LUT ? | Ratio of MDC to LUT | Units | Comments | Document |
|---------------|-----------------------------|------------------------------|----------------------|------------|---------------|----------|-------------|--------|----------|------------|------------------|------------------|-------------------|---------------------------|---------------------|-----------------------------|-------------|---------------------|-------|---|----------|
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Americium-241 | 0.0359 | 0.0371 | 0.066 | 0.0386 | MDC | - | - | - | - | 0.0359 | - | YES | 1.71 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Cesium-134 | 0 | 0.0466 | 0.068 | 0.0801 | MDC | - | - | - | - | 0 | - | - | 0.85 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Cesium-137 | -0.0211 | 0.0283 | 0.047 | 0.225 | BTV | - | - | - | - | -0.0211 | - | - | 0.21 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Cobalt-60 | 0.00665 | 0.0282 | 0.049 | 0.0363 | MDC | - | - | - | - | 0.00665 | - | YES | 1.35 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Europium-152 | 0.00609 | 0.0678 | 0.108 | 0.0739 | MDC | - | - | - | - | 0.00609 | - | YES | 1.46 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Europium-154 | -0.056 | 0.0875 | 0.145 | 0.198 | MDC | - | - | - | - | -0.056 | - | - | 0.73 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Manganese-54 | 0.0079 | 0.0274 | 0.049 | - | - | - | - | - | - | 0.0079 | - | - | N/A | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Potassium-40 | 21.8 | 1.65 | 0.421 | 35.5 | BTV | - | YES | 21.8 | - | - | - | - | 0.01 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Sodium-22 | -0.0201 | 0.0311 | 0.052 | 0.0468 | MDC | - | - | - | - | -0.0201 | - | YES | 1.10 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Strontium-90 | -0.00422 | 0.0175 | 0.038 | 0.117 | MDC | - | - | - | - | -0.00422 | - | - | 0.32 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Thorium-228 | 1.25 | 0.13 | 0.059 | 4.27 | BTV | - | YES | 1.25 | - | - | - | - | 0.01 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Thorium-232 | 1.13 | 0.234 | 0.172 | 3.44 | BTV | - | YES | 1.13 | - | - | - | - | 0.05 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Tritium | -0.154 | 0.354 | 0.669 | 8.59 | MDC | - | - | - | - | -0.154 | - | - | 0.08 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Uranium-235 | 0.00421 | 0.138 | 0.233 | 0.152 | BTV | - | - | - | - | 0.00421 | - | YES | 1.53 | pCi/g | Cal Haz Area | 234235 |
| 7/28/2009 | ELV-1C | ISWC0051 | ISWC0051RadS001 | Soil | Uranium-238 | 0.686 | 0.608 | 0.652 | 1.96 | BTV | - | YES | 0.686 | - | - | - | - | 0.33 | pCi/g | Cal Haz Area | 234235 |
| 9/28/2012 | ELV-1C | ISWC0136 | ISWC0136S001 | Soil | Cesium-137 | 0.142 | 0.0495 | 0.052 | 0.225 | BTV | - | YES | 0.142 | - | - | - | - | 0.23 | pCi/g | Cal Haz Area; ISWC0052,53,54 Stepout #2 | 312152 |
| 9/28/2012 | ELV-1C | ISWC0115 | ISWC0115S001 | Soil | Cesium-137 | 0.0158 | 0.0225 | 0.0419 | 0.225 | BTV | - | - | - | - | 0.0158 | - | - | 0.19 | pCi/g | Cal Haz/Non-Haz Boundary; ISWC0055 Stepout #1 | 312152 |
| 11/2/2012 | ELV-1C | ISWC0121 | ISWC0121S001 | Soil | Cesium-137 | 0.0596 | 0.0342 | 0.046 | 0.225 | BTV | - | YES | 0.0596 | - | - | - | - | 0.21 | pCi/g | Cal Haz Area; ISWC0052,53,54 Stepout #6 | 314581 |
| 11/2/2012 | ELV-1C | ISWC0123 | ISWC0123S001 | Soil | Cesium-137 | 0.0719 | 0.0456 | 0.054 | 0.225 | BTV | - | YES | 0.0719 | - | - | - | - | 0.24 | pCi/g | Cal Haz Area; ISWC0052,53,54 Stepout #8 | 318761 |
| 1/23/2013 | ELV-1C | ISWC0124 | ISWC0124S001 | Soil | Cesium-137 | 0 | 0.0531 | 0.040 | 0.225 | BTV | - | - | - | - | 0 | - | - | 0.18 | pCi/g | Cal Haz Area; ISWC0052,53,54 Stepout #9 | 318991 |
| 1/23/2013 | ELV-1C | ISWC0125 | ISWC0125S001 | Soil | Cesium-137 | 0.0288 | 0.029 | 0.049 | 0.225 | BTV | - | - | - | - | 0.0288 | - | - | 0.22 | pCi/g | Cal Haz Area; ISWC0052,53,54 Stepout #10 | 318992 |
| 1/23/2013 | ELV-1C | ISWC0126 | ISWC0126S001 | Soil | Cesium-137 | 0.00256 | 0.0207 | 0.036 | 0.225 | BTV | - | - | - | - | 0.00256 | - | - | 0.16 | pCi/g | Cal Haz Area; ISWC0052,53,54 Stepout #11 | 318992 |