Confirmatory Survey

Building 4133
Hazardous Material Treatment Facility
(HMTF)

Santa Susana Field Laboratory
Boeing - Rocketdyne
Ventura County, California

Prepared By
Roger K. Lupo, Health Physicist

Radiological Assessment Unit
Radiologic Health Branch

Introduction

The Department of Health Services, Radiologic Health Branch, received a verbal request from Boeing to survey the Building 4133 located in Area IV of the Santa Susana Field Laboratory currently owned by Boeing-Rocketdyne. No written request for a confirmation survey has been received. Building 4133 (a.k.a. – T133, HWMF, Hazardous Waste Management Facility) was built to treat non-radioactivity sodium and NaK (sodium potassium mix) from non –radioactive test loops and secondary sodium loops. The 4133 site area and structures are a non-impacted area with no history of radioactive materials usage. A limited confirmatory survey was conducted by Radiologic Health Branch Staff on October 28, 1999 with particular attention to be given to any elevated area found. The locations where elevated measurements might be expected to be found would be inside the burn room and within the catch tank as these areas would be the primary location for any residue of material brought to the 4133 site for processing.

Survey

The limited confirmatory survey of Building 4133 consisted of gamma and exposure rate surveys of the majority of the site areas with an alpha/beta/gamma survey of the structures as described below:

- An exposure rate survey, one meter above the surface outside the site boundary fenced area and extending 15 feet out from the fence,
- An exposure rate survey, one meter above the surface area inside of the fenced area and outside of the structures,
- An exposure rate survey, one meter from inside surfaces of the structures,
- A gamma scan survey, using a NaI 1x1 detector at no more than ½ inch above the surface of the area inside of the fenced perimeter and including 15 feet outside of the fenced perimeter,
- A gamma scan survey using a NaI 1x1 detector at no more than ½ inch from the floor surfaces inside the structures and the lower 2 meters of the interior and exterior surface of the walls.
- An Alpha-Beta-Gamma scanning survey, using a G-M pancake detector of the structures interior floor and 2 meter up the interior wall surface were performed.
- A soil sample collected down gradient from the site to determine the radioactive status of the soil that would be impacted by any surface run off from the site.

Instruments

The instruments and detectors used during this survey are listed in Table 1. The background measurements collected for this survey are listed in Table 2 with the exception of an outside measurement for the alpha/beta contamination scintillation detector used for direct measurements on surfaces. Background measurements were made at Building 4039, an office building with no history of radioactive materials usage.

Table 1: Instruments Used in the Survey of Building 4133.

Instrument	s/n	Probe Model	s/n	Probe Type	Calibration Date
Ludlum Model 3	158504	Ludlum 44-2	PR162272	1x1 NaI scint.	8/20/1999
Ludlum Model 18	151891	Ludlum 44-9	PR163587	pancake G-M	8/19/1999
Ludlum Model 2224	125592	Ludlum 43-89	PR123115	Alpha/Beta scint.	9/17/1999
Ludlum Model 19	80382	na	na	internal NaI	9/7/1999

Table 2: Instrument Background measurements.

Instrument	Instrument Background (inside)	Instrument Background (outside)
Ludlum Model 3	1800-2000 cpm	3000-3500 cpm
Ludlum Model 18	30-60 cpm	30-60 cpm
Ludlum Model 2224	1 alpha / 289 beta cpm	na
Ludlum Model 19	6-8 µR/hr	10-12 µR/hr

Survey Results

No elevated radiation areas were found during the surveys of the structures, associated pits and catch tank. All measurements were at similar levels as background measurements. The following figures document the survey measurements in relation to the site and the structures within.

- Figure 1 Exposure Rate,
- Figure 2 Gamma scan,
- Figure 3 Surface contamination survey and exposure rate survey of the Control Room,
- Figure 4 Surface contamination survey and exposure rate survey of the Parts Spray/Burn Room,
- Figure 5 Surface contamination survey and exposure rate survey of the Scrubber Effluent Catch Tank.

One soil sample was collected down gradient from the site to determine the radioactive status of any soil that may have been impacted by surface run off from the site. The soil concentrations reported by the laboratory are similar to background soil samples collected at various times prior to this survey.

