



Department of Energy

Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831— 8723

February 10, 1995

Redacted - Privacy Act
9040 Frost Avenue
St. Louis, Missouri 63134

Dear Redacted - Privacy Act:

ST. LOUIS AIRPORT SITE VICINITY PROPERTIES - POST-REMEDIAL ACTION RESULTS FOR THE PROPERTY AT 9040 FROST AVENUE, ST. LOUIS, MISSOURI

This letter transmits a summary of survey results confirming that remedial action is complete on your property at 9040 Frost Avenue, St. Louis, Missouri. Final sample results for your property are not only well below DOE guidelines, they are also barely distinguishable from natural background concentrations.

Included in this letter are figures showing the approximate sample and direct reading survey locations, tables reporting the radiation instrument survey results, and the analytical results from the samples collected.

As always, if you have any questions or concerns, please call me at (615) 576-9634. Given that much of the information enclosed is fairly technical, I would be happy to arrange for someone to discuss it with you in person once you have reviewed it, if you wish. The final Post Remedial Action Report is anticipated to be completed by the end of 1995. The Oak Ridge Institute of Science and Education, the Independent Verification Contractor will also publish their own report in late 1995.

I would once again like to thank you, on behalf of all the FUSRAP staff, for your patience and cooperation during the process of completing the clean-up of your property.

Sincerely,

A handwritten signature in black ink, appearing to read "David G. Adler", is written over the word "Sincerely,".

David G. Adler, Site Manager
Former Sites Restoration Division

Enclosures

POST-REMEDIAL ACTION SAMPLING AND SURVEY RESULTS
9040 Frost Avenue, St. Louis, MO

To document the completeness of the decontamination of your property the following surveying and sampling activities were performed:

1. Background Samples and Surveys

Before collection of any post-remedial action data, samples and direct instrument readings were obtained from three remote background locations in the general vicinity of your property. Background data serves as a frame of reference for evaluating the data from your property because it presents typical conditions for the areas unaffected by the transportation of material from the St. Louis Airport Site. Samples from these areas were analyzed for radium-226, thorium-230, thorium-232, uranium-234, uranium-235 and uranium-238. External gamma radiation exposure rates were also measured. This data is presented in Table 1 and the background locations are shown in Figure 1.

2. Soil Sampling

To confirm that all contamination was removed from your property, samples of the soil remaining after excavation were collected and analyzed for radium-226, thorium-230, thorium-232, uranium-234, uranium-235 and uranium-238. The concentrations of each contaminant in these samples shown in Table 1 were barely distinguishable from background concentrations.

To collect the post-remedial action samples, one-hundred-square-meter grids were established along the curb of your property. Since the formerly contaminated area was limited to the area immediately adjacent to the road, 6 meter by 16 meter (19.7 ft x 52.5 ft) grids were established along the roadway to collect post-remedial action samples and measurements. Within each grid 30 locations were sampled from the surface down to six inches below the surface, and composited into one sample representing the average for the first six inches of the grid. Figure 2 shows the location of the grids on your property.

The DOE guidelines for residual concentrations of radium-226, thorium-232, and thorium-230 in soil at FUSRAP sites are 5 pCi/g above background when averaged over the first 15 cm (6 in.) of soil below the surface, and 15 pCi/g above background when averaged over any 15 cm (6 in.) thick soil layer below the surface layer. These guidelines do not include naturally occurring background radioactivity in soils near the site. The site-specific guideline for the remediation of uranium-238 is 50 pCi/g. Site-specific guidelines are developed based on the reasonable exposure pathways that can be hypothesized for the site to ensure that the annual radiation dose (excluding radon) received by an individual member of the general public is less than 100 millirem per year (the unit used to measure radiation dose to man). All sample results from your property were well below the release criteria.

