Confirmatory Survey

17th Street Drainage Area

Santa Susana Field Laboratory
Boeing - Rocketdyne
Ventura County, California

Prepared By
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Radiological Assessment Unit
Radiologic Health Branch
California Department of Health Services

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Introduction:

At Boeing-Rocketdyne Propulsion and Power, Santa Susana Field Laboratory, located in Ventura County, a natural rainwater channel is located south of the intersection of "G" Street and 17th Street in Area IV. In 1962, a berm was constructed across this channel to provide a hold-up pond for rainwater runoff. In subsequent years, the area became overgrown with shrubs and trees, and filled in with silt. Characterization surveys performed in 1997 and 1998 by Boeing-Rocketdyne identified elevated levels of Cesium 137 (Cs-137) in samples collected from this area. In 1998, the area was remediated and a final status survey was preformed. The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) was requested to verify the radiological status of the 17th Street drainage area, the results of which are reported in ORISE document #00-0576. The Department of Health Services / Radiologic Health Branch (RHB) performed a confirmation survey of the 17th street drainage area, which is the subject of this report.

This confirmation survey and review of the Final Status Survey will determine whether the land designated as the 17th street drainage area south of "G" Street in Area IV has been remediated and is acceptable for unrestricted use. The isotope of concern identified from the previous surveys of the area is Cs-137. The former hold-up pond area is approximately 85 square meters and the entire impacted area is approximately 2230 square meters.

The reference documents were evaluated for appropriate survey methods, instruments usage and sampling methodology to ensure that areas previously identified as exceeding site guidelines have been remediated and that the residual soil concentrations are less than the established guidelines (Table 6).

Survey Report:

The radiation detection equipment used in the survey and listed in Table 1 was operationally checked prior to the beginning of the survey. Background measurements and a soil sample (sample #1) were collected approximately 50 yards outside the survey area. The background measurements are listed in Table 2. As the primary isotope on concern is Cs-137, a good gamma emitter the use of instruments sensitive to gamma radiation will be used. Direct measurements (one meter and on the surface) and soil samples were collected from ten (10) selected locations within the survey area.

Surface Scan for Gamma Radiation:

An initial surface scanning survey with a 1x1 Sodium Iodide (NaI) detector connected to instrument with an auditable indicator sensitive to gamma photons was performed over the entire survey area. The surface scans are performed by passing the detector slowly over the surface in a pendulum manner while progressing at the speed of a slow walk and maintaining a distance between the detector and the surface at approximately 2 centimeters as surface conditions allowed. Identification of elevated count rates (counts per minute – cpm) was based on increases in the audible signal from the indicating instrument. The gamma scan survey yielded measurements between 3000 cpm and 3500 cpm in the open areas and 4000 cpm to 4500 cpm in the confined trenched through section of the berm. The increased count rate in the trench of the berm is due to the enclosed geometry of the trench.

Exposure Rate Scan:

An exposure rate (micro Roentgen per hour - μR/h) survey of the area at one meter above the surface yielded measurements between 12.5 and 13.5μR/hr, with a background measurement of 12.5 μR/h.

Direct Measurement and Soil Samples:

Direct measurements and soil samples were taken at ten selected locations within the survey area. These measurements included: an exposure rate with a pressurized ion chamber (PIC) at one meter above the surface, an exposure rate with a μR/hr meter on the surface and at one meter above and a count rate with a NaI detector on the surface and at one meter above. The direct field measurements, at the surface and one meter above the surface are listed in Table 2. Approximately one kilogram of soil was collected from each sample location. The collected samples were placed in a plastic bag, sealed, and labeled for shipment to the Sanitation and Radiation Laboratory Branch (SRLB) in Berkeley for analysis.

The concentrations of radionuclides in the soil samples collected from the 17th Street Drainage area are provided in Tables 3 and 4. The radionuclide concentrations ranged as follows: 18.50 to 24.27 pCi/g for K-40, <0.99 to 3.56 pCi/g for U-238, 0.674 to 2.16 pCi/g for Ra-226, 1.01 to2.87 pCi/g for Th-232, 0.929 to 2.69 pCi/g for Th-228, 1.01 to 2.87 pCi/g for Ra-228 and <0.11 to 0.167 pCi/g for U-235. These concentrations are similar to background values and are below the site wide release criteria for these isotopes. The soil samples gross concentration of the isotope of concern, Cs-137 ranged from 0.132 pCi/g to 1.73 pCi/g, with a net maximum net concentration of 1.449 pCi/g for one sample, this net concentration is below the site wide release criteria of 9.2 pCi/g. These soil concentration values are comparable to the soil concentrations found during Boeing's final status survey.

The range of exposure rates as measured by the PIC at one meter above the soil surface was 11.9 to 12.9 μR/h with a maximum net exposure rate of 0.9 μR/h for the survey area.

Summary & Conclusion:

The confirmatory survey results indicate that soil concentrations for the 17th street Drainage Area satisfy applicable site specific soil guidelines. In, addition, exposure rates were comparable to background levels. The laboratory analyses of the collected soil samples indicate gross radioactivity levels for the contaminant of concern, Cs-137 is below the Site-Wide Release Criteria level as listed in Table 5. Therefore, it is recommended that the 17th Street Drainage Area as described in this report be released from radiologic controls for unrestricted use.

