

Department of Energy

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

February 10, 1995

Redacted - Privacy Act

8834 Heather Lane
Hazelwood, Missouri 63042

Dear Redacted - Privacy Act :

**ST. LOUIS AIRPORT SITE VICINITY PROPERTIES - RESPONSE TO LETTER OF
DECEMBER 15, 1994 AND TRANSMITTAL OF POST-REMEDIAL ACTION RESULTS FOR 8834
HEATHER LANE, HAZELWOOD, MO**

Thank you for your recent letter. You raise an issue that has been the source of some unfortunate misunderstandings--the actual, versus apparent, boundaries of contamination. I hope this letter will explain things to your satisfaction.

The original sampling done on your property (and the other properties along the roads in the vicinity) in the late 1980s was, by design, a "broad brush" attempt to paint the boundaries of contamination. Instead of meticulously placing each sampling location based on property boundaries, the topography of each property, and other such factors (a costly labor-intensive effort), we elected to use a more generic approach of consistently spaced samples. We took a set of samples at the edge of the road, spaced 50 feet apart. We took another set of samples every 50 feet in a line set back 50 feet from the samples along the edge of the road. The last set of samples were spaced at 100 feet apart and were in a line 150 feet from the road. This provided enough detail (at a more reasonable cost) to allow us to proceed to the next step of planning and designing the cleanup.

What the sampling results showed was that in most cases where contamination was found at the edge of the road, it was not found in the sample 50 feet back from the road. In that 50-foot wide strip along the road, there are no buildings so we then knew we would not have to dig around or under anyone's house or place of business when the contamination was confined to the first 50 feet from the road.

When we reported the results of the sampling to each property owner, as well as to the regulators, local officials, and others, we acknowledged the conservatism that was produced by this approach, knowing that before the contamination was cleaned up we would take additional samples to bound contamination more accurately. In the interim, our recommendation was to assume the entire 50-foot wide strip was contaminated, which generally extended beyond the road rights-of-way and onto the adjacent private properties, like yours. This recommendation was intended to limit disturbance of the contaminated soil.

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The results of the sampling done along your property at 5-foot intervals in preparation for the clean up showed that contamination ended within about 20 feet from the road, within the right-of-way. This meant that contamination did not extend onto your property. I regret any distress this caused you, but please understand that the approach we took in conservatively stating the boundaries of contamination was designed to keep opportunities for exposure to the contamination to an absolute minimum.

I am very pleased to inform you that the right-of-way adjacent to your property has been cleaned up so that it and your property can be used without any further restrictions. Enclosed is a summary of sampling and surveying results confirming the remedial action is complete on your property at 8834 Heather Ln, Hazelwood, MO. The post-remedial action sample results for your property are not only well below DOE guidelines, they are also barely distinguishable from the background concentrations. These results indicate that the conditions on your property do not differ from conditions in the vicinity that were not influenced by transportation of radioactive residues from St. Louis Airport Site to the Latty Avenue site.

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. Based on these results, it was concluded that there is no remaining radioactive contaminants on your property that would require further investigation or remediation.

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 its own report in late 1995.

Once again I thank you, on behalf of all the FUSRAP staff, for your patience and cooperation during the process of completing the cleanup of your property.

Sincerely,



David G. Adler, Site Manager
Former Sites Restoration Division

Enclosure

10407
POST-REMEDIAL ACTION SAMPLING AND SURVEY RESULTS
8834 Heather Lane, Hazelwood, 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 was barely indistinguishable 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 10.1 to 10.4 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.

4. Post-RA Survey of Direct Surface Contamination and Transferable Contamination

The results for post-remedial action surveys of direct and transferable contamination are presented in Table 3 and are well below applicable DOE guidelines. Post-remedial action surveys were conducted on all the culverts and retaining walls between your property and 8841 Heather Lane, Hazelwood, MO.

