Confirmatory Survey
of
Mass Spectroscopy Laboratory
Building 104 DeSoto Facility
Boeing - Rocketdyne
Canoga Park, California

Prepared By
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Introduction:

The DeSoto Facility, Building 104 was one of several buildings comprising the headquarters of the former Atomics International from 1960 to 1984. In 1984, Atomics International merged with Rocketdyne. The Mass Spectroscopy Laboratory (Mass Spec Lab), located in the northeast quadrant of the first floor of the DeSoto Facility Building 104, in Canoga Park, California, was operational for approximately 25 years. The Mass Spec Lab analyzed low-level, activated test samples for universities and national laboratories until May 1995, when operations terminated. This laboratory was one of the original facilities in the world that performed Helium analyses on activated materials. In 1995, Rockwell International terminated operations at the laboratory, and the equipment was shipped to the Department of Energy at the Hanford Burial Site of Pacific Northwest Laboratories (PNL) in early 1996.

The laboratory housed a Helium Mass Spectroscopic Analyzer capable of measuring irradiated metal samples for He-3 / H-4 ratios useful in the evaluation of steels for use in reactor cores. Typical isotopes controlled by the laboratory were mainly activation products, such as Mn-54, Mn-56, Co-58, Co-60, Fe-59, and Nb-95. The laboratory also operated a Mass Spectrograph for the measurement of heavy elements, primarily isotopes of uranium, used in fuel fabrication. Low level radioactive materials were also stored in the Mass spectroscopy Laboratory until operations ceased.

The sanitary drain for the Mass Spec Lab was found to be contaminated and was removed from the structure, leaving a trench in the floor.

Reference Document(s):

1. Letter to Tim Vitkus from Phil Rutherford, dated August 27, 1998, "Documentation for Radiological Surveys of the De Soto Mass Spectroscopy Laboratory, Santa Susanna Buildings 4064, 4019 and the recent excavation at Building 4020", with attachments. (Attached document of interest # N001SRR140129).
2. Letter to Tim Vitkus from Phil Rutherford, dated September 9, 1998, "Documentation for Radiological Surveys of the De Soto Mass Spectroscopy Laboratory and Santa Susana Building 4064", with attachments (document of interest "Final Survey Data Package for the "De Soto Mass Spectrometry Laboratory Final Survey Report", August 31, 1998, Draft)
3. Letter to Mike Lopez from Phil Rutherford, dated December 16, 1998, "Final Survey Report of the DeSoto, Building 104, Mass Spectroscopy Laboratory", with attachment document # N001Srr140130, "DeSoto 104 Mass Spectroscopy Laboratory Final Status Survey Report".

Survey Personnel:

Radiological Health Branch staff: Roger Lupo, Lisa Brown, and Xaiosong Yin.

Survey Instruments:

Manufacture & Model	S/N	Probe/detector	S/N	Calibration due date
Ludlum model 3	134076	44-2 1x1 NaI Scintillator	PR137133	11/98
Ludlum model 3	134215	44-2 1x1 NaI Scintillator	PR137117	11/98
Ludlum model 19	80382	internal 1x1 NaI Scintillator	N/A	6/99
Ludlum model 19	109936	internal 1x1 NaI Scintillator	N/A	5/99
Ludlum model 18 analyzer	105775	44-9 pancake GM	PR110029	11/98
		43-90 100cm^2 α scintillator	PR106313	11/98
Ludlum model 2221	126531	44-10 2x2 NaI Scintillator	PR038043	11/98
Eberline ESP - 2	0406	44-9 pancake GM	PR043314	11/98

Survey Report:

On October 8, 1998, Radiologic Health Branch (RHB) staff, Misters Roger Lupo, Xaiosong Yin and Ms. Lisa Brown performed a confirmatory survey of the Mass Spec Lab located in Building 104 of the Boeing/Rocketdyne DeSoto Facility and the roof area surrounding the vents from the Mass Spec Lab. Background measurements on the floor and on a concrete column were taken in an unaffected office area of Building 104. The results are listed by instrument in Table 1. The Mass Spec Lab and roof were surveyed with a 1x1 NaI detector for gamma, a G-M pancake detector for beta/gamma, and a micro R ratemeter for exposure rate. . Exposure rates measurements inside the Mass Spec Lab ranged from 11 μR/hr to 13 μR/hr while the rate on the roof ranged from 6μR/hr to 10.5μR/hr, these lower measurements are due to the shielding of the ground by the building structure. No elevated levels were

found. Single point measurements for alpha and beta activity were performed and a swipe sample for the determination of removable gross alpha and gross beta activity were collected at selected locations on the floor and walls of the Mass Spec Lab and on the roof surface