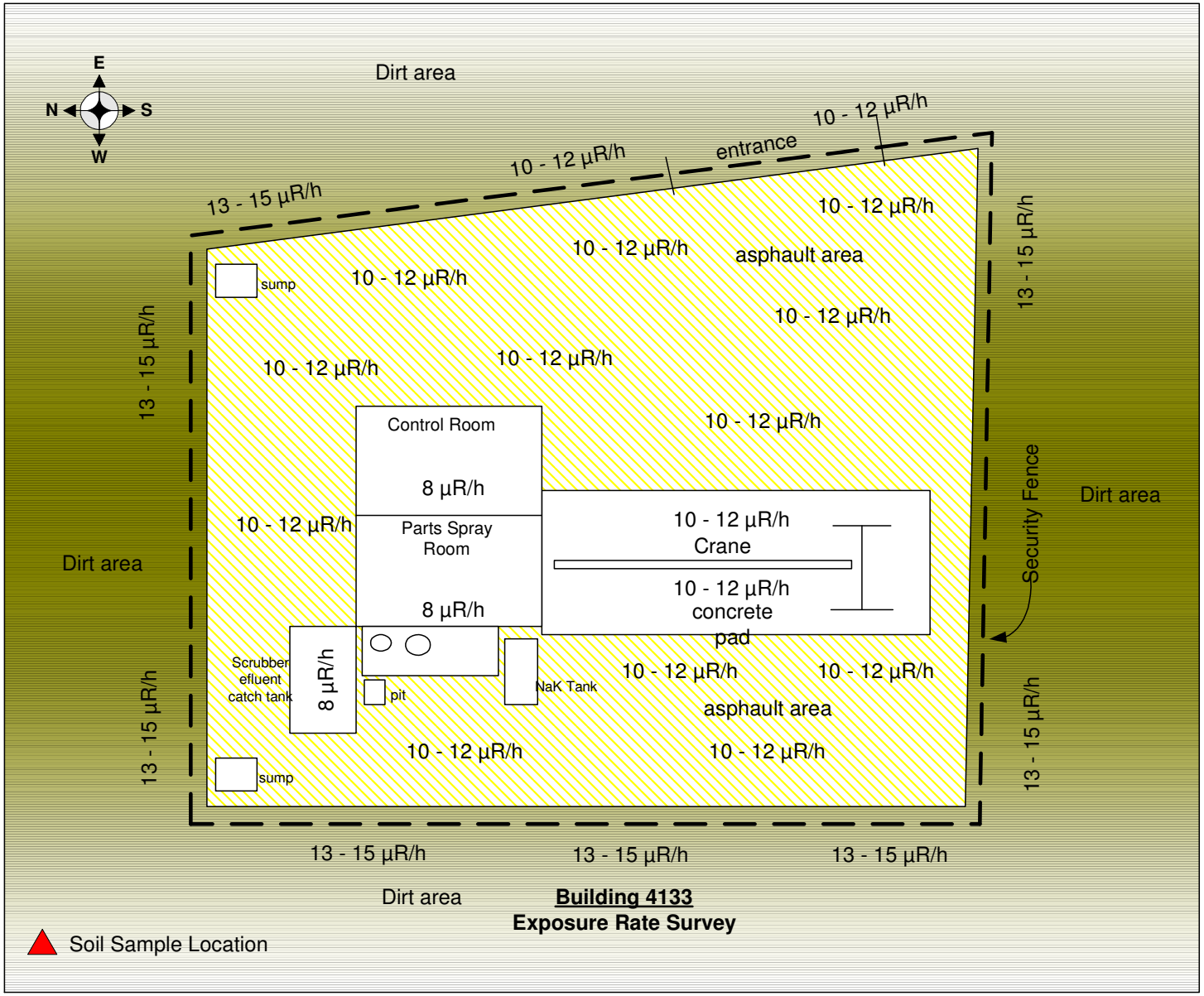
Soil Sample Results

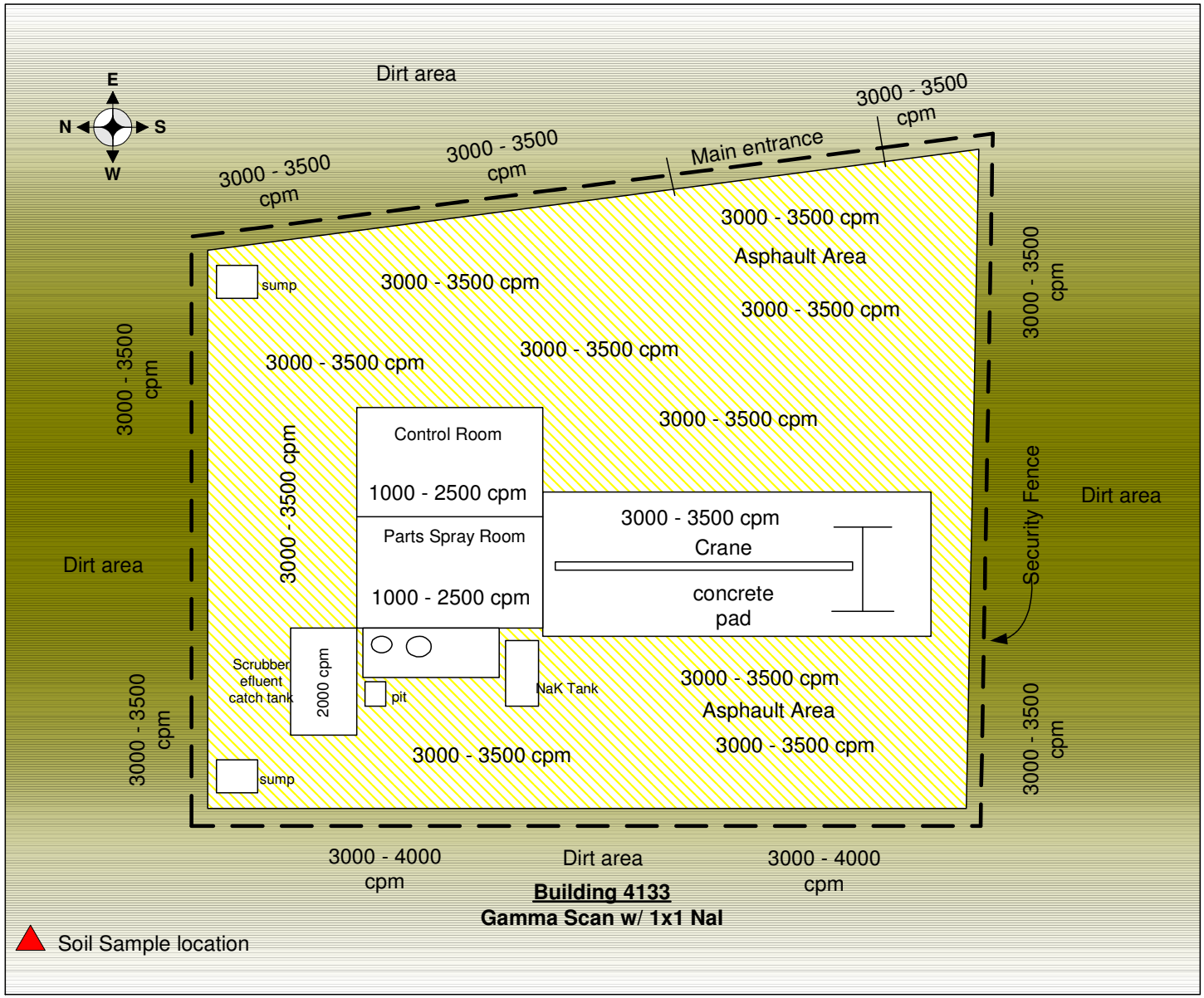
Sample ID	Gross Alpha	Gross Beta	Gamma Spec	
Location	**pCi/g ± CE**	**pCi/g ± CE**	**Isotope**	**pCi/g ± CE**
Down gradient from building 4133	9.70 ± 1.61	20.8 ± 2.8	K-40	23.07 ± 0.64
			Cs-137	0.145 ± 0.018
			U-238	1.29 ± 0.99
			Ra-226	0.691 ± 0.050
			Th-232	0.990 ± 0.106
			Th-228	0.944 ± 0.086
			Ra-228	0.990 ± 0.106
			U-235	N.D.