Direct surface contamination is the total amount of radioactive contamination on a surface; therefore, a survey of direct surface contamination will quantify both that portion of the contamination that is removable and that which is permanently fixed. Transferable contamination is the removable component of the total contamination on the surface and is that contamination that could migrate or conceivably be picked up on clothing or skin upon contact.

To quantify direct surface contamination, radiation detection instrumentation is placed directly on the surface to measure the radioactivity emitted from a known surface area. Direct alpha radiation is measured with an alpha scintillation detector connected to a rate meter, an instrument that counts the number of radioactive disintegrations (decays) detected in a specified amount of time. Direct beta/gamma radiation measurements are obtained with a Geiger-Meüller probe attached to a rate meter. The probe is placed on the surface to be surveyed, and pulses are allowed to accumulate for one minute on the rate meter, resulting in a measurement of counts per minute (cpm) for the surface area. These measurements are then converted, with appropriate calibration and conversion factors, to disintegrations per minute per 100 cm² area surveyed (dpm/100 cm²), a commonly used unit of measurement in health physics.

Transferable contamination is the radioactive material that can be readily removed from a surface when it is "swiped" or "smeared" with a soft absorbent paper. The smear is taken from a 100 cm² area and is placed in a portable smear counter, and alpha and beta/gamma radiation are each counted for one minute. The resulting measurements in counts per minute are then converted to dpm/100 cm².