Reference Documents:

1. Boeing, RS-00005, "*17th Street Drainage Area, Final Status Survey Procedure*," P. Liddy, June 14, 1999.
2. Boeing, RS-00009, "*17th Street Drainage Area, Final Status Survey*," P. Liddy, October 7, 1999.
3. ORISE 00-0576, "*Verification Survey of the 17th Street Drainage Area Santa Susana Field Laboratory, The Boeing Company, Ventura County, California*," John R. Morton, April 2000.
4. Boeing, RS-00009, Rev. A, "*17th Street Drainage Area, Final Status Survey*," P. Liddy, April 15, 2000.

Table 1: Survey Instruments

Manufacture & Model	S/N	Probe/detector	S/N	Calibration due date
Ludlum Micro R model 19	80382	Internal NaI 1x1 scint.	NA	9/1/00
Ludlum model 3	158504	44 – 2 NaI 1x1 scint.	PR162272	8/20/00
Reuter-Stokes PIC	NA	High Pressure Ion Chamber	99104788	8/1/00

Table 2: Background Measurements

Instrument	50 feet from drainage area @ one meter (S-1)
Ludlum Micro R Model-19 (Exposure rate)	12.5 μR/hr
Ludlum Model 3 w/ 44 – 2 1x1 NaI (gamma rate)	3200 cpm
Reuter-Stokes PIC (Exposure rate)	12.0 μR/hr

Table 3: Field Data - Direct Measurements

Sample ID	One meter above surface			Surface measurements	
	PIC (μR/hr)	Model 19 (μR/hr)	Model 3 (cpm)	Model 19 (μR/hr)	Model 3 (cpm)
S-1	12.0	12.5	3200	14.0	3500
S-2	12.2	13.0	3200	13.5	3500
S-3	11.9	12.0	3500	13.5	3500
S-4	12.1	12.5	3200	14.0	3500
S-5	12.8	13.0	4000	15.0	3500
S-6	11.3	13.0	3500	15.0	3500
S-7	12.1	13.5	3500	16.0	3800
S-8	12.1	13.0	3200	14.5	3700
S-9	12.2	12.5	3500	15.0	3800
S-10	12.5	12.5	3500	15.0	3700
S-11	12.9	12.0	3400	15.0	3600
Data range	11.3 – 12.9	12.0 – 13.5	3200 – 4000	13.5 – 16.0	3500 - 3800

Table 4: Sanitation and Radiation Laboratory Results (Gross Alpha and Gross Beta).

Sample ID	Laboratory Analysis	Results ± CE (pCi/g) (dry wt)	Dry wt./Wet wt. Ratio	Results ± CE (pCi/g) (wet wt)*
S-1	Gross alpha Gross Beta	12.8 ± 1.8 19.9 ± 2.9	0.9943	12.7 ± 1.8 19.8 ± 2.9
S-2	Gross alpha Gross Beta	12.2 ± 1.7 17.8 ± 2.8	0.9990	12.2 ± 1.7 17.8 ± 1.7
S-3	Gross alpha Gross Beta	14.0 ± 1.8 16.4 ± 2.9	0.9890	13.8 ± 1.8 16.2 ± 2.9
S-4	Gross alpha Gross Beta	16.4 ± 2.0 16.1 ± 3.1	0.9810	16.1 ± 2.0 15.8 ± 3.0
S-5	Gross alpha Gross Beta	24.7 ± 2.3 12.9 ± 3.4	0.9794	24.2 ± 2.3 12.6 ± 3.3
S-6	Gross alpha Gross Beta	15.9 ± 1.9 17.9 ± 3.0	0.9696	15.4 ± 1.8 17.4 ± 2.9
S-7	Gross alpha Gross Beta	26.2 ± 2.7 8.66 ± 3.43	0.9938	26.0 ± 2.7 8.6 ± 3.4
S-8	Gross alpha Gross Beta	14.6 ± 1.9 19.0 ± 3.0	0.9712	14.2 ± 1.8 18.5 ± 2.9
S-9	Gross alpha Gross Beta	17.3 ± 2.0 14.1 ± 3.0	0.9773	16.9 ± 2.0 13.8 ± 2.9
S-10	Gross alpha Gross Beta	16.3 ± 2.0 15.9 ± 3.0	0.9648	15.7 ± 1.9 15.3 ± 2.9
S-11	Gross alpha Gross Beta	13.5 ± 1.8 17.9 ± 2.9	0.9843	13.3 ± 1.8 17.6 ± 2.9

CE → counting error at the 95% confidence level.
N.D.→ Not Detected
*This concentration value is calculated by multiplying the dry weight value by the ratio of the dry to wet weights. The wet weight is that weight of the soil sample prior to drying for sample processing in the laboratory. The wet weight concentration represents the actual concentration to be found in the soil samples prior to processing in the laboratory.

Table 5: Sanitation and Radiation Laboratory Results, (Gamma Spec.)