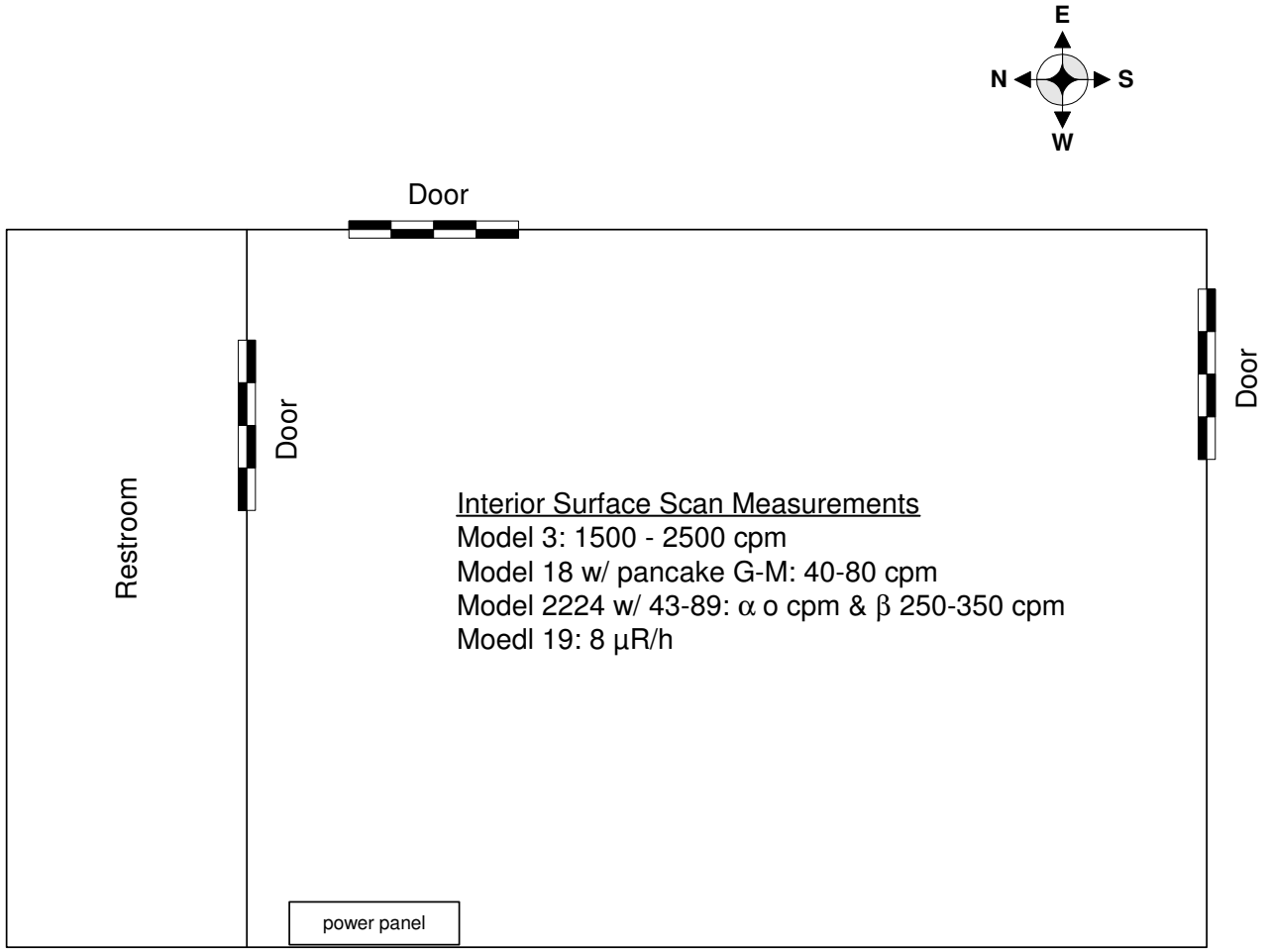
N.D. ➔ Non Detect.