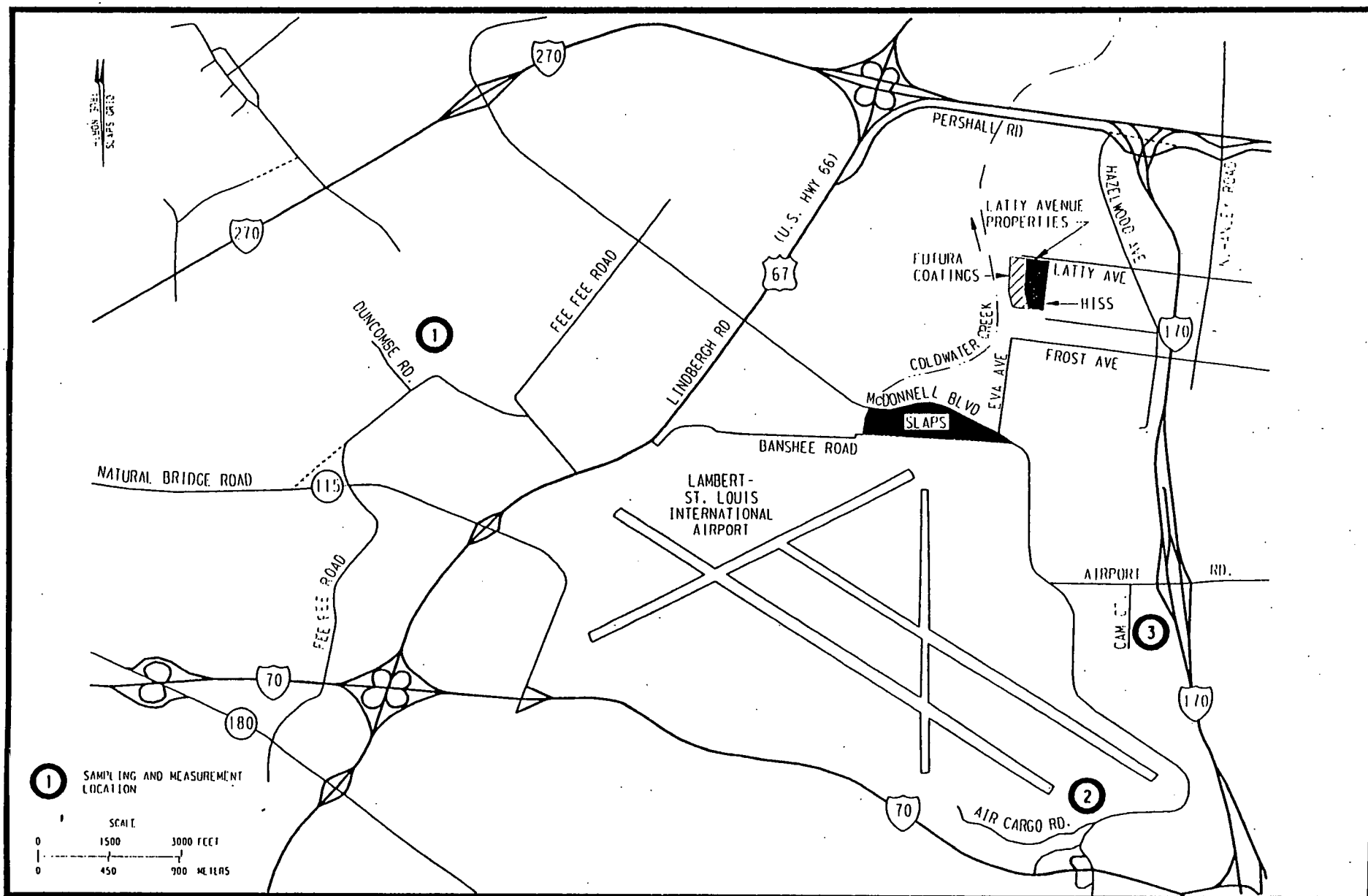
Note: A picocurie (pCi) is a unit of measure for radioactivity, just as an ounce is a unit to measure weight. A measurement of 1 pCi equals 2.2 disintegrations per minute (dpm), which means that one radioactive particle is released on the average every 27 seconds. Therefore, picocuries per gram is a measure of radioactivity per gram of soil.

The sum of ratios is when the concentration of the individual radionuclides, less natural background, are compared to the guideline for each radionuclide. The summation of each fractional contribution for these radionuclides must not exceed one, per DOE Order 5400.5. An example of how compliance with this DOE Order is determined is given on Table 1. All sample results from your property passed the sum of ratios guideline.

3. External Gamma Radiation Exposure Survey

The results of the external gamma radiation exposure surveys conducted on your property following the completion of the remediation are found in Table 2. The external gamma exposure rate one meter above the surface of the ground was measured in the center of each survey grid block. Readings taken at this height provide an estimate of the potential exposure from gamma radiation to the critical body organs.