Sample Id	K-40 pCi/g	Cs-137 pCi/g	U-238 pCi/g	Radium-226 pCi/g	Th-232 pCi/g	Th-228 pCi/g	Radium-228 pCi/g	U-235 pCi/g
S-1	21.81 ± 0.70	0.281 ± 0.028	1.55 ± 1.40	0.730 ± 0.065	1.18 ± 0.12	1.05 ± 0.090	1.18 ± 0.12	N.D.(0.13)
S-2	24.27 ± 0.37	0.132 ± 0.011	1.37 ± 0.67	0.743 ± 0.032	1.15 ± 0.060	1.02 ± 0.049	1.15 ± 0.060	N.D.(0.076)
S-3	19.82 ± 0.43	0.472 ± 0.020	N.D.(0.99)	0.674 ± 0.036	1.01 ± 0.072	0.929 ± 0.056	1.01 ± 0.072	0.106 ± 0.078
S-4	20.58 ± 0.43	1.27 ± 0.029	1.50 ± 0.87	1.08 ± 0.045	1.52 ± 0.081	1.44 ± 0.070	1.52 ± 0.081	0.126 ± 0.074
S-5	18.50 ± 0.82	1.73 ± 0.063	3.00 ± 2.05	1.69 ± 0.11	2.36 ± 0.17	2.34 ± 0.15	2.36 ± .017	N.D.(0.20)
S-6	22.47 ± 0.52	0.170 ± 0.016	3.56 ± 1.31	0.869 ± 0.046	1.34 ± 0.091	1.23 ± 0.072	1.34 ± 0.091	0.136 ± 0.088
S-7	19.60 ± 0.54	0.324 ± 0.020	2.11 ± 0.64	2.16 ± 0.070	2.87 ± 0.13	2.69 ± 0.096	2.87 ± 0.13	N.D.(0.13)
S-8	20.52 ± .051	0.841 ± 0.026	2.14 ± 0.61	1.30 ± 0.060	1.62 ± 0.099	1.44 ± 0.075	1.62 ± 0.099	N.D.(0.11)
S-9	20.55 ± 0.81	0.763 ± 0.045	N.D.(1.8)	1.34 ± 0.086	1.25 ± 0.14	1.41 ± 0.12	1.25 ± 0.14	N.D.(0.16)
S-10	21.58 ± 0.42	0.465 ± 0.020	1.36 ± 0.80	1.05 ± 0.047	1.46 ± 0.076	1.32 ± 0.064	1.46 ± 0.076	0.167 ± 0.102
S-11	21.76 ± 0.40	0.220 ± 0.014	1.37 ± 0.72	0.963 ± 0.042	1.40 ± 0.071	1.24 ± 0.059	1.40 ± 0.071	N.D.(0.095)

N.D.→ Not Detected (below Minimum Detectable Activity)

Table 6: SSFL Area IV Site Wide Release Criteria*.

	K-40 pCi/g	Cs-137 pCi/g	U-238 pCi/g	Radium-226 pCi/g	Th-232 pCi/g	Th-228 pCi/g	Radium-228 pCi/g	U-235 pCi/g
Release criteria	27.6	9.2	35	5	5	5	5	30

* Concentration values are from Boeing Document N001SRR140131 "Approved Sitewide Release Criteria for Remediation of Radiological Facilities at the SSFL", dated February 18, 1999.