Summary/Conclusion

After reviewing Boeing survey data, ORISE survey results and associated data, and the results of this survey, it is determined that there are no elevated areas of radioactive inside or outside the perimeter fence of the site, no surface contamination of the structures within the site boundary and no soil contamination down gradient of the site. A dose assessment of the site was not done as there is no net residual contamination. The site known as Building 4133 is suitable for release for unrestricted use.

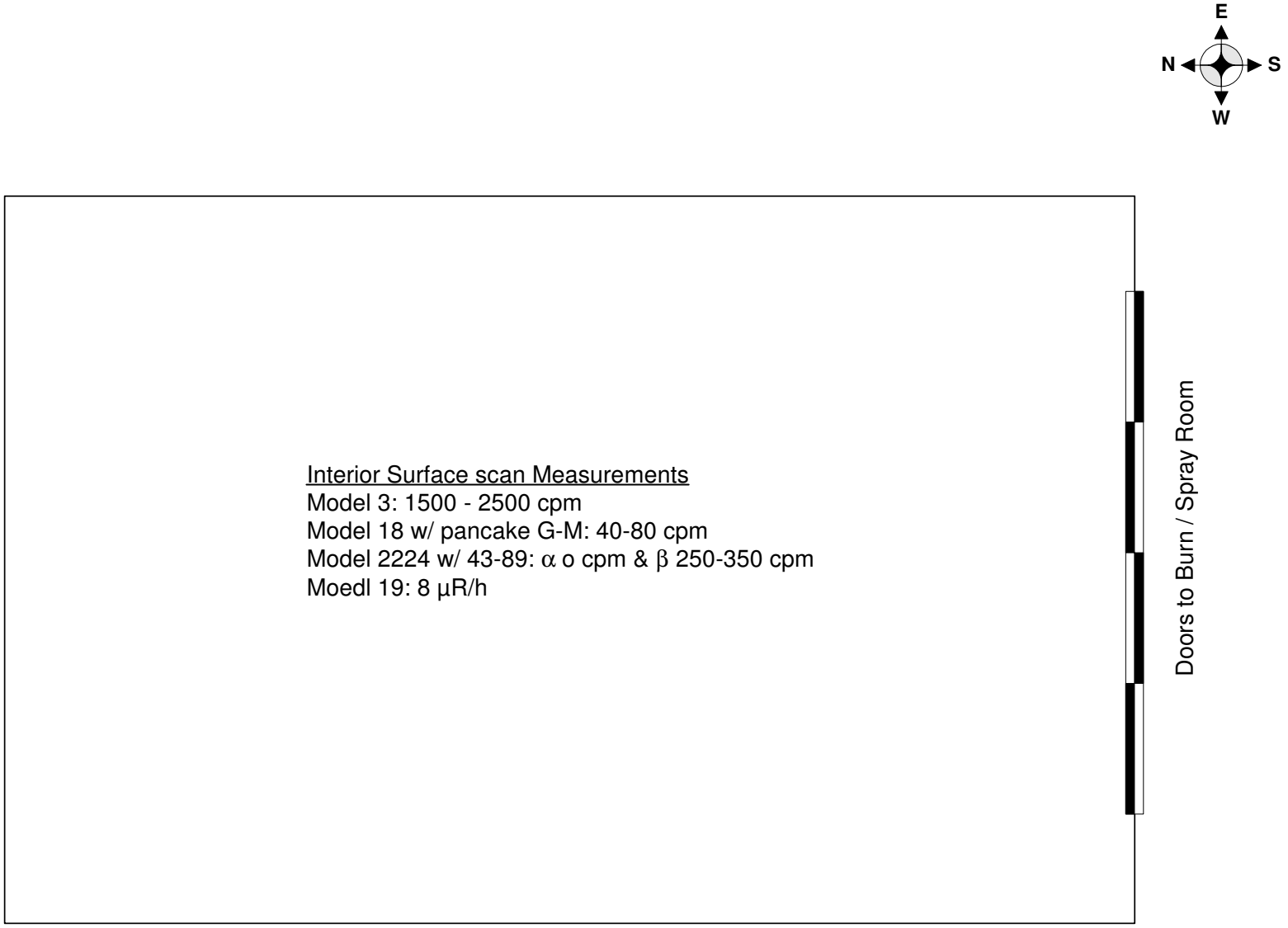

E
N
S
W
Dirt area
10 - 12 µR/h
entrance
10 - 12 µR/h
13 - 15 µR/h
10 - 12 µR/h
asphault area
13 - 15 µR/h
sump
10 - 12 µR/h
10 - 12 µR/h
13 - 15 µR/h
10 - 12 µR/h
10 - 12 µR/h
Control Room
10 - 12 µR/h
8 µR/h
Security Fence
Dirt area
10 - 12 µR/h
Parts Spray Room
10 - 12 µR/h
Crane
Dirt area
10 - 12 µR/h