Soil samples were collected from the trench in the floor of the Mass Spec Lab from which a sanitary drain line had been removed. The soil samples were taken at the location where there had been a junction in the drain line, a likely leak location. Figure 1 shows the locations of the contact measurements, the swipe samples and the trench soil samples. Figure 2 shows the locations of the contact measurements and swipe samples taken on the roof of the Mass Spec Lab. The survey data and laboratory analysis results of the swipes are listed in Tables 2 and 3. The Laboratory analysis results of the Trench soil samples are listed in Tables 4, 5, and 6.

The soil excavated from the sanitary drain trench of the DeSoto Building 104 Mass Spec Lab was placed into twenty (20) B-Box type bins and stored at the Santa Susana Field Laboratory site pending survey by RHB personnel. The bins were surveyed on October 9, 1998 with a micro R meter and ranged from 12.0 μR/hr to 15.0 μR/hr exposure rate at the surface of the bin. The exposure rate measurement 25 feet from the bins was 15 μR/hr and at one meter the exposure rate was 15 μR/hr

List of B-Box Bins surveyed:
B1033, B1051, B1064, B1084, B1086, B1087, B1088, B1090, B1092, B1093, B1095, B1100, B1102, B1103, B1104, B1105, B1111, B1113, B1114, B1116;

Of the 20 bins, five were randomly selected for sampling. The samples for each of the five bins were composited over different locations within each bin, collecting soil from the surface to a maximum depth of six inches. The survey and laboratory analysis results are listed in Tables 6 and 7.

Table 1: Background Measurements:

Meter and Detector	open air measurement	concrete column located in the office area	average bkgnd ± σ
Ludlum model 3 w/ 1x1 NaI gamma scintillator	2.5k – 3k cpm	3k cpm	2766 ± 188 cpm
Ludlum model 19 micro R exposure ratemeter	11 – 14 μR/hr	12 – 14 μR/hr	12.5 ± 1.1 μR/hr
Ludlum model 18 w/ 43-90 100cm^2 α scintillator	0 cpm	0 cpm	0 cpm
Ludlum model 18 w/ 44-9 pancake GM	40 – 60 cpm	40 – 60 cpm	50 ± 8 cpm
Ludlum model 2221 w/ 2x2 NaI gamma scintillator	3928 cpm	4043 cpm	3985.5 ± 57.5 cpm
Eberline ESP-2 w/ 44-9 pancake GM	53.8 cpm	52.8 cpm	53.3 ± 0.5 cpm

Table 2: Contact Survey Data (gross measurements):

Location and Wipe ID	Alpha cpm (model 18 w/ 43 - 90)	Beta cpm (ESP-2 w/44 - 9 G-M)	Gamma cpm (model 2221 w/ 2x2 NaI)	µR/hr (Ludlum M-19)
Lab 1	4	96.7	4166	12
Lab 2	1	68.8	4236	13
Lab 3	5	69.8	3964	11.5
Lab 4	3	70.8	3817	11.5
Lab 5	5	71.8	4166	12
Lab 6	3	86.7	4145	12
Lab 7	3	76.8	4087	13
Lab 8	1	73.8	4179	13
Lab 9	5	63.8	4046	11
Lab 10	4	65.8	3966	11.5
Roof 1	6	31.9	1870	7.5
Roof 2	6	38.9	1249	6
Roof 3	4	61.8	2865	10.5
Roof 4	3	42.9	1755	7

Table 3: Net Measurements and Wipe Sample Laboratory Results:

Location and Wipe ID	Net Alpha dpm/100cm^2 (m-18 w/ 43-90)	Net Beta dpm/100cm^2 (ESP-2 w/44-9)	Laboratory Results for Removable Contamination		
			Gross Alpha dpm/100cm^2	Gross Beta dpm/100cm^2	Gamma dpm/100cm^2
Lab 1	1808	21	N.D.	N.D.	N.D.
Lab 2	646	5	N.D.	N.D.	N.D.
Lab 3	688	26	N.D.	N.D.	N.D.
Lab 4	729	16	N.D.	N.D.	N.D.
Lab 5	771	26	N.D.	N.D.	N.D.
Lab 6	1392	16	N.D.	N.D.	N.D.
Lab 7	979	16	N.D.	N.D.	N.D.
Lab 8	854	5	N.D.	N.D.	N.D.
Lab 9	438	26	N.D.	N.D.	N.D.
Lab 10	521	21	N.D.	N.D.	N.D.
Roof 1	- 892	32	1.11 ± 0.56	1.29 ± 0.73	K-40 30.19 ± 33.3
Roof 2	- 600	32	N.D.	1.09 ± 0.71	
Roof 3	354	21	N.D.	N.D.	
Roof 4	- 433	16	1.24 ± 0.58	2.89 ± 0.82	

Negative values indicate calculated numbers associated with measured levels that are below the background levels for the site.
Results less than the lower limit of detection are reported as not detected (N.D.)

Table 4: Soil Samples from the Sanitary Drain Trench of Room 104, Analysis by Gamma Spec

Soil Sample Id	K-40 pCi/g	Cs-137 pCi/g	U-238 pCi/g	Ra-226 pCi/g	Th-232 pCi/g	Th-228 pCi/g	Ra-228 pCi/g	U-235 pCi/g
1	22.2 ± 0.4	N.D.	1.50 ± 0.83	0.77 ± 0.04	0.59± 0.07	0.51 ± 0.05	0.59 ± 0.07	0.079 ± 0.055
2	22.8 ± 0.5	N.D.	0.86 ± 0.41	0.81 ± 0.05	0.66 ± 0.06	0.58 ± 0.05	0.66 ± 0.06	N.D.
3	22.8 ± 0.7	N.D.	N.D.	0.90 ± 0.06	0.75± 0.10	0.60 ± 0.06	0.75 ± 0.10	N.D.
4	23.7 ± 0.5	0.013 ± 0.009	1.62 ± 0.90	0.82 ± 0.04	0.66 ± 0.07	0.61 ± 0.05	0.66 ± 0.07	N.D.
5	23.5 ± 0.5	0.015 ± 0.007	0.91 ± 0.76	0.77 ± 0.04	0.63 ± 0.06	0.51 ± 0.05	0.63 ± 0.06	0.11 ± 0.06
6	24.0 ± 0.4	0.030 ± 0.010	0.70 ± 0.57	0.87 ± 0.03	0.70 ± 0.06	0.63 ± 0.04	0.70 ± 0.06	0.075 ± 0.058

Table 5: Soil Samples from the Sanitary Drain Trench of Room 104, Isotopic Uranium Analysis

Soil Sample Id	Isotopic Uranium (pCi/g)		
	U-234	U-235	U-238
1	0.910 ± 0.104	0.046 ± 0.020	0.942 ± 0.106
2	0.990 ± 0.106	0.043 ± 0.019	1.019 ± 0.115
3	0.953 ± 0.105	0.040 ± 0.019	0.904 ± 0.103
4	1.045 ± 0.115	0.046 ± 0.022	1.064 ± 0.115
5	1.069 ± 0.125	0.050 ± 0.023	1.059 ± 0.125
6	0.931 ± 0.113	0.069 ± 0.027	0.813 ± 0.108

Table 6: Soil Samples from the Sanitary Drain Trench of Room 104, Gross Alpha Beta results

Soil Sample Id	Gross	
	Alpha (pCi/g)	Beta (pCi/g)
1	11.0 ± 1.5	23.5 ± 2.0
2	12.9 ± 2.0	25.2 ± 2.2
3	14.0 ± 1.8	27.4 ± 2.1
4	14.2 ± 1.8	27.0 ± 2.5
5	12.4 ± 1.6	24.8 ± 2.2
6	13.4 ± 1.7	26.1 ± 2.0