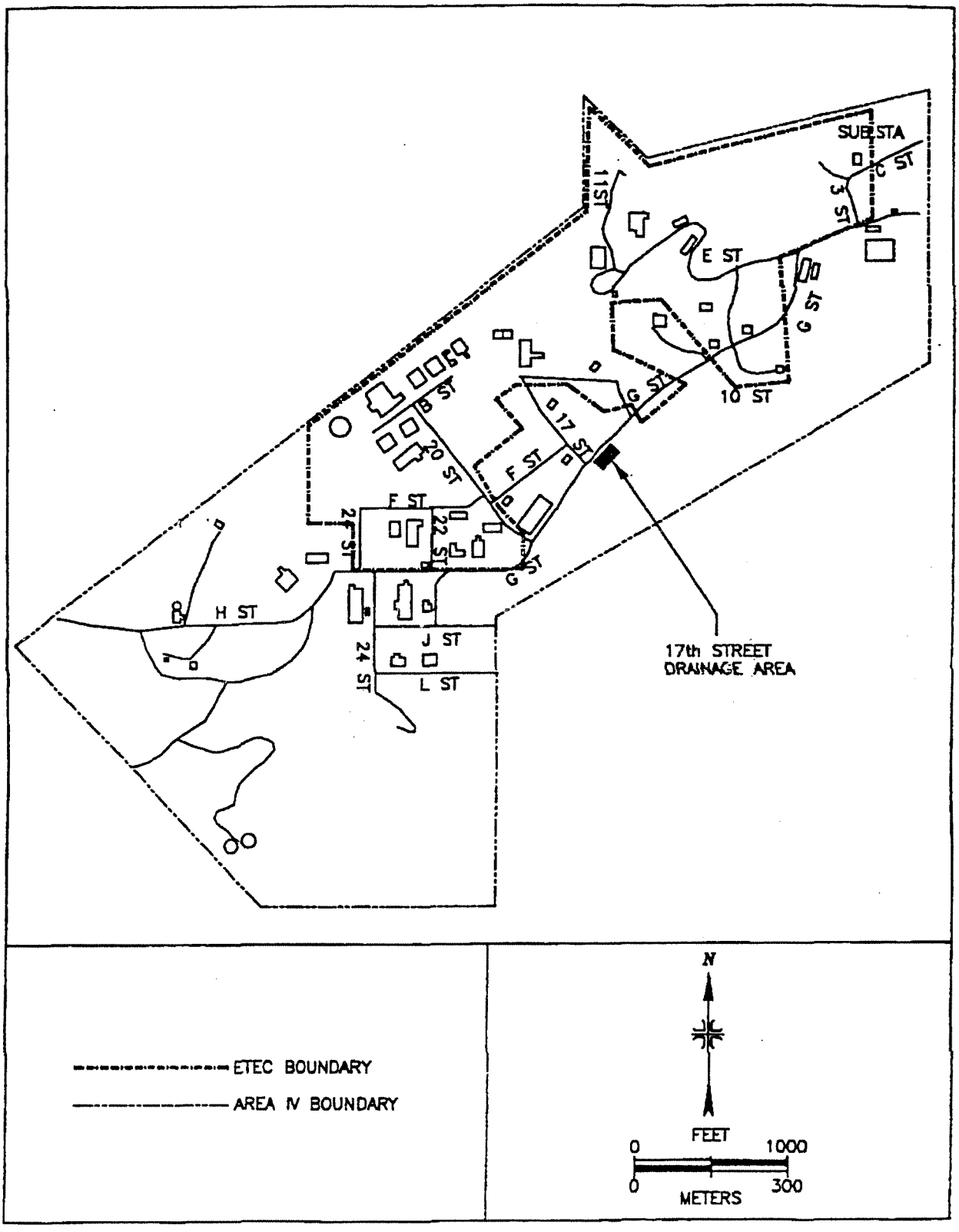
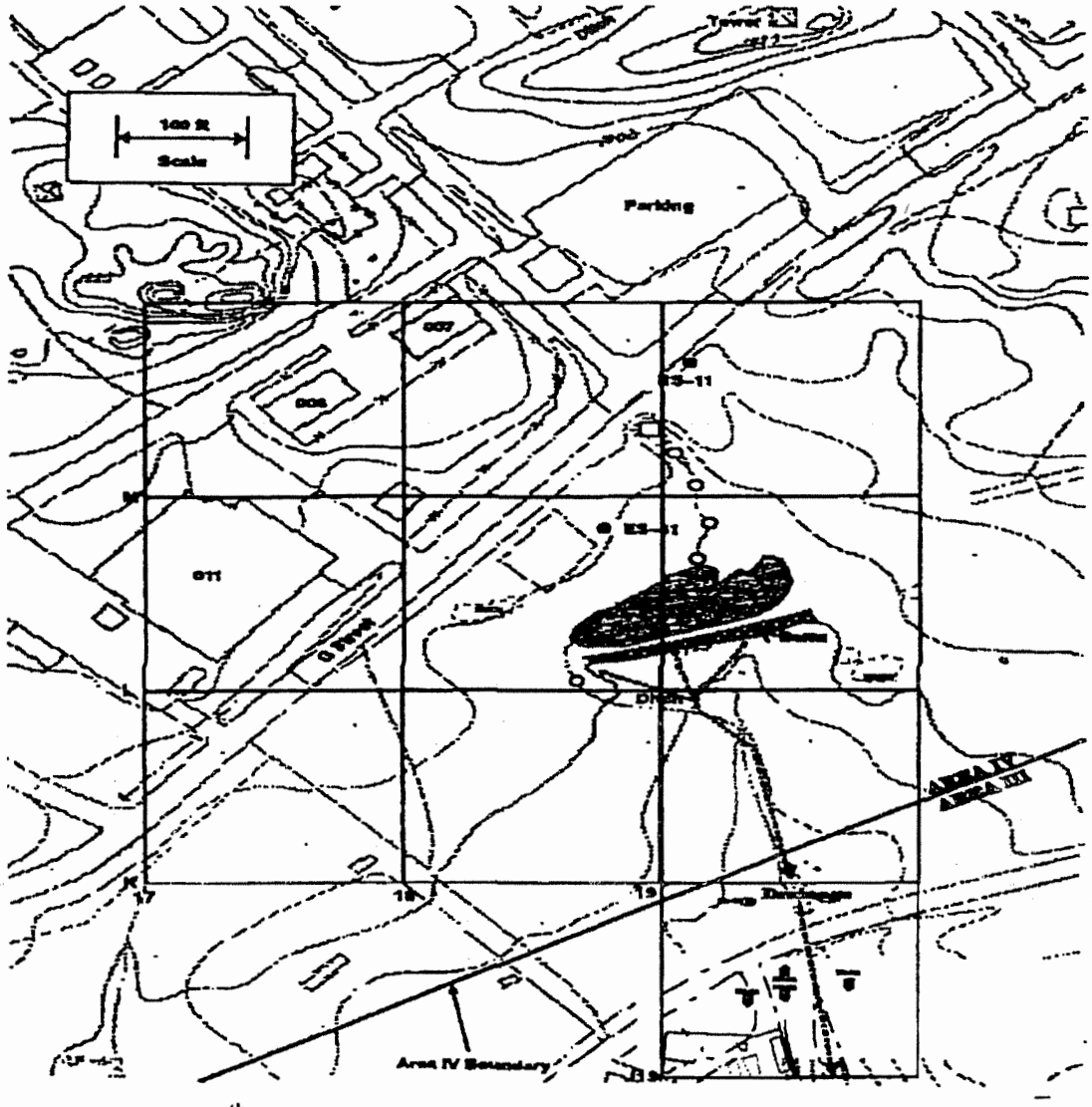


Figure 1: Santa Susana Field Laboratory Area IV, Plot Plan – Location of the 17th Street Drainage Area

Figure 2:



Topographical Map of 17th Street Drainage

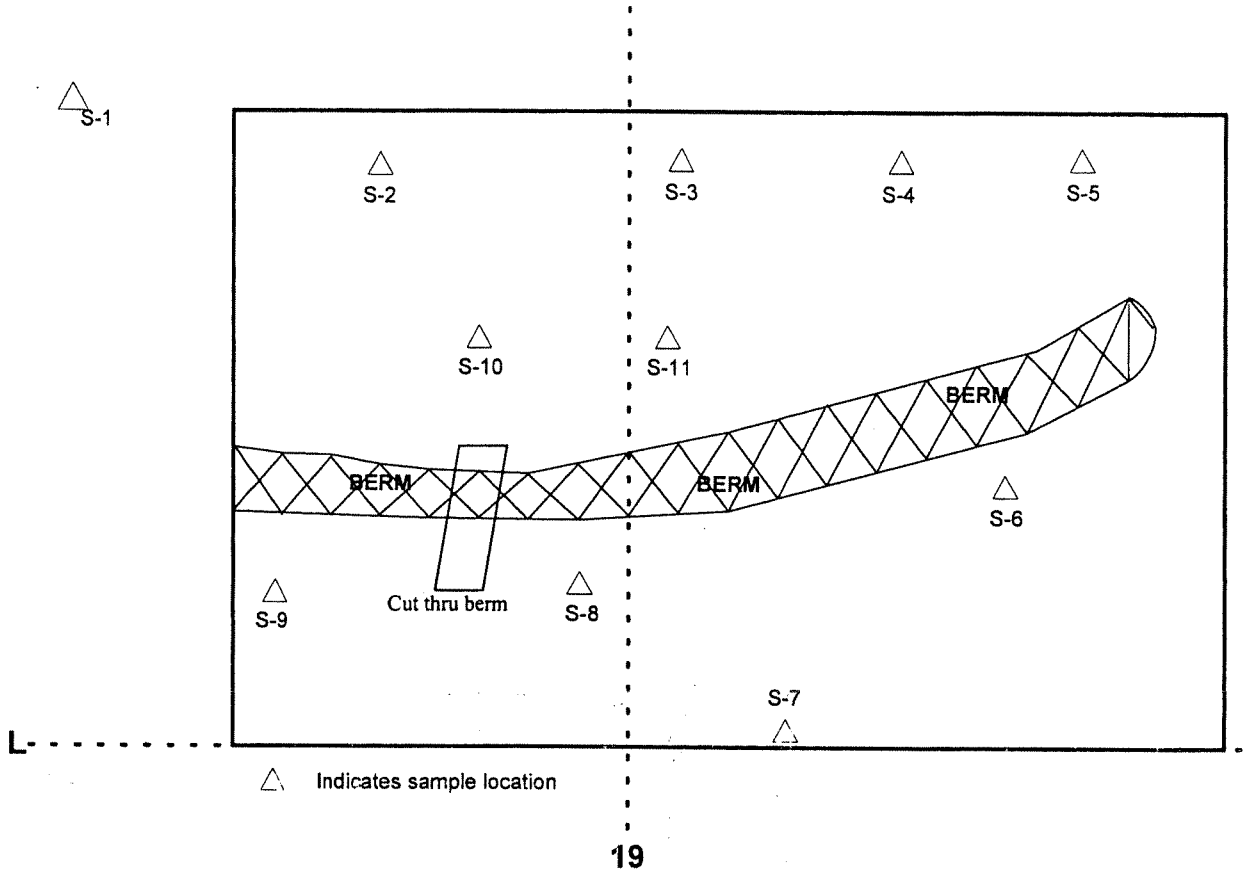


Figure 3: Survey Area of 17th Street Drainage Area Survey Sample Locations

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 27, 1999 14:06	R 76011
Date Received	**Lab No.**
November 5, 1999	99-2056s

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): Area 17 drainage System No. (ODW): Sample # S-1	[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/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.
76011/99-2056	Sample # S-1	Gross Alpha[4]	12.8 ± 1.8	1.2	pCi/g	0.9943
		Gross Beta[4]	19.9 ± 2.9	2.6	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. 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. Bolinao — Analyst/Radiochemist
12-9-99 — Date
Carolyn I. Wong — Lead Person/Supervisor
12/10/99 — 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 27, 1999 14:35	R 76012
Date Received	**Lab No.**
November 5, 1999	99-2057s

Collector's Name: Roger Lupo
Agency Address: Radiologic Health Branch, 601 N. 7th Street, Sacramento, CA. 95814
Phone No.: 916-324-3731

Send Report To: Steve Hsu
Agency Address: Radiologic Health Branch, 601 N. 7th Street, Sacramento, CA. 95814
Phone No.: 916-322-4797

Sampling Point: Boeing Rocketdyne
Location of Sample(s): Area 17 drainage
System No. (ODW): Sample # S-2

[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/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.
76012/99-2057	Sample # S-2	Gross Alpha[4]	12.2 ± 1.7	1.2	pCi/g	0.9990
		Gross Beta[4]	17.8 ± 2.8	2.6	pCi/g.	

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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. Solinan — Analyst/Radiochemist — 12-9-99 — Date
Conrad J. Wong — Lead Person/Supervisor — 12/10/99 — Date

99-2057sw.6

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 27, 1999 14:46	R 76013
Date Received	**Lab No.**
November 5, 1999	99-2058s

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): Area 17 drainage System No. (ODW): Sample # S-3	[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/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.
76013/99-2058	Sample # S-3	Gross Alpha[4]	14.0 ± 1.8	1.2	pCi/g	0.9890
		Gross Beta[4]	16.4 ± 2.9	2.6	pCi/g.	

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Violeta M. Solinap — Analyst/Radiochemist
12-9-99 — Date
Cindy Z. Wang — Lead Person/Supervisor
12/10/99 — Date

99-2058sw.6

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 27, 1999 14:56	R 76014
Date Received	**Lab No.**
November 5, 1999	99-2059s

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): Area 17 drainage System No. (ODW): Sample # S-4	[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/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.
76014/99-2059	Sample # S-4	Gross Alpha[4]	16.4 ± 2.0	1.2	pCi/g	0.9810
		Gross Beta[4]	16.1 ± 3.1	2.7	pCi/g.	

