RUST CLEMSON TECHNICAL CENTER

DOE FUSRAP - ST. LOUIS SITE
TREATABILITY STUDY

INTERIM CHARACTERIZATION REPORT

Prepared by

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1.0 INTRODUCTION / PURPOSE

Rust Federal Services/Clemson Technical Center (CTC) was contracted by DOE, through SAIC, to investigate the remediation of the FUSRAP St. Louis site soils via soil washing/chemical extraction of the radioactive contaminants. The first phase of this work consisted of characterization of the soils with respect to screening and size classification of the whole soil followed by a determination of the distribution of the radionuclide contaminants with respect to the various size fractions. In addition, the relative extractability of the contaminants, either by attrition scrubbing or using selected chemical extractants, has been examined. This interim report provides the data from this initial phase of testing, as well as conclusions and recommendations for continuation of the study.

Soil washing is a technology developed to support environmental restoration, bringing to bear chemical and engineering sciences on the decontamination of contaminated sites. Soil washing technology may combine both physical and chemical processes to produce significant volume reduction of contaminated soils. While success has been demonstrated for removal of organic and, to a lesser extent, non-radioactive metal contaminants, a review of available publications on practical applications to radioactive sites indicates that most volume reduction has been the result of unique circumstances such as screening or flotation of non-soil materials containing most of the contaminants, or selective leaching of contaminants (uranium or TRU) that exist as anionic[1] complexes which are not bound by the soil cation-exchange capacity. In either case, the potential for success of soil washing technology is extremely site and contaminant specific.

In conducting the characterization of the St. Louis site soils, we have followed the

[1] Johnson, N. R., *et al* "Remediation of Transuranic-Contaminated Coral Soil at Johnson Atoll Using the Segmented Gate System," *Proceedings of Soil Decon '93: Technology Targeting Radionuclides and Heavy Metals* June, 1993, Gatlinburg, TN.

EPAs "Characterization Protocol for Radioactive Contaminated Soils."[2] Accordingly, these characterization protocols are intended to demonstrate the suitability (or lack thereof) of radioactive contaminated soils for either physical separation (gravity, magnetic, *etc.*) or chemical extraction processes. The characterization testing recommended[2] is in support of one or more of the following general categories of treatment technologies:

* Particle separation (gravity or magnetic);
* Particle liberation (attrition scrubbing); and
* Chemical extraction (selective dissolution of contaminants).

2.0 SCOPE OF WORK

The Scope of Work (SOW) for the characterization of the St. Louis site soils included a number of discrete steps. The first step consisted of obtaining soil samples that would represent a wide range of conditions that could be encountered at the site. This sampling effort, conducted by SAIC, resulted in samples from 28 separate locations being sent to the CTC for analysis and testing. Each of these samples was subjected to particle size and radiochemical analysis to determine how the radionuclides were distributed within the soil matrix. The 28 discrete samples were blended into 7 composite materials, based on their site location and expected level of activity. The composites were analyzed again for radioactivity and particle size distribution, although to a lesser degree than the initial analysis of the raw samples. Two of the composite materials were subjected to a series of physical/chemical treatments to allow an assessment of the relative extractability of the radionuclides to be made. Further details on the analyses and testing are provided in the following sections.

2.1 Site Sampling / Cleanup Criteria

A total of 28 discrete soil samples were taken from various areas at the FUSRAP St. Louis site. These samples were chosen by SAIC to provide a representative distribution of contaminant concentrations and soil characteristics for the majority of the properties in the St. Louis site FUSRAP program. Three generic treatability groups were defined, with the primary basis being the large estimated volumes of

[2] "Characterization Protocol for Radioactive Contaminated Soils," *Publication 9380.1-10FS* May 1992, U.S.E.P.A. Office of Solid Waste and Emergency Response

contaminated soil in these locations:

Treatability Group	Symbol(s)	Est. Volume
St. Louis Airport Site (SLAPS)	SL	279,000 yd^3
HISS/Latty VPs	HS/LV	175,000 yd^3
Ball Fields/Haul Roads/SLAPS Ditches	BF/HR/SD	138,000 yd^3

The three treatability groups were further subdivided according to the level of radioactivity. A "Total Activity Ratio (TAR)" is used to quantify the activity level, and is calculated as:

$$TAR = ([^{226}Ra + {}^{230}Th]/5\ pCi/g) + ([^{238}U]/50\ pCi/g); \textbf{ or}$$
$$= [^{232}Th]/5\ pCi/g; \text{ whichever is greater.}$$

The cleanup activity goals for the St. Louis FUSRAP site are used as the reference value for the TAR, with a designated value of 1.0. The cleanup criteria/goals for the St. Louis FUSRAP site are as follows:

Thorium-230:	< 5 pCi/g (surface) and < 15 pCi/g (subsurface)
Radium-226:	< 5 pCi/g (surface) and < 15 pCi/g (subsurface)
Uranium:	< 50 pCi/g for ^{238}U and < 100 pCi/g for total U
TOTAL:	The sum of the ratios of each radionuclide to its activity goal shall be less than 1.0. (*i.e.* - the TAR formula)

Notes:
- All activity goals are referenced as above background levels.
- Decay products are included in the activity goals.

For the SLAPS treatability group, three activity groups were defined:

Group #1	low concentration	TAR between 1 and 20
Group #2	intermediate concentration	TAR between 20 and 40
Group #3	high concentration	TAR greater than 40

For the other two treatability groups, HS/LV and BF/HR/SD, only two activity groups were defined:

Group #1	average concentration	TAR between 1 and 40
Group #3	high concentration	TAR greater than 40

Table 1 shows the breakdown of the 28 samples with respect to their treatability and activity groups, and which analyses were performed on them.

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Table 1. St. Louis FUSRAP Site Sample Summary

ACTIVITY GROUP	Group #1 (low/average)			Group #2 (intermediate)			Group #3 (high)		
TREATABILITY GROUP	Total Samples	Rad. Anal.	P.S. Only	Total Samples	Rad. Anal.	P.S. Only	Total Samples	Rad. Anal.	P.S. Only
SLAPS (SL)	4	2	2	4	2	2	4	2	2
Ball Field (BF)	2	1	1				2	1	1
Haul Roads (HR)	2	1	1				2	1	1
SLAPS Ditches (SD)	1	1	0				1	1	0
HISS (HS)	2	1	1				0	0	0
Latty VPs (LV)	2	1	1				2	1	1
TOTALS	13	7	6	4	2	2	11	6	5

Notes: 1) "Rad. Anal." refers to the number of samples within that group that are subjected to radioisotopic analysis after wet sieving/particle size (P.S.) analysis. [15 out of 28 samples]

2) "P.S. Only" refers to the number of samples within that group that are subjected to wet sieving/particle size analysis only. [13 out of 28 samples]

2.2 Characterization of Raw Samples

Each of the 28 samples consisted of three 1-gallon jars of material, with each jar containing approximately 3-4 kilograms of soil. After being received at the CTC, the contents of the three containers were mixed together, using a cone blender, to give a single homogeneous material. A description of the blending/mixing procedure was provided in **Appendix A** of the Work Plan.

The homogenized raw samples were assigned unique sample numbers based on their designated treatability and activity groups from **Table 1**. For example, the four samples from the St. Louis Airport Site, with an estimated total activity ratio (TAR) between 1 and 20, were designated as SL101, SL102, SL103, and SL104, where the letters refer to the treatability group abbreviation (in parentheses in **Table 1**), the first digit refers to the activity group (1, 2, or 3), and the last two digits refer to the number of the sample within the group. Similarly, the two samples from the Haul Roads, with an estimated TAR > 40 were designated as HR301 and HR302.

Each of the 28 homogenized samples was wet sieved to determine the particle size distribution of the soil. Seven solids fractions were recovered, six on standard sieves, and the seventh from the filtration of the aqueous sieving solution. The size fractionations used in the characterization were:

US Sieve Designation	Tyler Designation	Sieve Opening mm	Sieve Opening inches	Fraction (μm) Description
1/4"	--	6.35	0.250	+6300
No. 10	9 mesh	2.00	0.0787	+2000
No. 35	32 mesh	0.500	0.0197	+500
No. 100	100 mesh	0.150	0.0059	+150
No. 200	200 mesh	0.075	0.0029	+75
No. 400	400 mesh	0.038	0.0015	+38
Filter paper	--	0.0007		+0.7

The raw soil sample, the separated size fractions, and the sieving solution were weighed before and after wet sieving. The solid materials were dried and reweighed so that the solids data could be presented on a dry weight basis.

As shown in **Table 1**, 15 of the 28 soil samples were analyzed for radioisotopes (Ra, Th, and U). This included the raw soil sample, each of the seven size fractions, and the sieving solution. The solid materials were also subjected to density/specific gravity and moisture/solids content measurements. The sieve solution (water) was analyzed for the listed isotopes and pH.

The data from these characterization analyses demonstrates how the contaminants are distributed in the soil with respect to particle size and particle density. This allows a preliminary assessment to be made with respect to the potential success of some of the physical soil washing processes.

2.3 Characterization of Composite Samples

The characterization of the 28 discrete soil samples focused heavily on the distribution of the specific radionuclides in seven different particle size fractions. For the majority of the screening and treatability tests, this level of detail and cost was assumed to be unjustified. Therefore, the 28 samples were combined into 7 composite samples for the remainder of the study, including the extractability tests. Furthermore, a maximum of three size fractions were used in the characterization of the treated and untreated composite materials, with each fraction analyzed for gross α/β radioactivity, rather than specific isotopic distribution. In some of the tests showing beneficial results, isotopic analyses were to be used to support or confirm the gross α/β measurements with respect to the cleanup activity goals.

As shown in **Table 1**, the 28 discrete soil samples are divided into treatability groups, based on location and soil type, and activity groups, based on their Total Activity

Ratio (TAR) with respect to the cleanup activity goals. This method of classification produces a matrix of 7 distinct soil groups that serves as the basis for the compositing operations. The 7 composite samples are defined and described in **Table 2**, where the discrete sample numbers and activity information refer to the designations from **Table 1**.

Table 2. Composite Sample Definitions

Composite Designation	Discrete Samples Included	Activity Group	Activity Range (TAR)
SL1C	(4) - SL101, SL102, SL103, SL104	Low	1 < TAR < 20
SL2C	(4) - SL201, SL202, SL203, SL204	Intermediate	20 < TAR < 40
SL3C	(4) - SL301, SL302, SL303, SL304	High	TAR > 40
BF1C	(5) - BF101, BF102, HR101, HR102, SD101	Average	1 < TAR < 40
BF3C	(5) - BF301, BF302, HR301, HR302, SD301	High	TAR > 40
LV1C	(4) - HS101, HS102, LV101, LV102	Average	1 < TAR < 40
LV3C	(2) - LV301, LV 302	High	TAR > 40

Approximately 10-12 kg of each composite was prepared for further use in the study, by mixing equal portions of the component materials in the cone blender. For example, composite BF3C is made by combining 2.0-2.4 kg each of BF301, BF302, HR301, HR302, and SD301. Details on the mixing procedure were provided in an appendix to the Work Plan.

Since the composites are mixtures of many different samples, some initial characterization analyses were required to determine the baseline conditions for the treated soils generated during later testing. As stated above, a maximum of three size fractions, rather than seven, were used during the characterization and testing of the composites. The primary reasons for this limitation were cost and time, but it was also based on preliminary particle size distribution data, which showed that 50-80% of the soils were less than 38 μm (400 mesh) in size. Therefore, significant fractionation of the particles larger than 38 μm was not warranted.

The size fraction cutoff points used for the characterization of the composite materials, and also for the analysis of treated soils, were 150 μm (100 mesh), 38 μm (400 mesh), and 0.7 μm (filter paper). Approximately 300 grams of each composite

was wet sieved into these fractions. Each fraction was dried and analyzed for gross α/β radioactivity.

The characterization data for the composite samples also showed how the activity was distributed within the different soil fractions. Mass balances were calculated for the primary streams - solids, liquids (water), and radionuclides. The gross α/β measurements were compared to the isotopic measurements on the raw soil samples to determine if any correlation existed between the activity values.

2.4 Extractability Testing

As part of the characterization procedure, a limited series of physical and/or chemical treatment tests were conducted on some of the composite materials in order to assess the relative extractability of the radionuclides from the St. Louis site soils. The distribution of radioactive contaminants (40% - 90% of the total activity is found in the <38 μm fraction) precludes a "classical" soil washing approach (separation by size classification), and indicates that attrition scrubbing and/or chemical extraction will be required to achieve the volume reduction and clean-up goals for the St. Louis site.

While attrition scrubbing is frequently adequate for exposing and solubilizing contaminant species, specifically by removal of weathering products, chemical extraction using chelants (*e.g.*, EDTA, citrate, TIRON®) is often required to remove (hydrated) oxide coatings.[3] The attrition scrubbing and chemical extraction tests were performed to supplement the characterization and were anticipated (i) to provide information, albeit indirect, on the oxidation state speciation [U(IV) or U(VI)] of uranium, (ii) to determine whether the contaminants reside in surficial (hydrated) oxide coatings which can be either abraded away or dissolved with the aid of chelants, and (iii) to determine whether the contaminants reside in surficial (hydrated) oxide coatings which are amenable to reductively enhanced dissolution processes.

2.4.1 Attrition Scrubbing

Attrition scrubbing is primarily used for soils that contain relatively large percentages of coarse grained materials, *i.e.* - sands and gravels larger than about 75 μm in size.

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[3] (a) Chiarizia, R.; Horwitz, E. P. *Hydrometallurgy* **1991**, *27(3)*, 339-60; (b) Lin, C.-F.; Benjamin, M. M. *Environ. Sci. Technol.* **1990**, *24*, 126; (c) Furrer, G.; Stumm, W. *Chimia* **1983**, *37*, 338; (d) Schindler, P. W.; Stumm, W. "The Surface Chemistry of Oxides, Hydroxides and Oxide Minerals," in *Aquatic Chemistry*, Stumm, W., Ed.; Wiley-Interscience: New York, 1987; pp.83-110.

A high solids content slurry is agitated with a special mixing device that causes the soil particles to abrade themselves, thereby removing any surface films and adsorbed contaminants. Due to the relatively small percentage of coarse particles in the St. Louis soils, estimated at 20-30% or less of the total soil mass, it was doubtful that attrition scrubbing would provide significant benefits in this application. However, limited testing was conducted on two of the composite samples containing the highest percentage of coarse particles, so that a cursory evaluation could be made. A Denver laboratory flotation device, with an attrition scrubber attachment, was used to simulate commercial-scale scrubbers. A nominal 60% solids slurry was agitated in the cell for 30 minutes at ambient temperature. The treated samples were wet sieved into the three size fractions, with each one analyzed for gross α/β radioactivity and moisture content. The wash/rinse water was analyzed for gross α/β.

This data allows RUST to evaluate the effect of physical (attrition) treatment of the soils. The primary factors to be assessed with respect to the viability of attrition scrubbing are: 1) How effective was the process in removing the radionuclides from the larger size soil fractions, in comparison to the characterization data?; and 2) To what degree does the process break down some of the larger soil particles into fines, *i.e.* - is there a notable shift downward in the particle size distribution from the treatment?

2.4.2 Chemical Extraction

Preliminary tests conducted as part of the characterization phase have evaluated specific chemical extraction solutions which are known, based on previous corporate experience (INEL Pit 9 Remediation Program)[4] and/or literature precedent,[5] to be

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[4] (a) B. N. Diel, R. R. Bloom, J. A. Van Vliet "Pilot-Scale SOIL*EX™ Demonstration: Removal of Radionuclides and Heavy Metals and Heavy Metals from Contaminated Soil With Volatile Organic Compound Destruction," *Proceedings of Spectrum '94 Nuclear and Hazardous Waste Management International Topical Meeting* **August 14 - 18, 1994**; Atlanta, GA; Paper #D-0535; (b) B. N. Diel, R. L. Hemmings, R. R. Bloom, J. A. Van Vliet "Pilot-Scale SOIL*EX™ Demonstration: Removal of Radionuclides and Heavy Metals and Heavy Metals from Contaminated Soil With Volatile Organic Compound (VOC) Destruction," *Proceedings in Emerging Technologies in Hazardous Waste Management V*, September 27-29, 1993 Atlanta, Ga; Paper #35.6.

[5] (a) Francis, C. W.; Mattus, A. J.; Farr, L. L.; Elless, M. P.; Lee, S. Y. "Selective Leaching of Uranium from Uranium-Contaminated Soils: Progress Report 1," *ORNL Report ORNL/TM-12177*, **February 1993**, Oak Ridge National Lab: Oak Ridge, Tennessee; (b) Soil Decon Task Group, Uranium in Soils Integrated Demonstration, "Removal of Uranium from Uranium-Contaminated Soils - Phase I: Bench-Scale Testing," *ORNL Report ORNL-6762*, **September 1993**, Oak Ridge National Lab: Oak Ridge, Tennessee

effective for the removal of the specific radionuclide contaminants found in the St. Louis Site soils, *i.e.*, U, Th and Ra. These extraction solutions employed chelating ligands and/or complexing ligands (*e.g.*, carbonate, CO_3^{2-}) to selectively enhance the dissolution of the radionuclides, while simultaneously minimizing the dissolution of soil constituents. Historically, uranium has been leached from uranium ores using either acid- or carbonate-based extractants.[5] The use of alkaline solutions of carbonate/bicarbonate has become increasingly attractive for uranium extraction, specifically in the area of soil decontamination, because solubilization of soil constituents and/or contaminant metals is minimized under such conditions.

During the Pit 9 Proof-of-Process Demonstration (bench and pilot-scale), EDTA[6] was proven to be highly effective for the removal of both uranium and thorium (and neodymium), in most cases to below background levels. Under the DOE's Uranium in Soils Integrated Demonstration Program (USID), the chelant TIRON®[7] has been shown[3b] to be an effective chelant for uranium (in Fernald soils), particularly when the uranium is present as or re-speciated to U(IV). Consequently, any observed differences in uranium removal efficiencies, using either EDTA or TIRON, may be ascribed in part to the oxidation state of the uranium. That is, TIRON is expected to preferentially enhance dissolution of U(IV), while EDTA is expected to preferentially dissolve U(VI).

In addition, the reducing agent sodium dithionite has been evaluated for its ability to augment the ligand-promoted dissolution. The use of reducing agents to accelerate soil dissolution, *i.e.*, the manganese and/or iron oxide fractions in soil, is well known.[8] In soil, oxides of aluminum, manganese and/or iron readily hydrate to form a semi-continuous layer which may occlude, *i.e.*, trap, other cations or particles, *i.e.*, contaminants. Manganese and iron oxides are readily reduced thereby enhancing their dissolution rates, and therefore the dissolution of any contaminants sorbed to or

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6 EDTA ≡ Ethylenediamminetetraacetic acid

7 TIRON® ≡ 4,5-Dihydroxy-1,3-benzenedisulfonic acid

8 (a) Stone, A. T.; Morgan, J. J. "Reductive Dissolution of Metal Oxides" in *Aquatic Surface Chemistry: Chemical Processes at the Particle-Water Interface*, W. Stumm, Ed.; Wiley-Interscience: New York, 1987; pp. 221-254, and references therein; (b) Wehrli, B. "Redox Reactions of Metal Ions at Mineral Surfaces" in *Aquatic Chemical Kinetics. Reaction Rates of Processes in Natural Waters*, Stumm, W., Ed.; Wiley-Interscience: New York, 1990; pp. 311-336, and references therein; (c) Stumm, W.; Wieland, E. "Dissolution of Oxide and Silicate Minerals: Rates Depend on Surface Speciation: in *Aquatic Chemical Kinetics: Reaction Rates of Processes in Natural Waters*, Stumm, W., Ed.; Wiley-Interscience: New York, 1990; pp. 367-400, and references therein.

occluded within the hydrated oxide surface coating. As alluded to above, sodium dithionite has been shown[5b] to be particularly effective, in conjunction with the chelant TIRON®, for the removal of uranium [specifically as U(IV)] from Fernald soils. In this case, the reducing agent may play the dual role of converting any surface U(VI) to U(IV), which is then solubilized by the TIRON®, as well as promoting reductive dissolution of the surficial manganese and/or iron oxide coatings, and any uranium occluded or sorbed within that coating.

3.0 RESULTS AND CONCLUSIONS

The physical and radiochemical data from the testing described in Section 2 is presented below, along with discussions and conclusions regarding the feasibility of the continuation of the project.

3.1 Raw Soil Sample Characterization

The St. Louis site soil samples were wet sieved into seven size fractions and analyzed for Uranium, Thorium, and Radium isotopes. Particle size distribution, bulk density/specific gravity, and activity data for the various fractions are provided in the following sections.

3.1.1 Particle Size Distribution

The particle size distribution data for the 28 soil samples is provided in **Tables A-1** through **A-7** in **Appendix A**. The samples are grouped in the tables according to the way they were composited for the study, as described in **Section 2.3**. This method of classification produced a matrix of 7 distinct soil groups that serves as the basis for the composite sample materials. The first portion of **Table 3** summarizes the particle size data on the basis of the three size fractions which were used for the composite characterization testing: >150 μm, between 38-150 μm, and <38 μm (collected on the 0.7 μm filter paper). Also, the samples are grouped in **Table 3** according to how they are composited.

Figure 1 provides a graphical representation of the particle size distribution for the SLAPS (SL) soil samples. **Figure 2** and **Figure 3** present the same information for the Ball Fields/Haul Roads/SLAPS Ditches (BF/HR/SD) and Latty Vicinity/HISS (LV/HS) soil samples, respectively. **Figure 4** shows the estimated particle size distribution for the seven composite materials, based on the average values for the individual samples making up each composite.

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Table 3. Particle Size Distribution Summary

PARTCLE SIZE DATA (Percent of material in the size fraction)			
Sample Number	Size Fraction (microns)		
	>150	38-150	<38
SL101	3.6	29.6	66.9
SL102	8.9	31.8	59.3
SL103	3.8	33.7	62.5
SL104	8.8	22.6	68.6
SL201	3.0	25.4	71.6
SL202	8.1	21.0	70.9
SL203	25.3	19.6	55.2
SL204	9.1	24.5	66.4
SL301	2.8	19.8	77.4
SL302	3.2	21.1	75.8
SL303	7.5	19.6	72.9
SL304	4.1	15.7	80.2
SLAPS Avg.	7.4	23.7	69.0
BF101	1.3	30.8	67.9
BF102	1.3	29.6	69.2
HR101	27.9	36.4	35.8
HR102	40.7	22.2	37.2
SD101	2.2	23.5	74.3
BF301	2.4	30.2	67.4
BF302	12.7	24.5	62.8
HR301	7.6	18.1	74.3
HR302	6.4	28.7	64.8
SD301	3.4	22.4	74.2
BF/HR/SD Avg.	10.6	26.6	62.8
LV101	10.6	16.9	72.4
LV103	33.3	14.0	52.6
HS101	7.2	25.7	67.2
HS102	2.6	19.7	77.7
LV301	0.9	26.6	72.5
LV302	9.7	29.4	60.9
LV/HS Avg.	10.7	22.0	67.2
Composite Averages			
SL1C	6.3	29.4	64.3
SL2C	11.4	22.6	66.0
SL3C	4.4	19.0	76.6
BF1C	14.7	28.5	56.8
BF3C	6.5	24.8	68.7
LV1C	13.4	19.1	67.5
LV3C	5.3	28.0	66.7
Overall Parameters			
Overall Avg.	9.2	24.4	66.4
Standard Deviation	10.0	5.6	10.5
Maximum Value	40.7	36.4	80.2
Minimum Value	0.9	14.0	35.8

DISTRIBUTION FREQUENCY (Number of samples in each fraction percent)			
Fraction Percent	Size Fraction (microns)		
	>150	38-150	<38
0-5	13		
5-10	9		
10-15	2	1	
15-20		7	
20-25		8	
25-30	2	7	
30-35	1	4	
35-40		1	2
40-45	1		
45-50			
50-55			1
55-60			2
60-65			4
65-70			7
70-75			8
75-80			3
80-85			1
Total Samples	28	28	28

Figure 1.

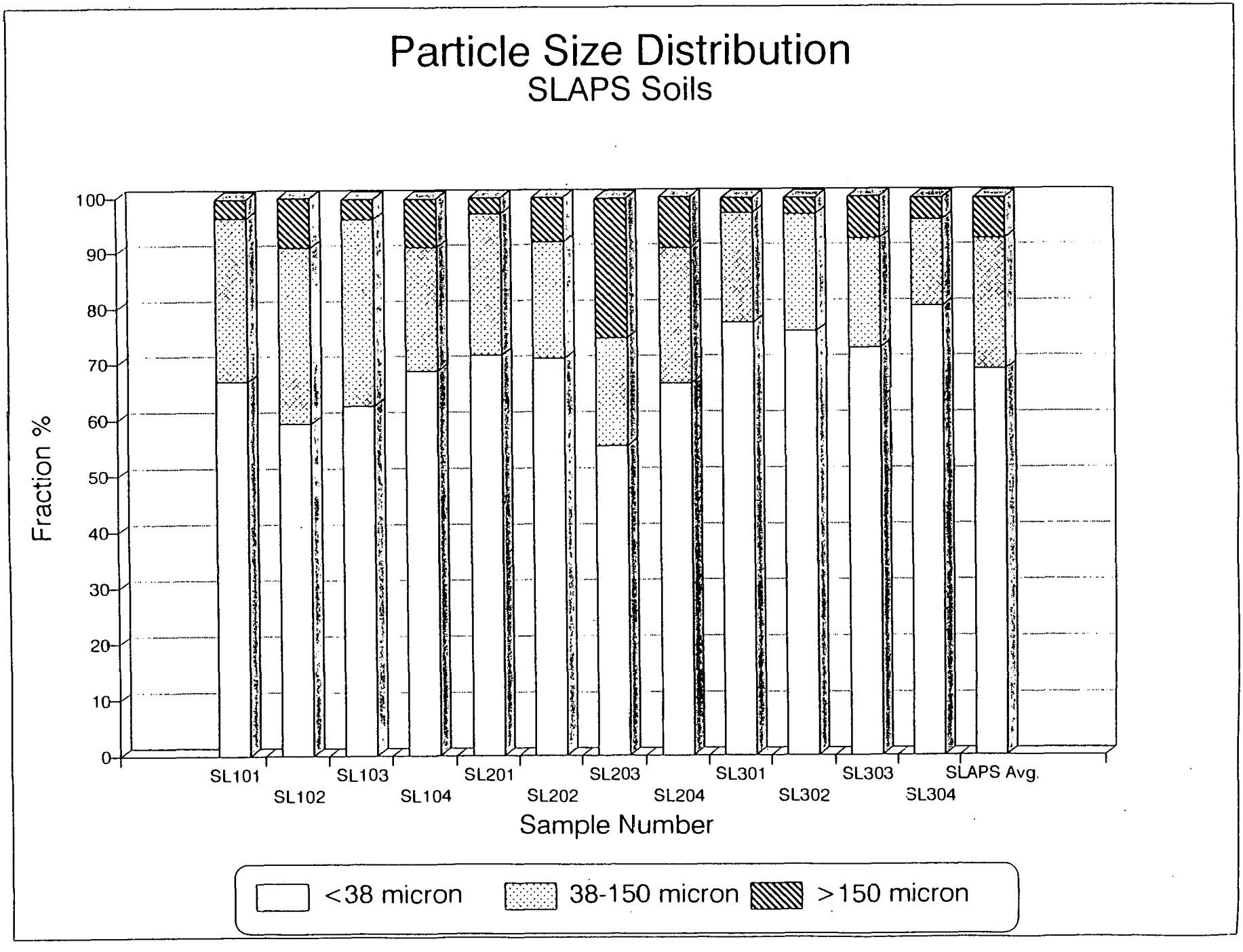

Figure 2.