Table 7: Excavated soil from DeSoto Mass Spec Lab - Analysis by Gamma Spec

Soil Bin Id	survey µR/hr	K-40 pCi/g	Cs-137 pCi/g	U-238 pCi/g	Ra-226 pCi/g	Th-232 pCi/g	Th-228 pCi/g	Ra-228 pCi/g	U-235 pCi/g
B1090	12 – 15	21.7 ± 0.6	N.D.	N.D.	0.96 ± 0.06	0.68 ± 0.10	0.74 ± 0.08	0.68 ± 0.08	0.13 ± 0.09
B1087	12 - 15	22.8 ± 0.4	N.D.	1.26 ± 0.89	0.88 ± 0.04	0.63 ± 0.06	0.63 ± 0.05	0.63 ± 0.06	0.10 ± 0.06
B1064	12 – 15	24.0 ± 0.5	N.D.	1.15 ± 0.46	0.95 ± 0.05	0.61 ± 0.08	0.68 ± 0.06	0.61 ± 0.08	N.D.
B1111	12 – 15	23.9 ± 0.4	N.D.	N.D.	0.81 ± 0.04	0.67 ± 0.07	0.57 ± 0.05	0.67 ± 0.07	N.D.
B1033	12 – 15	22.6 ± 0.5	N.D.	1.42 ± 0.41	1.04 ± 0.05	0.87 ± 0.08	0.80 ± 0.06	0.87 ± 0.08	N.D.

Table 7: Excavated Soil from DeSoto Mass Spec Lab - Isotopic Uranium Analysis

Soil Bin Id	Isotopic Uranium (pCi/g)		
	U-234	**U-235**	**U-238**
B1090	1.17 ± 0.13	0.046 ± 0.022	1.15 ± 0.13
B1087	1.09 ± 0.13	0.053 ± 0.023	1.00 ± 0.12
B1064	1.05 ± 0.12	0.067 ± 0.024	1.06 ± 0.12
B1111	1.05 ± 0.12	0.087 ± 0.029	0.98 ± 0.12
B1033	1.16 ± 0.14	0.061 ± 0.029	1.09 ± 0.13

Table 9:Excavated Soil from DeSoto Mass Spec Lab - Gross Alpha Beta results

Soil Bin Id	Gross	
	Alpha (pCi/g)	**Beta (pCi/g)**
B1090	17.0 ± 1.9	28.7 ± 2.3
B1087	17.3 ± 1.9	25.9 ± 2.1
B1064	15.1 ± 1.8	26.2 ± 2.2
B1111	14.2 ± 1.8	25.6 ± 2.2
B1033	15.4 ± 1.8	27.3 ± 2.1

Figure 1: Floor Plan of the Mass Spectroscopy Laboratory at the Rocketdyne DeSoto Facility