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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. 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. Soliman — Analyst/Radiochemist
12-9-99 — Date
Carolyn J. Wang — Lead Person/Supervisor
12/10/99 — Date

99-2059sw.6

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 27, 1999 15:07	R 76015
Date Received	**Lab No.**
November 5, 1999	99-2060s

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): Area 17 drainage System No. (ODW): Sample # S-5	[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/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.
76015/99-2060	Sample # S-5	Gross Alpha[4]	24.7 ± 2.3	1.1	pCi/g	0.9794
		Gross Beta[4]	12.9 ± 3.4	2.6	pCi/g.	

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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. 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. Soliman — Analyst/Radiochemist
12-9-99 — Date
Cindy J. Wang — Lead Person/Supervisor
12/10/99 — 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 27, 1999 15:26	R 76016
Date Received	**Lab No.**
November 5, 1999	99-2061s

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): Sample # S-6	[ ] 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.
76016/99-2061	Sample # S-6	Gross Alpha[4]	15.9 ± 1.9	1.2	pCi/g	0.9696
		Gross Beta[4]	17.9 ± 3.0	2.6	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. 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. Salinas — Analyst/Radiochemist
12-9-99 — Date
Cindy I. Way — Lead Person/Supervisor
12/10/99 — Date

99-2061w.6

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 27, 1999 15:33	R 76017
Date Received	**Lab No.**
November 5, 1999	99-2062s

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): Sample # S-7	[ ] 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.
76017/99-2062	Sample # S-7	Gross Alpha[4]	26.2 ± 2.4	1.2	pCi/g	0.9938
		Gross Beta[4]	8.66 ± 3.43	2.62	pCi/g	

Radiologic Health Branch
STATE DEPT. OF HEALTH SERVICES
DEC 14 1999
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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. 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. Soliman — Analyst/Radiochemist — 12-9-99 — Date
Cindy L. Wong — Lead Person/Supervisor — 12/10/99 — Date

99-2062sw.6

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 27, 1999 15:41	R 76018
Date Received	**Lab No.**
November 5, 1999	99-2063s

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): Sample # S-8	[ ] 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.
76018/99-2063	Sample # S-8	Gross Alpha[4]	14.6 ± 1.9	1.2	pCi/g	0.9712
		Gross Beta[4]	19.0 ± 3.0	2.6	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. 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. Soliman — Analyst/Radiochemist — 12-10-99 — Date

Cassidy L. Way — Lead Person/Supervisor — 12/10/99 — Date

RADIOCHEMICAL ANALYSIS REPORT State of California-Department of Health Services Sanitation & Radiation Laboratory 2151 Berkeley Way Berkeley, CA 94704	Date & Time Sampled October 27, 1999 15:54	Serial No. R 76019
	Date Received November 5, 1999	Lab No. 99-2064s

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: Location of Sample(s): System No. (ODW):	[X] RHB ( ) [ ] ODW ( ) [ ] EMB ( ) [ ] RWQCB ( ) [ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD [ ] Other (specify):

Type of Sample

[ ] Air Filters: Meter Date/Time
Finishing: _______ ____/____
Starting: _______ ____/____
Net (M³): _______
[ ] Air Charcoal Cartridge
[ ] Radon Canister

[ ] Drinking Water
[ ] Groundwater
[ ] Surface Water
[ ] Sea Water
[ ] Rain/Snow
[ ] Other (Specify)

[ ] Sewage/Sludge
[ ] Sewage/Effuent
[X] Soil/Sediment
[ ] Vegetation
[ ] Wipes

[ ] Milk
[ ] Fish/Shellfish
[ ] NPP Influent/Eff
[ ] Seaweed
[ ] Composites

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.
76019/99-2064	Sample # S-9	Gross Alpha[4]	17.3 ± 2.0	1.2	pCi/g	0.9773
		Gross Beta[4]	14.1 ± 3.0	2.6	pCi/g.	

Radiologic Health Branch
STATE DEPT. OF HEALTH SERVICES
DEC 14 1999
SACRAMENTO

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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. 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. Soliman	12-10-99	Carolyn L. Wong	12/10/99
Analyst/Radiochemist	Date	Lead Person/Supervisor	Date

99-2064sw.6

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 14:44	R 76025
Date Received	**Lab No.**
November 5, 1999	99-2070s

Collector's Name: Roger Lupo
Agency Address: Radiologic Health Branch
601 N. 7th Street
Sacramento, CA. 95814
Phone No.: 916-324-3731

Send Report To: Steve Hsu
Agency Address: Radiologic Health Branch
601 N. 7th Street
Sacramento, CA. 95814
Phone No.: 916-322-4797

Sampling Point: Boeing Rocketdyne
Location of Sample(s): Area 17 drainage
System No. (ODW): S - 10

[X] RHB ( ) [ ] ODW ( ) [ ] EMB ( ) [ ] RWQCB ( )
[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
[ ] Other (specify):

Type of Sample

[ ] Air Filters: Meter Date/Time
Finishing: _______ ____/____
Starting: _______ ____/____
Net (M^3): _______
[ ] Air Charcoal Cartridge
[ ] Radon Canister

[ ] Drinking Water
[ ] Groundwater
[ ] Surface Water
[ ] Sea Water
[ ] Rain/Snow
[ ] Other (Specify)

[ ] Sewage/Sludge
[ ] Sewage/Effuent
[X] Soil/Sediment
[ ] Vegetation
[ ] Wipes

[ ] Milk
[ ] Fish/Shellfish
[ ] NPP Influent/Eff
[ ] Seaweed
[ ] Composites

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.
76025/99-2070	S - 10	Gross Alpha[4]	16.3 ± 2.0	1.3	pCi/g	0.9648
		Gross Beta[4]	15.9 ± 3.0	2.7	pCi/g.	