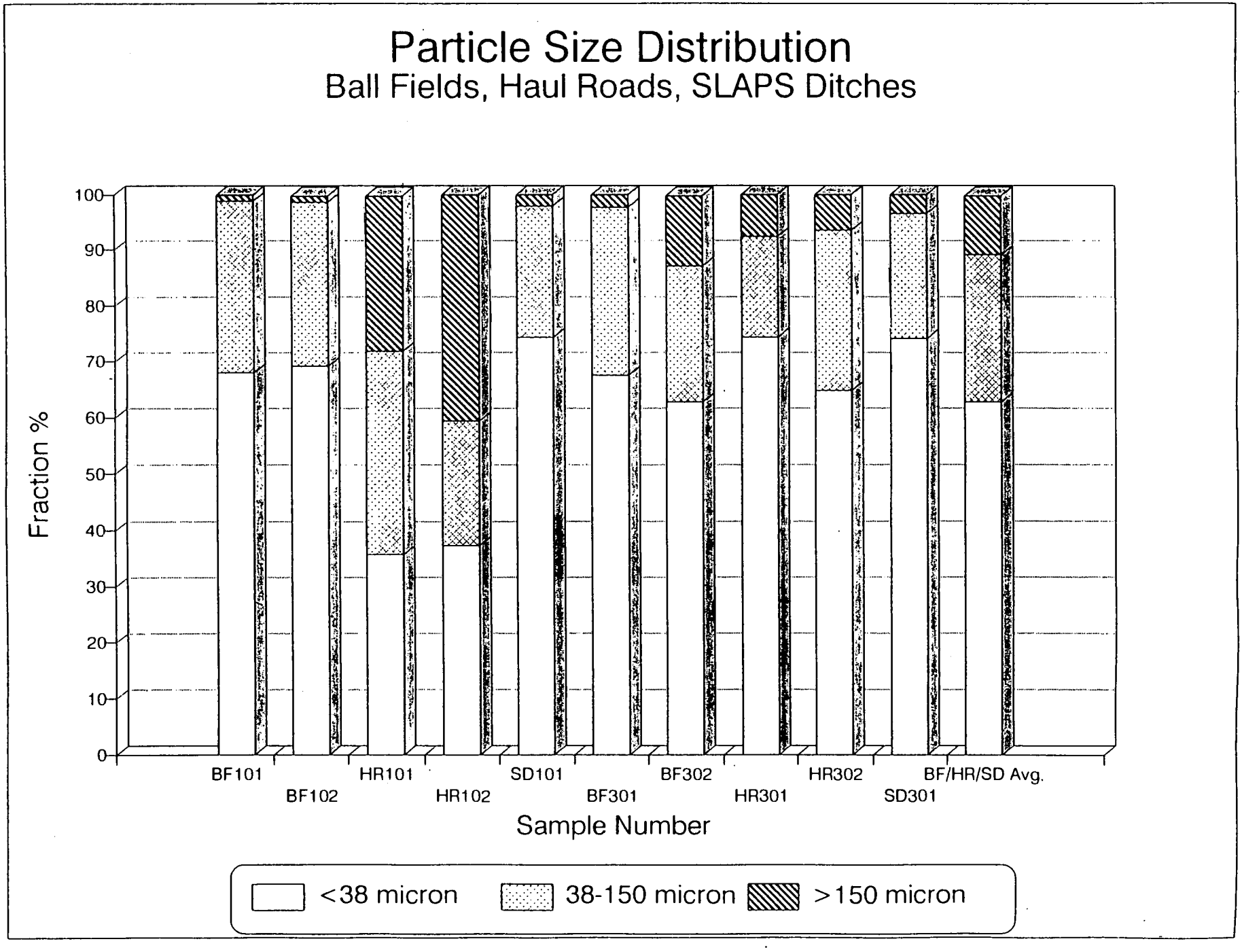

Figure 3.

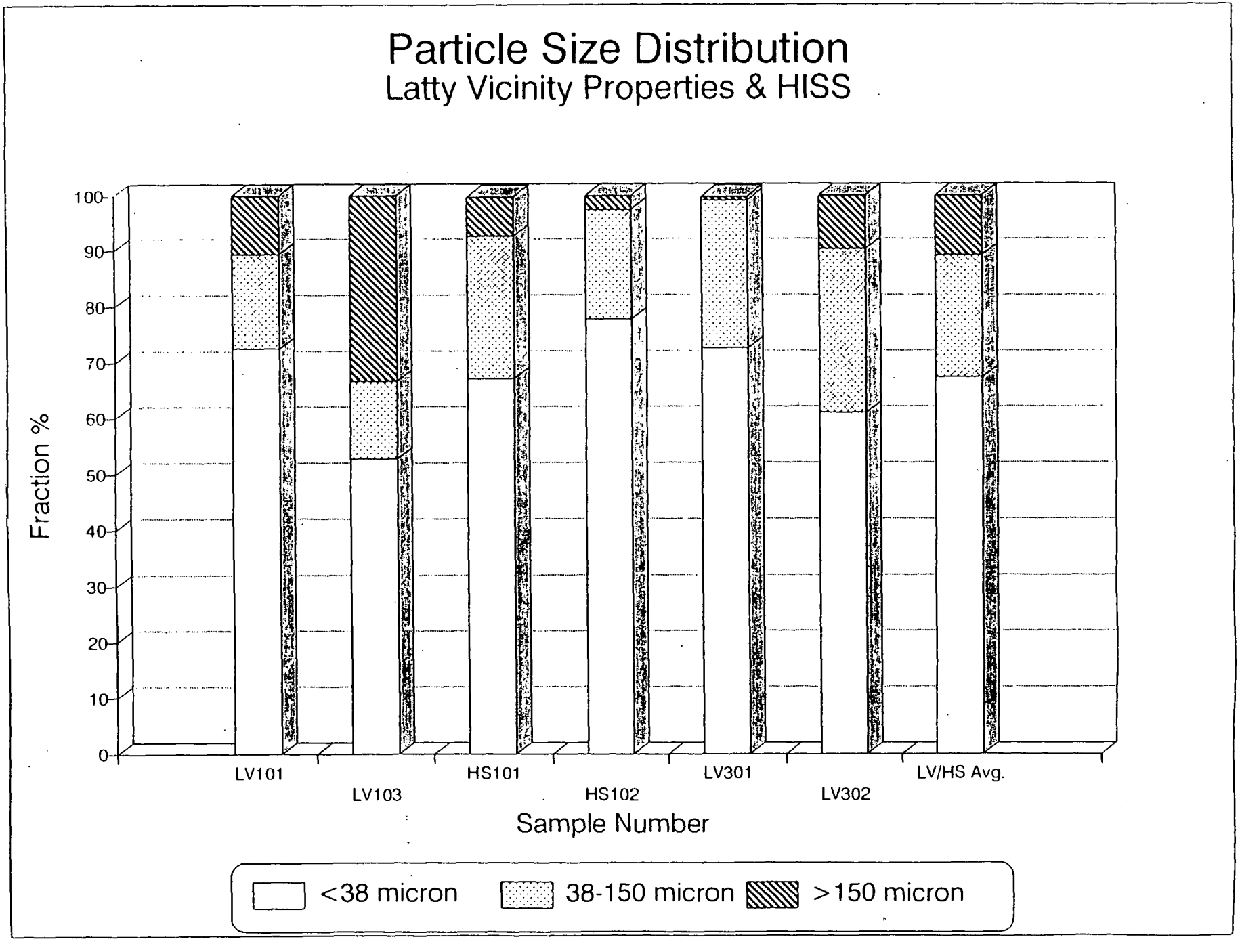

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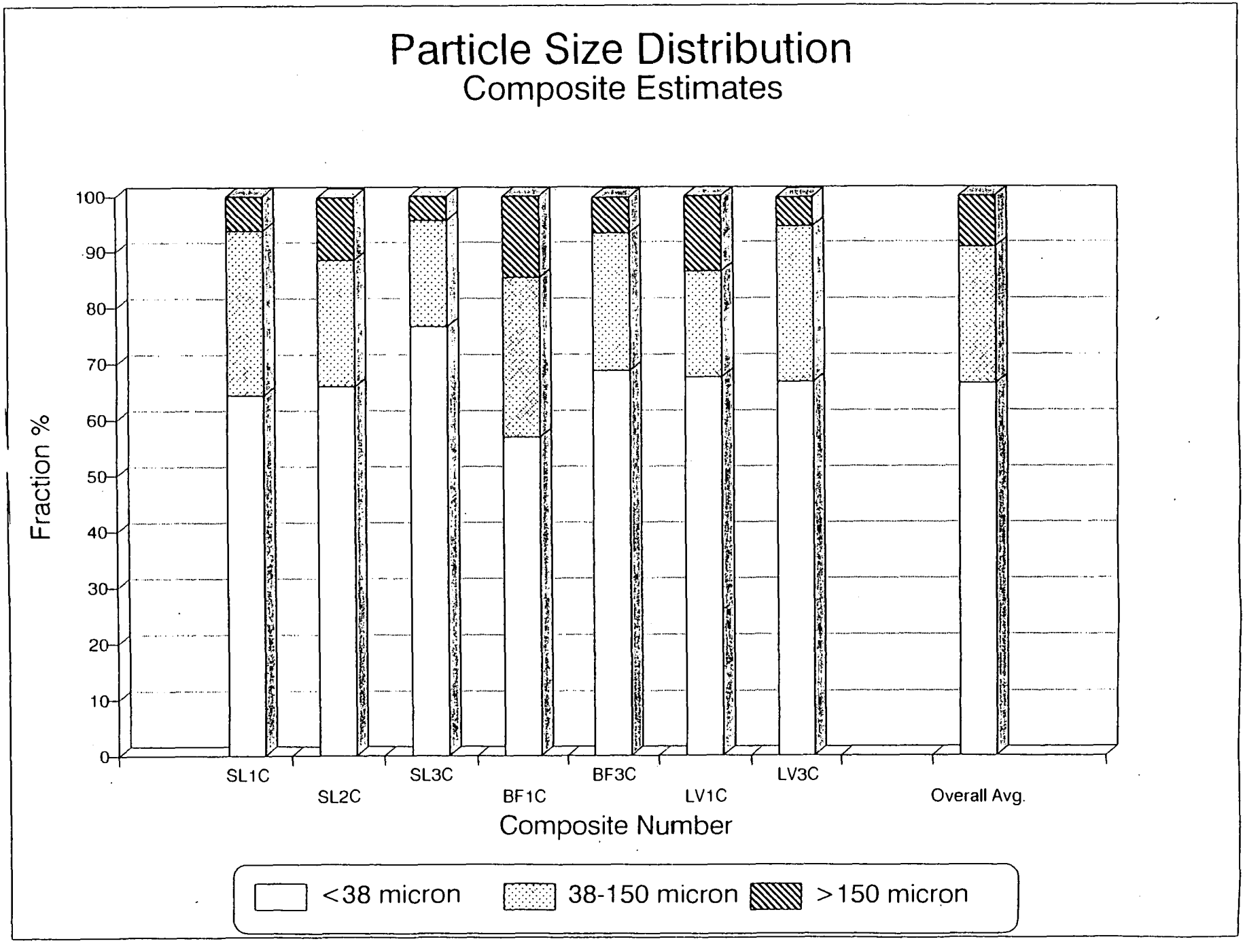
Figure 4.


Particle Size Distribution
Composite Estimates
Fraction %
100
90
80
70
60
50
40
30
20
10
0
SL1C
SL2C
SL3C
BF1C
BF3C
LV1C
LV3C
Overall Avg.
Composite Number
<38 micron
38-150 micron
>150 micron

The second portion of **Table 3** shows the frequency distribution for the samples with respect to the particle size fraction (>150, 38-150, or <38 microns) and a "fraction percent" range. The "fraction percent" represents the percentage of the material that falls within a particular size fraction. For example, the first number in the table indicates that 13 out of the 28 samples contained between 0-5% large soil particles (>150 μm). Similarly, the last entry in the table (lower right) indicates that 1 out of 28 samples contained between 80-85% fine soil particles (<38 μm). **Figure 5** provides a graphical representation of this distribution frequency data.

Pertinent observations about the particle size data are as follows:

- In general, the St. Louis site soils could be classified primarily as silts and clays, with some fine to medium sands.
- Only 2 of the 28 samples contained less than 50% fine material (<38 μm) - HR101 & HR102. 23 out of 28 samples contained greater than 60% fines.
- HR101 & HR102 were also two of the only 4 samples that contained greater than 25% large material (>150 μm), along with SL203 & LV103. 22 of the 28 samples contained less than 10% large particles.
- The overall average composition for the soils was:

Large particles (>150 μm)	9.2%
Medium particles (38-150 μm)	24.4%
Fine particles (<38 μm)	66.4%

3.1.2 Bulk Density/Specific Gravity

Table 4 provides a summary of the bulk density/specific gravity data that was obtained during the fractionation of the 15 samples submitted for radioisotopic analysis. As seen in the table, specific gravities were indeterminate for a number of the fractions due to insufficient quantities of material. Observations about the specific gravity data are as follows:

- In general, the density values appear to be lighter than "normal" for soil materials. It is surmised that this can be attributed to the method used, coupled with the relatively small quantities of material that were obtained for most of the fractions.

Figure 5.

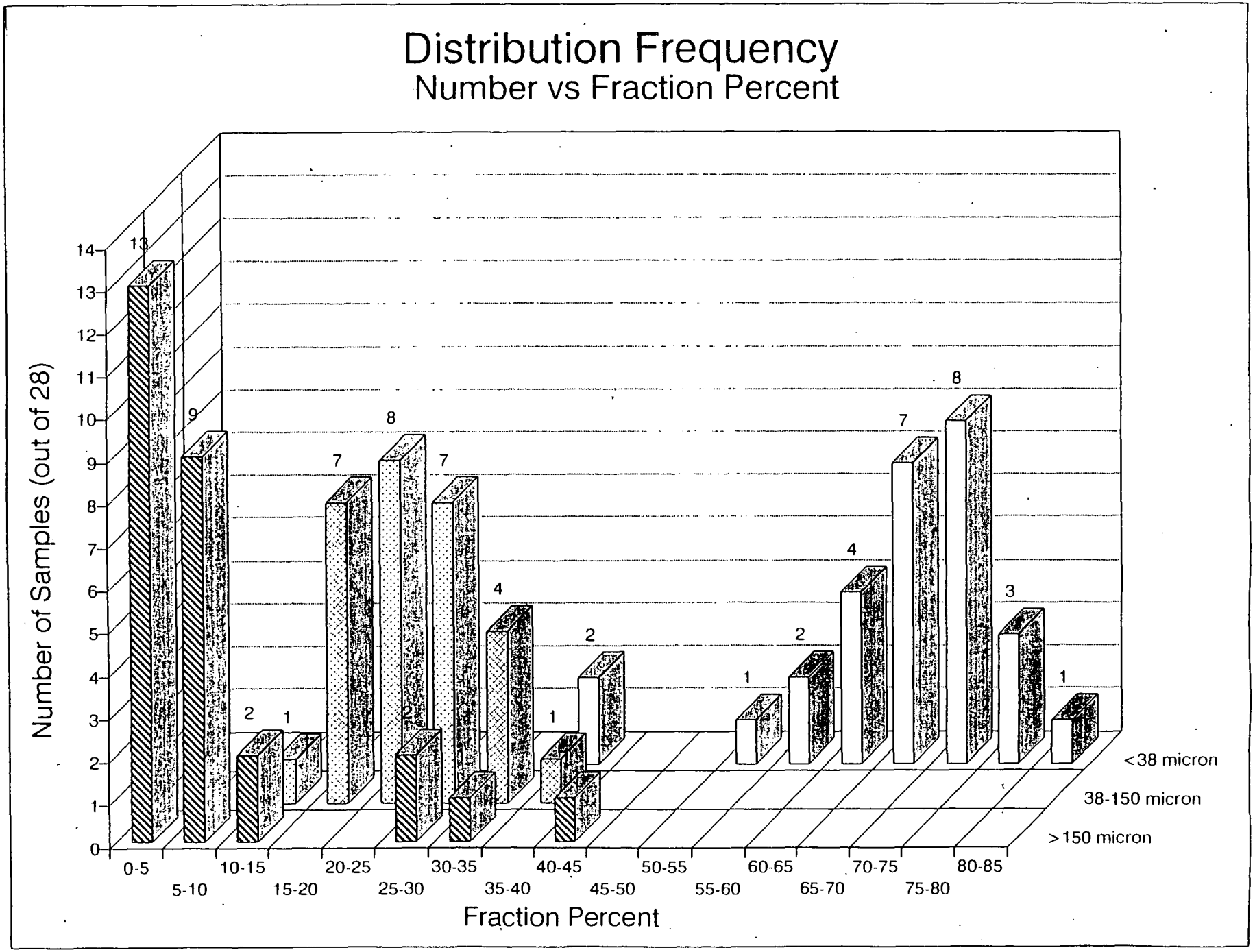


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Table 4. Bulk Densities / Specific Gravities

Sample Number	Size Fraction (microns)							Whole Sample
	+6300	+2000	+500	+150	+75	+38	+0.7	
SL102		0.82	0.91	0.90	0.67	1.14	0.94	1.19
SL104		1.44	1.14			1.25	1.24	0.92
SL203		0.91	1.09	0.64	0.56	0.99	1.06	1.49
SL204		0.97	1.08	0.66	0.60	1.15	1.18	1.18
SL303		1.23	1.04	0.57	0.50	1.08	1.19	1.10
SL304			0.59	0.45	0.54	0.63	1.17	0.94
BF102						1.05	1.08	0.82
HR102		0.95	1.06	0.81	0.58	0.85	0.89	0.78
SD102			0.89			1.09	1.12	0.96
BF302		0.44	0.44	0.51	0.58	0.77	0.90	0.84
HR301			0.62	0.35	0.44	0.88	0.97	0.74
SD301			0.62	0.53	0.60	1.09	1.09	0.90
LV103		1.11	1.00	1.13		1.05	0.90	0.95
HS101		1.06	0.73	0.98		1.26	1.08	0.81
LV302		1.04	1.13	1.14	0.64	1.04	1.01	0.82
Average	--	1.00	0.88	0.72	0.57	1.02	1.05	0.96
Std. Dev.	--	0.25	0.23	0.25	0.06	0.17	0.11	0.19
Maximum	--	1.44	1.14	1.14	0.67	1.26	1.24	1.49
Minimum	--	0.44	0.44	0.35	0.44	0.63	0.89	0.74

Notes: Values are in grams/milliliter (density) or dimensionless (specific gravity).
Missing values indicate insufficient sample to perform analysis.

- The lightest fractions were the 75-150 and 150-500 micron portions, which had average specific gravities of 0.57 and 0.72, respectively. The finer fractions were measured as being more dense, which is assumed to be due to typically higher moisture contents in these materials.

- Significant variability was noted in the calculation of the average values, as the standard deviation was up to +/- 25% in many cases. Again, it was surmised that the small fraction sizes coupled with inaccuracy in the method produced significant errors in this data.

3.1.3 Radioisotope Distribution

Summary and raw data tables for the 15 soil samples that were analyzed for isotopic Uranium, Thorium, and Radium are provided in **Appendix B. Table 5** and **Table 6** summarize this information based on the same groupings that were used for the particle size distribution data, *i.e.* - the seven composite sample groupings and the three particle size fractions.

Table 5 shows the activities in pCi/gram for each isotope for the various fractions, as well as the activities for the whole samples. **Table 6** summarizes the activities of each isotope for the whole samples and provides estimated Total Activity Ratios (TARs) for each sample. The TAR is used as an indicator of the level of contamination with respect to the site cleanup goals, with a TAR of 1 being roughly equivalent to the cleanup goals.

Figures 6 - 11 provide graphical representations of the distribution of some of the isotopes with respect to particle size. Graphs for ^{235}U, ^{228}Th, and ^{232}Th are not provided due to their very low levels of activity in the samples, as seen in **Table 5**. The graphs are summarized as follows:

Figure 6: ^{234}U distribution in size fractions
Figure 7: ^{238}U distribution in size fractions
Figure 8: Total U distribution in size fractions
Figure 9: ^{230}Th distribution in size fractions for Group 1 samples
Figure 10: ^{230}Th distribution in size fractions for Groups 2 & 3 samples
Figure 11: ^{226}Ra distribution in size fractions

Figures 12 - 16 present comparative views of the levels of activity for the various isotopes for the whole soil samples. These are summarized as follows:

Table 5. Radionuclide Summary -- Activity versus Particle Size Fraction

(Table values are measured activities in pCi/g. Sub-headings refer to the particle size fractions, in microns)

URANIUM	U-234			U-235			U-238			Total U			Whole Sample -- Averages			
Sample #	>150	38-150	<38	>150	38-150	<38	>150	38-150	<38	>150	38-150	<38	U-234	U 235	U-238	Tot. U
SL102	154	18	35	7.8	1.0	1.8	157	19	37	319	38	74	44	2.3	45	92
SL104	7	5	17	0.4	0.3	0.8	7	5	18	15	11	36	14	0.7	15	30
SL203	3	10	41	0.2	0.6	1.4	3	11	31	7	22	73	26	1.0	20	47
SL204	136	15	26	6.8	0.8	1.0	137	14	22	280	30	49	34	1.5	32	67
SL303	60	21	58	2.8	1.0	3.0	58	21	60	121	43	121	52	2.6	53	108
SL304	174	28	187	9.2	1.5	6.1	174	28	112	357	57	305	162	5.5	101	269
BF102	5	0	1	1.9	0.0	0.1	3	0	0	10	0	1	1	0.1	0	1
HR102	16	35	82	0.8	1.9	3.7	16	36	86	32	73	171	45	2.2	47	95
SD102	9	1	2	0.3	0.1	0.0	7	1	1	17	2	3	2	0.1	1	3
BF302	52	29	41	2.3	1.5	1.9	52	29	43	107	60	85	40	1.9	41	83
HR301	63	58	182	3.1	2.7	9.7	63	58	184	129	118	376	151	7.9	152	311
SD301	97	11	25	4.5	0.5	1.2	95	11	25	197	22	52	25	1.2	25	51
LV103	2	3	8	0.1	0.3	0.4	2	3	9	3	6	17	6	0.3	6	11
HS101	10	2	8	0.6	0.1	0.5	10	2	8	21	4	17	7	0.4	7	15
LV302	8	4	12	0.5	0.2	0.4	9	4	11	18	7	23	9	0.4	9	18
Maximum	174	58	187	9.2	2.7	9.7	174	58	184	357	118	376	162	7.9	152	311
Minimum	1.8	0.2	0.6	0.1	0.0	0.0	1.5	0.2	0.4	3.4	0.4	1.1	0.5	0.1	0.4	1.0
THORIUM/RADIUM	Th-228			Th-230			Th-232			Ra-226			Whole Sample -- Averages			
Sample #	>150	38-150	<38	>150	38-150	<38	>150	38-150	<38	>150	38-150	<38	Th-228	Th-230	Th-232	Ra-226
SL102	0.3	0.1	0.1	78	41	50	0.1	0.0	0.1	22	14	14	0.1	50	0.1	14.7
SL104	0.1	0.4	0.2	30	229	52	0.2	0.2	0.1	5	6	11	0.2	90	0.2	9.1
SL203	0.1	0.6	0.1	2	400	248	0.1	9.7	0.2	2	18	32	0.2	218	2.1	21.8
SL204	0.6	0.2	0.3	1043	463	219	1.9	0.9	0.5	147	28	44	0.3	355	0.8	49.2
SL303	0.4	0.2	0.3	1389	935	554	1.1	0.5	0.4	16	7	2	0.3	692	0.5	3.9
SL304	1.8	0.2	0.2	7224	580	1050	6.3	0.7	1.0	37	6	9	0.2	1230	1.2	10.0
BF102	9.2	0.4	0.2	311	0	1	3.5	0.0	0.0	3	0	0	0.4	4	0.1	0.1
HR102	0.3	0.2	0.7	39	42	8	0.1	0.0	0.1	1	13	5	0.4	29	0.1	5.4
SD102	2.1	0.3	0.1	14	3	6	0.4	0.1	0.2	6	0	0	0.2	5	0.2	0.5
BF302	0.8	0.3	0.2	579	259	413	0.6	0.3	0.3	26	16	4	0.3	397	0.3	10.0
HR301	0.8	0.3	0.6	2416	890	1400	1.8	0.5	1.0	21	10	2	0.6	1386	1.0	5.2
SD301	1.3	0.1	0.1	537	218	186	0.6	0.2	0.1	63	2	2	0.1	205	0.2	3.8
LV103	0.1	0.1	0.2	3	2	3	0.0	0.0	0.0	0	1	4	0.1	3	0.0	2.3
HS101	0.3	0.1	0.1	138	15	19	0.3	0.0	0.1	8	2	13	0.1	27	0.1	10.0
LV302	0.3	0.1	0.1	224	38	54	0.3	0.0	0.1	14	6	24	0.1	68	0.1	17.5
Maximum	9.2	0.6	0.7	7224	935	1400	6.3	9.7	1.0	147	28	44	0.6	1386	2.1	49.2
Minimum	0.1	0.1	0.1	1.8	0.4	0.5	0.0	0.0	0.0	0.2	0.2	0.0	0.1	3.1	0.0	0.1

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Table 6. Radionuclide Summary -- Activity in Whole Samples

(Table values are measured activities in pCi/g.)

Sample Number	Uranium				Thorium			Radium	Total Activity Ratio (TAR)	
	U-234	U-235	U-238	Tot. U	Th-228	Th-230	Th-232	Ra-226	Method A	Method B
SL102	44.0	2.3	45.3	91.6	0.1	49.7	0.1	14.7	13.8	0.1
SL104	14.1	0.7	14.9	29.7	0.2	90.0	0.2	9.1	20.1	0.2
BF102	0.5	0.1	0.4	1.0	0.4	4.3	0.1	0.1	0.9	0.1
HR102	45.4	2.2	47.3	94.9	0.4	29.0	0.1	5.4	7.8	0.1
SD102	1.8	0.1	1.4	3.3	0.2	5.4	0.2	0.5	1.2	0.2
LV103	5.5	0.3	5.5	11.3	0.1	3.1	0.0	2.3	1.2	0.0
HS101	7.0	0.4	7.1	14.5	0.1	26.5	0.1	10.0	7.4	0.1
SL203	26.0	1.0	20.3	47.3	0.2	218.0	2.1	21.8	48.4	2.1
SL204	34.0	1.5	31.5	67.0	0.3	354.7	0.8	49.2	81.4	0.8
SL303	51.9	2.6	53.0	107.5	0.3	692.2	0.5	3.9	140.3	0.5
SL304	161.7	5.5	101.4	268.6	0.2	1230.3	1.2	10.0	250.1	1.2
BF302	39.9	1.9	41.3	83.1	0.3	397.0	0.3	10.0	82.2	0.3
HR301	150.6	7.9	152.0	310.5	0.6	1386.0	1.0	5.2	281.3	1.0
SD301	24.6	1.2	24.9	50.7	0.1	205.0	0.2	3.8	42.3	0.2
LV302	9.2	0.4	8.5	18.1	0.1	68.1	0.1	17.5	17.3	0.1
Maximum	161.7	7.9	152.0	310.5	0.6	1386.0	2.1	49.2	281.3	2.1
Minimum	0.5	0.1	0.4	1.0	0.1	3.1	0.0	0.1	0.9	0.0

TAR Calculation Methods -- A: TAR = [U-238]/50 + ([Ra-226] + [Th-230])/5

B: TAR = [Th-232]

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Figure 6.

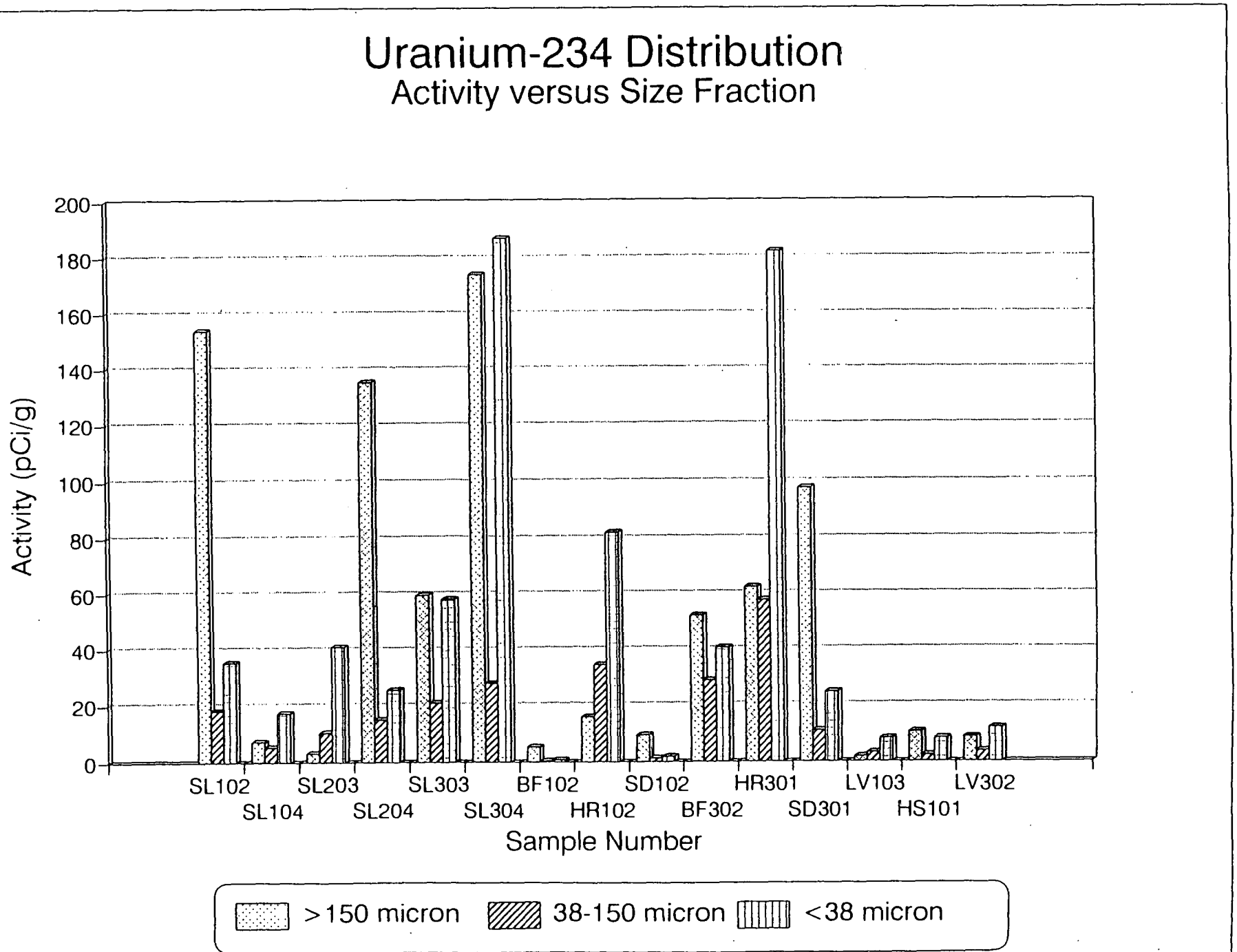

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Figure 7.