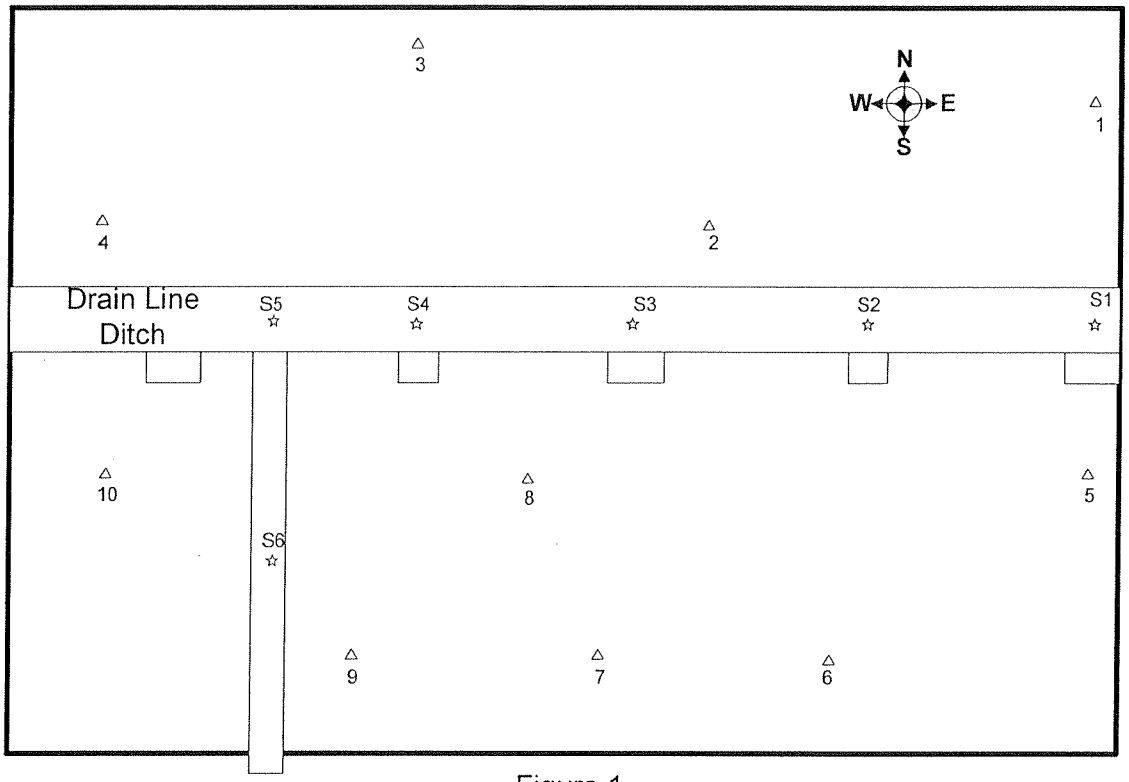

Figure 1
DeSoto Facility: Mass Spec Lab. Floor Plan
△ swipe sample location
☆ soil sample location

Figure 2: Roof Area over Mass Spectroscopy Laboratory at the Rocketdyne DeSoto Facility

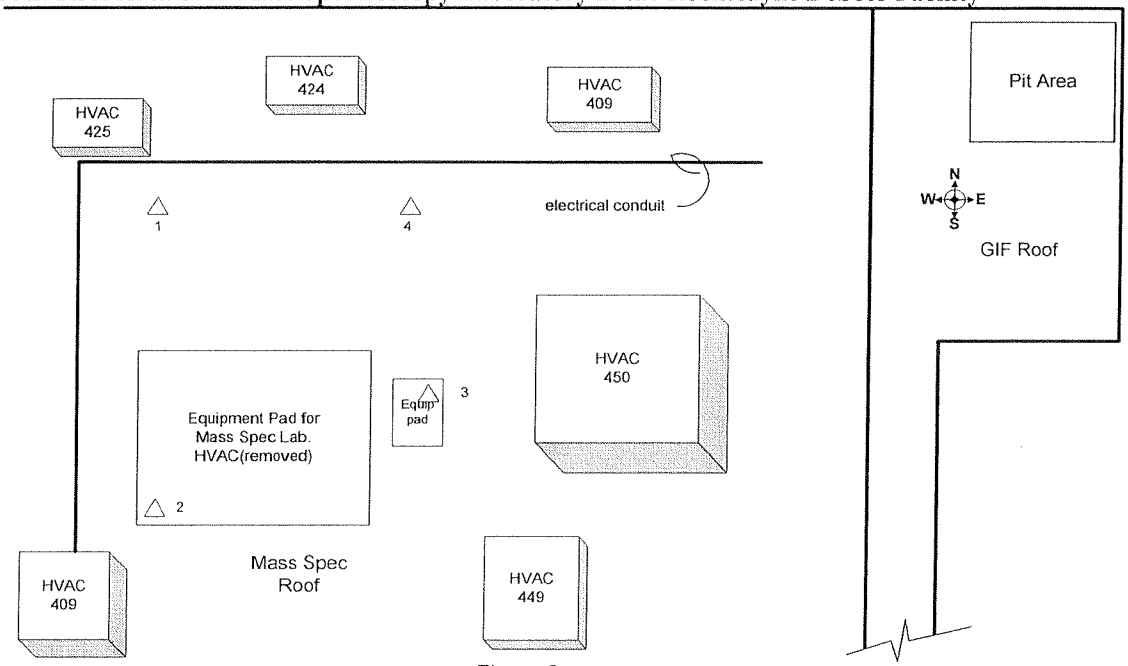

Figure 2
Mass Spec Lab Roof

Summary:
The scan survey of the Mass Spectroscopy Laboratory found the ambient radiation levels to be in the range of the background radiation levels for the structure. The results of the contact measurements and the laboratory analysis of the swipe samples collected have activity levels below the acceptable surface contamination levels as listed in DECON-1 (Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use). The soil samples from the sanitary drain trench and the segregated soil in B-boxes have levels of radioactivity below the soil concentration limits as listed in the Approved Site Wide Release Criteria for Remediation of Radiological Facilities (amended to the Boeing/Rocketdyne California Radioactive Materials License 0015). Therefore the Mass Spectroscopy Laboratory may be released for unrestricted use.

Prepared by: Roger K Lyon Date: July 30, 1999