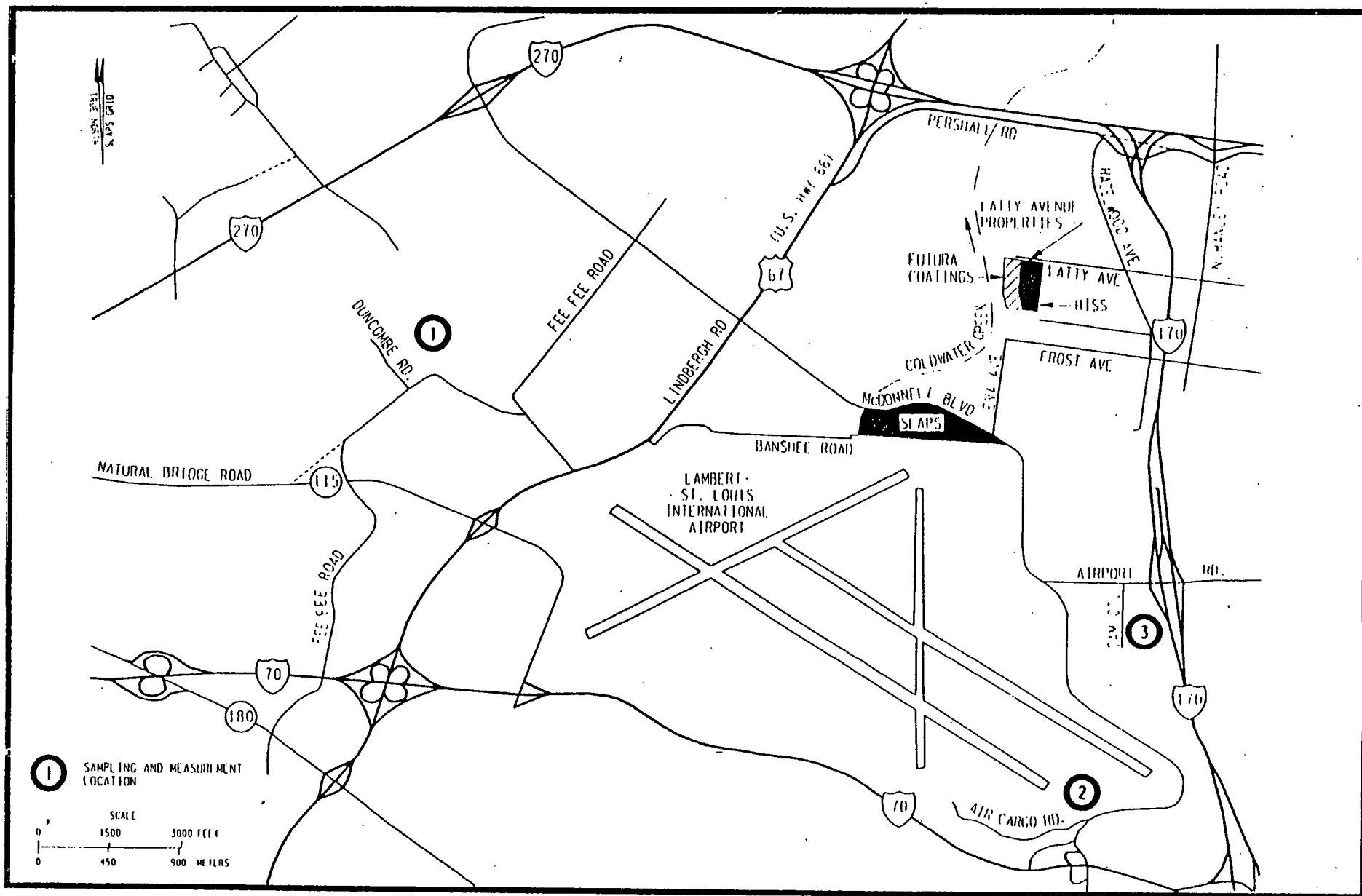
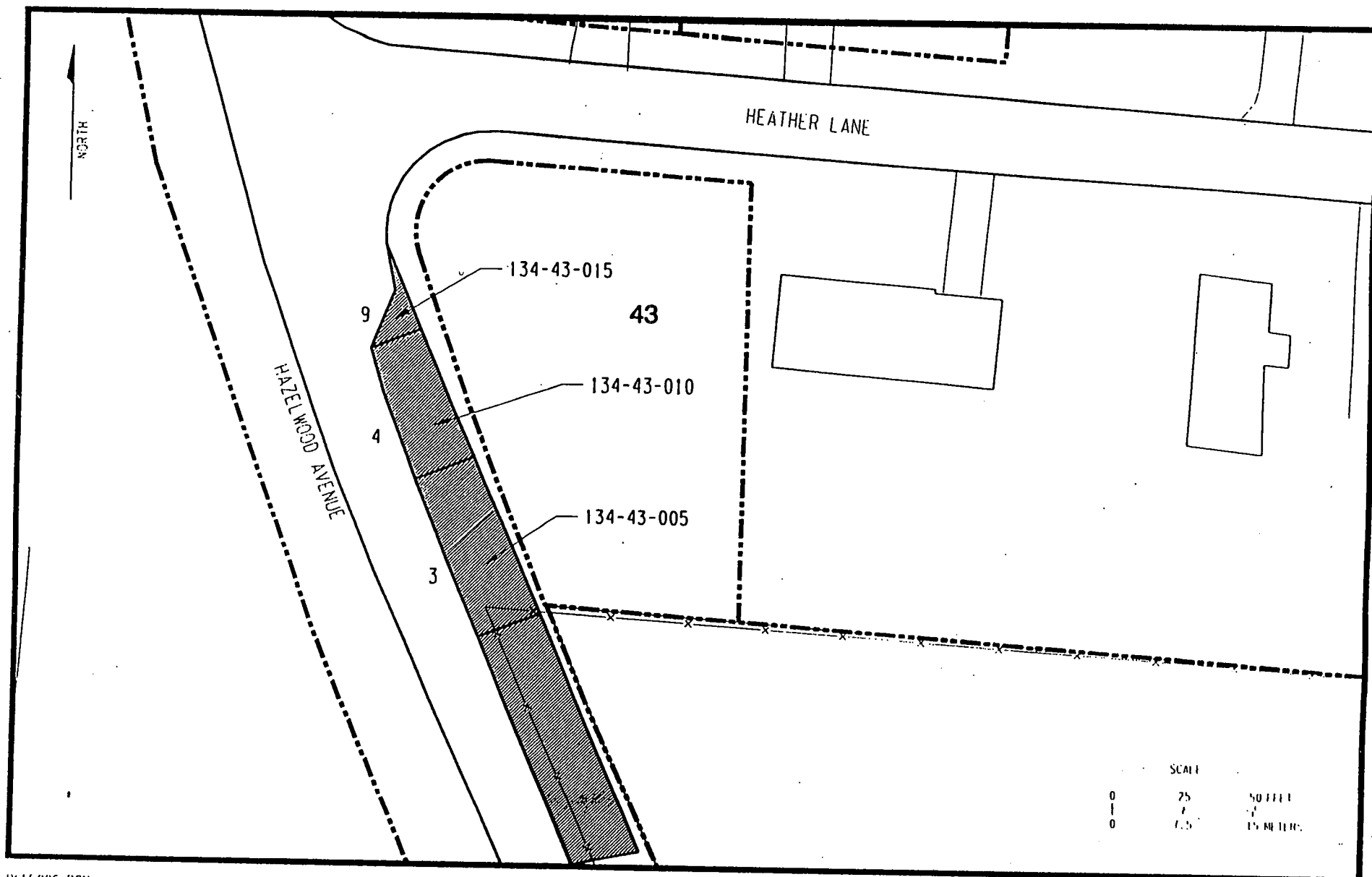