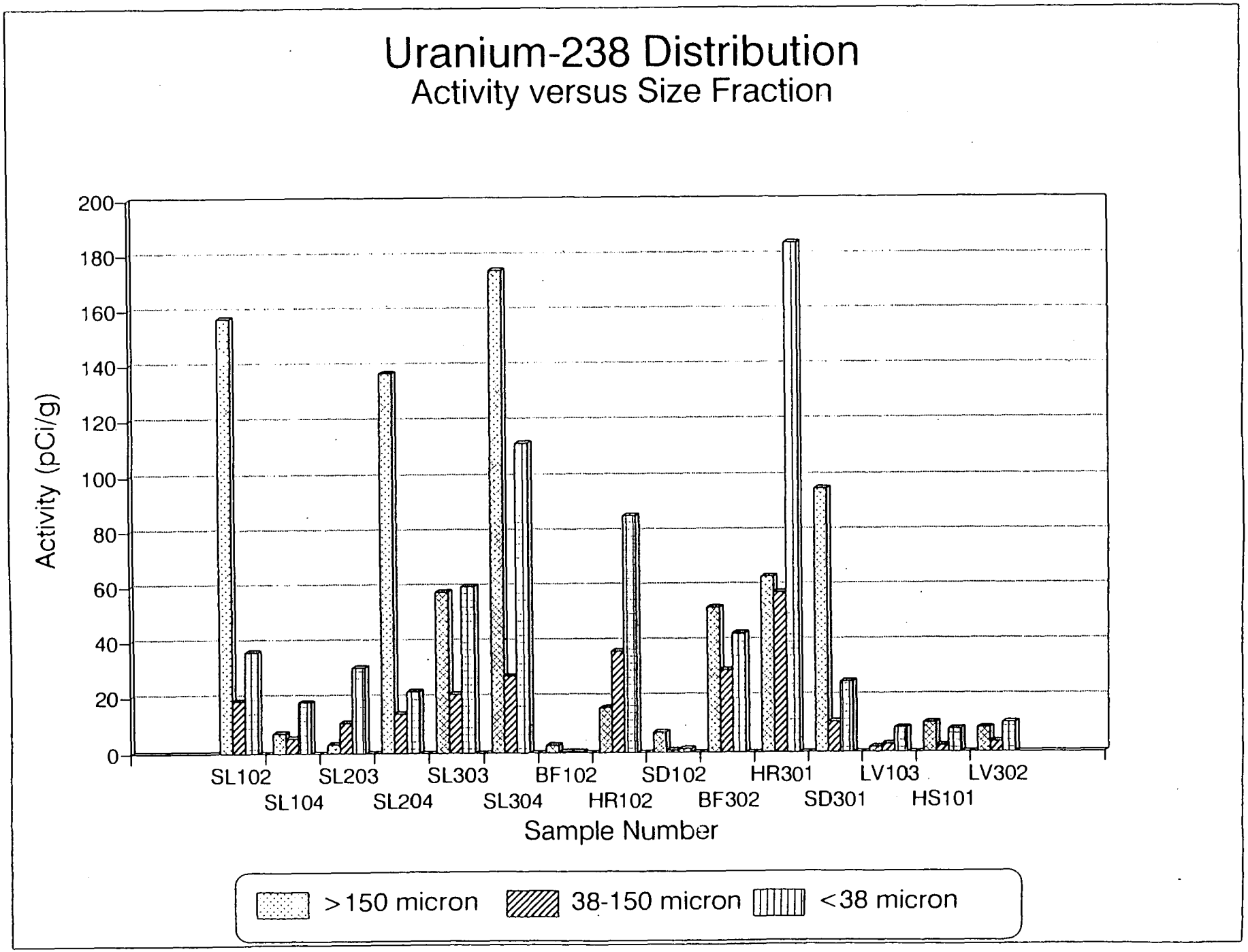

Uranium-238 Distribution
Activity versus Size Fraction
Activity (pCi/g)
200
180
160
140
120
100
80
60
40
20
0
SL102
SL104
SL203
SL204
SL303
SL304
BF102
HR102
SD102
BF302
HR301
SD301
LV103
HS101
LV302
Sample Number
>150 micron
38-150 micron
<38 micron

Figure 8.

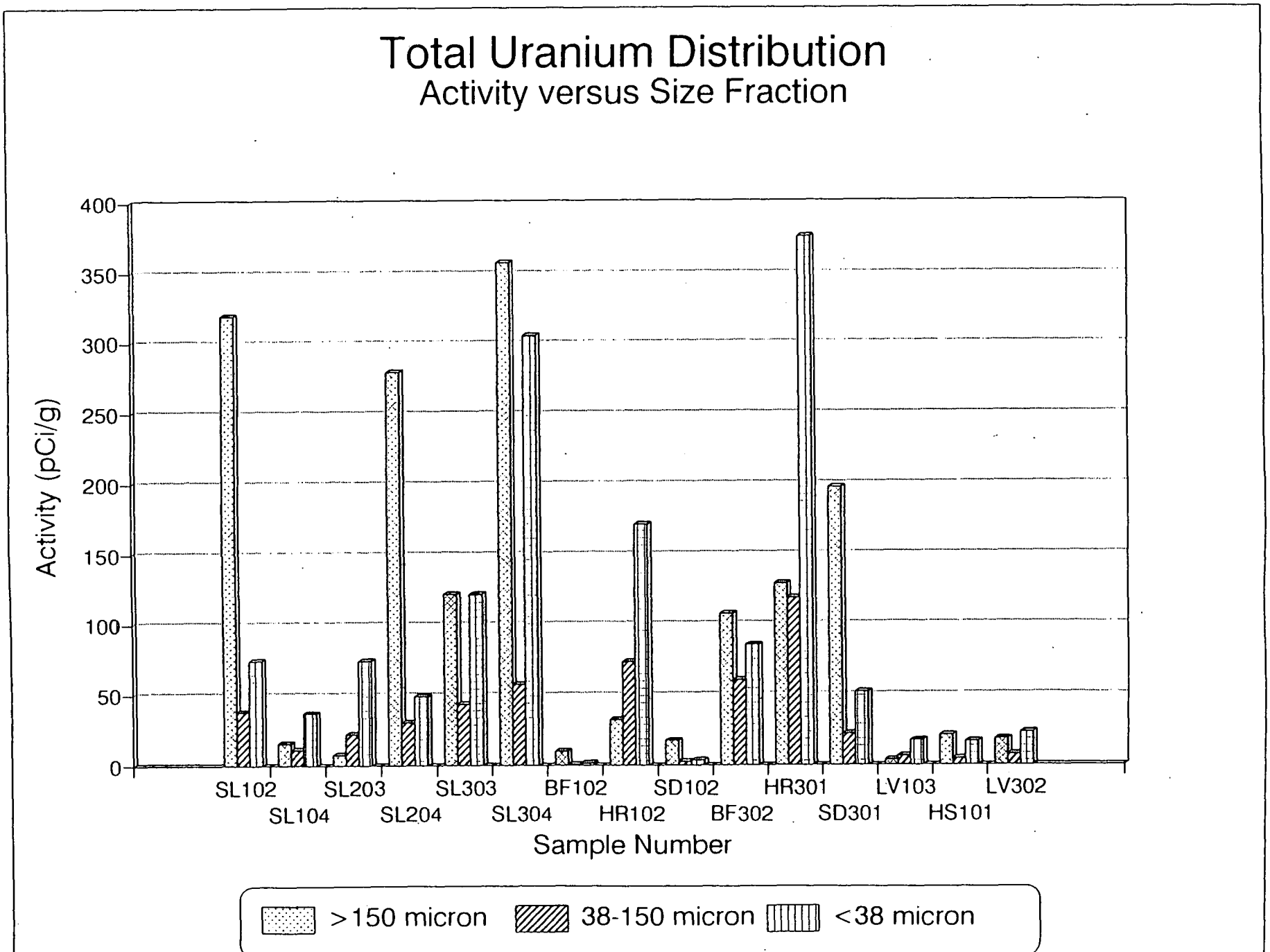


Figure 9.

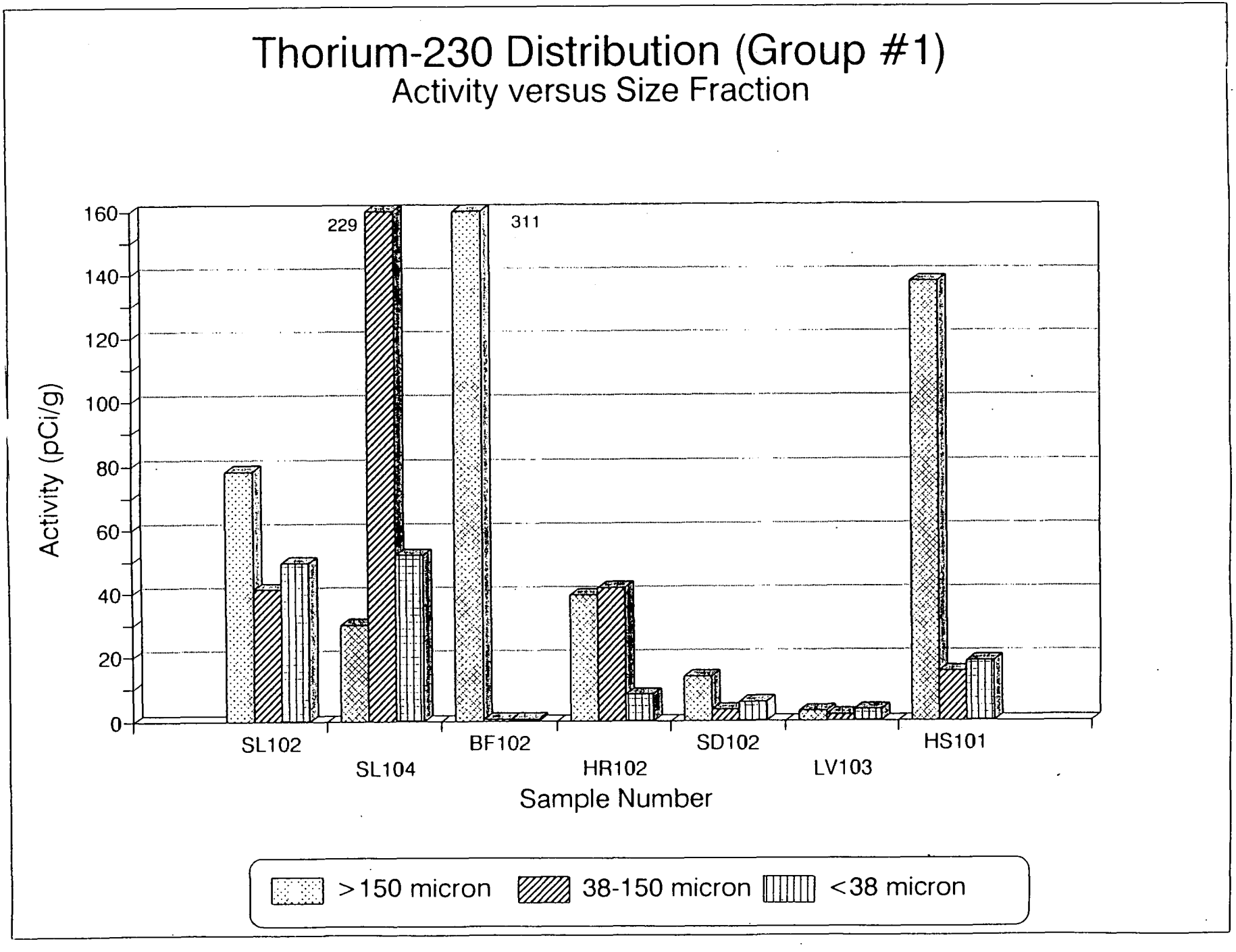


Figure 10.

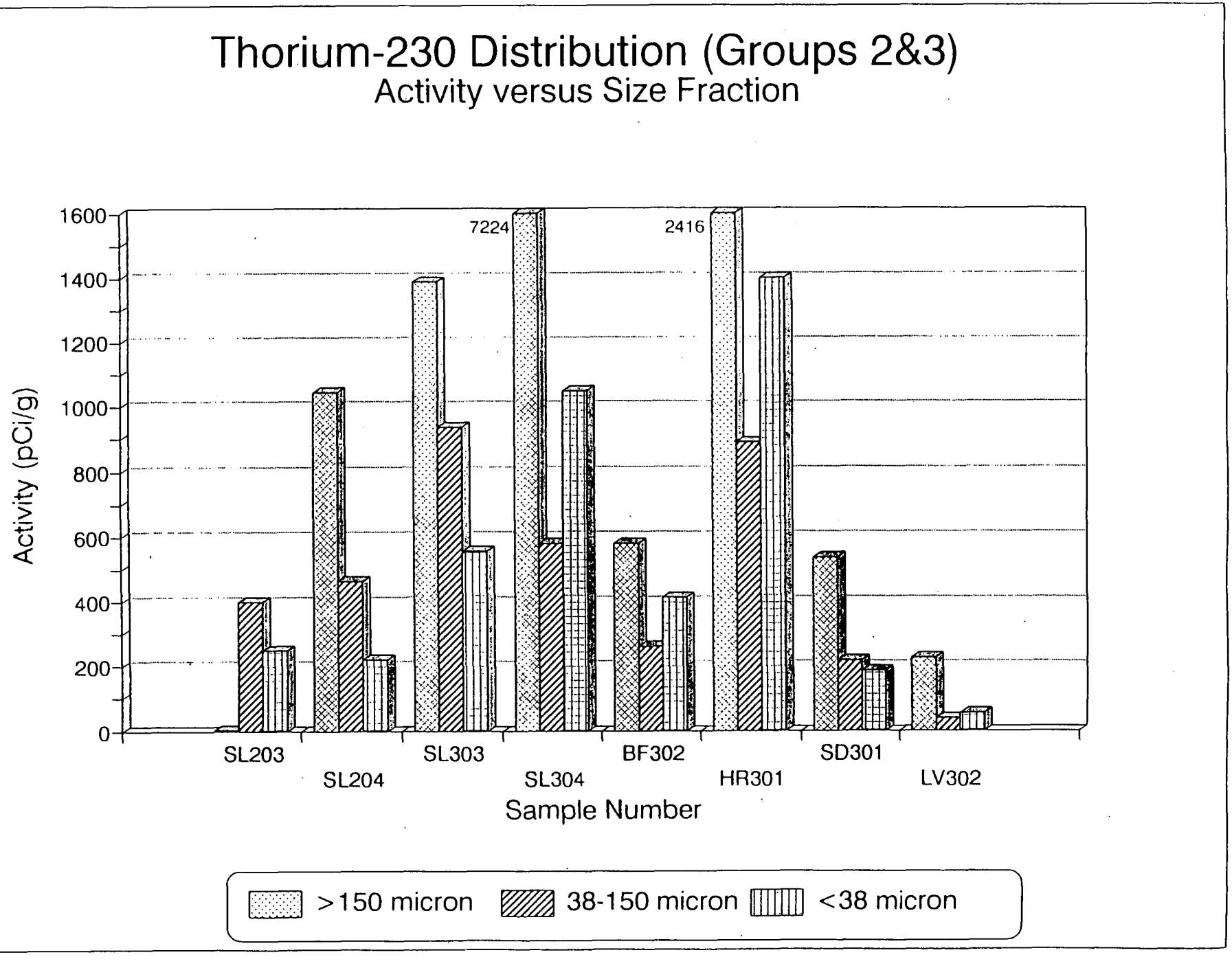


Figure 11.

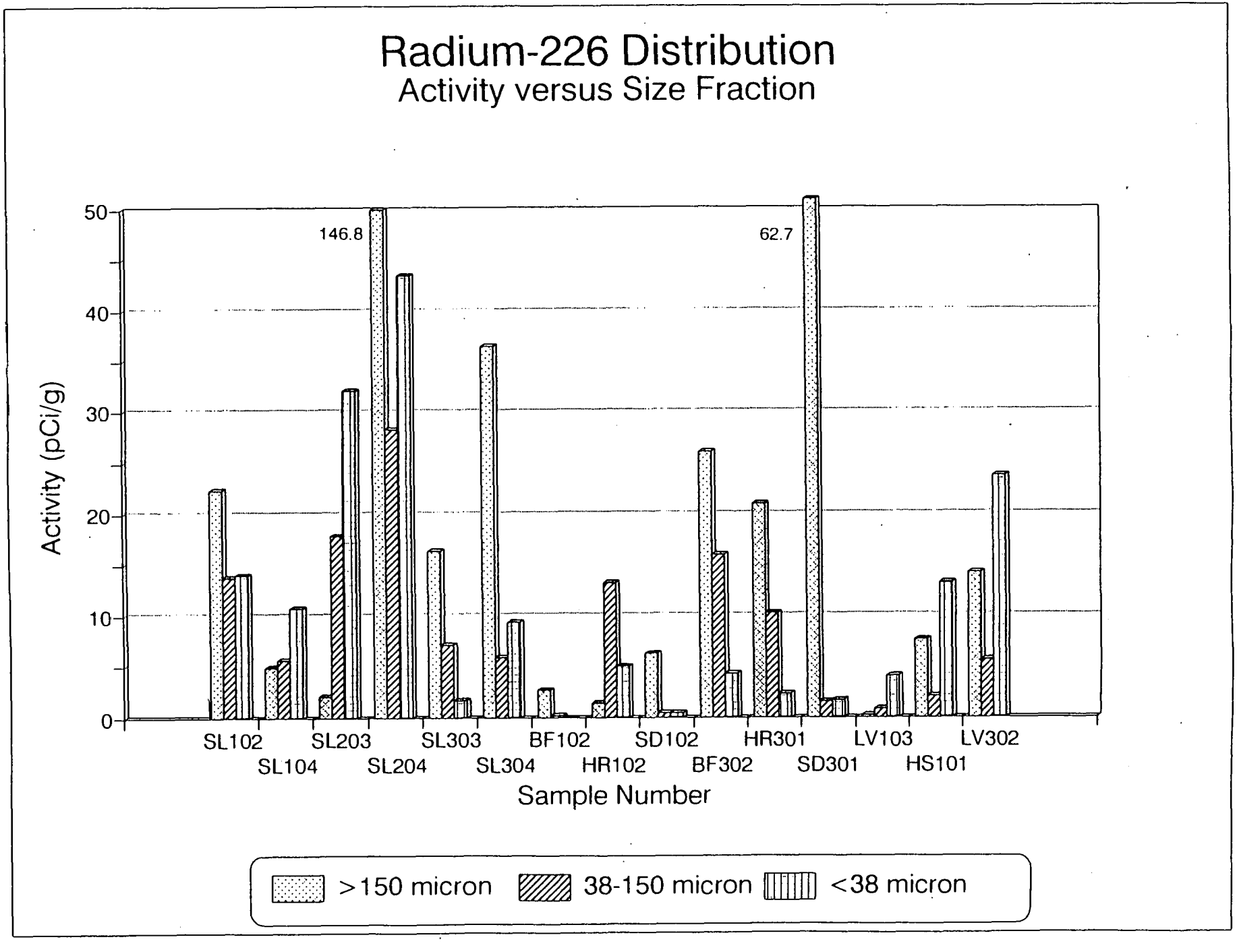


Figure 12.

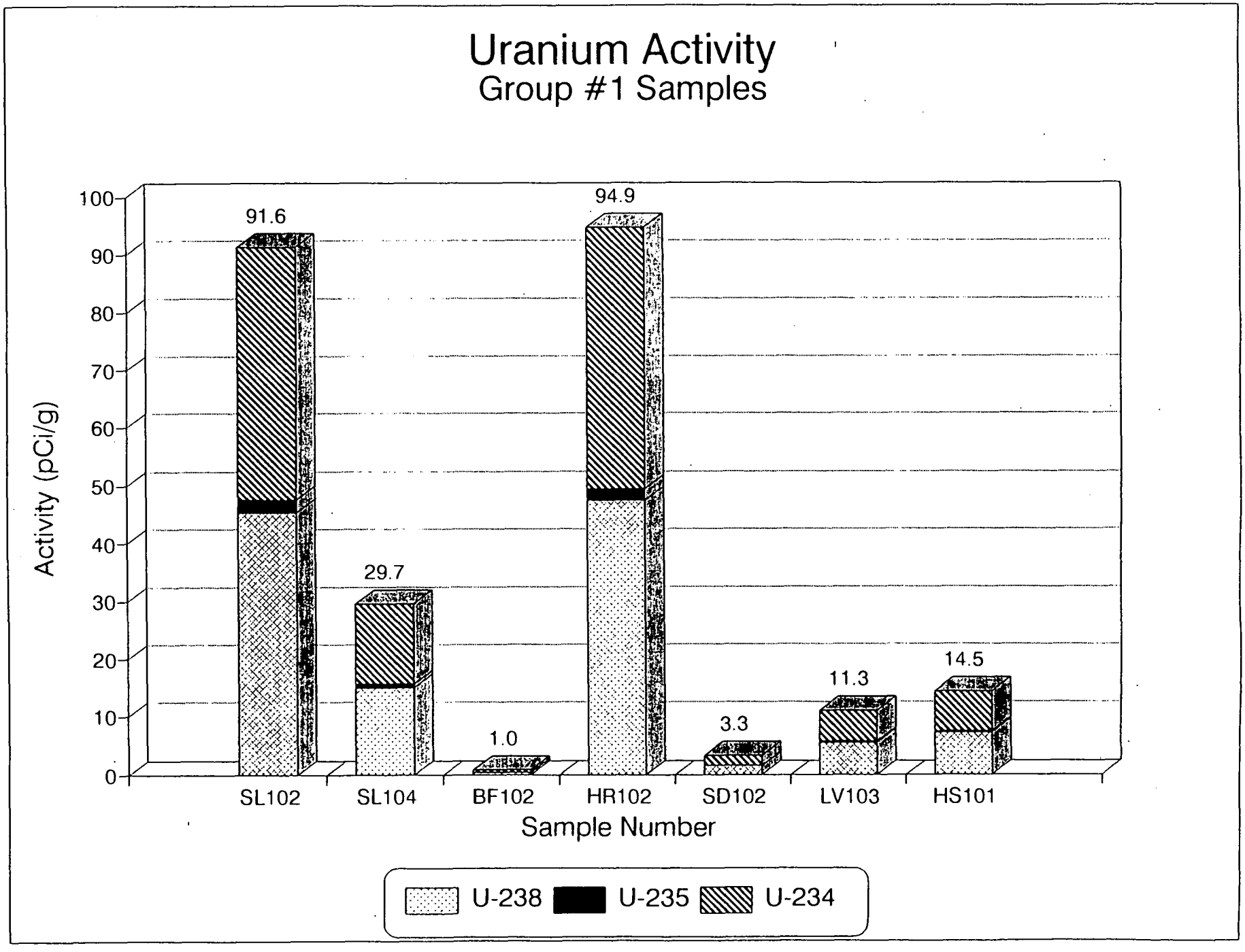


Figure 13.

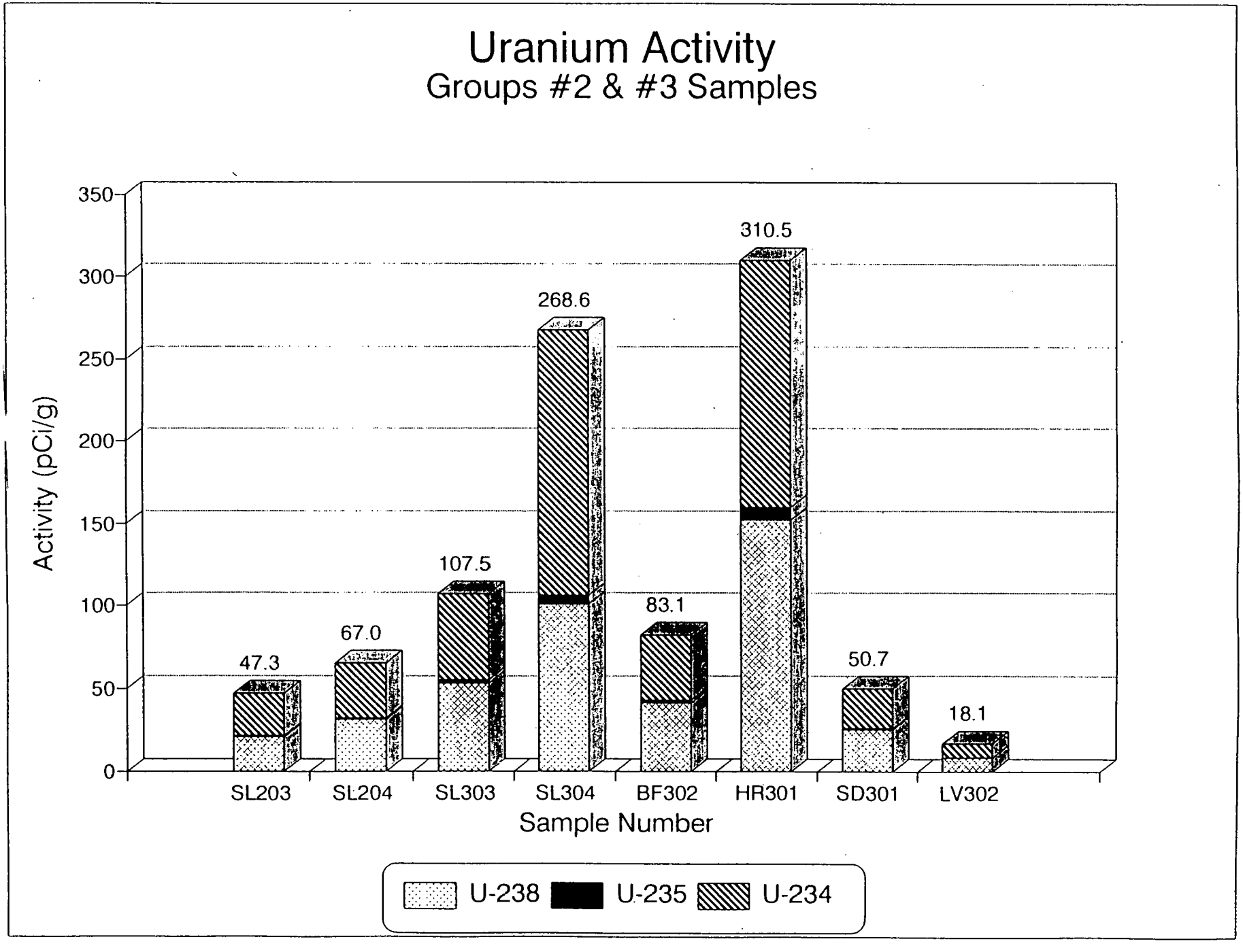

Uranium Activity
Groups #2 & #3 Samples
Activity (pCi/g)
350
300
250
200
150
100
50
0
47.3
67.0
107.5
268.6
83.1
310.5
50.7
18.1
SL203
SL204
SL303
SL304
BF302
HR301
SD301
LV302
Sample Number
U-238
U-235
U-234

Figure 14.