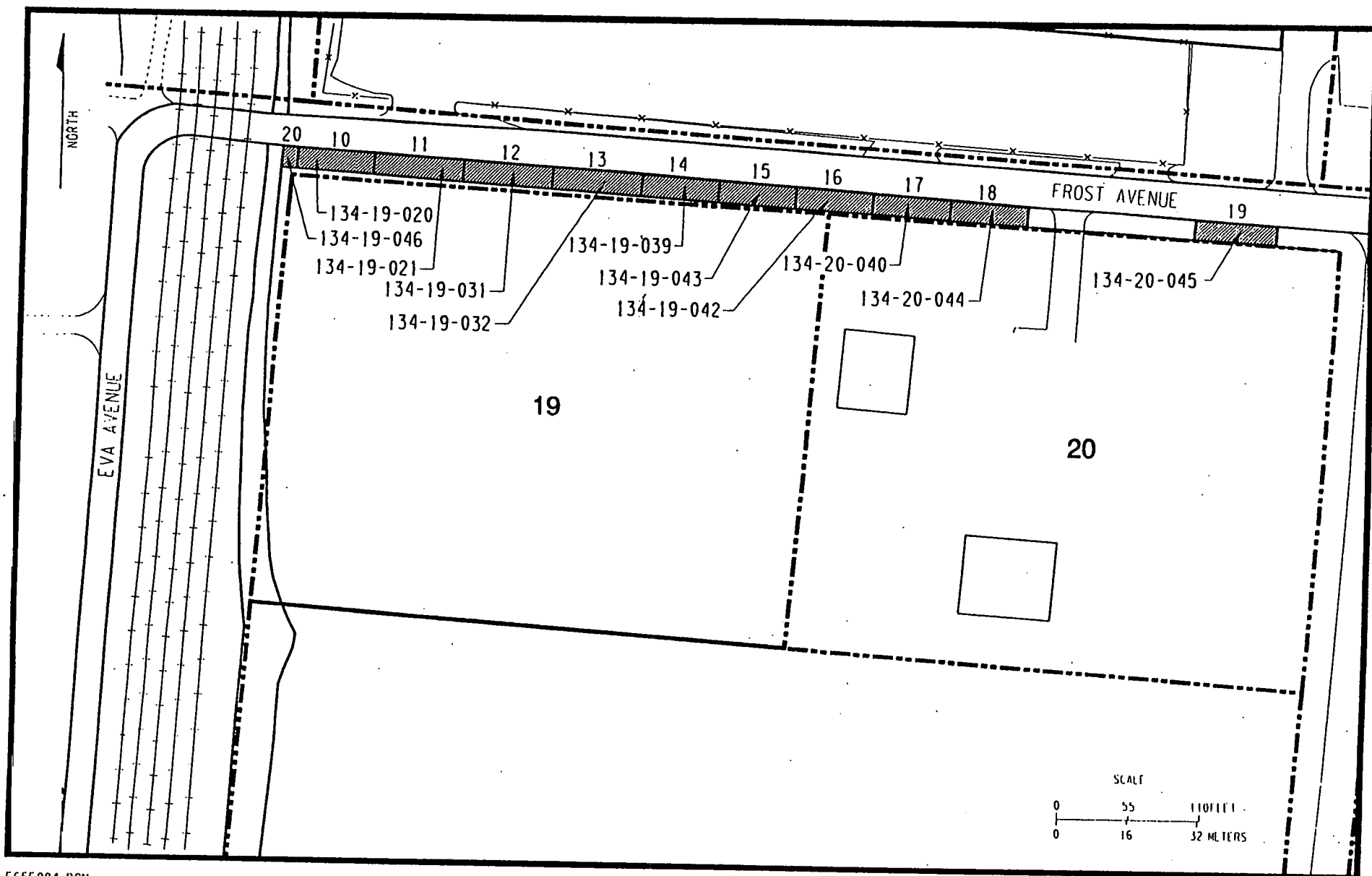
Readings were recorded using a pressurized ionization chamber. Exposure rates measured on your property ranged from 7.2 to 9.3 microroentgens per hour ($\mu\text{R/hr}$) and were comparable to the average background reading of 9.4 $\mu\text{R/hr}$. A microroentgen (μR) is a unit for measuring exposure that applies to gamma radiation. As shown in Table 2, the exposure rates are all well below the DOE limit which is 11.4 $\mu\text{R/hr}$ (which over 24 hr/day, 365 days/year equals 100 mrem/year) above background readings.