Radiologic Health Branch STATE DEPT. OF HEALTH SERVICES DEC 14 1999 SACRAMENTO

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. 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. Saliman — Analyst/Radiochemist — Date: 12-10-99
[signature] — Lead Person/Supervisor — Date: 12/10/99

99-2070sw.6

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 14:49	R 76139
Date Received	**Lab No.**
November 5, 1999	99-2071s

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): S - 11	[ ] 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.
76139/99-2071	S - 11	Gross Alpha[4]	13.5 ± 1.8	1.3	pCi/g	0.9843
		Gross Beta[4]	17.9 ± 2.9	2.7	pCi/g.	

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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. 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. Soliman — Analyst/Radiochemist — 12-10-99 — Date

Conrad J. Wong — Lead Person/Supervisor — 12/10/99 — 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 27, 1999 14:06	R 76011
Date Received	**Lab No.**
November 5, 1999	99-2056

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): Sample # S-1	[ ] 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.
76011/99-2056	Sample # S-1	K-40[4]	21.81 ± 0.70	0.21	pCi/g	0.9943
		Cs-137[4]	0.281 ± 0.028	0.027	pCi/g.	
		U-238 (Th-234,63 keV)[4]	1.55 ± 1.40	1.39	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	0.730 ± 0.065	0.044	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.18 ± 0.12	0.084	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	1.05 ± 0.090	0.065	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.18 ± 0.12	0.084	pCi/g	
		U-235 (144 keV)[4]	N. D.	0.13	pCi/g	

Radiologic Health Branch
STATE DEPT. OF HEALTH SERVICES
DEC 07 1999
SACRAMENTO

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. Stimac — Analyst/Radiochemist — 12-1-99 — Date
Cindy Z. Wong — Lead Person/Supervisor — 12/3/99 — Date

99-2056w.6

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 27, 1999 14:35	R 76012
Date Received	**Lab No.**
November 5, 1999	99-2057

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): Sample # S-2	[ ] 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.
76012/99-2057	Sample # S-2	K-40[4]	24.27 ± 0.37	0.099	pCi/g	0.9990
		Cs-137[4]	0.132 ± 0.011	0.011	pCi/g.	
		U-238 (Th-234,63 keV)[4]	1.37 ± 0.67	0.63	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	0.743 ± 0.032	0.019	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.15 ± 0.060	0.036	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	1.02 ± 0.049	0.028	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.15 ± 0.060	0.036	pCi/g	
		U-235 (144 keV)[4]	N. D.	0.076	pCi/g	

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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 — 12-1-99 — Date

Cindy J. Wong — Lead Person/Supervisor — 12/3/99 — 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 27, 1999 14:46	R 76013
Date Received	**Lab No.**
November 5, 1999	99-2058

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): Area 17 drainage System No. (ODW): Sample # S-3	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD [ ] 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.
76013/99-2058	Sample # S-3	K-40[4]	19.82 ± 0.43	0.11	pCi/g	0.9890
		Cs-137[4]	0.472 ± 0.020	0.015	pCi/g.	
		U-238 (Th-234,63 keV)[4]	N. D.	0.99	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	0.674 ± 0.036	0.024	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.01 ± 0.072	0.049	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	0.929± 0.056	0.037	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.01 ± 0.072	0.049	pCi/g	
		U-235 (144 keV)[4]	0.106 ± 0.078	0.085	pCi/g	

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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	12-2-99	Carolyn Z. Wong	12/3/99
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 27, 1999 14:56	R 76014
Date Received	**Lab No.**
November 5, 1999	99-2059

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): Sample # S-4	[ ] 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.
76014/99-2059	Sample # S-4	K-40[4]	20.58 ± 0.43	0.13	pCi/g	0.9810
		Cs-137[4]	1.27 ± 0.029	0.016	pCi/g.	
		U-238 (Th-234,63 keV)[4]	1.50 ± 0.87	0.87	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	1.08 ± 0.045	0.026	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.52 ± 0.081	0.051	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	1.44 ± 0.070	0.037	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.52 ± 0.081	0.051	pCi/g	
		U-235 (144 keV)[4]	0.126 ± 0.074	0.099	pCi/g	

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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. Robinson — Analyst/Radiochemist — 12-1-99 — Date

Conrad L. Wong — Lead Person/Supervisor — 12/3/99 — 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 27, 1999 15:07	R 76015
Date Received	**Lab No.**
November 5, 1999	99-2060

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): Area 17 drainage System No. (ODW): Sample # S-5	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD [ ] 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.
76015/99-2060	Sample # S-5	K-40[4]	18.50 ± 0.82	0.27	pCi/g	0.9794
		Cs-137[4]	1.73 ± 0.063	0.037	pCi/g.	
		U-238 (Th-234,63 keV)[4]	3.00 ± 2.05	2.12	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	1.69 ± 0.11	0.062	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	2.36 ± 0.17	0.11	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	2.34 ± 0.15	0.099	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	2.36 ± 0.17	0.11	pCi/g	
		U-235 (144 keV)[4]	N. D.	0.20	pCi/g	

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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. Poliman — Analyst/Radiochemist — 12-1-99 — Date

Conrad J. Wong — Lead Person/Supervisor — 12/3/99 — 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 27, 1999 15:26	R 76016
Date Received	**Lab No.**
November 5, 1999	99-2061

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): Area 17 drainage System No. (ODW): Sample # S-6	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD [ ] 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.
76016/99-2061	Sample # S-6	K-40[4]	22.47 ± 0.52	0.13	pCi/g	0.9696
		Cs-137[4]	0.170 ± 0.016	0.017	pCi/g.	
		U-238 (Th-234,63 keV)[4]	3.56 ± 1.31	1.23	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	0.869 ± 0.046	0.030	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.34 ± 0.091	0.058	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	1.23 ± 0.072	0.045	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.34 ± 0.091	0.058	pCi/g	
		U-235 (144 keV)[4]	0.136 ± 0.088	0.105	pCi/g	