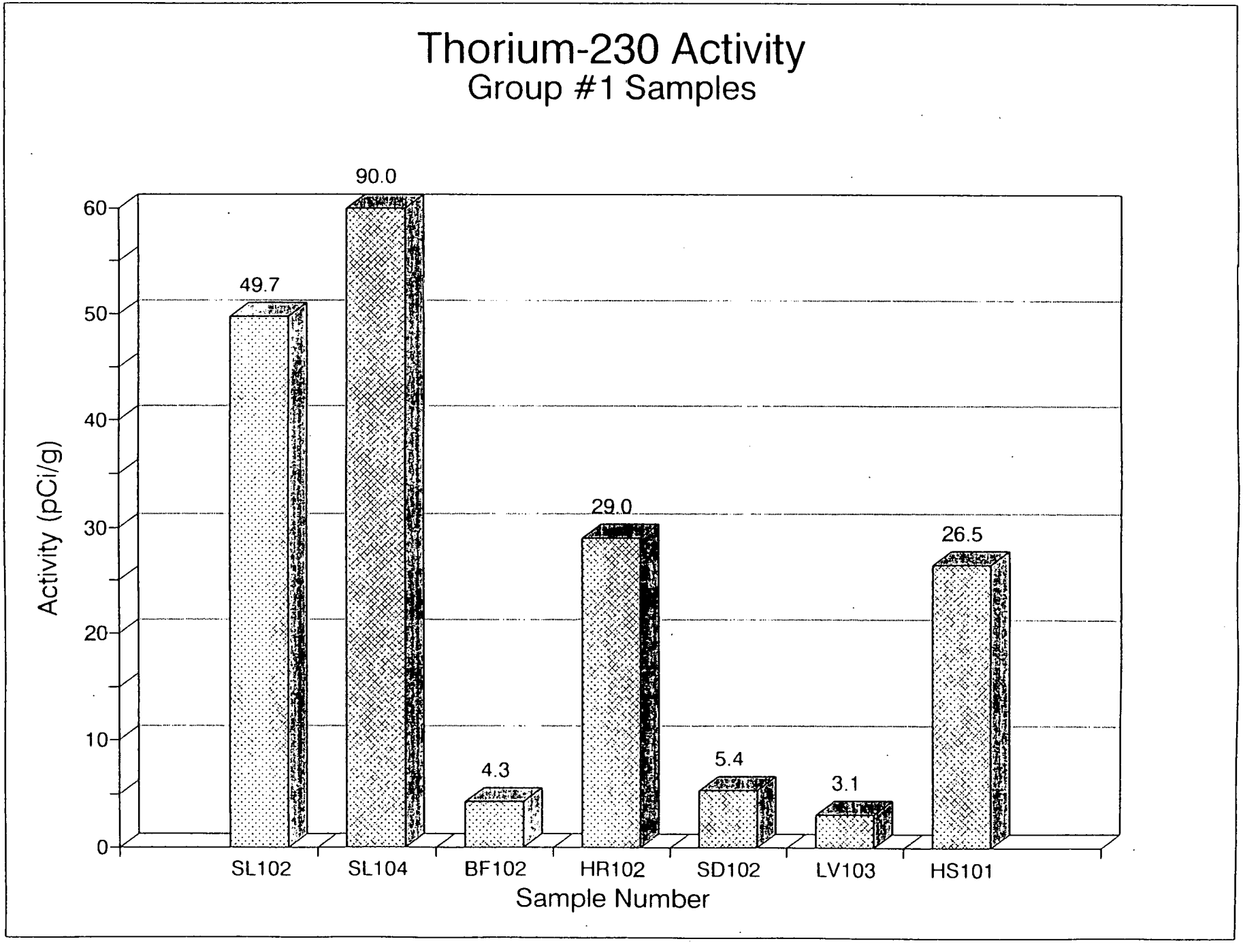
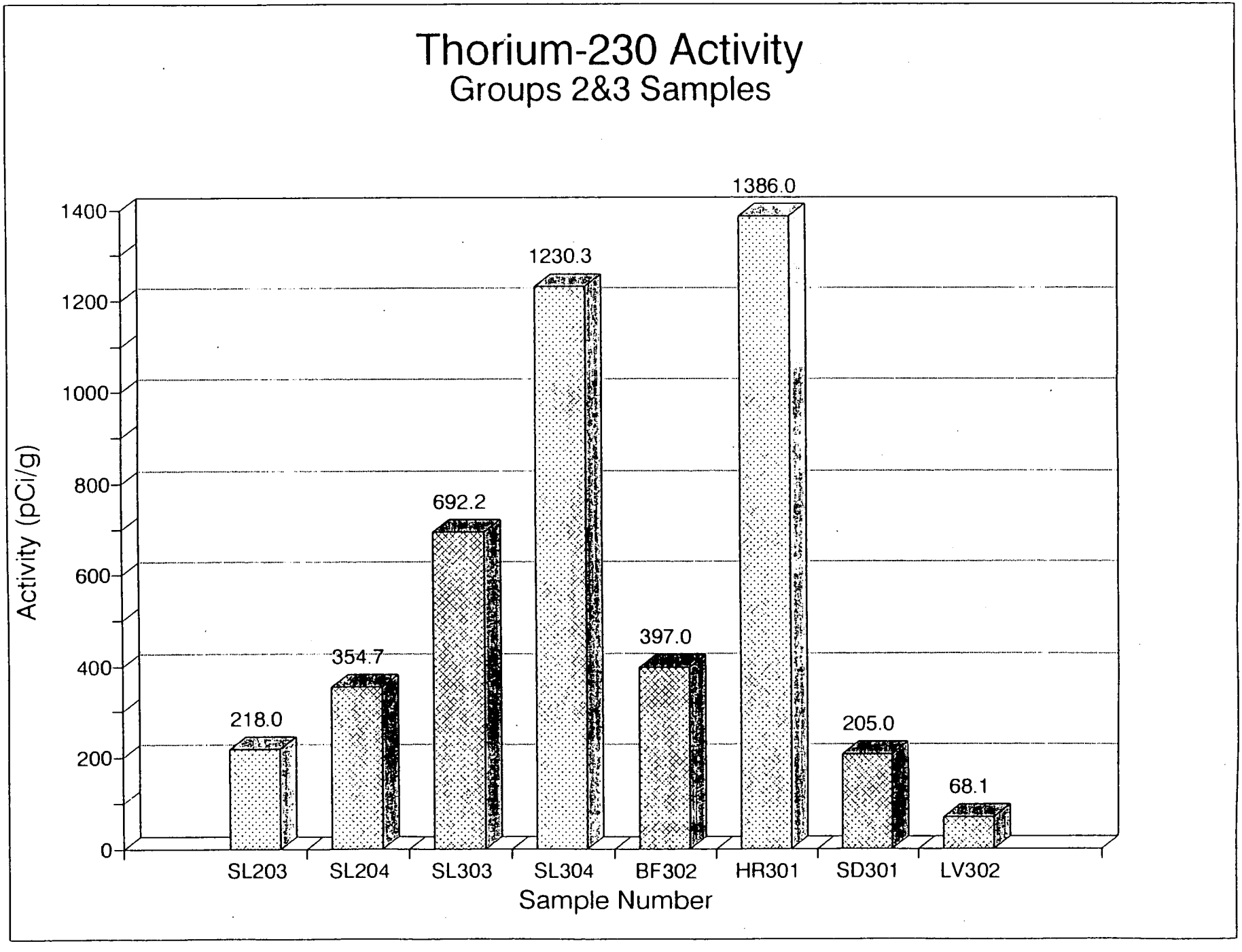


Figure 15.



13173

Figure 16.

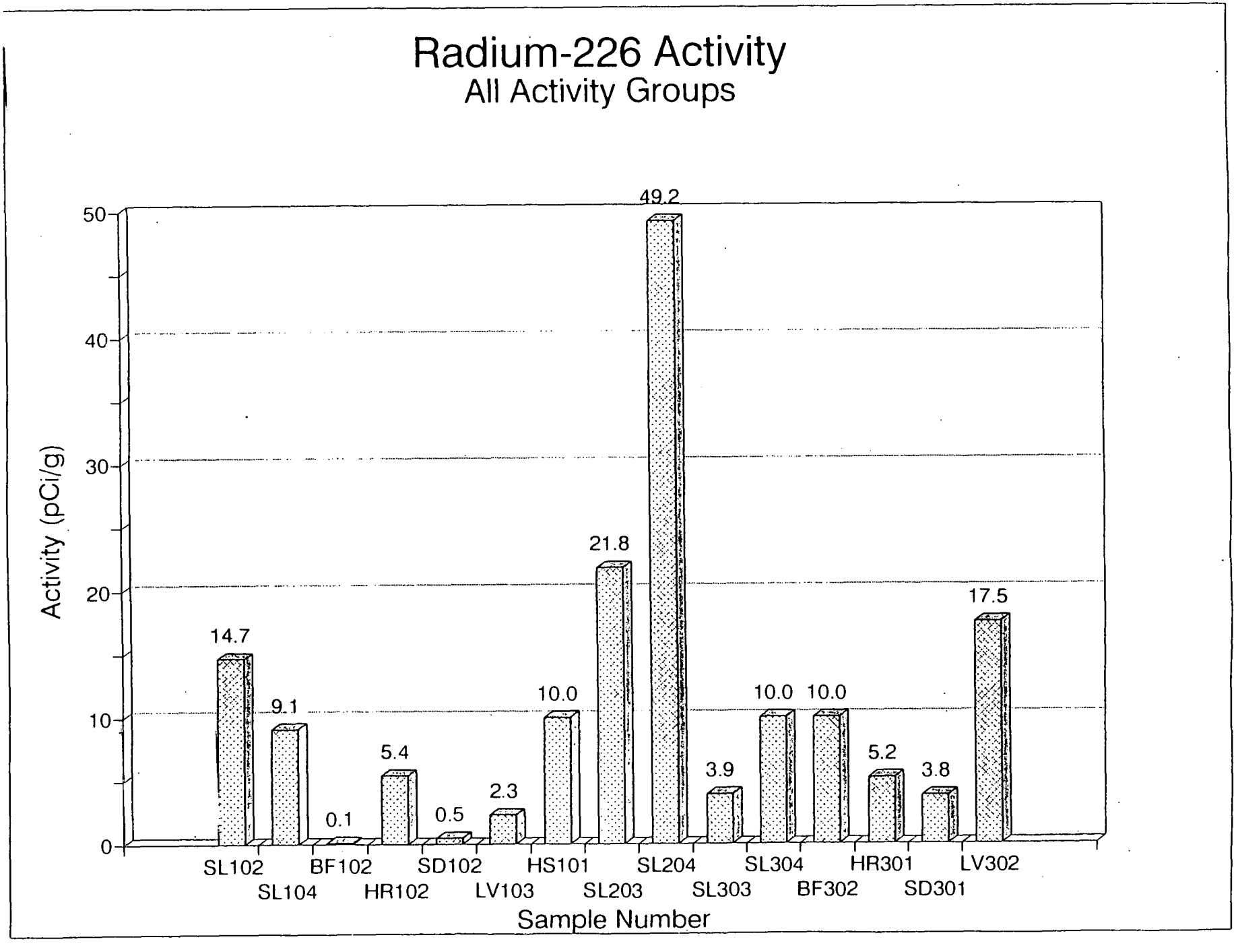


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Figure 12: Uranium activity for Group 1 samples
Figure 13: Uranium activity for Groups 2 & 3 samples
Figure 14: ^{230}Th activity for Group 1 samples
Figure 15: ^{230}Th activity for Groups 2 & 3 samples
Figure 16: ^{226}Ra activity for all activity Groups

Pertinent observations about the radionuclide distribution data are as follows:

- The data in **Table 5**, as well as **Figures 6 - 11**, shows the high degree of variability with respect to the distribution of the activity between the fractions. In most cases, the highest activity concentration (in pCi/g) was measured in the fines (< 38 μm). However, there were quite a few cases in which the large (> 150 μm) or medium (38-150 μm) fractions contained concentrations of the radionuclides comparable to or exceeding those in the fines. Examples of this include the following:

  - Uranium -- The ^{234}U, ^{238}U, and total Uranium activities in the large fraction of samples SL102, SL204, SL303, SL304, BF302, and SD301 are comparable to or exceed those in the fines.

  - ^{230}Th -- The distribution is highly variable. None of the samples have the highest activity level in the fines, with most showing the highest concentrations in the large fraction. In sample BF102, the activity in the large fraction constitutes about 84% of the total activity. In sample SL 104, a significant portion of the activity comes from the medium fraction, at 229 pCi/g. The large fractions of samples SL304 and HR301 showed very high activities, at 7224 and 2416 pCi/g, respectively.

  - ^{226}Ra -- This distribution is also highly variable, with the highest concentrations found in the large or fine fractions except in one case (HR102). Samples SL204 and SD301 showed the highest values, with 147 and 63 pCi/g being measured in the large fractions of these materials, respectively.

- Even though many of the samples contain high radionuclide activities in the large and medium soil fractions, in comparison to the fine fractions, the largest percent of the total activity (in pCi rather than pCi/g) still resides in the fines in all but a few instances. This is due to the much larger percentages of fine materials present in the majority of the samples.

- The isotopes ^{235}U, ^{228}Th, and ^{232}Th contribute very little to the overall activity

of the samples. ^{235}U usually comprised less than 3% of the total Uranium activity in any sample. The ^{228}Th and ^{232}Th activities were typically at least two orders of magnitude less than the ^{230}Th concentrations.

- **Figure 12** shows that all 7 of the Group 1 samples meet the cleanup criteria for Uranium (<50 pCi/g ^{238}U and <100 pCi/g total U), although SL102 and HR 102 are close to the limits. **Figure 13** shows that only two of the Groups 2 & 3 samples, SL304 and HR301, significantly exceed the cleanup criteria, while sample SL303 is on the borderline. Therefore, out of the 15 total samples, 13 would be expected to meet the cleanup criteria for Uranium with minimal or no treatment.

- The ^{230}Th activities shown on **Figures 14, 15** indicate that most of the samples will require significant treatment to meet the cleanup goals (<5 pCi/g for surface soils and <15 pCi/g for subsurface). Only BF102 and LV103 meet the surface criteria, although SD102 is on the borderline. The rest of the materials will require DFs of at least 2 (50% removal) to even meet the subsurface criteria. The worst case are samples SL304 and HR301, which require DFs greater than 80 to meet the subsurface criteria.

- As seen in **Figure 16**, 5 of the 15 samples readily meet the surface soil cleanup criteria for ^{226}Ra (<5 pCi/g), with two others, HR102 and HR301, on the borderline. With respect to the subsurface soil cleanup goal (<15 pCi/g), 12 of the samples already pass, with two others (SL203 and LV302) requiring moderate treatment to meet the criteria. Sample SL204 would require significant treatment to reduce its activity from 49 pCi/g to either of the cleanup goals.

- During the wet sieving of the samples into the seven size fractions, some activity was leached from the solids into the sieve solution/filtrate (deionized water). Observations relevant to this phenomenon include the following:

  - General -- U was more susceptible to leaching than either Th or Ra.

  - Uranium -- Removals were typically less than 3%, although 8% of all isotopes were removed from SL102, and 5-8% removals were measured for HS101.

  - Thorium -- ^{230}Th removals were typically less than 1%, although 3% was removed from LV302. The ^{228}Th and ^{232}Th isotopes typically exhibited higher percent removals (up to 14%), but these could be attributed to

the relatively low starting concentrations.

- Radium -- Radium removals were typically less than 1%.

In reviewing this data, one needs to consider two natural decay chains and the relationships of the various members of these chains. Of course the two chains of interest are the ^{238}U and ^{232}Th chains. Both decay chains exist in nature and by examining the activity levels of the various components, one can determine if chemical separations (either natural or induced by human activities) have taken place.

^{238}U Series

The ^{238}U series starts with ^{238}U decaying to ^{234}Th followed by ^{234}Pa, ^{234}U, ^{230}Th, ^{226}Ra and further progeny until ^{206}Pb is reached. If the uranium is of natural origin and no chemical separation and/or isotopic enrichment has taken place, one would expect an equilibrium condition with respect to the decay rates of ^{238}U and its progeny. Thus the decay rates of ^{238}U, ^{234}Pa, ^{234}U, ^{230}Th, and ^{226}Ra should roughly be equal, assuming that each of these radionuclides behaves similarly in the matrix and has not been removed. In all samples analyzed except SL304, roughly equal activity levels for ^{238}U and ^{234}U are seen. However, sample SL304 has a $^{234}U/^{238}U$ ratio of approximately 1.6. For this sample, all the fractions have approximately equal activities of ^{238}U and ^{234}U except the 0.7 $\mu m < X \leq 38$ μm fraction. The cause of this is unknown.

An equilibrium or close-to-equilibrium condition between ^{238}U, ^{234}U and ^{230}Th exists in only 1 sample (SL102). In 2 other samples (HR102 and LV103), the ^{230}Th activity levels are less than the ^{238}U and ^{234}U levels. In all other samples, the ^{230}Th activity levels are significantly higher than the ^{238}U and ^{234}U activity levels. In every sample the ^{226}Ra activity level is less than the ^{230}Th activity level and in all but one sample (LV103), the ^{226}Ra activity level is significantly less than the ^{230}Th activity level.

If the uranium has not been enriched, the activity contribution from ^{235}U should be about 2.2% of the total uranium activity. One can see that this is the case for all of the samples analyzed. Thus there is no strong evidence for uranium isotopic enrichment.

^{232}Th Series

The ^{232}Th series starts with ^{232}Th decaying to ^{228}Ra followed by ^{228}Ac, ^{228}Th, ^{224}Ra, ^{220}Rn and further progeny until ^{208}Pb is reached. If the thorium is of natural origin and no chemical separation and/or isotopic enrichment has taken place, one would expect an equilibrium condition with respect to the decay rates of ^{232}Th and its progeny. Thus the decay rates of ^{232}Th, ^{228}Ra, ^{228}Ac, ^{228}Th, and ^{224}Ra should roughly be equal, assuming that each of these radionuclides behaves similarly in the matrix and has not been removed. In all of the samples analyzed, the activity contributions from ^{232}Th and ^{228}Th are small in comparison to the activity from ^{230}Th; hence, they are relatively insignificant. It is difficult to reach a conclusion regarding the equilibrium condition between ^{232}Th and ^{228}Th due to the small activity levels.

3.1.4 Conclusions

- The St. Louis site soils contain relatively high proportions (range = 36-80%, average = 66%) of fine particles (< 38 μm). This tends to preclude the use of "classical" size separation soil washing processes. Therefore, the focus of the study should be shifted to chemical extraction of the radionuclides.

- The primary contaminant of concern is the Thorium-230, as it is present in concentrations that significantly exceed the cleanup goals (by two orders of magnitude in some cases). The Uranium and Radium activities are not quite as overwhelming, as many of the samples already fall under the goals.

- The distribution of the radionuclides within the soil fractions is highly variable. In many cases, the large fraction contained the highest concentration of some of the isotopes. Therefore, size separation of the soils to achieve simple volume reduction of the contaminated material does not look very promising. This technique is also hindered by the relatively small percentages of the large fraction materials (< 10% on average).

3.2 Composite Sample Characterization

The 28 discrete soil samples from the St. Louis site were blended into seven composite materials, based on the criteria described in Section 2.3. These composites were wet sieved into three fractions and analyzed for gross α/β radioactivity and moisture content. The raw data from the composite characterization tests can be

Table 7. Composite Gross Activity versus Size Fraction

Composite Number	Particle Size (%) Size Fraction (microns)			Alpha Activity (pCi/g) Size Fraction (microns)			Alpha Activity (pCi/g) Whole Solids	Beta Activity (pCi/g) Size Fraction (microns)			Beta Activity (pCi/g) Whole Solids	Total Activity (pCi/g) Size Fraction (microns)			Total Activity (pCi/g) Whole Solids	Alpha: Beta Ratio
	>150	38-150	<38	>150	38-150	<38		>150	38-150	<38		>150	38-150	<38		
SL1C	7.4	21.9	70.8	84	122	414	330	24	51	190	149	108	173	604	479	2.22
SL2C	9.8	17.5	72.7	221	253	860	694	64	89	310	249	286	342	1,170	942	2.79
SL3C	3.8	16.4	79.9	710	187	1,567	1,311	260	79	472	402	970	266	2,040	1,712	3.26
BF1C	18.3	27.8	53.9	135	43	79	80	35	27	41	38	170	70	120	118	2.13
BF3C	4.0	21.2	74.9	425	222	503	441	96	97	146	136	521	319	649	576	3.25
LV1C	8.3	19.4	72.3	20	15	64	52	9	16	27	25	29	30	91	77	2.11
LV3C	5.0	20.9	74.0	26	31	258	200	10	24	145	114	36	55	402	314	1.75
Average	8.1	20.7	71.2	--	--	--	--	--	--	--	--	--	--	--	--	2.50
Maximum	18.3	27.8	79.9	710	253	1,567	1,311	260	97	472	402	970	342	2,040	1,712	3.26
Minimum	3.8	16.4	53.9	20	15	64	52	9	16	27	25	29	30	91	77	1.75

Table 8. Composite Sample Characterization Summary

Parameter	Units	Composite Number							Maximum Value	Minimum Value	Ave.	Std. Dev.
		SL1C	SL2C	SL3C	BF1C	BF3C	LV1C	LV3C				
Particle Size Distribution												
>150 microns	%	7.4	9.8	3.8	18.3	4.0	8.3	5.0	18.3	3.8	8.1	4.7
38-150 microns	%	21.9	17.5	16.4	27.8	21.2	19.4	20.9	27.8	16.4	20.7	3.4
<38 microns	%	70.8	72.7	79.9	53.9	74.9	72.3	74.0	79.9	53.9	71.2	7.6
Gross Activity (measured)												
Alpha	pCi/g	330.4	693.5	1,310.6	80.0	440.8	52.4	199.5	1310.6	52.4	--	--
Beta	pCi/g	148.8	248.7	401.5	37.5	135.5	24.8	114.2	401.5	24.8	--	--
Total	pCi/g	479.2	942.2	1,712.1	117.5	576.3	77.2	313.7	1712.1	77.2	--	--
Alpha:Beta ratio	--	2.22	2.79	3.26	2.13	3.25	2.11	1.75	3.3	1.7	2.5	0.6
Isotopic Activity (estimated)												
Uranium-238	pCi/g	30.1	25.9	77.2	16.3	72.7	6.3	8.5	77.2	6.3	--	--
Total Uranium	pCi/g	60.7	57.2	188.1	33.0	148.1	13.0	18.1	188.1	13.0	--	--
Thorium-230	pCi/g	69.9	286.4	961.2	12.9	663.0	14.8	68.1	961.2	12.9	--	--
Radium-226	pCi/g	11.9	35.5	6.9	2.0	6.3	6.2	17.5	35.5	2.0	--	--
Ratio of Total Alpha/Beta to Isotopic Activities												
Ratio Basis												
Total Uranium	--	7.89	16.47	9.10	3.56	3.89	5.94	17.33	17.3	3.6	9.2	5.2
Thorium-230	--	6.86	3.29	1.78	9.11	0.87	5.22	4.61	9.1	0.9	4.5	2.7
Total Isotopes	--	2.78	2.33	1.39	1.83	0.65	1.92	2.80	2.8	0.6	2.0	0.7
Estimated Decontamination Factors (DFs) Required												
Basis	Goal (pCi/g)	SL1C	SL2C	SL3C	BF1C	BF3C	LV1C	LV3C	Max.	Min.	Ave.	St.D.
Uranium-238	50	0.6	0.5	1.5	0.3	1.5	0.1	0.2	1.5	0.1	0.7	0.5
Total Uranium	100	0.6	0.6	1.9	0.3	1.5	0.1	0.2	1.9	0.1	0.7	0.6
Thorium-230	5	14.0	57.3	192.2	2.6	132.6	3.0	13.6	192.2	2.6	59.3	69.3
	15	4.7	19.1	64.1	0.9	44.2	1.0	4.5	64.1	0.9	19.8	23.1
Radium-226	5	2.4	7.1	1.4	0.4	1.3	1.2	3.5	7.1	0.4	2.5	2.1
	15	0.8	2.4	0.5	0.1	0.4	0.4	1.2	2.4	0.1	0.8	0.7

Note: Shading indicates activity levels exceeding the cleanup criteria (i.e. - required DF > 1).

Figure 17.

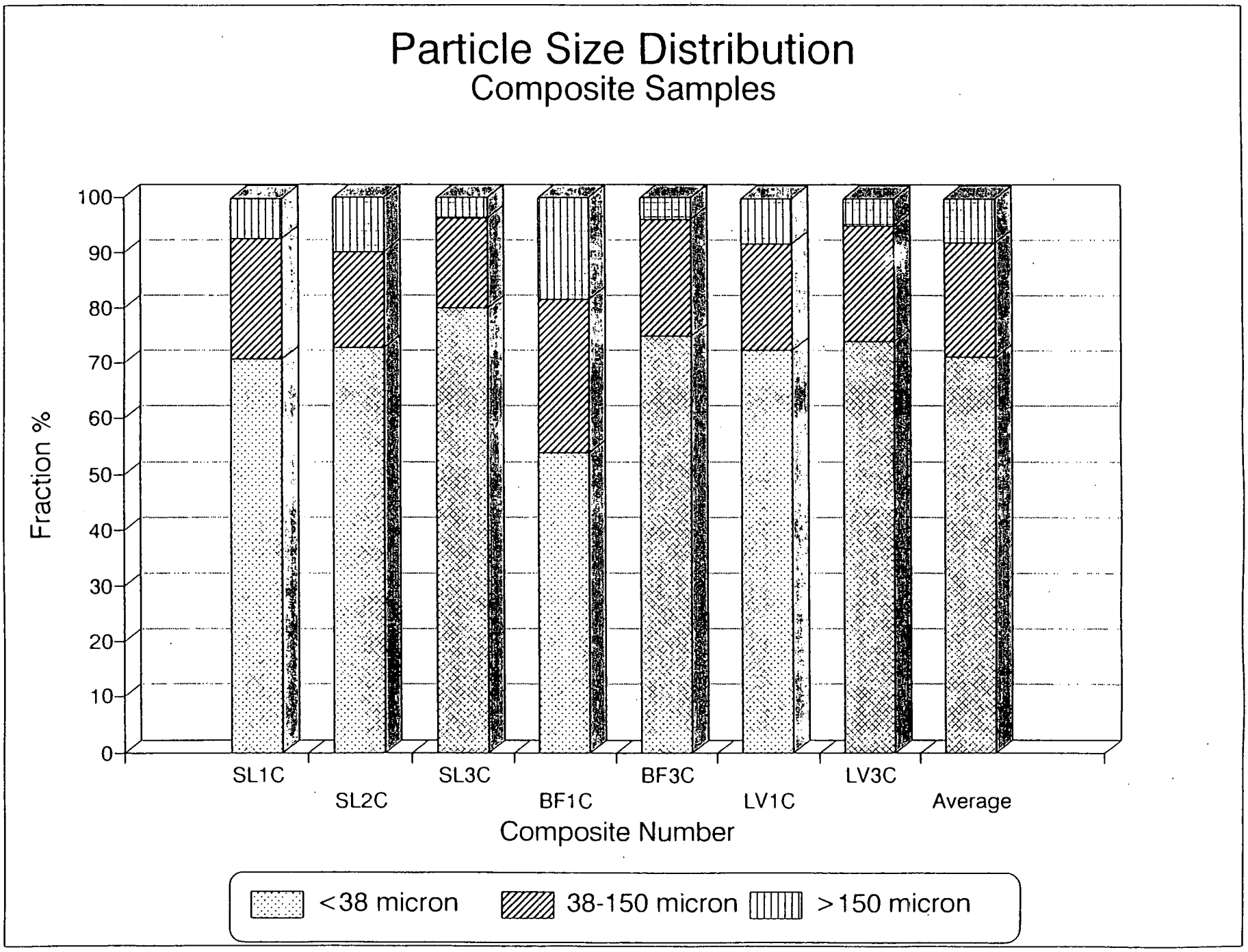

Particle Size Distribution
Composite Samples
Fraction %
100
90
80
70
60
50
40
30
20
10
0
SL1C
SL2C
SL3C
BF1C
BF3C
LV1C
LV3C
Average
Composite Number
<38 micron
38-150 micron
>150 micron

Figure 19.