concrete pad
8 µR/h
Scrubber efluent catch tank
8 µR/h
pit
NaK Tank
10 - 12 µR/h
10 - 12 µR/h
asphault area
13 - 15 µR/h
10 - 12 µR/h
10 - 12 µR/h
sump
13 - 15 µR/h
13 - 15 µR/h
13 - 15 µR/h
Dirt area
Building 4133
Exposure Rate Survey
Soil Sample Location


E
N
S
W
Dirt area
3000 - 3500 cpm
3000 - 3500 cpm
Main entrance
3000 - 3500 cpm
3000 - 3500 cpm
Asphault Area
3000 - 3500 cpm
sump
3000 - 3500 cpm
3000 - 3500 cpm
3000 - 3500 cpm
3000 - 3500 cpm
3000 - 3500 cpm
3000 - 3500 cpm
Control Room
1000 - 2500 cpm
Parts Spray Room
1000 - 2500 cpm
3000 - 3500 cpm
Crane
concrete pad
Security Fence
Dirt area
Dirt area
Scrubber efluent catch tank
2000 cpm
pit
NaK Tank
3000 - 3500 cpm
Asphault Area
3000 - 3500 cpm
3000 - 3500 cpm
3000 - 3500 cpm
3000 - 3500 cpm
sump
3000 - 4000 cpm
Dirt area
3000 - 4000 cpm
Building 4133
Gamma Scan w/ 1x1 Nal
Soil Sample location