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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. Golimon — Analyst/Radiochemist — 12-1-99 — Date

Carolyn T. Wong — Lead Person/Supervisor — 12/3/99 — 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 27, 1999 15:33	R 76017
Date Received	**Lab No.**
November 5, 1999	99-2062

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): Sample # S-7	[ ] 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.
76017/99-2062	Sample # S-7	K-40[4]	19.60 ± 0.54	0.18	pCi/g	0.9938
		Cs-137[4]	0.234 ± 0.020	0.021	pCi/g.	
		U-238 (Th-234,63 keV)[4]	2.11± 0.64	0.67	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	2.16 ± 0.070	0.038	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	2.87 ± 0.13	0.066	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	2.69 ± 0.096	0.057	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	2.87 ± 0.13	0.066	pCi/g	
		U-235 (144 keV)[4]	N. D.	0.13	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. Solinan — Analyst/Radiochemist
12-3-99 — Date
Conrad T. Wong — Lead Person/Supervisor
12/3/99 — 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 27, 1999 15:41	R 76018
Date Received	**Lab No.**
November 5, 1999	99-2063

Collector's Name: Roger Lupo

Agency Address: Radiologic Health Branch
601 N. 7th Street
Sacramento, CA. 95814

Phone No.: 916-324-3731

Send Report To: Steve Hsu

Agency Address: Radiologic Health Branch
601 N. 7th Street
Sacramento, CA. 95814

Phone No.: 916-322-4797

Sampling Point: Boeing Rocketdyne
Location of Sample(s): Area 17 drainage
System No. (ODW): Sample # S-8

[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/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.
76018/99-2063	Sample # S-8	K-40[4]	20.52 ± 0.51	0.15	pCi/g	0.9712
		Cs-137[4]	0.841 ± 0.026	0.018	pCi/g.	
		U-238 (Th-234,63 keV)[4]	2.14 ± 0.61	0.53	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	1.30 ± 0.060	0.033	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.62 ± 0.099	0.063	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	1.44 ± 0.075	0.051	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.62 ± 0.099	0.063	pCi/g	
		U-235 (144 keV)[4]	N. D.	0.11	pCi/g	

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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. Golimon — Analyst/Radiochemist — 12-1-99 — Date

Cindy Z. Wong — Lead Person/Supervisor — 12/3/99 — 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 27, 1999 15:54	R 76019
Date Received	**Lab No.**
November 5, 1999	99-2064

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:	[X] RHB ( ) [ ] ODW ( ) [ ] EMB ( ) [ ] RWQCB ( )
Location of Sample(s):	[ ] 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.
76019/99-2064	Sample # S-9	K-40[4]	20.55 ± 0.81	0.25	pCi/g	0.9773
		Cs-137[4]	0.763 ± 0.045	0.035	pCi/g.	
		U-238 (Th-234,63 keV)[4]	N. D.	1.8	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	1.34 ± 0.086	0.050	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.25 ± 0.14	0.11	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	1.41 ± 0.12	0.082	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.25 ± 0.14	0.11	pCi/g	
		U-235 (144 keV)[4]	N. D.	0.16	pCi/g	

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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 — 12-2-99 — Date

Cindy J. Wong — Lead Person/Supervisor — 12/3/99 — 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 14:44	R 76025
Date Received	**Lab No.**
November 5, 1999	99-2070

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): Area 17 drainage System No. (ODW): S - 10	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD [ ] 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.
76025/99-2070	S - 10	K-40[4]	21.58 ± 0.42	0.099	pCi/g	0.9648
		Cs-137[4]	0.465 ± 0.020	0.016	pCi/g.	
		U-238 (Th-234,63 keV)[4]	1.36 ± 0.80	0.79	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	1.05± 0.047	0.025	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.46 ± 0.076	0.047	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	1.32 ± 0.064	0.038	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.46 ± 0.076	0.047	pCi/g	
		U-235 (144 keV)[4]	0.167 ± 0.102	0.108	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 — 12-1-99 — Date

Carol J. Wong — Lead Person/Supervisor — 12/3/99 — 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 14:49	R 76139
Date Received	**Lab No.**
November 5, 1999	99-2071

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): Area 17 drainage	[ ] FDB ( ) [ ] DWR ( ) [ ] CDFG ( ) [ ] County HD
System No. (ODW): S - 11	[ ] 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.
76139/99-2071	S - 11	K-40[4]	21.76 ± 0.40	0.092	pCi/g	0.9843
		Cs-137[4]	0.220 ± 0.014	0.013	pCi/g.	
		U-238 (Th-234,63 keV)[4]	1.37 ± 0.72	0.72	pCi/g.	
		Ra-226 (Bi-214,609 keV)[4]	0.963± 0.042	0.024	pCi/g.	
		Th-232 (Ac-228,911 keV)[4]	1.40 ± 0.071	0.044	pCi/g.	
		Th-228 (Tl-208,583 keV)[4]	1.24 ± 0.059	0.035	pCi/g.	
		Ra-228 (Ac-228,911 keV)[4]	1.40 ± 0.071	0.044	pCi/g	
		U-235 (144 keV)[4]	N. D.	0.095	pCi/g	

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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	12-1-99	Cindy I. Wang	12/3/99
Analyst/Radiochemist	Date	Lead Person/Supervisor	Date