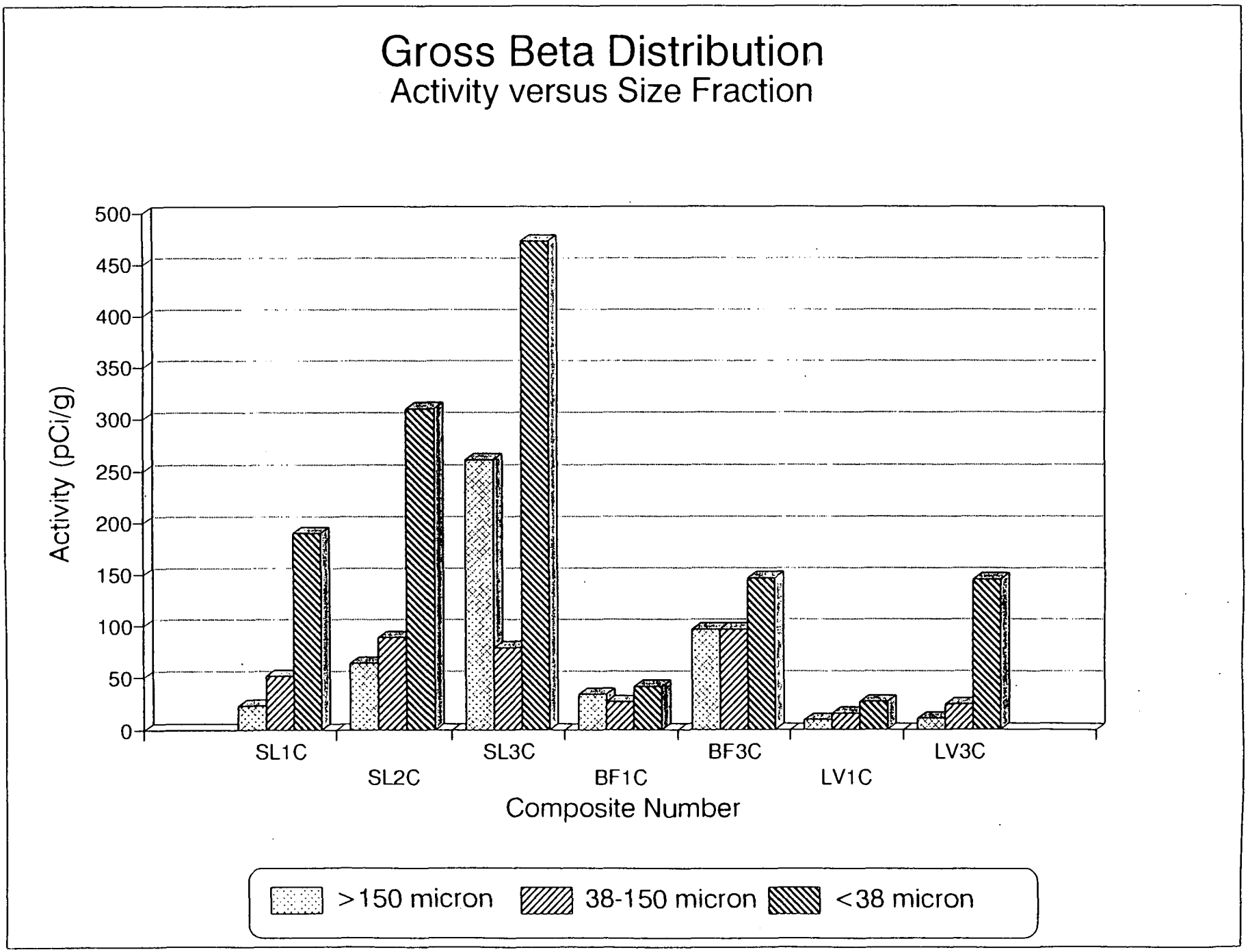
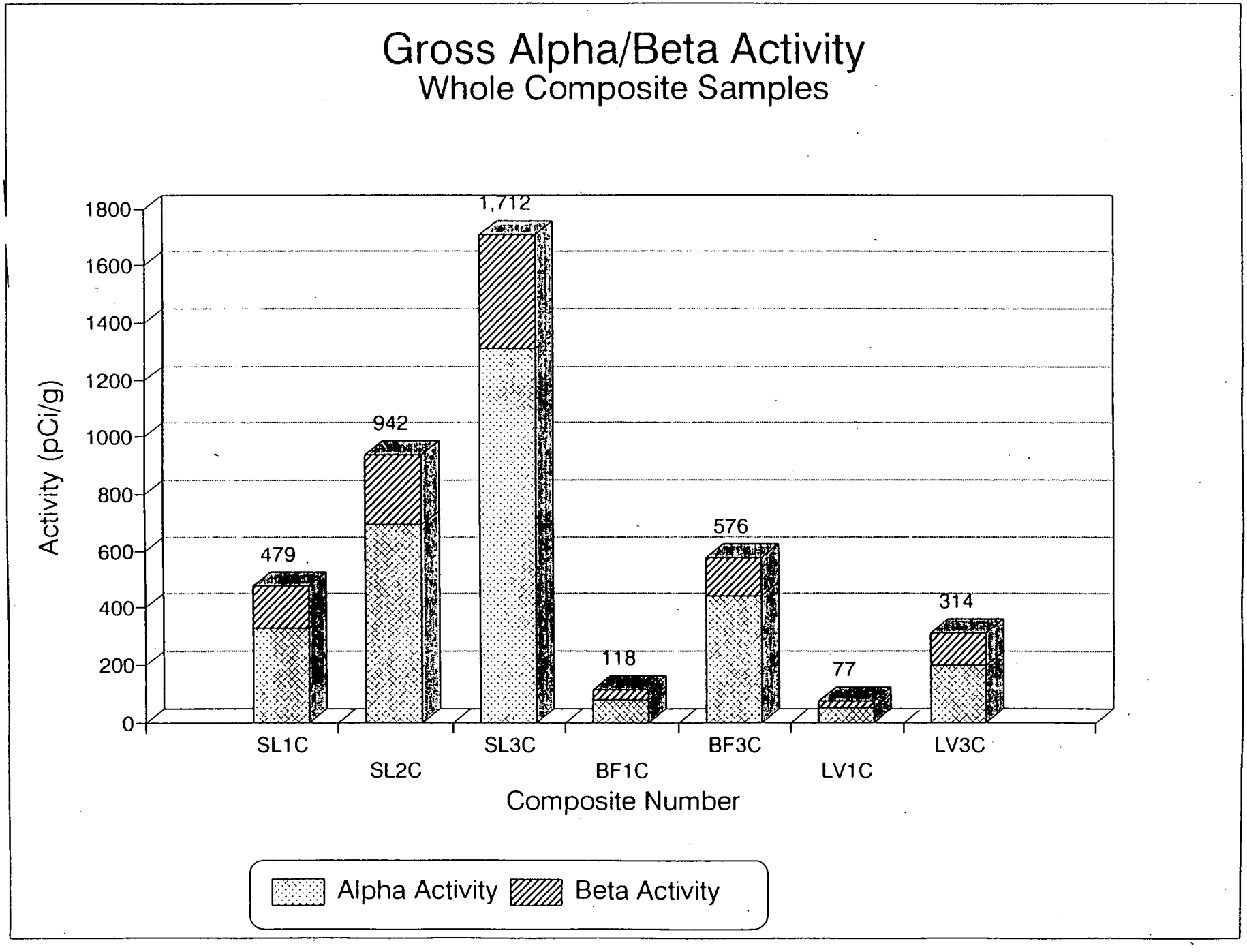

Gross Beta Distribution
Activity versus Size Fraction
Activity (pCi/g)
500
450
400
350
300
250
200
150
100
50
0
SL1C
SL2C
SL3C
BF1C
BF3C
LV1C
LV3C
Composite Number
>150 micron
38-150 micron
<38 micron

Figure 20.



are based on the measurements from the discrete samples that were blended into the composite. These values are used in the last two sections of the table for comparison to the α/β measurements and the cleanup criteria.

Pertinent observations about the composite data are as follows:

- The next to last section of **Table 8** shows the comparison of the gross α/β measurements to various isotopic measures. Due to the highly variable nature of these ratios, there is essentially no correlation that can be made between the two measurements.

- Similar to the isotopic analyses, some activity was removed from the soils by the DI water wash solution during the wet sieving process. The removals were typically less than 2% of the total activity, although 7% of the beta and 4% of the total activity ended up in the filtrate for sample LV1C. Beta removal percentages were generally higher than those for the alpha activity.

- The last section of **Table 8** presents the required decontamination factors (DFs) for the composite samples, based on the estimated isotopic concentrations and the cleanup goals. Observations are as follows:

  - Uranium -- Only SL3C and BF3C exceed the cleanup goals, and these two materials would only require minimal treatment to achieve the required DF of 1.5-2. This information is consistent with the data shown on Figures 12 and 13, as the discrete samples that exceeded the cleanup goals are included in these two composites: SL3C contains samples SL303 and SL 304, and BF3C contains HR301.

  - ^{230}Th -- Concentrations significantly in excess of the cleanup goals are noted for all of the composites, consistent with the previous data shown in Figures 14 and 15. The average DFs required are 60 and 20 to achieve the cleanup goals of % pCi/g and 15 pCi/g, respectively. Individual composite DFs exceed 100 in two instances (SL3C and BF3C).

  - ^{226}Ra -- Minimal to moderate treatment will be required to achieve the cleanup criteria for Radium. Five of the 7 composites already meet the 15 pCi/g goal. This is consistent with the Figure 16 data, where 12 of the 15 samples were shown as passing this criteria. The toughest composite to treat is SL2C (DF = 7.1 or 2.4), as it contains sample SL204, which had the highest measured activity of 49 pCi/g.

- The particle size distribution data for the composite materials was comparable to that obtained in the analysis of the discrete samples, although some variation in the fraction percentages was noted.

3.2.3 Conclusions

- The composite testing confirmed the particle size distribution data from the discrete sample analyses. The percentage of material larger than 150 μm is less than 20%, and the percentage of fines (< 38 μm) is between 55-80%.

- The gross α/β measurements do not correlate very well with the estimated isotopic measurements. However, the α/β analyses can still be used as a screening tool to determine the relative success of the chemical extraction tests with respect to the DF. Isotopic analyses would be conducted on those tests which had very high DFs.

- The data shows that composites BF1C and LV1C should be the easiest materials to treat successfully, as they only require DFs of 1-3 to meet the cleanup goals for ^{230}Th. They already meet the goals for U and Ra.

- Composites SL1C and LV3C require minimal to moderate treatment to meet all of the cleanup criteria. Both already pass for Uranium, and require DFs up to 4 to meet the Ra goal of 5 pCi/g. DFs of 15 and 5 would be required to meet the Thorium cleanup goals of 5 and 15 pCi/g, respectively.

- The remaining composites, SL2C, SL3C, and BF3C, will all require significant treatment to meet the cleanup criteria. The required DFs for Uranium and Radium are very manageable. The removal of Thorium, however, will be much more difficult, as DFs up to 60 will be required to even meet the 15 pCi/g criteria.

3.3 Extractability Testing

As described in **Section 2**, a limited number of physical and chemical treatment tests have been conducted on some (samples **SL3C** and **BF1C**) of the composite materials as part of the characterization strategy. The purpose of these tests was to assess the relative extractability of the radionuclides from the St. Louis site soils, either by attrition scrubbing or through the application of specific selective chemical extractants.

3.3.1 Attrition Scrubbing

A nominal 60% (w/w) solids slurry was agitated in the cell for 30 minutes at ambient temperature. The treated samples were wet sieved into the three size fractions, with each one analyzed for gross α/β radioactivity and moisture content. The wash/rinse water was analyzed for gross α/β. As illustrated in **Figures 21 - 24**, the percent of total activity removed, based on gross α/β results, ranged from 1.2% - 9.7%. These results demonstrate clearly that the contaminants are not readily solubilized by water alone, nor are they easily abraded away.

3.3.2 Chemical Extraction

As discussed in **Section 2**, chemical extraction tests conducted as part of the characterization phase evaluated four (4) specific chemical extraction solutions. The extraction solutions selected were known, based on previous corporate experience and/or literature precedent, to be effective for the removal of the specific radionuclide contaminants found in the St. Louis Site soils, *i.e.*, U, Th and Ra. These extraction solutions employed chelating ligands (EDTA and TIRON®) and/or complexing ligands (*e.g.*, carbonate, CO_3^{2-}) to selectively enhance the dissolution of the radionuclides. In addition, the reducing agent sodium dithionite ($Na_2S_2O_4$) was evaluated for its ability to augment the ligand-promoted dissolution.

The specific extractants examined were as follows:

1. 0.1M EDTA + 0.5M CO_3^{2-} (as $NaHCO_3$), pH = 9.0
2. 0.1M TIRON® + 0.5M CO_3^{2-} (as $NaHCO_3$), pH = 9.0
3. 0.1M EDTA + 0.5M CO_3^{2-} (as $NaHCO_3$) + 0.1M $S_2O_4^{2-}$, pH = 9.0
4. 0.1M TIRON® + 0.5M CO_3^{2-} (as $NaHCO_3$) + 0.1M $S_2O_4^{2-}$, pH = 9.0

Figures 21 - 24 illustrate the percent of total activity removed, based on gross α/β results, for each of the extractants. The EDTA/carbonate extractant, without added sodium dithionite, is unquestionably the most effective of the four solutions, with removals ranging from 87% - 99.5% of total activity. The TIRON®/carbonate extractant is much less effective, with removals ranging from 35% - 56% of total activity. Since all of the isotopic analytical results are not yet available, it is not possible to evaluate the selectivity of either chelating agent.

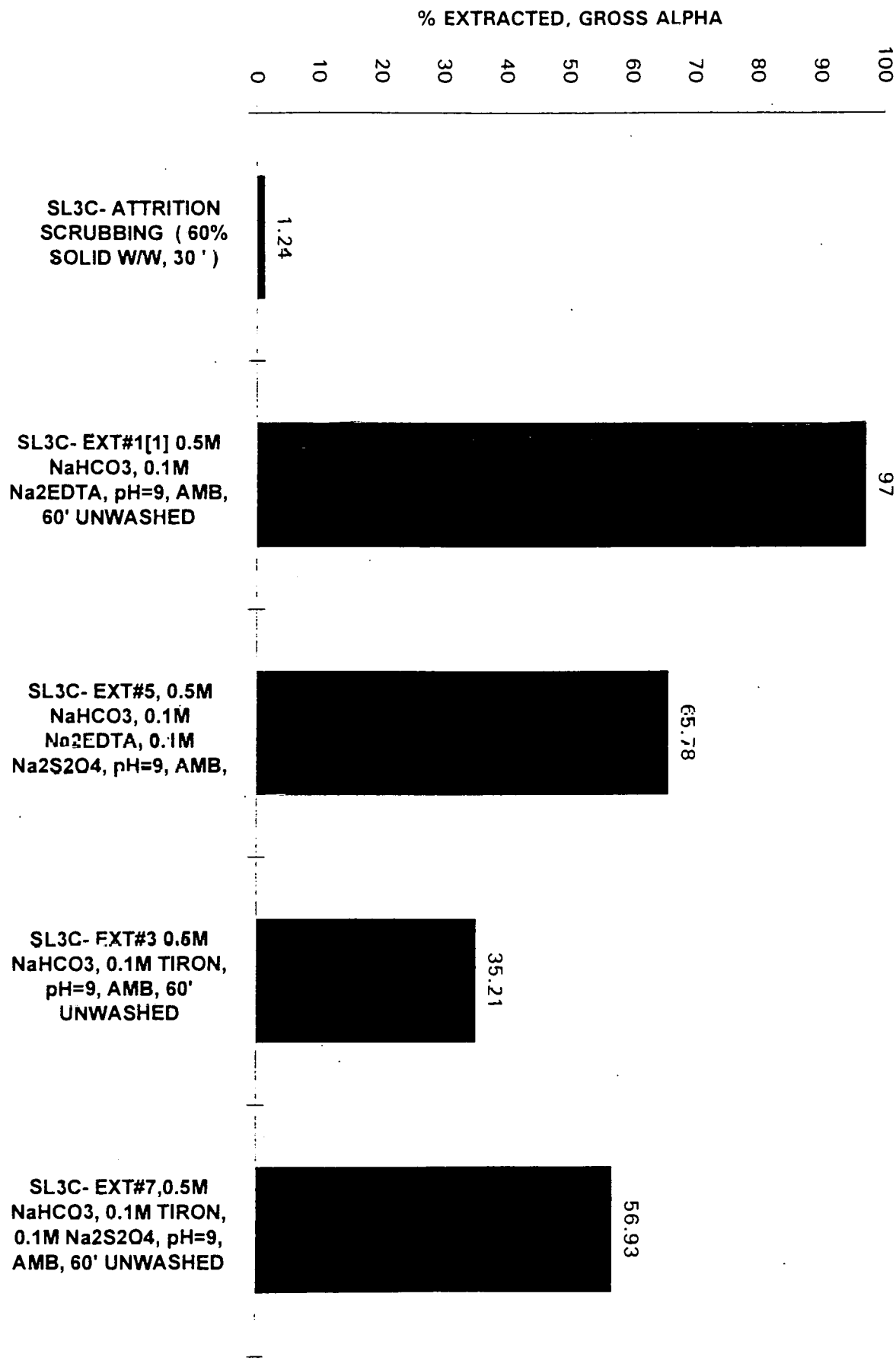
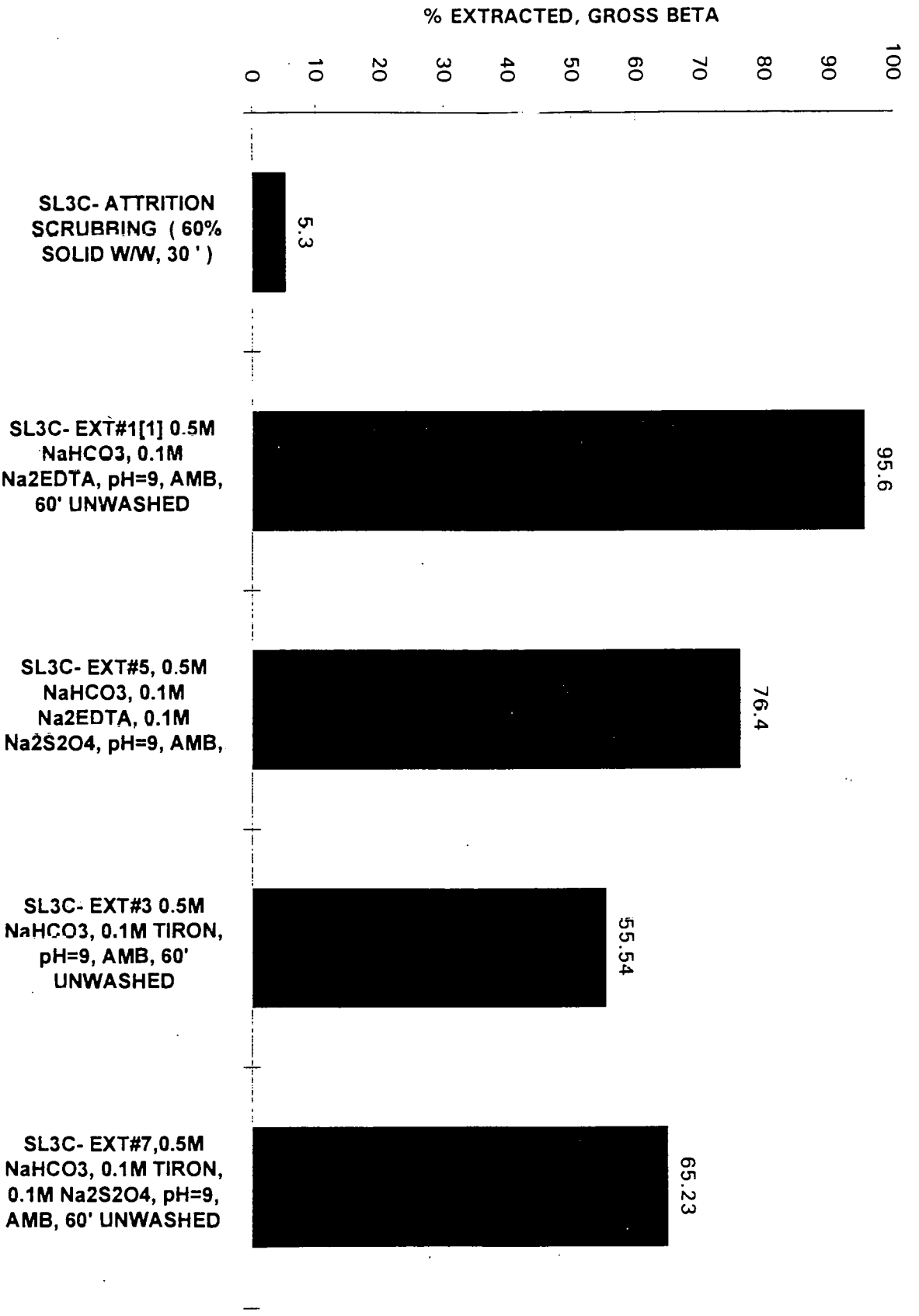


Figure 21. Extractant Screening - Sample SL3C, Gross Alpha

SL3C

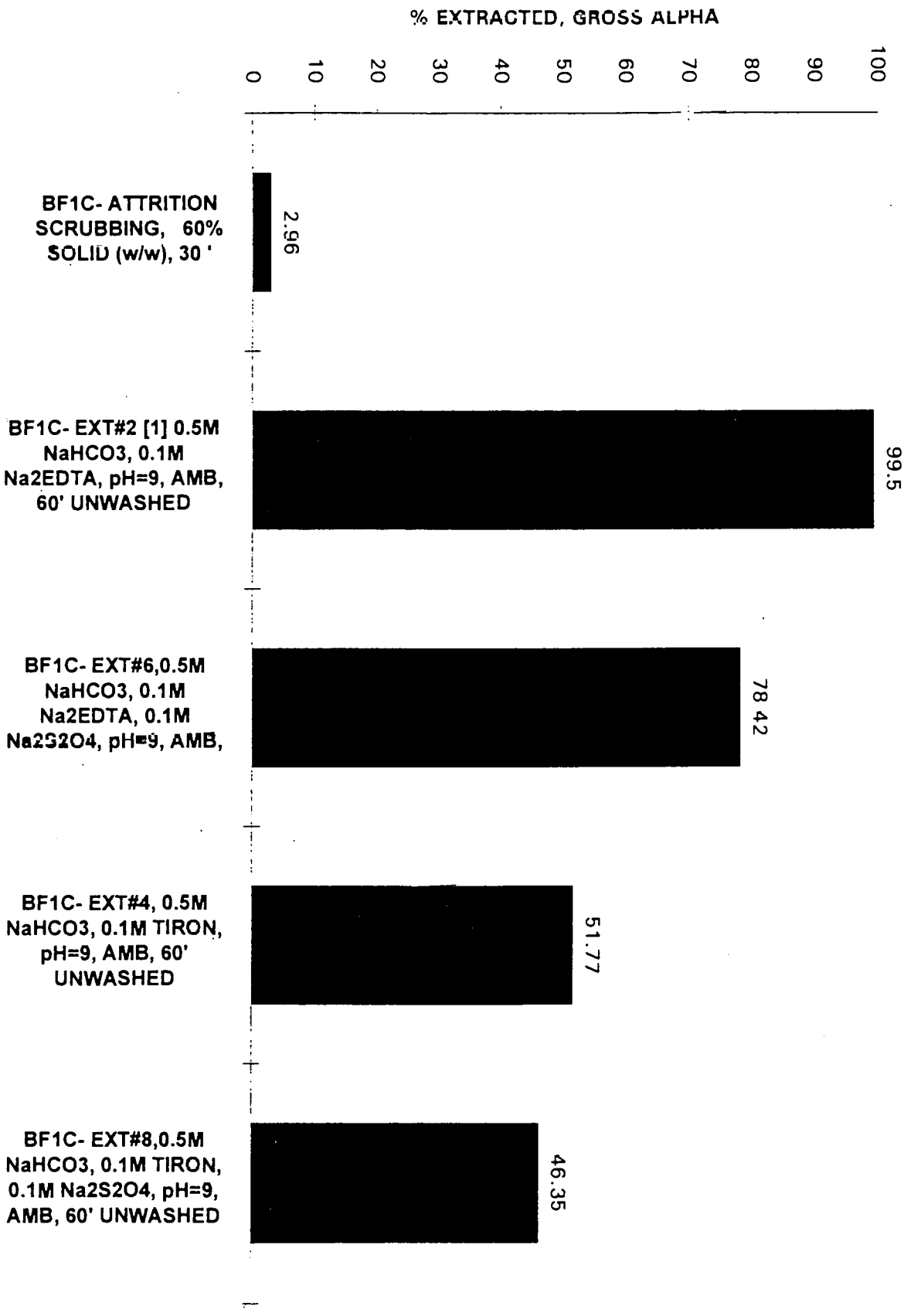
RL1181



SL3C

Figure 22. Extractant Screening - Sample SL3C, Gross Beta

13192



BF1C

Figure 23. Extractant Screening - Sample BF1C, Gross Alpha

T11181

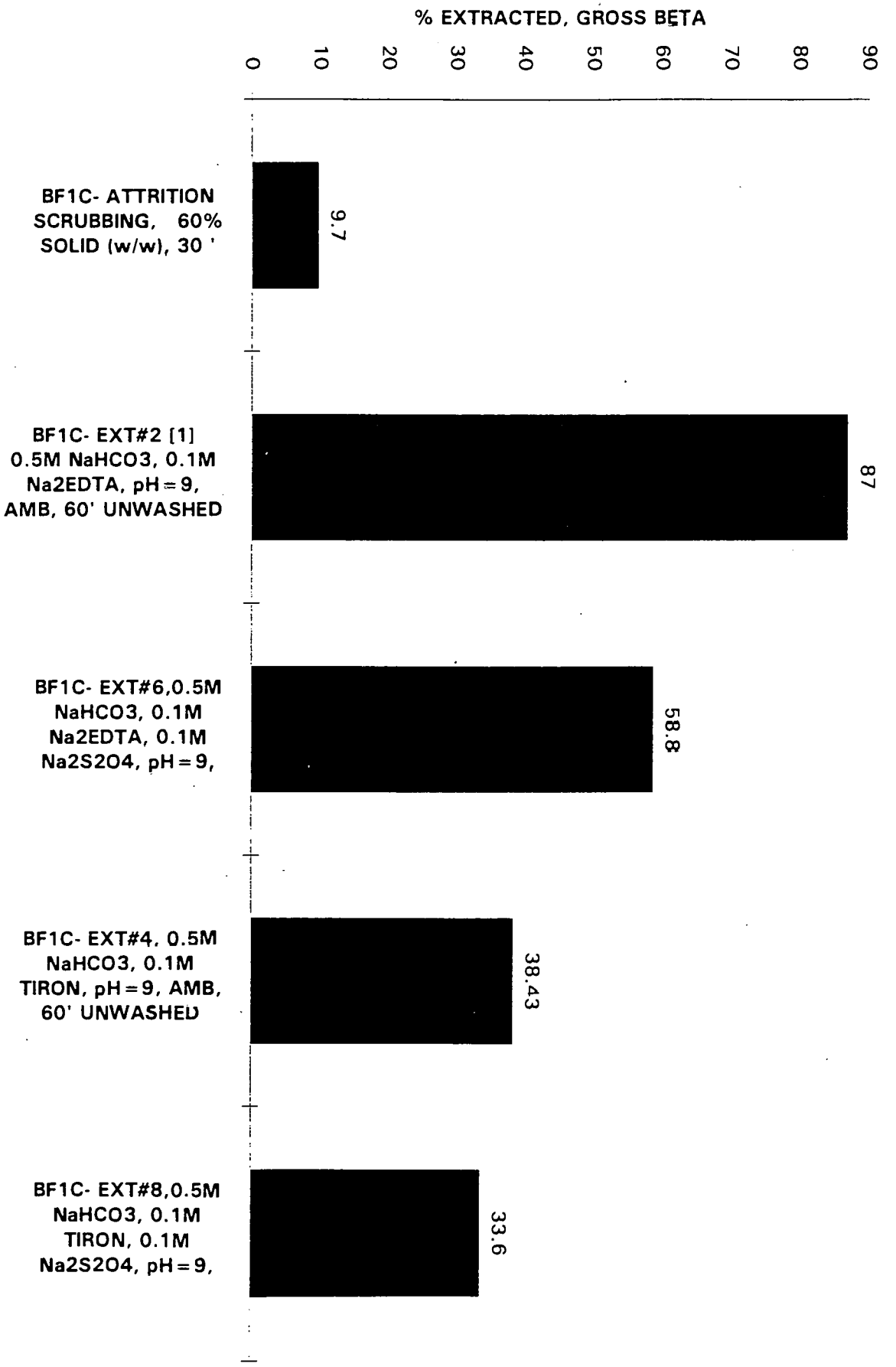


Figure 24. Extractant Screening - Sample BF1C, Gross Beta

BF1C

CCCIEI

Inclusion of sodium dithionite in the EDTA/carbonate extraction solution diminishes significantly the removal efficiency, for both composite samples. Inclusion of dithionite in the TIRON®/carbonate extractant increases removal efficiency for sample **SL3C**, between 10% - 20%, while for sample **BF1C** the removal efficiencies are diminished by approximately 5%. Clearly, the results obtained by inclusion of dithionite are conflicting; only for one sample (**SL3C**) did dithionite increase removal, and only when TIRON® was employed as the chelant. This result may imply that a portion of the uranium is present as hexavalent [U(VI)] species, which are reported[5b] to be more readily solubilized by TIRON® after re-speciation to U(IV). In contrast, dithionite suppressed radionuclide removal from both samples when EDTA was the chelant, as well as for sample **BF1C** when TIRON® was used. Since the primary consequence of dithionite addition is to induce reductive dissolution of surficial metal oxide coatings, the resultant dissolved solids (Mn, Fe, Mg and Ca solids) burden, and the corresponding competition for EDTA, may outweigh any incremental dissolution of the target contaminants.

Isotopic analytical results, obtained on the filtercake and extraction fluid resulting from the EDTA/carbonate (w/o dithionite) extractant, are illustrated in **Figures 25 - 32.** Although isotopic radioanalytical data is incomplete, the results available indicate that (i) both ^{238}U and total uranium clean-up goals can be readily accomplished, (ii) ^{230}Th removal ranges from approximately 88% - 98.4%, but requires further optimization to attain the clean-up goals, and (iii) ^{226}Ra removal ranges from approximately 33% - 67%, and will also require further optimization to realize the clean-up goals.