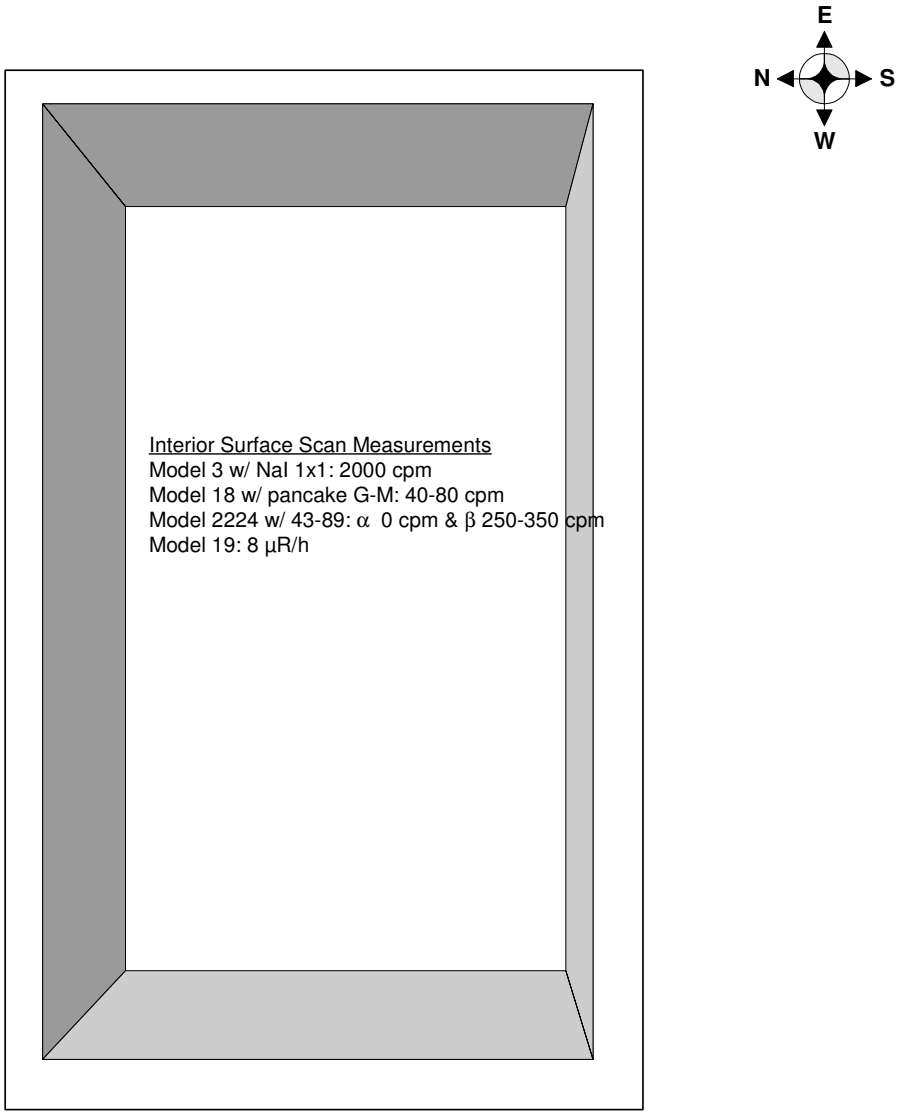
Building 4133

Control Room



Building 4133

Parts Spray Room / Burn Room



Building 4133
Scrubber Effluent Catch Tank

RADIOCHEMICAL ANALYSIS REPORT
State of California-Department of Health Services
Sanitation & Radiation Laboratory
2151 Berkeley Way
Berkeley, CA 94704

Date & Time Sampled	Serial No.
October 28, 1999 14:21	R 76140
Date Received	**Lab No.**
November 5, 1999	99-2072s

Collector's Name: Roger Lupo	Send Report To: Steve Hsu
Agency Address: Radiologic Health Branch 601 N. 7th Street Sacramento, CA. 95814	Agency Address: Radiologic Health Branch 601 N. 7th Street Sacramento, CA. 95814
Phone No.: 916-324-3731	Phone No.: 916-322-4797
Sampling Point: Boeing Rocketdyne Location of Sample(s): Bldg. 133 outside System No. (ODW):	[X] RHB ( ) [ ] ODW ( ) [ ] EMB ( ) [ ] RWQCB ( ) [ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD [ ] Other (specify):

Type of Sample

[ ] Air Filters: Meter Date/Time	[ ] Drinking Water	[ ] Sewage/Sludge	[ ] Milk
Finishing: _____ __/___	[ ] Groundwater	[ ] Sewage/Effluent	[ ] Fish/Shellfish
Starting: _____ ___/___	[ ] Surface Water	[X] Soil/Sediment	[ ] NPP Influent/Eff
Net (M^3): _____	[ ] Sea Water	[ ] Vegetation	[ ] Seaweed
[ ] Air Charcoal Cartridge	[ ] Rain/Snow	[ ] Wipes	[ ] Composites
[ ] Radon Canister	[ ] Other (Specify)		

The analyses were performed using the referenced methods. Precision criteria for these methods were determined to be acceptable.

R No./SRL No.	Sample Identification	Analysis	Results[1] ± CE[2]	MDA_{95}[3]	Units	Dry wt./Wet wt.
76140/99-2072		Gross Alpha[4]	9.70 ± 1.61	1.27	pCi/g	0.9989
		Gross Beta[4]	20.8 ± 2.8	2.7	pCi/g	

1. Results less than the Minimum Detectable Activity (MDA) are reported as not detected (N. D.).
2. CE is the counting error at the 95% confidence level as defined in Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA-600/4-80-032, August 1980.
3. MDA_{95} is the sample specific minimum detectable activity at the 95% confidence level, which is the LLD_{95} divided by 2.22, the efficiency, and the yield, and may include factors for abundance, decay, and ingrowth, dependent on the particular radionuclide. LLD_{95} is defined in section 7010C Standard Methods for the Examination of Water and Wastewater, American Water Works Association, 18th ed., 1992, where 5, is the square root of the instrument background count rate.
4. EPA Method 900.0, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA-600/4-8-032, August 1980, modified for soil.