Figure 1
Background Sampling Locations
in the St. Louis Area



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

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TABLE 1

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		
3	134-41-005	1.50	0.58	0.12	0.12	1.50	0.57	1.79	0.61	3.65	1.31	1.04	0.56	0.167333	pass
4	134-43-010	2.10	0.58	0.12	0.09	8.80	2.00	1.80	0.55	2.60	0.90	1.30	0.56	0.260667	pass
9	134-43-015	1.40	0.44	<0.07(a)	0.06	1.10	0.36	1.80	0.63	2.20	0.71	0.96	0.42	0.06	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 the concentration of the individual radionuclides, less natural background, compared to the guideline. 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 134-41-005.

(U-238)		(Ra-226)		(Th-230)		(Th-232)		(Ra-228)	
$\frac{1.50-1.1}{50}$	+ greater of :	$\frac{1.79-0.9}{15}$	or	$\frac{3.65-1.3}{15}$	+ greater of :	$\frac{1.04-1.0}{15}$	or	$\frac{0-0}{15}$	
0.008	+	(0.059	or	0.157)	+	(0.0027	or	0)	= 0.167

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 # 3	134PIC02	10.4
Grid # 4	134PIC02	10.4
Grid # 9	134PIC03	10.1

TABLE 3**Summary of Post-Remedial Action Radiological Survey Results**

Location	<u>Direct Surface Contamination</u>		<u>Transferable Contamination</u>	
	Alpha Sample Activity Range (dpm/ 100cm ²)	Beta/Gamma Sample Activity Range (dpm/ 100cm ²)	Alpha Sample Activity Range (dpm/ 100cm ²)	Beta/Gamma Sample Activity Range (dpm/ 100cm ²)
South Wall Culvert				
1) Culvert Bottom 1'	<BKG	852	0	8
2) Culvert Bottom 2'	<BKG	594	0	0
3) West Wall Grid	<BKG - 26	282 - 328	0	0 - 24
4) East Wall Grid	<BKG - 35	268 - 340	0 - 3	0
DOE Guideline	100	5000	20	1000

< BKG - This notation means that the reading was less than average background. When the reading was converted and the background subtracted, the result was less than zero.

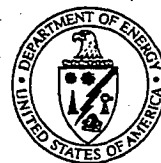
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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the St. Louis Site, Missouri



U.S. Department of Energy

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