3.3.3 Conclusions

Based on the results obtained through characterization, the St. Louis site soils include a very high percentage of fine soil particles, *e.g.*, silt and clay particles. The samples characterized average approximately 68% (w/w) < 38 μm in size. In addition, the radionuclide distribution is highly variable, with significant concentrations measured in all soil fractions. Consequently, classical soil washing, *i.e.*, separation based on particle size alone, shows little or no potential for volume reduction of contaminated soils at the St. Louis site. It is recommended that no further testing of size separation processes be pursued.

No results have been obtained to date on density separation techniques. Since a primary source of thorium in nature is monazite,[9] with a particle density approximately twice that of "average" soil particles, density separation may offer

[9] Monazite ≡ A complex phosphate containing thorium, cerium and other lanthanides.

SL3C
U-238

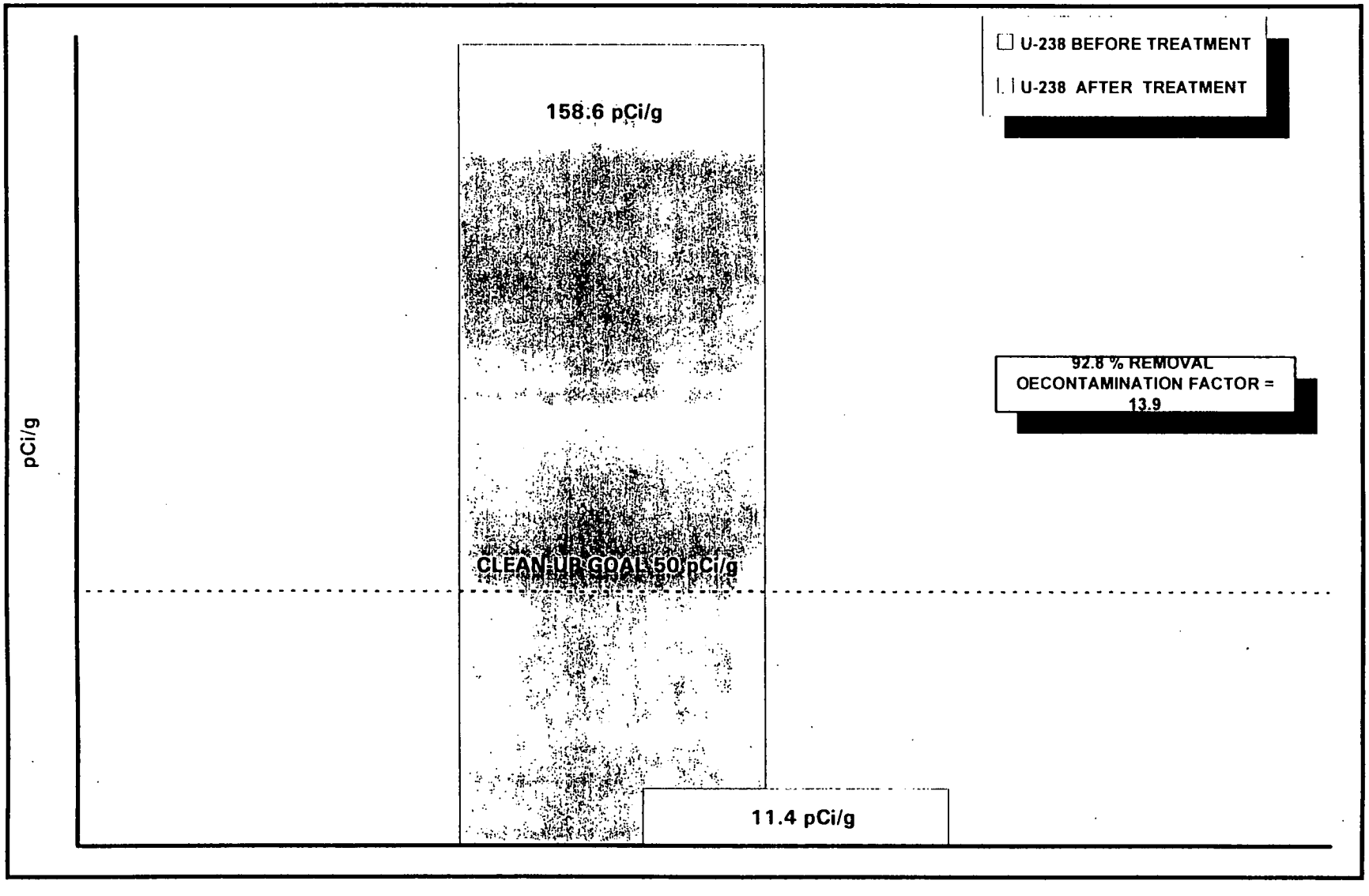


Figure 25. Extractant Screening - Sample SL3C, ^{238}U Removal

131772

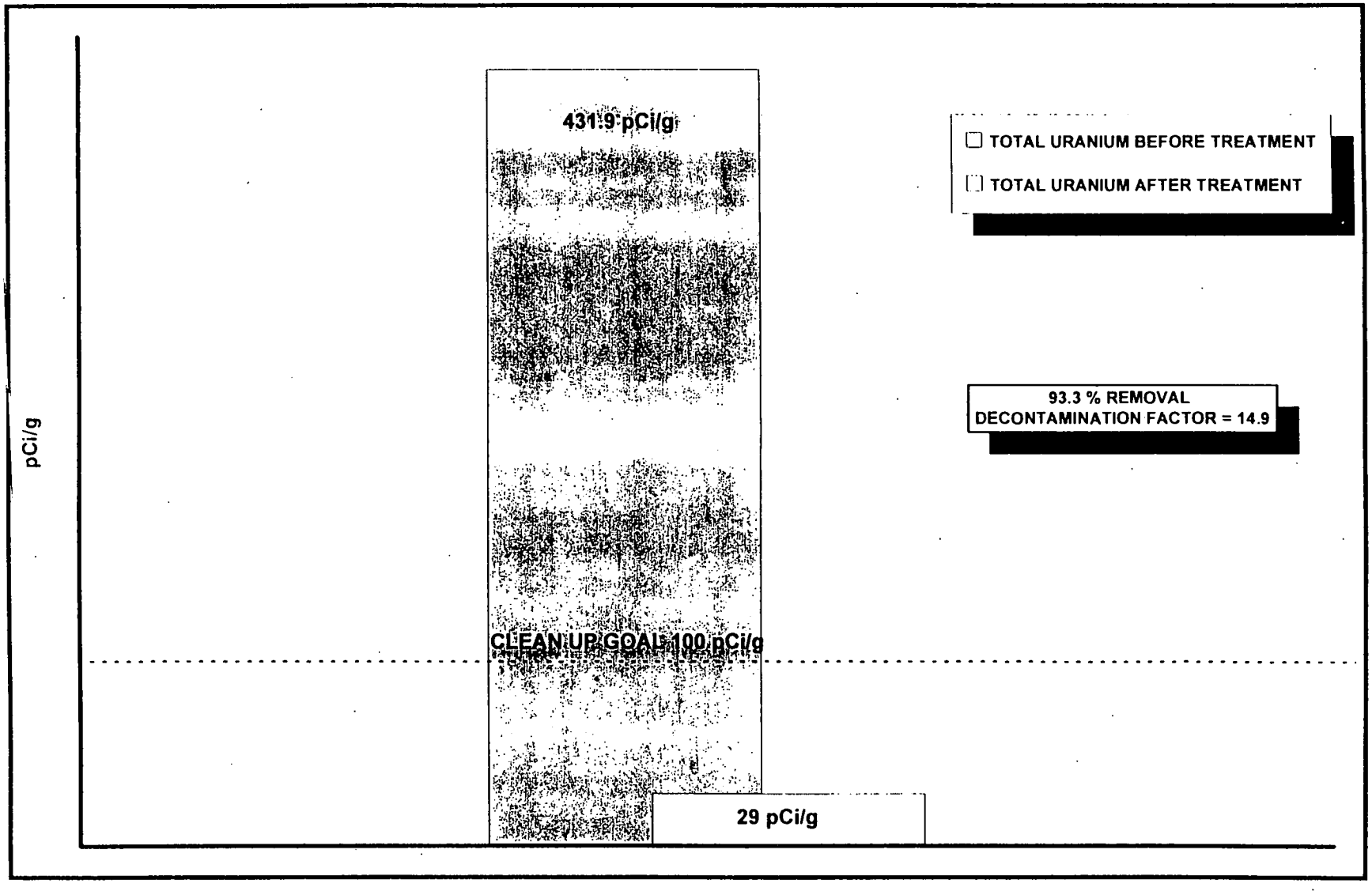


Figure 26. Extractant Screening - Sample SL3C, Total Uranium Removal

SL3C
Th-230

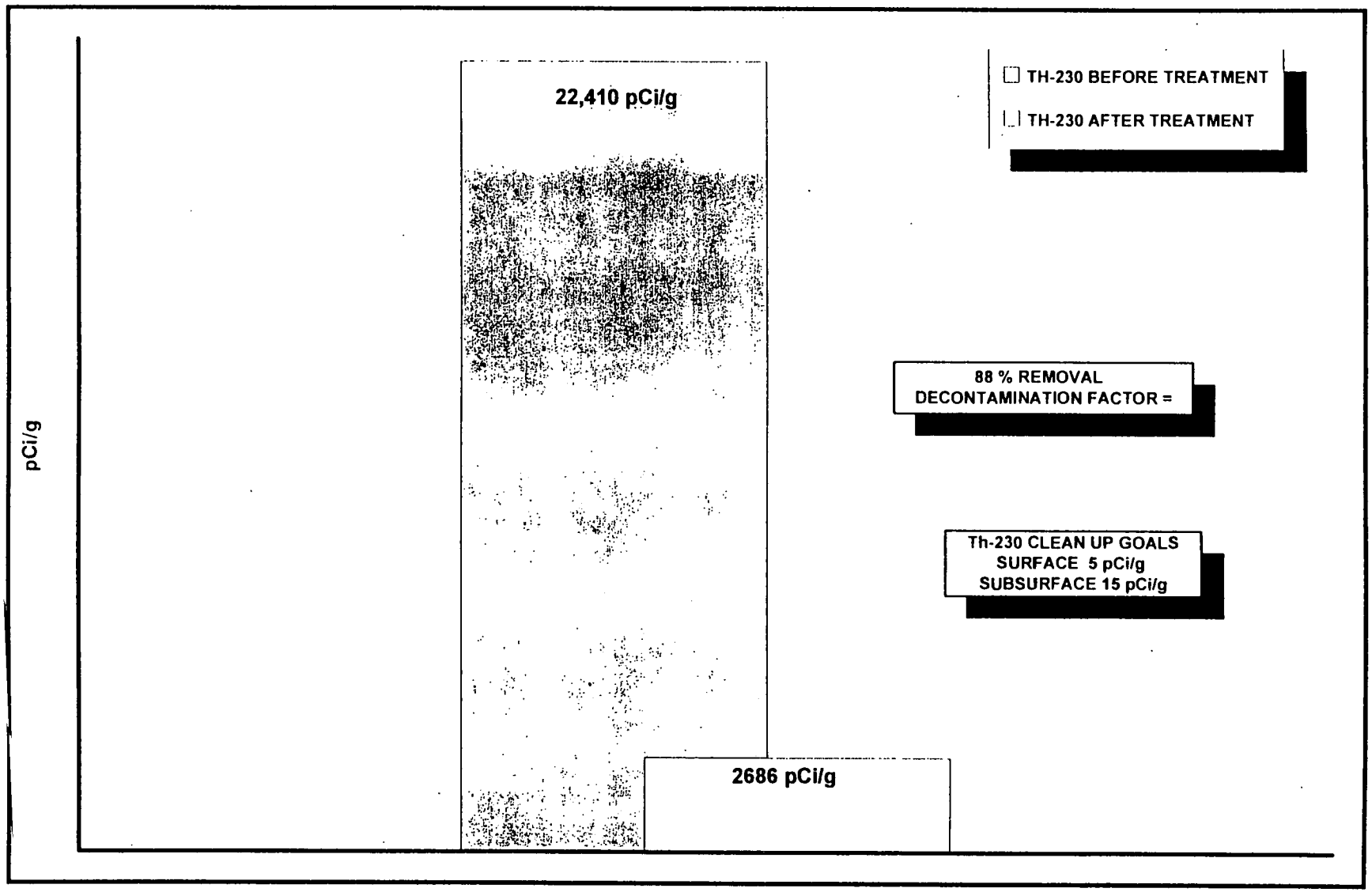


Figure 27. Extractant Screening - Sample SL3C, ^{230}Th Removal

181774

SL3C
Ra-226

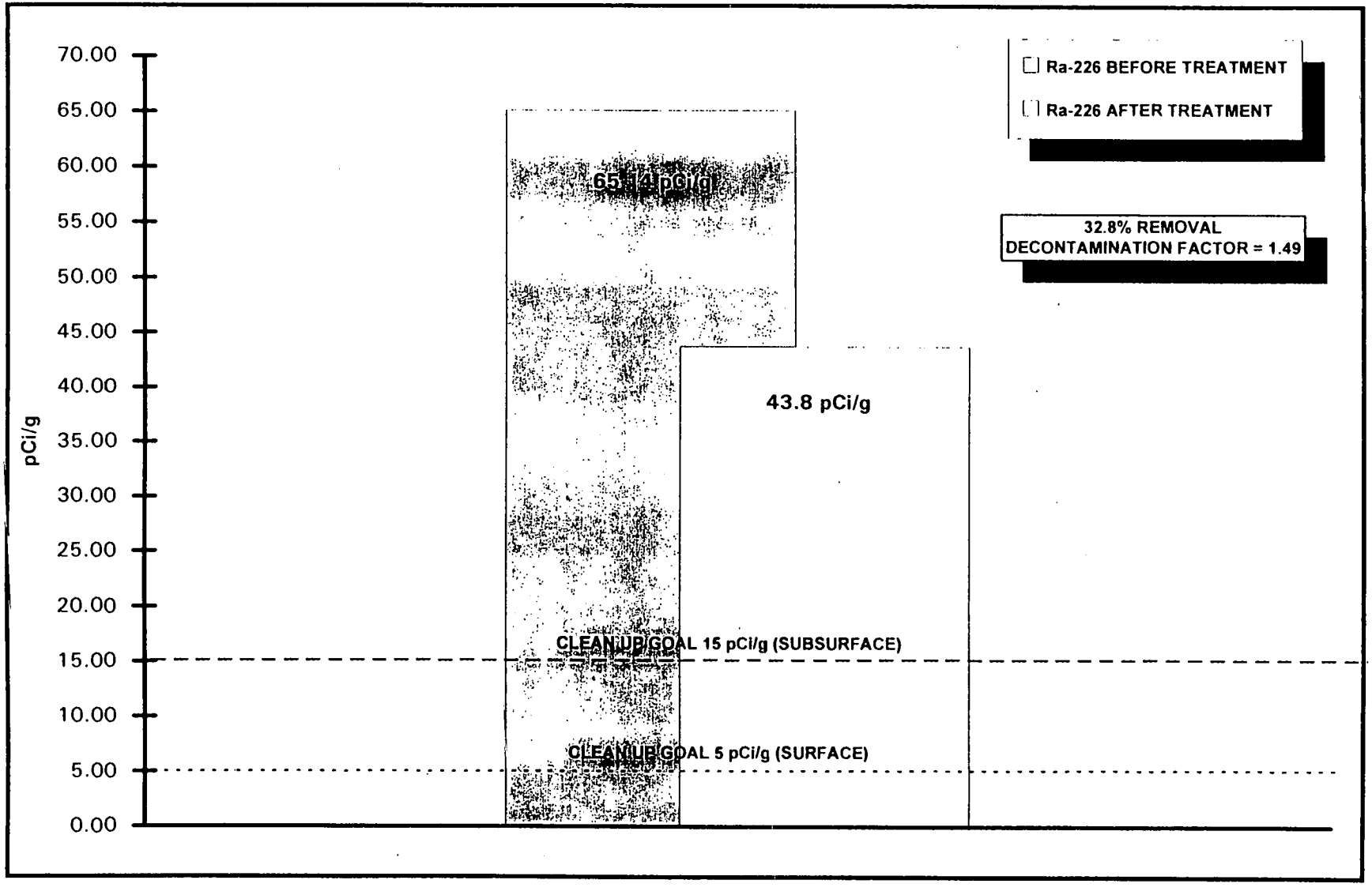


Figure 28. Extractant Screening - Sample SL3C, ^{226}Ra Removal

BF1C
U-238

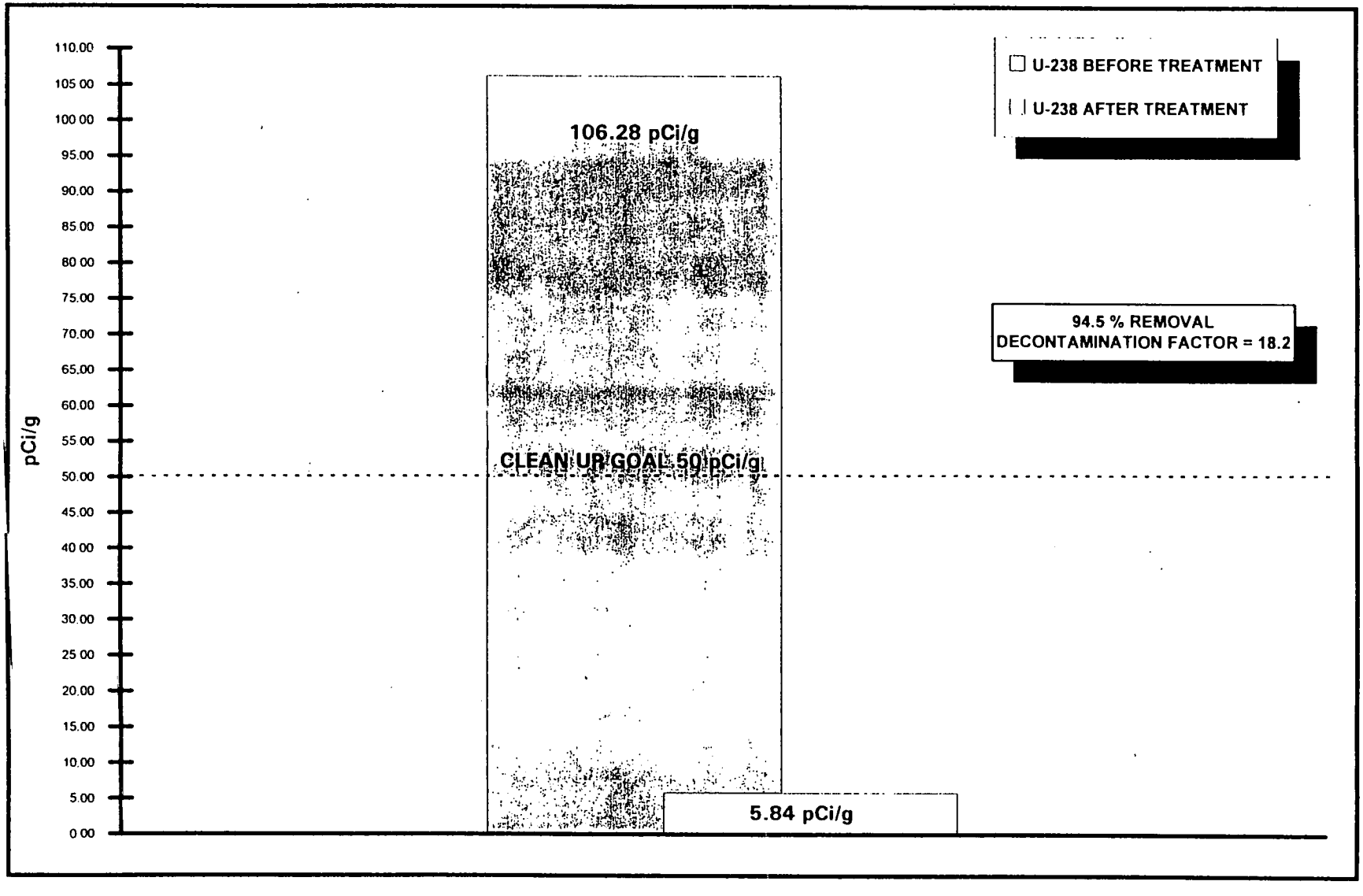


Figure 29. Extractant Screening - Sample BF1C, ^{238}U Removal

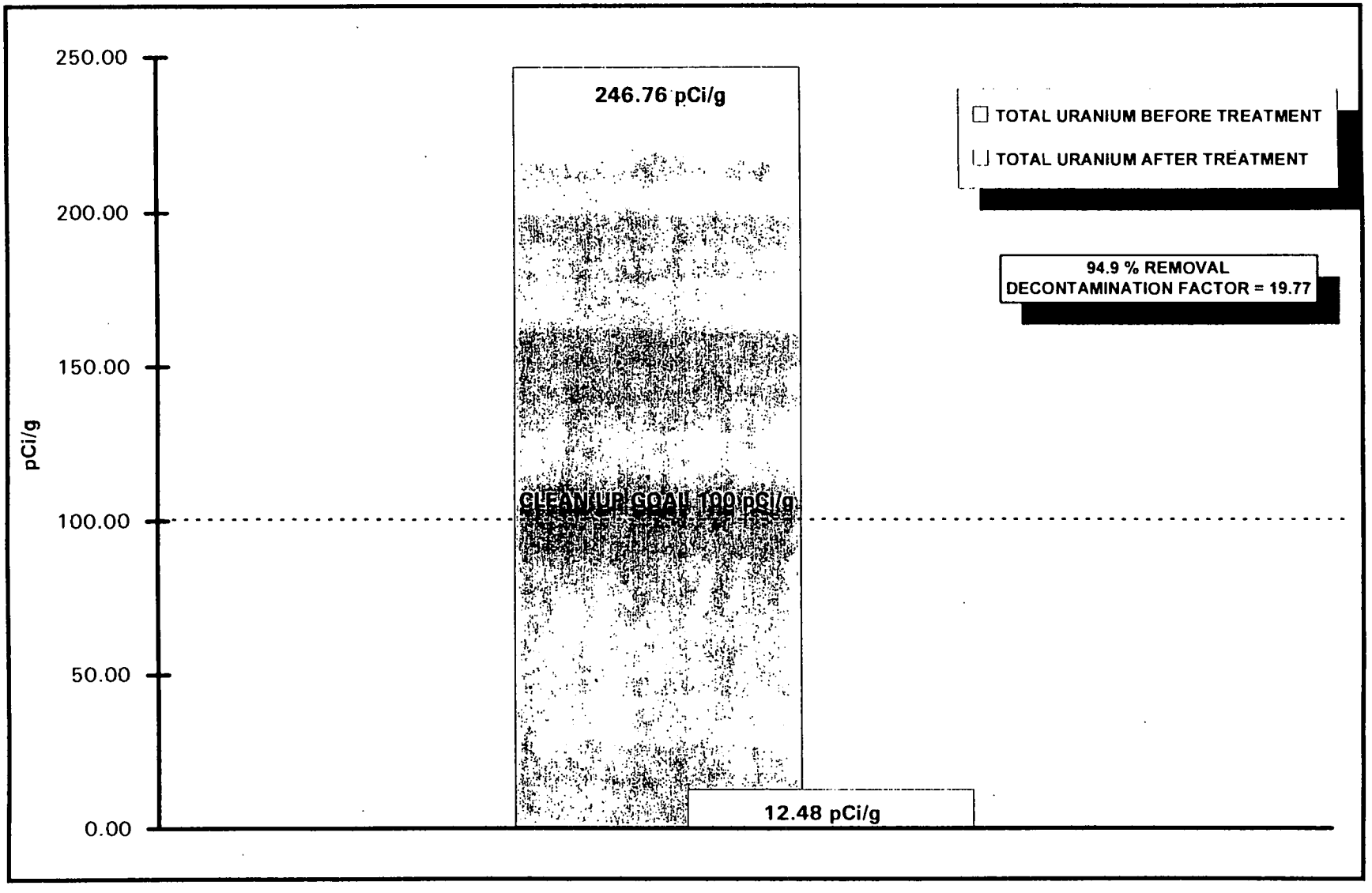


Figure 30. Extractant Screening - Sample BF1C, Total Uranium Removal

BF1C
Th-230

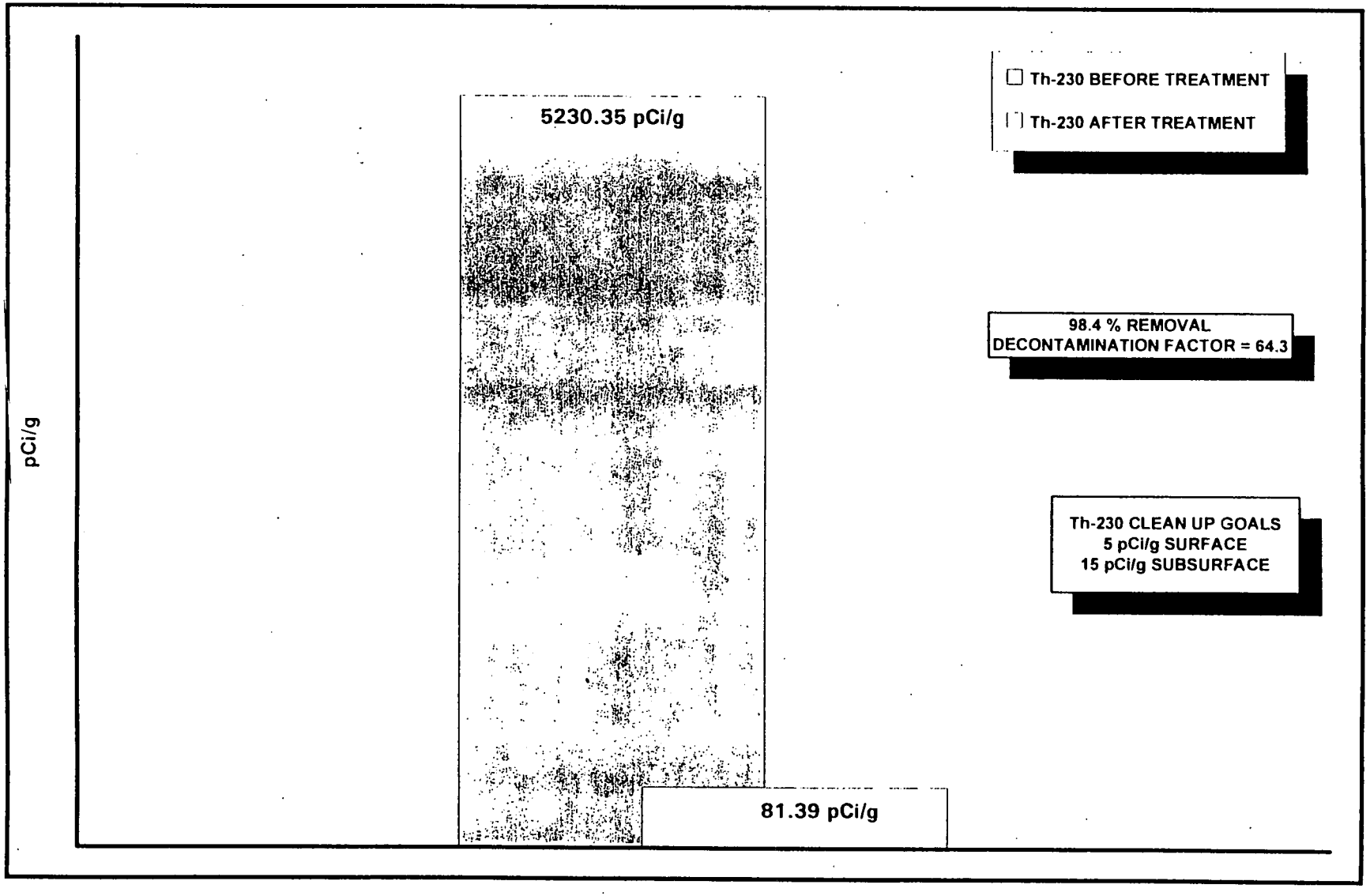


Figure 31. Extractant Screening - Sample BF1C, ^{230}Th Removal

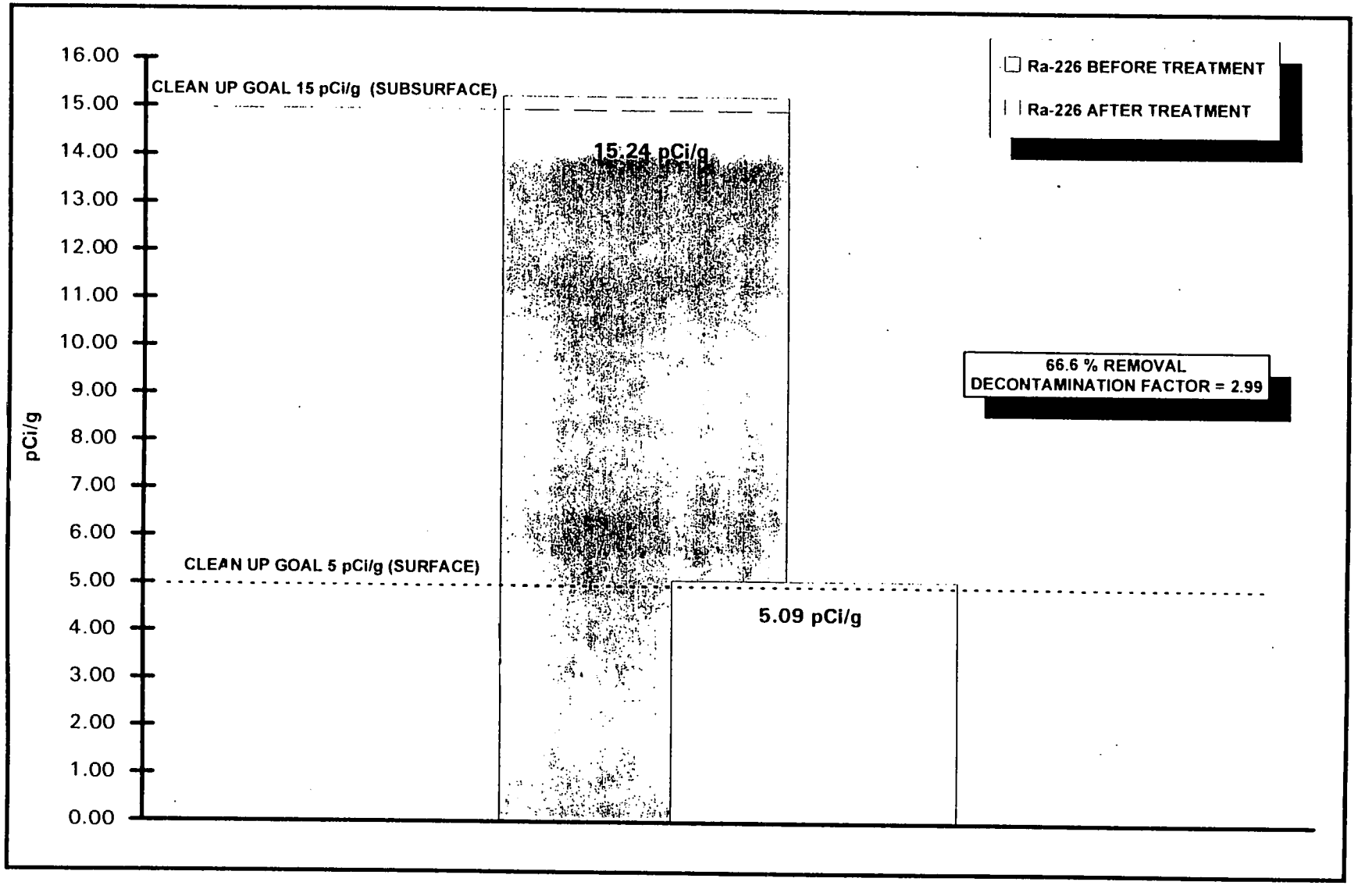


Figure 32. Extractant Screening - Sample BF1C, ^{226}Ra Removal

potential benefits, depending on the form and ease of solubilization of the thorium contaminant(s). Limited further testing is recommended in this area.