Violeta M. Galiman — 12-10-99 — Cindy T. Wong — 12/10/99
Analyst/Radiochemist — Date — Lead Person/Supervisor — Date

RADIOCHEMICAL ANALYSIS REPORT
State of California-Department of Health Services
Sanitation & Radiation Laboratory
2151 Berkeley Way
Berkeley, CA 94704

Date & Time Sampled	Serial No.
October 28, 1999 14:21	R 76140
Date Received	**Lab No.**
November 5, 1999	99-2072

Collector's Name: Roger Lupo	Send Report To: Steve Hsu
Agency Address: Radiologic Health Branch 601 N. 7th Street Sacramento, CA. 95814	Agency Address: Radiologic Health Branch 601 N. 7th Street Sacramento, CA. 95814
Phone No.: 916-324-3731	Phone No.: 916-322-4797
Sampling Point: Boeing Rocketdyne	[X] RHB ( ) [ ] ODW ( ) [ ] EMB ( ) [ ] RWQCB ( )
Location of Sample(s): Bldg. 133 outside	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW):	[ ] Other (specify):

Type of Sample

[ ] Air Filters: Meter Date/Time	[ ] Drinking Water	[ ] Sewage/Sludge	[ ] Milk
Finishing: _____ ____/____	[ ] Groundwater	[ ] Sewage/Effuent	[ ] Fish/Shellfish
Starting: _____ ____/____	[ ] Surface Water	[X] Soil/Sediment	[ ] NPP Influent/Eff
Net (M^3): _____	[ ] Sea Water	[ ] Vegetation	[ ] Seaweed
[ ] Air Charcoal Cartridge	[ ] Rain/Snow	[ ] Wipes	[ ] Composites
[ ] Radon Canister	[ ] Other (Specify)		

The analyses were performed using the referenced methods. Precision criteria for these methods were determined to be acceptable.

R No./SRL No.	Sample Identification	Analysis	Results[1] ± CE[2]	MDA_{95}[3]	Units	Dry wt./Wet wt.
76140/99-2072		K-40[4]	23.07 ± 0.64	0.15	pCi/g	0.9989
		Cs-137[4]	0.145 ± 0.018	0.021	pCi/g.	
		U-238 (Th-234,63 keV)[4]	1.29 ± 0.99	1.22	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	0.691 ± 0.050	0.037	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	0.990 ± 0.106	0.080	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	0.944 ± 0.086	0.056	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	0.990 ± 0.106	0.080	pCi/g	
		U-235 (144 keV)[4]	N. D.	0.12	pCi/g	

---

1. Results less than the Minimum Detectable Activity (MDA) are reported as not detected (N. D.).
2. CE is the counting error at the 95% confidence level as defined in Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA-600/4-80-032, August 1980.
3. MDA_{95} is the sample specific minimum detectable activity at the 95% confidence level, which is the LLD_{95} divided by 2.22, the efficiency, and the yield, and may include factors for abundance, decay, and ingrowth, dependent on the particular radionuclide. LLD_{95} is defined in section 7010G, Standard Methods for the Examination of Water and Wastewater, American Water Works Association, 18th ed., 1992, where S_b is the square root of the instrument background count rate.
4. HASL-300, 27th Ed., Vol. 1, Rev. 2/92, Method 4.5.2.3, Environmental Measurements Laboratory, U.S. Department of Energy, New York, NY.

Violeta M. Soliman — Analyst/Radiochemist — 12-3-99 — Date

Cynthia J. Wong — Lead Person/Supervisor — 12/3/99 — Date

References

1. Boeing, received 1999, “Preliminary Draft Procedure for Building 4133”, (R21-RF) RS-00011 and miscellaneous radiation survey reports (form 732A) with maps detailing survey locations and associated Tennelec analysis results for various portions of the 4133 building site area and structures supplied by Boeing at the time of the survey.

2. Boeing, 2004, “Building 4133 Radiation Survey Report.” (RS-00015)

3. ORISE, 2000, “Verification Survey of Building 4133, Santa Susanna Field Laboratory the Boeing Company, Ventura County, California.”