12657 0117, DGN

Figure 1
Background Sampling Locations
in the St. Louis Area

104921



F65F004.DGN

Figure 2
St. Louis Airport Site Vicinity Properties
Post-Remedial Action Sample Locations

SLAPS VP'S POST-RA SOIL SAMPLE RESULTS

GRID #	Sample ID	U-234 (pCi/g)		U-235 (pCi/g)		U-238 (pCi/g)		Ra-226 (pCi/g)		Th-230 (pCi/g)		Th-232 (pCi/g)		Sum of Ratios(b)	Pass/Fail
		result	error	result	error	result	error	result	error	result	error	result	error		
10	134-19-020	1.00	0.34	<0.04(a)	0.05	0.91	0.32	1.10	0.43	2.30	0.77	0.91	0.42	0.06667	pass
11	134-19-021	1.10	0.37	<0.07	0.03	1.10	0.35	0.72	0.33	3.30	1.00	0.68	0.36	0.13333	pass
12	134-19-031	0.82	0.33	<0.09	0.06	0.92	0.36	0.75	0.32	1.60	0.59	0.61	0.33	0.02	pass
13	134-19-032	1.40	0.43	<0.09	0.08	1.20	0.38	1.60	0.58	1.60	0.61	1.20	0.51	0.062	pass
14	134-19-039	0.77	0.30	<0.09	0.04	0.95	0.36	1.20	0.40	2.60	0.78	0.82	0.37	0.08667	pass
15	134-19-043	0.65	0.27	<0.08	0.06	0.77	0.31	1.50	0.50	3.30	0.92	1.00	0.41	0.13333	pass
16	134-19-042	0.92	0.38	<0.12	0.05	1.10	0.44	0.90	0.40	2.90	0.80	1.10	0.41	0.11333	pass
17	134-20-040	1.00	0.38	0.08	0.08	1.40	0.49	1.10	0.40	2.50	0.76	1.00	0.42	0.086	pass
18	134-20-044	0.75	0.29	0.10	0.09	0.96	0.35	0.80	0.30	3.20	0.95	1.10	0.45	0.13333	pass
19	134-20-045	1.00	0.39	0.10	0.10	0.89	0.35	0.60	0.30	4.10	1.10	1.50	0.53	0.22	pass
20	134-19-046	1.10	0.35	<0.04	0.04	0.85	0.29	0.80	0.30	3.90	1.00	0.81	0.34	0.17333	pass
	avg. background	1.1		0.1		1.1		0.9		1.3		1.0			

(a) The "less than" (<) notation indicates that the radioactive contamination was below the detection limit of the analytical technique and/or the detection instrument. Therefore, the actual concentration of radioactivity in a sample is less than the reported value preceded by the "less than" symbol

(b) The sum of ratios is when the concentration of the individual radionuclides, less natural background, are compared to the guideline for each radionuclide. The summation of each fractional contribution for these radionuclides must not exceed one, per DOE Order 5400.5. The following is an example of how compliance with the DOE Order is determined for sample 134-19-032.

(U-238)		(Ra-226)		(Th-230)		(Th-232)		(Ra-228)
$\frac{1.20-1.1}{50}$	+greater of :	$\frac{1.60-0.9}{15}$	or	$\frac{1.60-1.3}{15}$	+ greater of :	$\frac{1.20-1.0}{15}$	or	$\frac{0-0}{15}$
0.002	+	(0.047	or	0.02)	+	(0.013	or	0) =0.062

TABLE 2

Post-Remedial Action
External Gamma Radiation Exposure Rates

background = 9.4 uR/h

DOE limit = 11.4 uR/h above background

Location	Survey Number	Exposure Rate (uR/h)
Grid # 10	134PIC05	7.5
Grid # 11	134PIC05	7.2
Grid # 12	134PIC05	7.2
Grid # 13	134PIC05	8.6
Grid # 14	134PIC05	8.4
Grid # 15	134PIC05	8.4
Grid # 16	134PIC05	8.4
Grid # 17	134PIC04	9.3
Grid # 18	134PIC05	8.4
Grid # 19	134PIC05	8.3
Grid # 20	134PIC05	7.7