Chemical extraction testing, conducted as part of the characterization phase, appears very promising with removals of up to 99.5% (based on gross α/β) noted after only a single-stage washing process. The limited isotopic radioanalytical results available indicate that (i) both ^{238}U and total uranium clean-up goals can be readily accomplished, (ii) ^{230}Th removal ranges from approximately 88% - 98.4%, but requires further optimization to attain the clean-up goals, and (iii) ^{226}Ra removal ranges from approximately 33% - 67%, and will also require further optimization to realize the clean-up goals.

Both carbonate and a chelant appear to be necessary components of the selective chemical extraction solution. Sodium dithionite (a reducing agent) appears to provide a marginal benefit in some cases, presumably through reductively-enhanced dissolution of surficial hydrated metal oxide coatings. Further testing is strongly indicated and recommended in this area, including the screening of other chelants and the optimization of the identified extraction solution and process parameters, *e.g.*, additive concentrations, solids loading, contact time and temperature, number of extraction stages, *etc.*

Because a chelant-assisted carbonate leaching solution shows the greatest promise thus far, the downstream treatment processes will play a significant role in the overall economics of the soil decontamination process. Those processes which will require investigation include (i) effective dewatering of the extraction slurry and washing of the filtercake, (ii) rejuvenation of the extraction solution with recovery and recycle of the extraction reagents, and (iii) concentration/minimization of the radionuclide residual stream.

4.0 SUMMARY / RECOMMENDATIONS

The characterization work described in the previous sections has provided significant insight into the nature of the St. Louis FUSRAP site soils and their contaminants. The analyses have shown that the soil is very fine, with an average of 65% to 70% consisting of particles that are less than 38 microns in diameter. The radiochemical analyses showed that the distribution of the target radionuclides - Uranium, Thorium, and Radium - within the soil fractions is highly variable. The primary contaminant of concern, with respect to being able to achieve the cleanup criteria, is Thorium, and specifically the ^{230}Th isotope. In some cases, the estimated decontamination factors (DFs) exceed 100 for the Thorium removal. The removal of Uranium and Radium are

judged to be readily achievable, as the DFs for these radionuclides are estimated to be 7 or less.

The soil and contaminant characteristics described above essentially preclude the use of "classical" soil washing techniques, such as attrition scrubbing and size separation, as potential treatment processes. Therefore, the successful treatment of these soils to meet the defined cleanup goals will rely on chemical extraction of the radionuclides. The data from the preliminary extraction (characterization) tests demonstrates that the radionuclides can be removed from the soils by a variety of extraction solutions. The question then becomes one of which is the best solution with respect to extraction performance, recoverability, and cost. Each of these elements plays a key role in the overall assessment of the feasibility of applying soil washing/extraction technology to the remediation of the St. Louis FUSRAP site.

Rust-CTC is confident that a workable and cost-effective solution can be found for the removal of the radionuclides from the St. Louis soils. Our work on the INEL Pit 9 project has provided tremendous experience and insight on the application of chemical extraction processes. Further testing, as defined in the Work Plan, is required to demonstrate whether the cleanup criteria can be achieved, and to allow an accurate assessment of the process economics to be made. A number of processes downstream from the actual extraction step, such as dewatering, solution recovery/recycle, waste minimization, etc., will play a key role in the overall economics. These ancillary processes can only be evaluated after the extraction solution is optimized/finalized. Rust-CTC recommends that the treatability study be allowed to continue as shown in the Work Plan.

131772

DOE FUSRAP - ST. LOUIS SITE TREATABILITY STUDY

INTERIM CHARACTERIZATION REPORT

APPENDIX A:

Summary Tables - Particle Size Distribution

Table A-1. SLAPS Activity Group #1 (SL1C) -- Particle Size Distribution Data

SAMPLE #	SL101			SL102			SL103			SL104			SL1C Averages		
Screen/Filter Size (microns)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Percent of Total (%)	Estimated Composite Percent (%)	Cumulative % Passing (%)
6300	1.7	0.6	99.4	1.8	0.7	99.3	3.0	1.1	98.9	8.1	2.9	97.1	1.3		98.7
2000	2.5	0.8	98.6	3.1	1.2	98.2	2.8	1.1	97.8	9.7	3.4	93.7	1.6		97.1
500	4.1	1.4	97.2	8.9	3.3	94.8	2.7	1.0	96.7	4.3	1.5	92.1	1.8		95.2
150	2.4	0.8	96.4	10.0	3.8	91.1	1.4	0.5	96.2	2.7	1.0	91.2	1.5	6.3	93.7
75	1.9	0.6	95.8	4.5	1.7	89.4	0.7	0.3	95.9	1.5	0.5	90.6	0.8		92.9
38	87.0	28.9	66.9	80.1	30.1	59.3	87.4	33.4	62.5	61.9	22.0	68.6	28.6	29.4	64.3
0.7	201.2	66.9	0.0	158.0	59.3	-0.0	163.4	62.5	0.0	193.0	68.6	-0.0	64.3	64.3	-0.0
Total	300.8	100.0		266.4	100.0		261.4	100.0		281.2	100.0		100.0	100.0	
Raw Soil															
- Weight used (grams)		333.9			302.8			305.7			324.3				
- Moisture (%)		9.9			12.0	12.0		14.5			13.3	12.0			
- Dry solids (grams)		300.8			266.5	266.5		261.4			281.2	285.4			
Retained/raw solids (%)		100.0			100.0	100.0		100.0			100.0	98.5			
Filtrate quantity (ml)		4,415			3,220			4,040			3,780				
% H20 analysis by:		TD&D			TD&D	Analytical		TD&D			TD&D	Analytical			

Table A-2. SLAPS Activity Group #2 (SL2C) -- Particle Size Distribution Summary

SAMPLE #	SL201			SL202			SL203			SL204			SL2C Averages		
Screen/Filter Size (microns)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Percent of Total (%)	Estimated Composite Percent (%)	Cumulative % Passing (%)
6300	2.1	0.8	99.2	6.9	2.6	97.4	19.5	7.6	92.4	6.6	2.3	97.7	3.3		96.7
2000	1.8	0.7	98.5	4.1	1.6	95.8	19.5	7.6	84.8	7.6	2.7	95 0	3.1		93.5
500	3.0	1.1	97.4	6.0	2.3	93.6	12.2	4.8	80.0	6.7	2.4	92.6	2.6		90.9
150	1.1	0.4	97.0	4.4	1.7	91.9	13.6	5.3	74.7	4.9	1.7	90.9	2.3	11.4	88.6
75	2.1	0.8	96.2	2.2	0.8	91.1	5.6	2.2	72.6	2.5	0.9	90.0	1.2		87.4
38	65.0	24.6	71.6	53.2	20.2	70.9	44.6	17.4	55.2	66.8	23.6	66.4	21.4	22.6	66.0
0.7	189.1	71.6	0.0	187.2	70.9	0.0	141.6	55.2	0.0	187.8	66.4	0.0	66.0	66.0	0.0
Total	264.2	100.0		264.0	100.0		256.6	100.0		282.9	100.0		100.0	100.0	
Raw Soil															
- Weight used (grams)		307.6			310.4			318.8			311.0				
- Moisture (%)		14.1			14.9			19.4	19.9		9.0	9.6			
- Dry solids (grams)		264.2			264.2			257.0	255.4		283.0	281.1			
Retained/raw solids (%)		100.0			99.9			99.9	100.5		100.0	100.6			
Filtrate recovered (ml)		3,290			3,970			3,240			2,715				
% H2O analysis by:		TD&D			TD&D			TD&D	Analytical		TD&D	Analytical			

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Table A-3. SLAPS Activity Group #3 (SL3C)-- Particle Size Distribution Summary

SAMPLE #	SL301			SL302			SL303			SL304			SL3C Averages		
Screen/Filter Size (microns)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Percent of Total (%)	Estimated Composite Percent (%)	Cumulative % Passing (%)
6300	0.0	0.0	100.0	0.6	0.2	99.8	3.7	1.4	98.6	1.0	0.4	99.6	0.5		99.5
2000	1.5	0.6	99.4	2.4	0.9	98.9	5.7	2.1	96.5	1.6	0.6	99.0	1.0		98.5
500	2.6	1.0	98.4	3.1	1.2	97.7	5.6	2.1	94.5	3.3	1.2	97.8	1.4		97.1
150	3.3	1.3	97.2	2.4	0.9	96.8	5.4	2.0	92.5	5.0	1.9	95.9	1.5	4.4	95.6
75	2.2	0.8	96.3	2.2	0.8	96.0	2.9	1.1	91.4	2.5	0.9	95.0	0.9		94.7
38	49.4	18.9	77.4	54.2	20.2	75.8	50.2	18.5	72.9	39.2	14.7	80.2	18.1	19.0	76.6
0.7	201.8	77.4	0.0	202.9	75.8	0.0	197.5	72.9	0.0	213.3	80.2	0.0	76.6	76.6	0.0
Total	260.8	100.0		267.8	100.0		271.0	100.0		265.9	100.0		100.0	100.0	
Raw Soil															
- Weight used (grams)		313.8			307.6			309.6			316.3				
- Moisture (%)		16.9			12.9			12.5	12.0		15.9	16.8			
- Dry solids (grams)		260.8			267.9			270.9	272.6		266.0	263.2			
Retained/raw solids (%)		100.0			100.0			100.0	99.4		100.0	101.0			
Filtrate recovered (ml)		1,740			1,800			2,300			2,050				
% H20 analysis by:		TD&D			TD&D			TD&D	Analytical		TD&D	Analytical			

Table A-4. Ball Fields (BF), Haul Roads (HR), and SLAPS Ditches (SD) Activity Group #1 (BF1C) -- Particle Size Distribution Summary

SAMPLE #	BF101			BF102			HR101			HR102			SD101			BF1C Averages		
Screen/Filter Size (microns)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Percent of Total (%)	Estimated Composite Percent (%)	Cumulative % Passing (%)
6300	2.1	0.8	99.2	0.0	0.0	100.0	12.0	4.1	95.9	12.0	3.9	96.1	0.0	0.0	100.0	1.8		98.2
2000	0.0	0.0	99.2	1.4	0.5	99.5	10.7	3.7	92.2	36.8	11.9	84.3	1.9	0.8	99.2	3.4		94.9
500	0.6	0.2	99.0	0.7	0.2	99.3	19.6	6.8	85.4	37.0	11.9	72.3	2.3	0.9	98.3	4.0		90.9
150	0.9	0.3	98.7	1.5	0.5	98.8	38.6	13.3	72.1	40.2	13.0	59.3	1.3	0.5	97.8	5.5	14.7	85.3
75	1.6	0.6	98.1	1.5	0.5	98.2	15.8	5.4	66.7	11.6	3.7	55.6	1.3	0.5	97.2	2.2		83.2
38	84.0	30.2	67.9	84.0	29.1	69.1	89.7	30.9	35.7	57.1	18.4	37.2	56.8	23.0	74.3	26.3	28.5	56.8
0.7	188.7	67.9	-0.0	199.7	69.1	0.0	103.7	35.7	0.0	115.2	37.2	-0.0	183.6	74.3	-0.0	56.8	56.8	-0.0
Total	277.9	100.0		288.8	100.0		290.1	100.0		309.9	100.0		247.2	100.0		100.0	100.0	
Raw Soil																		
- Weight used (grams)		310.3			327.0			311.9			333.2			313.0				
- Moisture (%)		10.4			11.7	23.8		3.6			7.0	6.9		21.0	21.2			
- Dry solids (grams)		277.9			288.8	249.2		300.7			309.9	310.2		247.3	246.6			
Retained/raw solids (%)		100.0			100.0	115.9		96.5			100.0	99.9		100.0	100.2			
Filtrate quantity (ml)		2,720			1,980			2,070			3,780			2,060				
% H20 analysis by:		TD&D			TD&D	Analytical		TD&D			TD&D	Analytical		TD&D	Analytical			

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Table A-5. Ball Fields (BF), Haul Roads (HR), and SLAPS Ditches (SD) Activity Group #3 (BF3C) -- Particle Size Distribution Summary

SAMPLE #	BF301			BF302			HR301			HR302			SD301			BF3C Averages		
Screen/Filter Size (microns)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Percent of Total (%)	Estimated Composite Percent (%)	Cumulative % Passing (%)
6300	0.3	0.1	99.9	1.4	0.7	99.3	3.4	1.5	98.5	0.0	0.0	100.0	0.0	0.0	100.0	0.5		99.5
2000	2.0	0.7	99.2	4.8	2.2	97.1	1.3	0.6	97.9	1.2	0.5	99.5	1.4	0.6	99.4	0.9		98.6
500	2.2	0.8	98.4	8.0	3.7	93.4	7.9	3.5	94.4	6.2	2.6	96.9	3.8	1.6	97.8	2.4		96.2
150	2.1	0.7	97.7	12.9	6.0	87.3	4.6	2.0	92.4	8.1	3.4	93.6	3.0	1.2	96.6	2.7	6.5	93.5
75	1.3	0.5	97.2	12.6	5.9	81.4	3.4	1.5	90.9	5.4	2.2	91.3	2.9	1.2	95.4	2.3		91.2
38	83.6	29.8	67.4	39.9	18.6	62.8	37.5	16.6	74.3	64.0	26.5	64.8	50.9	21.2	74.2	22.5	24.8	68.7
0.7	189.4	67.4	-0.0	134.4	62.8	0.0	168.0	74.3	-0.0	156.6	64.8	-0.0	178.1	74.2	0.0	68.7	68.7	-0.0
Total	280.9	100.0		214.0	100.0		226.1	100.0		241.5	100.0		240.1	100.0		100.0	100.0	
Raw Soil																		
- Weight used (grams)		319.8			325.3			309.3			307.4			314.5				
- Moisture (%)		12.2			34.2	35.1		26.9	26.4		21.4			23.7	22.9			
- Dry solids (grams)		280.9			214.0	211.1		226.1	227.6		241.6			240.1	242.5			
Retained/raw solids (%)		100.0			100.0	101.4		100.0	99.4		100.0			100.0	99.0			
Filtrate recovered (ml)		1,600			2,550			1,950			1,850			2,240				
% H20 analysis by:		TO&O			TO&D	Analytical		TO&O	Analytical		TD&O			TO&O	Analytical			

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Table A-6. Latty Vicinity Properties (LV) and HISS (HS) Activity Group #1 (LV1C) -- Particle Size Distribution Summary

SAMPLE #	LV101			LV103			HS101			HS102			LV1C Averages		
Screen/Filter Size (microns)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Percent of Total (%)	Estimated Composite Percent (%)	Cumulative % Passing (%)
6300	10.2	3.8	96.2	31.2	10.0	90.0	3.9	1.4	98.6	1.9	0.7	99.3	4.0		96.0
2000	8.8	3.3	92.9	34.6	11.1	78.9	7.9	2.8	95.8	1.2	0.4	98.9	4.4		91.6
500	7.0	2.6	90.3	26.5	8.5	70.4	4.9	1.7	94.1	2.0	0.7	98.1	3.4		88.2
150	2.4	0.9	89.4	11.8	3.8	66.7	3.7	1.3	92.8	2.0	0.7	97.4	1.7	13.4	86.6
75	1.8	0.7	88.7	4.1	1.3	65.4	1.9	0.7	92.2	2.0	0.7	96.6	0.8		85.7
38	43.4	16.2	72.4	39.7	12.7	52.6	71.0	25.0	67.2	51.1	18.9	77.7	18.2	19.1	67.5
0.7	193.5	72.4	0.0	164.4	52.6	0.0	190.8	67.2	0.0	210.0	77.7	-0.0	67.5	67.5	0.0
Total	267.1	100.0		312.3	100.0		284.1	100.0		270.2	100.0		100.0	100.0	
Raw Soil															
- Weight used (grams)		326.0			362.1			331.6			316.3				
- Moisture (%)		18.1			13.7	13.9		14.3	13.9		14.6				
- Dry solids (grams)		267.0			312.5	311.8		284.1	285.4		270.2				
Retained/raw solids (%)		100.0			99.9	100.2		100.0	99.5		100.0				
Filtrate quantity (ml)		2,175			2,650			2,260			2,435				
% H20 analysis by:		TD&D			TD&D	Analytical		TD&D	Analytical		TD&D				

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Table A-7. Latty Vicinity Properties (LV) Activity Group #3 (LV3C) -- Particle Size Distribution Summary

SAMPLE #	LV301			LV302			BF3C Averages		
Screen/Filter Size (microns)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Dry Wt. Retained (grams)	Percent of Total (%)	Cumulative % Passing (%)	Percent of Total (%)	Estimated Composite Percent (%)	Cumulative % Passing (%)
6300	0.0	0.0	100.0	1.2	0.5	99.5	0.2		99.8
2000	0.5	0.2	99.8	4.1	1.6	98.0	0.9		98.9
500	0.7	0.3	99.5	7.4	2.9	95.1	1.6		97.3
150	1.0	0.4	99.1	12.4	4.8	90.3	2.6	5.3	94.7
75	1.4	0.6	98.5	2.7	1.0	89.3	0.8		93.9
38	63.7	26.0	72.5	73.4	28.4	60.9	27.2	28.0	66.7
0.7	177.8	72.5	0.0	157.6	60.9	0.0	66.7	66.7	-0.0
Total	245.1	100.0		258.8	100.0		100.0	100.0	
Raw Soil									
- Weight used (grams)		307.0			306.0				
- Moisture (%)		20.2			15.4	13.8			
- Dry solids (grams)		245.0			258.8	263.6			
Retained/raw solids (%)		100.0			100.0	98.2			
Filtrate recovered (ml)		2,375			2,250				
% H20 analysis by:		TD&D			TD&D	Analytical			

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DOE FUSRAP - ST. LOUIS SITE TREATABILITY STUDY

INTERIM CHARACTERIZATION REPORT

APPENDIX B:

Summary & Raw Data Tables - Radioisotope Distribution

Note: Raw data tables for each of the 15 samples are included after Table B-7.

Table E-1. SLAPS Activity Group #1 (SL1C) -- Radioisotope Data Summary

PARAMETER	Units	SL102					SL104					Averages				
		Solids Fractions (microns)			Filtrate	Total	Solids Fractions (microns)			Filtrate	Total	Solids Fractions (microns)			Filtrate	Total
		>150	38-150	<38			>150	38-150	<38			>150	38-150	<38		
Particle Size Dist. (fraction %)	%	8.9	31.8	59.3		100.0	8.8	22.5	68.6		100.0	6.3	29.4	64.3		100.0
Radionuclide Data																
- Uranium:																
U-234 - concentration	pCi/g	153.9	18.1	35.2	0.3	44.0	7.3	5.3	17.2	0.0	14.1	80.6	11.7	26.2	0.2	29.1
- percent of total	%	31.2	13.1	47.4	8.2	100.0	4.5	8.5	83.6	3.4	100.0	17.9	10.8	65.5	5.8	100.0
U-235 - concentration	pCi/g	7.8	1.0	1.8	0.0	2.3	0.4	0.3	0.8	0.0	0.7	4.1	0.6	1.3	0.0	1.5
- percent of total	%	30.8	13.4	47.5	8.2	100.0	5.1	10.3	80.8	3.7	100.0	18.0	11.9	64.2	6.0	100.0
U-238 - concentration	pCi/g	157.0	18.6	36.5	0.3	45.3	7.4	5.4	18.2	0.0	14.9	82.2	12.0	27.4	0.2	30.1
- percent of total	%	31.0	13.0	47.8	8.2	100.0	4.4	8.2	84.1	3.3	100.0	17.7	10.6	65.9	5.8	100.0
Total U - concentration	pCi/g	318.7	37.7	73.5	0.6	91.6	15.1	11.0	36.2	0.1	29.7	166.9	24.4	54.9	0.3	60.6
Thorium:																
Th-228 concentration	pCi/g	0.3	0.1	0.1	0.0	0.1	0.2	0.4	0.1	0.0	0.2	0.2	0.3	0.1	0.0	0.2
- percent of total	%	19.8	29.7	48.5	2.0	100.0	7.0	45.2	46.4	1.5	100.0	13.4	37.4	47.5	1.7	100.0
Th-230 - concentration	pCi/g	78.2	41.3	49.7	0.0	49.7	30.1	229.3	51.8	0.0	90.0	54.2	135.3	50.8	0.0	69.9
- percent of total	%	14.1	26.4	59.3	0.2	100.0	3.0	57.4	39.5	0.1	100.0	8.5	41.9	49.4	0.2	100.0
Th-232 - concentration	pCi/g	0.1	0.0	0.1	0.0	0.1	0.2	0.2	0.1	0.0	0.2	0.1	0.1	0.1	0.0	0.1
- percent of total	%	9.8	3.3	86.4	0.6	100.0	10.6	31.8	56.7	0.9	100.0	10.2	17.5	71.6	0.7	100.0
- Radium:																
Ra-226 - concentration	pCi/g	22.3	13.8	14.0	0.0	14.7	4.9	5.7	10.8	0.0	9.1	13.6	9.8	12.4	0.0	11.9
- percent of total	%	13.5	29.9	56.5	0.0	100.0	4.7	14.1	81.2	0.0	100.0	9.1	22.0	68.9	0.0	100.0
Total Activity Ratio (TAR) Calculations																
Method A: TAR = |U-238|/50 + (|Ra-226| + |Th-232|)/5		7.6	3.1	3.6	0.0	3.9	1.2	1.3	2.6	0.0	2.2	4.4	2.2	3.1	0.0	3.0
- Method B: TAR = |Th-230|/5		15.6	8.3	9.9	0.0	9.9	6.0	45.9	10.4	0.0	18.0	10.8	27.1	10.2	0.0	14.0

Table B-2. SLAPS Activity Group #2 (SL2C) -- Radioisotope Data Summary

PARAMETER	Units	SL203					SL204					Averages				
		Solids Fractions (microns)			Filtrate	Total	Solids Fractions (microns)			Filtrate	Total	Solids Fractions (microns)			Filtrate	Total
		>150	38-150	<38			>150	38-150	<38			>150	38-150	<38		
Particle Size Dist. (fraction %)	%	25.3	19.6	55.2		100.0	9.1	24.5	66.4		100.0	11.4	22.6	66.0		100.0
Radionuclide Data																
· Uranium:																
U-234 · concentration	pCi/g	3.2	10.4	41.2	0.0	26.0	135.5	15.0	25.8	0.1	34.0	69.4	12.7	33.5	0.1	30.0
· percent of total	%	3.1	7.8	87.4	1.7	100.0	36.3	10.8	50.3	2.6	100.0	19.7	9.3	68.9	2.1	100.0
U-235 concentration	pCi/g	0.2	0.6	1.4	0.0	1.0	6.8	0.8	1.0	0.0	1.5	3.5	0.7	1.2	0.0	1.3
· percent of total	%	4.8	11.6	81.4	2.2	100.0	40.1	13.3	43.9	2.7	100.0	22.4	12.5	62.6	2.5	100.0
U 238 · concentration	pCi/g	3.2	10.8	30.8	0.0	20.3	137.2	14.3	22.0	0.1	31.5	70.2	12.5	26.4	0.1	25.9
· percent of total	%	4.0	10.4	83.6	2.0	100.0	39.8	11.2	46.4	2.7	100.0	21.9	10.8	65.0	2.3	100.0
Total U · concentration	pCi/g	6.6	21.7	73.4	0.1	47.3	279.5	30.1	48.8	0.2	67.0	143.0	25.9	61.1	0.1	57.2
Thorium:																
Th 228 · concentration	pCi/g	0.1	0.6	0.1	0.0	0.2	0.6	0.2	0.3	0.0	0.3	0.3	0.4	0.2	0.0	0.3
· percent of total	%	8.2	51.6	34.8	5.4	100.0	16.0	14.7	65.8	3.5	100.0	12.1	33.2	50.3	4.4	100.0
Th-230 · concentration	pCi/g	1.8	400.2	248.0	0.2	218.0	1043.1	462.7	219.0	0.1	354.7	522.4	431.5	233.5	0.1	286.4
· percent of total	%	0.2	35.9	62.8	1.1	100.0	26.8	32.0	41.0	0.2	100.0	13.5	33.9	51.9	0.7	100.0
Th-232 · concentration	pCi/g	0.1	9.7	0.2	0.0	2.1	1.9	0.9	0.5	0.0	0.8	1.0	5.3	0.4	0.0	1.4
· percent of total	%	0.8	92.8	6.1	0.3	100.0	21.7	27.7	44.4	6.1	100.0	11.3	60.3	25.3	3.2	100.0
· Radium:																
Ra-226 · concentration	pCi/g	2.0	17.8	32.1	0.0	21.8	146.8	28.3	43.5	0.0	49.2	74.4	23.1	37.8	0.0	35.5
· percent of total	%	2.3	16.0	81.4	0.3	100.0	27.2	14.1	58.7	0.0	100.0	14.8	15.1	70.0	0.2	100.0
Total Activity Ratio (TAR) Calculations																
· Method A: TAR = |U-238|/50 + (|Ra-226|+|Th-232|)/5		0.5	5.7	7.1	0.0	5.2	32.5	6.1	9.2	0.0	10.6	16.5	5.9	8.2	0.0	7.9
· Method B: TAR = |Th-230|/5		0.4	80.0	49.6	0.0	43.6	208.6	92.5	43.8	0.0	70.9	104.5	86.3	46.7	0.0	57.3

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Table B-3. SLAPS Activity Group #3 (SL3C) -- Radioisotope Data Summary

PARAMETER	Units	SL303					SL304					Averages				
		Solids Fractions (microns)			Filtrate	Total	Solids Fractions (microns)			Filtrate	Total	Solids Fractions (microns)			Filtrate	Total
		>150	38-150	<38			>150	38-150	<38			>150	38-150	<38		
Particle Size Dist. (fraction %)	%	7.5	19.6	72.9		100.0	4.1	15.7	80.2		100.0	4.4	19.0	76.6		100.0
Radionuclide Data																
Uranium:																
U-234 - concentration	pCi/g	59.7	21.0	58.2	0.1	51.9	173.9	27.9	187.0	0.0	161.7	116.8	24.4	122.6	0.1	106.8
- percent of total	%	8.6	7.9	81.7	1.8	100.0	4.4	2.7	92.8	0.1	100.0	6.5	5.3	87.2	0.9	100.0
U-235 - concentration	pCi/g	2.8	1.0	3.0	0.0	2.6	9.2	1.5	6.1	0.0	5.5	6.0	1.2	4.5	0.0	4.1
- percent of total	%	8.0	7.5	82.9	1.5	100.0	6.8	4.2	88.8	0.1	100.0	7.4	5.9	85.9	0.8	100.0
U-238 - concentration	pCi/g	58.2	21.0	59.8	0.1	53.0	174.1	27.5	112.0	0.0	101.4	116.1	24.2	85.9	0.1	77.2
- percent of total	%	8.3	7.8	82.2	1.8	100.0	7.0	4.2	88.6	0.1	100.0	7.6	6.0	85.4	1.0	100.0
Total U - concentration	pCi/g	120.7	42.9	121.0	0.2	107.6	357.1	56.8	305.1	0.0	268.6	238.9	49.9	213.0	0.1	188.1
Thorium:																
Th-228 - concentration	pCi/g	0.4	0.2	0.3	0.0	0.3	1.8	0.2	0.2	0.0	0.2	1.1	0.2	0.3	0.0	0.3
- percent of total	%	8.8	14.2	75.7	1.2	100.0	31.1	9.8	56.3	2.8	100.0	20.0	12.0	66.0	2.0	100.0
Th-230 - concentration	pCi/g	1388.7	935.4	554.0	0.1	692.2	7224.0	580.3	1050.0	0.1	1230.3	4306.3	757.9	802.0	0.1	961.2
- percent of total	%	15.1	26.5	58.3	0.1	100.0	24.1	7.4	68.5	0.1	100.0	19.6	16.9	63.4	0.1	100.0
Th-232 - concentration	pCi/g	1.1	0.5	0.4	0.0	0.5	6.3	0.7	1.0	0.0	1.2	3.7	0.6	0.7	0.0	0.8
- percent of total	%	17.0	21.5	61.4	0.1	100.0	22.5	8.9	68.4	0.2	100.0	19.7	15.2	64.9	0.2	100.0
Radium:																
Ra-226 - concentration	pCi/g	16.3	7.1	1.7	0.0	3.9	36.5	5.9	9.4	0.0	10.0	26.4	6.5	5.5	0.0	6.9
- percent of total	%	31.7	35.8	31.9	0.6	100.0	15.0	9.2	75.4	0.5	100.0	23.3	22.5	53.6	0.5	100.0
Total Activity Ratio (TAR) Calculations																
Method A: TAR = |U-238|/50 + (|Ra-226|+|Th-232|)/5		4.6	1.9	1.6	0.0	1.9	12.0	1.9	4.3	0.0	4.3	8.3	1.9	3.0	0.0	3.1
Method B: TAR = |Th-230|/5		277.7	187.1	110.8	0.0	138.4	1444.8	116.1	210.0	0.0	246.1	861.3	151.6	160.4	0.0	192.2

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Table B-4. Ball Fields (BF), Haul Roads (HR), and SLAPS Ditches (SD) Activity Group #1 (BF1C) -- Radioisotope Data Summary

PARAMETER	Units	BF102					HR102					SD102					Averages				
		Sol. Fractions (microns)			Fil-		Sol. Fractions (microns)			Fil-		Sol. Fractions (microns)			Fil-		Sol. Fractions (microns)			Fil-	
		>150	38-150	<38	trate	Total	>150	38-150	<38	trate	Total	>150	38-150	<38	trate	Total	>150	38-150	<38	trate	Total
Particle Size Dist.	%	1.2	29.6	69.1		100.0	40.7	22.2	37.2		100.0	2.2	23.5	74.3		100.0	14.7	28.5	56.8		100.0
Radionuclide Data																					
Uranium:																					
U-234 - conc.	pCi/g	5.1	0.2	0.6	0.0	0.5	15.8	34.6	81.9	0.1	45.4	9.4	1.0	1.8	0.0	1.8	10.1	11.9	28.1	0.0	15.9
- % total	%	12.2	10.3	76.6	0.9	100.0	14.1	16.9	67.0	2.1	100.0	11.6	12.8	73.5	2.1	100.0	12.6	13.3	72.4	1.7	100.0
U-235 - conc.	pCi/g	1.9	0.0	0.1	0.0	0.1	0.8	1.9	3.7	0.0	2.2	0.3	0.1	0.0	0.0	0.1	1.0	0.7	1.3	0.0	0.8
- % total	%	29.2	11.7	57.6	1.5	100.0	15.3	19.2	63.3	2.2	100.0	10.2	23.8	59.9	6.1	100.0	18.2	18.2	60.3	3.3	100.0
U-238 - conc.	pCi/g	2.5	0.2	0.4	0.0	0.4	15.8	36.4	85.6	0.1	47.3	7.4	0.8	1.3	0.0	1.4	8.6	12.5	29.1	0.0	16.3
- % total	%	7.6	17.2	74.9	0.3	100.0	13.6	17.1	67.3	2.0	100.0	12.2	13.1	72.0	2.7	100.0	11.1	15.8	71.4	1.7	100.0
Total U - conc.	pCi/g	9.5	0.5	1.1	0.0	1.0	32.4	72.9	171.2	0.2	94.9	17.1	1.8	3.1	0.0	3.2	19.7	25.1	58.5	0.1	33.1
Thorium:																					
Th-228 - conc.	pCi/g	9.2	0.4	0.2	0.0	0.4	0.3	0.2	0.7	0.0	0.4	2.1	0.3	0.1	0.0	0.2	3.8	0.3	0.3	0.0	0.3
- % total	%	31.9	30.9	36.8	0.4	100.0	25.6	11.8	61.8	0.8	100.0	21.9	31.8	45.5	0.8	100.0	26.5	24.9	48.0	0.6	100.0
Th-230 - conc.	pCi/g	310.9	0.4	0.5	0.0	4.3	39.2	41.5	8.2	0.1	29.0	13.8	3.3	5.7	0.0	5.4	121.3	15.1	4.8	0.0	12.9
- % total	%	89.4	2.7	7.7	0.2	100.0	55.0	31.8	10.5	2.7	100.0	5.7	14.6	79.2	0.4	100.0	50.0	16.4	32.5	1.1	100.0
Th-232 - conc.	pCi/g	3.5	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.4	0.1	0.2	0.0	0.2	1.4	0.1	0.1	0.0	0.1
- % total	%	48.7	15.2	34.8	1.3	100.0	53.6	8.3	35.9	2.3	100.0	5.4	12.6	81.7	0.3	100.0	35.9	12.0	50.8	1.3	100.0
Radium:																					
Ra-226 - conc.	pCi/g	2.7	0.2	0.0	0.0	0.1	1.4	13.2	5.0	0.0	5.4	6.3	0.4	0.4	0.0	0.5	3.5	4.6	1.8	0.0	2.0
- % total	%	28.0	59.9	12.0	0.2	100.0	10.9	54.3	34.2	0.6	100.0	25.7	15.5	58.7	0.2	100.0	21.5	43.2	35.0	0.3	100.0
Total Act. Ratio (TAR) Calcs.																					
Meth. A: TAR = |U-238|/50 + (|Ra-226|+|Th-232|)/5		1.3	0.1	0.0	0.0	0.1	0.6	3.4	2.7	0.0	2.0	1.5	0.1	0.2	0.0	0.2	1.1	1.2	1.0	0.0	0.8
Meth. B: TAR = |Th-230|/5		62.2	0.1	0.1	0.0	0.9	7.8	8.3	1.6	0.0	5.8	2.8	0.7	1.1	0.0	1.1	24.3	3.0	1.0	0.0	2.6

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Table B-5. Ball Fields (BF), Haul Roads (HR), and SLAPS Ditches (SD) Activity Group #3 (BF3C) -- Radioisotope Data Summary

PARAMETER	Units	BF302					HR301					SD301					Averages				
		Sol. Fractions (microns)			Fil-		Sol. Fractions (microns)			Fil-		Sol. Fractions (microns)			Fil-		Sol. Fractions (microns)			Fil-	
		>150	38-150	<38	trate	Total	>150	38-150	<38	trate	Total	>150	38-150	<38	trate	Total	>150	38-150	<38	trate	Total
Particle Size Dist.	%	12.7	24.5	62.8		100.0	7.6	18.1	74.3		100.0	3.4	22.4	74.2		100.0	6.5	24.8	68.7		100.0
Radionuclide Data																					
· Uranium:																					
U 234 · conc.	pCi/g	52.1	29.1	40.5	0.1	39.9	62.5	57.7	182.0	0.0	150.6	97.4	10.8	25.0	0.0	24.6	70.7	32.5	82.5	0.0	71.7
· % total	%	16.5	17.9	63.7	1.9	100.0	3.2	6.9	89.8	0.1	100.0	13.5	9.8	75.2	1.5	100.0	11.1	11.5	76.2	1.2	100.0
U 235 · conc.	pCi/g	2.3	1.5	1.9	0.0	1.9	3.1	2.7	9.7	0.0	7.9	4.5	0.5	1.2	0.0	1.2	3.3	1.6	4.3	0.0	3.7
· % total	%	15.5	19.6	62.6	2.3	100.0	3.0	6.1	90.9	0.1	100.0	12.9	9.3	76.3	1.5	100.0	10.5	11.7	76.6	1.3	100.0
U 238 · conc.	pCi/g	52.1	29.2	42.6	0.1	41.3	63.0	57.5	184.0	0.0	152.0	95.1	10.8	25.4	0.0	24.9	70.1	32.5	84.0	0.0	72.7
· % total	%	16.0	17.4	64.8	1.8	100.0	3.2	6.8	89.9	0.1	100.0	13.1	9.7	75.7	1.5	100.0	10.7	11.3	76.8	1.1	100.0
Total U · conc.	pCi/g	106.5	59.8	85.0	0.1	83.1	128.6	117.9	375.7	0.0	310.5	197.0	22.1	51.6	0.1	50.7	144.0	66.6	170.8	0.1	148.1
· Thorium:																					
Th 228 · conc.	pCi/g	0.8	0.3	0.2	0.0	0.3	0.8	0.3	0.6	0.0	0.6	1.3	0.1	0.1	0.0	0.1	1.0	0.2	0.3	0.0	0.3
· % total	%	37.4	24.5	34.7	3.5	100.0	10.7	10.8	73.2	5.2	100.0	38.9	24.7	34.2	2.3	100.0	29.0	20.0	47.3	3.7	100.0
Th-230 · conc.	pCi/g	579	259	413	0.1	397	2416	890	1400	0.1	1386	537	218	186	0.0	205	1178	455	666	0.0	663
% total	%	18.5	16.0	65.3	0.2	100.0	13.3	11.6	75.1	0.0	100.0	8.9	23.8	67.3	0.0	100.0	13.6	17.1	69.2	0.1	100.0
Th-232 · conc.	pCi/g	0.6	0.3	0.3	0.0	0.3	1.8	0.5	1.0	0.0	1.0	0.6	0.2	0.1	0.0	0.2	1.0	0.3	0.5	0.0	0.5
· % total	%	24.5	19.4	55.4	0.6	100.0	13.8	9.2	75.9	1.1	100.0	12.1	29.2	58.5	0.2	100.0	16.8	19.3	63.3	0.6	100.0
· Radium:																					
Ra-226 · conc.	pCi/g	26.0	16.0	4.3	0.0	10.0	20.9	10.2	2.3	0.0	5.2	62.7	1.6	1.7	0.0	3.8	36.5	9.3	2.8	0.0	6.3
· % total	%	33.1	39.4	27.2	0.3	100.0	30.6	35.6	33.3	0.5	100.0	56.5	9.4	33.9	0.3	100.0	40.1	28.1	31.5	0.4	100.0
Total Act. Ratio (TAR) Calcs.																					
· Meth. A: TAR = |U-238|/50 + (|Ra-226| + |Th-232|)/5		6.4	3.8	1.8	0.0	2.9	5.8	3.3	4.4	0.0	4.3	14.5	0.6	0.9	0.0	1.3	8.9	2.6	2.3	0.0	2.8
· Meth. B: TAR = |Th-230|/5		115.9	51.8	82.6	0.0	79.4	483.3	178.0	280.0	0.0	277.1	107.4	43.5	37.2	0.0	41.0	235.5	91.1	133.3	0.0	132.5

Table B-6. Latty Vicinity Properties (LV) and HISS (HS) Activity Group #1 (LV1C) -- Radioisotope Data Summary

PARAMETER	Units	LV103					HS101					Averages				
		Solids Fractions (microns)					Solids Fractions (microns)					Solids Fractions (microns)				
		>150	38 150	<38	Filtrate	Total	>150	38-150	<38	Filtrate	Total	>150	38-150	<38	Filtrate	Total
Particle Size Dist. (fraction %)	%	33.3	14.0	52.6		100.0	7.2	25.7	67.2		100.0	13.4	19.1	67.5		100.0
Radionuclide Data																
- Uranium:																
U-234 - concentration	pCi/g	1.8	2.8	8.3	0.0	5.5	10.3	2.0	8.0	0.1	7.0	6.0	2.4	8.1	0.0	6.3
- percent of total	%	10.9	7.0	78.6	3.4	100.0	10.5	7.4	76.3	5.8	100.0	10.7	7.2	77.5	4.6	100.0
U-235 - concentration	pCi/g	0.1	0.3	0.4	0.0	0.3	0.6	0.1	0.5	0.0	0.4	0.3	0.2	0.5	0.0	0.4
- percent of total	%	10.5	12.7	74.2	2.6	100.0	9.8	6.6	76.0	7.7	100.0	10.1	9.7	75.1	5.1	100.0
U-238 - concentration	pCi/g	1.5	2.5	8.5	0.0	5.5	10.2	2.3	8.1	0.0	7.1	5.8	2.4	8.3	0.0	6.3
- percent of total	%	8.8	6.3	81.6	3.3	100.0	10.3	8.3	76.2	5.2	100.0	9.6	7.3	78.9	4.2	100.0
Total U - concentration	pCi/g	3.4	5.5	17.2	0.0	11.3	21.0	4.4	16.5	0.1	14.5	12.2	5.0	16.9	0.1	12.9
- Thorium:																
Th-228 - concentration	pCi/g	0.1	0.1	0.2	0.0	0.1	0.3	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.0	0.1
- percent of total	%	18.5	13.7	56.0	11.8	100.0	22.2	26.7	45.3	5.7	100.0	20.4	20.2	50.7	8.7	100.0
Th-230 - concentration	pCi/g	3.1	1.7	3.3	0.0	3.1	137.7	15.2	18.7	0.0	26.5	70.4	8.4	11.0	0.0	14.8
- percent of total	%	33.5	7.8	57.1	1.6	100.0	37.3	14.7	47.3	0.7	100.0	35.4	11.2	52.2	1.2	100.0
Th-232 - concentration	pCi/g	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.1	0.2	0.0	0.1	0.0	0.1
- percent of total	%	28.1	8.2	49.8	13.9	100.0	29.3	10.3	52.0	8.4	100.0	28.7	9.3	50.9	11.1	100.0
- Radium:																
Ra-226 - concentration	pCi/g	0.2	0.8	4.1	0.0	2.3	7.6	2.1	13.2	0.0	10.0	3.9	1.5	8.7	0.0	6.2
- percent of total	%	2.6	4.8	92.3	0.2	100.0	5.5	5.5	89.0	0.0	100.0	4.0	5.2	90.7	0.1	100.0
Total Activity Ratio (TAR) Calculations																
- Method A: TAR = |U-238|/50 + (|Ra-226| + |Th-232|)/5		0.1	0.2	1.0	0.0	0.6	1.8	0.5	2.8	0.0	2.1	0.9	0.3	1.9	0.0	1.4
- Method B: TAR = |Th-230|/5		0.6	0.3	0.7	0.0	0.6	27.5	3.0	3.7	0.0	5.3	14.1	1.7	2.2	0.0	3.0

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Table B-7. Latty Vicinity Properties (LV) and HISS (HS) Activity Group #3 ('_V3C) -- Radioisotope Data Summary

PARAMETER		Units	LV302				
			Solids Fractions (microns)			Filtrate	Total
			>150	38-150	<38		
Particle Size Dist. (fraction %)		%	9.7	29.4	60.9		100.0
Radionuclide Data							
- Uranium:							
U-234	- concentration	pCi/g	8.4	3.6	11.7	0.0	9.2
	- percent of total	%	8.9	11.6	77.3	2.2	100.0
U-235	- concentration	pCi/g	0.5	0.2	0.4	0.0	0.4
	- percent of total	%	12.1	14.5	70.8	2.6	100.0
U-238	- concentration	pCi/g	8.7	3.5	10.6	0.0	8.5
	- percent of total	%	9.9	11.9	75.6	2.6	100.0
Total U	- concentration	pCi/g	17.6	7.3	22.7	0.0	18.1
- Thorium:							
Th 228	- concentration	pCi/g	0.3	0.1	0.1	0.0	0.1
	- percent of total	%	24.6	17.0	45.8	12.6	100.0
Th-230	- concentration	pCi/g	224.2	37.8	54.4	0.2	68.1
	- percent of total	%	31.9	16.3	48.7	3.1	100.0
Th-232	- concentration	pCi/g	0.3	0.0	0.1	0.0	0.1
	- percent of total	%	31.0	14.3	51.3	3.4	100.0
- Radium:							
Ra-226	- concentration	pCi/g	14.2	5.6	23.7	0.0	17.5
	- percent of total	%	7.9	9.5	82.3	0.3	100.0
Total Activity Ratio (TAR) Calculations							
- Method A: TAR = |U 238|/50 + (|Ra-226| + |Th-232|)/5			3.1	1.2	5.0	0.0	3.7
- Method B: TAR = |Th-230|/5			44.8	7.6	10.9	0.0	13.6

SAMPLE SL102 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	1 8	658 0	1184	10.1	34.8	63	10.4	669.0	1204	10.0	0.1	0	0.6	10.9	20	0.1	0.1	0	0 8	0.7	1	0.0
2000	3 1	66 1	205	1.7	3.3	10	1.7	67.6	210	1.7	0.6	2	6.7	122.0	378	2.9	0.1	0	1.4	10.3	32	0.8
500	8.9	106.0	943	8.0	5.4	48	8.0	107.0	952	7.9	0.2	2	6.8	109.0	970	7.3	0.0	0	1.9	26 4	235	6.0
150	10.0	133.0	1330	11.3	6.5	65	10.8	137.0	1370	11 4	0.2	2	6.8	49.4	494	3.7	0.1	1	5.6	26.2	262	6.7
75	4 5	169.0	761	6.5	8.2	37	6.2	177.0	797	6.6	0.5	2	7.5	111.0	500	3.8	0.1	0	1.8	5.4	24	0.6
38	80 1	9 7	776	6.6	0.5	44	7.3	9.7	776	6 4	0.1	7	22.3	37.4	2996	22.6	0.0	0	1.4	14.3	1145	29.3
0.7	168 0	35.2	5562	47.4	1.8	286	47.5	36.5	5767	47.8	0.1	16	48.5	49.7	7853	59.3	0.1	19	86.4	14.0	2212	56.5
Solids total	266.4		10759	91.8		552	91.8		11075	91.8		32	98.0		13210	99.8		22	99.4		3912	100.0
Filtrate	3220	0.3	966	8.2	0.0	49	8 2	0.3	995	8.2	0.0	1	2.0	0.0	30	0.2	0.0	0	0.6	0.0	1	0.0
Total		44.0	11725	100.0	2.3	602	100.0	45.3	12070	100.0	0.1	33	100.0	49.7	13240	100.0	0.1	22	100.0	14.7	3912	100.0
Raw	266 5	50.0	13323		2.8	733		48.7	12977		0.5	133		62.0	16521		0.0	12		14.9	3970	
DF			1.09			1.09			1.09			1.02			1.00			1.01			1.00	
Frac/Raw			0.88			0.82			0.93			0.24			0 80			1.76			0.99	
> 150	23.8	153.9	3663	31.2	7.8	186	30.8	157.0	3736	31.0	0.3	6	19.8	78.2	1862	14.1	0.1	2	9.8	22.3	530	13.5
38-150	84.6	18.1	1535	13.1	1.0	81	13 4	18.6	1572	13 0	0.1	10	29.7	41.3	3495	26.4	0.0	1	3.3	13.8	1170	29.9
< 38	168.0	35.2	5562	47.4	1.8	286	47.5	36.5	5767	47.8	0.1	16	48.5	49.7	7853	59.3	0.1	19	86.4	14.0	2212	56.5

13174

SAMPLE SL104 RAW DATA

	Dry wt	U 234			U-235			U-238			Th-228			Th-230			Th-232			Ra 226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	8.1	0.9	7	0.2	0.1	1	0.3	0.8	6	0.2	0.2	2	2.6	2.8	23	0.1	0.4	3	7.3	1.3	10	0.4
2000	9.7	2.8	27	0.7	0.1	1	0.7	2.5	24	0.6	0.1	1	1.5	2.4	23	0.1	0.0	0	0.4	1.6	16	0.6
600	4.3	11.7	50	1.3	0.6	3	1.3	12.1	52	1.2	0.3	1	1.8	30.4	131	0.5	0.1	0	0.9	8.6	37	1.4
150	2.7	35.6	96	2.4	2.1	6	2.8	37.2	100	2.4	0.3	1	1.2	211.0	570	2.3	0.3	1	2.0	21.7	59	2.3
75	1.5	57.4	86	2.2	3.2	5	2.4	60.0	90	2.2	15.1	23	36.9	7760.0	11640	46.0	8.2	12	26.1	57.4	86	3.4
38	61.9	4.0	250	6.3	0.3	16	8.0	4.1	253	6.1	0.1	5	8.2	46.8	2897	11.4	0.0	3	5.6	4.5	275	10.7
0.7	193.0	17.2	3320	83.6	0.8	163	80.8	18.2	3513	84.1	0.1	28	46.4	51.8	9997	39.5	0.1	27	66.7	10.8	2084	81.2
Solids total	281.2		3836	96.6		195	96.3		4039	96.7		60	98.6		25281	99.9		47	99.1		2567	100.0
Filtrate	3780	0.0	133	3.4	0.0	8	3.7	0.0	139	3.3	0.0	1	1.5	0.0	29	0.1	0.0	0	0.9	0.0	1	0.0
Total		14.1	3969	100.0	0.7	202	100.0	14.9	4178	100.0	0.2	61	100.0	90.0	25310	100.0	0.2	47	100.0	9.1	2568	100.0
Raw	281.2	9.6	2688		0.6	136		9.4	2646		0.1	37		14.3	4021		0.0	4		7.5	2117	
DF			1.03			1.04			1.03			1.01			1.00			1.01			1.00	
Frac/Raw			1.48			1.49			1.58			1.66			6.29			11.40			1.21	
>150	24.8	7.3	180	4.6	0.4	10	5.1	7.4	183	4.4	0.2	4	7.0	30.1	747	3.0	0.2	5	10.6	4.9	121	4.7
38-150	63.4	5.3	336	8.5	0.3	21	10.3	5.4	343	8.2	0.4	28	46.2	229.3	14537	57.4	0.2	16	31.8	5.7	362	14.1
<38	193.0	17.2	3320	83.6	0.8	163	80.8	18.2	3513	84.1	0.1	28	46.4	51.8	9997	39.5	0.1	27	66.7	10.8	2084	81.2

SL203 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	19.6	0.4	8	0.1	0.0	1	0.3	0.4	9	0.2	0.1	2	3.8	2.4	47	0.1	0.0	1	0.2	0.5	9	0.2
2000	19.6	1.2	23	0.3	0.1	2	0.7	1.1	21	0.4	0.0	1	1.1	1.3	26	0.0	0.1	3	0.6	1.8	34	0.6
600	12.2	5.7	70	1.0	0.3	4	1.5	5.5	66	1.3	0.1	1	1.5	3.5	43	0.1	0.0	0	0.1	3.2	39	0.7
150	13.6	8.0	109	1.6	0.4	6	2.3	8.2	111	2.1	0.1	1	1.7	0.1	1	0.0	0.0	0	0.1	3.5	47	0.8
75	5.6	21.8	122	1.8	1.1	6	2.5	22.6	127	2.4	0.4	2	3.4	227.0	1271	2.3	0.4	2	0.4	28.3	158	2.8
38	44.6	9.0	400	6.0	0.5	23	9.1	9.3	414	7.9	0.6	28	48.2	422.0	18821	33.6	10.9	486	92.4	16.5	736	13.2
0.7	141.6	41.2	5834	87.4	1.4	204	81.4	30.8	4361	83.6	0.1	20	34.8	248.0	35117	62.8	0.2	32	6.1	32.1	4545	81.4
Solids tot	256.6		6565	98.3		245	97.8		5109	98.0		54	94.6		55325	98.9		525	99.7		5568	99.7
Filtrate	3240	0.0	112	1.7	0.0	6	2.2	0.0	105	2.0	0.0	3	5.4	0.2	616	1.1	0.0	2	0.3	0.0	18	0.3
Total		26.0	6677	100.0	1.0	251	100.0	20.3	5215	100.0	0.2	58	100.0	218.0	55940	100.0	2.1	526	100.0	21.8	5587	100.0
Raw	257.0	37.6	9636		1.5	391		34.9	8968		0.1	21		147.0	37772		0.3	67		36.7	9430	
DF			1.02			1.02			1.02			1.06			1.01			1.00			1.00	
Frac/Raw			0.69			0.64			0.58			2.71			1.48			7.85			0.59	
> 150	64.8	3.2	209	3.1	0.2	12	4.8	3.2	208	4.0	0.1	5	8.2	1.8	116	0.2	0.1	4	0.8	2.0	129	2.3
38-150	50.2	10.4	522	7.8	0.6	29	11.6	10.8	540	10.4	0.6	30	51.6	400.2	20092	36.9	9.7	488	82.8	17.8	894	16.0
< 38	141.6	41.2	5834	87.4	1.4	204	81.4	30.8	4361	83.6	0.1	20	34.8	248.0	35117	62.8	0.2	32	6.1	32.1	4545	81.4

13178

SL204 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	6.6	5.1	34	0.3	0.2	1	0.3	5.2	34	0.4	0.1	1	1.0	21.2	140	0.1	0.1	0	0.2	9.2	61	0.4
2000	7.6	168.0	1277	13.3	7.4	56	12.9	168.0	1277	14.3	0.3	2	2.7	181.0	1376	1.4	0.3	3	1.1	39.1	297	2.1
500	6.7	172.0	1152	12.0	8.9	67	15.3	176.0	1179	13.2	0.4	3	2.9	53.2	356	0.4	0.4	3	1.3	177.0	1186	8.5
150	4.9	211.0	1034	10.7	10.4	51	11.7	214.0	1049	11.8	1.7	8	9.4	5110.0	25039	26.0	8.8	43	19.2	458.0	2244	16.1
75	2.6	156.0	395	4.1	8.0	20	4.6	162.0	408	4.6	2.6	6	7.1	*******	25250	25.2	18.6	47	20.7	344.0	860	6.2
38	66.8	9.6	641	6.7	0.6	38	8.7	8.8	586	6.6	0.1	7	7.6	102.0	6814	6.8	0.2	16	7.0	16.5	1102	7.9
0.7	187.8	25.8	4845	50.3	1.0	192	43.9	22.0	4132	46.4	0.3	59	65.8	219.0	41128	41.0	0.6	100	44.4	43.6	8169	58.7
Solids tot	282.9		9378	97.4		424	97.3		8664	97.3		97	96.5		100103	99.8		211	93.9		13920	100.0
Filtrate	2715	0.1	246	2.6	0.0	12	2.7	0.1	237	2.7	0.0	3	3.6	0.1	249	0.2	0.0	14	6.1	0.0	3	0.0
Total		34.0	9624	100.0	1.5	436	100.0	31.5	8900	100.0	0.3	90	100.0	354.7	100352	100.0	0.8	225	100.0	49.2	13923	100.0
Raw	283.0	31.1	8802		1.5	425		31.5	8916		0.2	49		53.0	15000		0.2	52		10.5	2972	
DF			1.03			1.03			1.03			1.04			1.00			1.07			1.00	
Frac/Raw			1.09			1.03			1.00			1.85			6.69			4.32			4.69	
>150	25.8	135.5	3497	36.3	6.8	176	40.1	137.2	3539	39.8	0.6	14	16.0	1043.1	26911	26.8	1.9	49	21.7	146.8	3788	27.2
38-150	69.3	15.0	1036	10.8	0.8	58	13.3	14.3	993	11.2	0.2	13	14.7	462.7	32064	32.0	0.9	62	27.7	28.3	1962	14.1
<38	187.8	25.8	4846	50.3	1.0	192	43.9	22.0	4132	46.4	0.3	59	65.8	219.0	41128	41.0	0.6	100	44.4	43.6	8169	58.7

SD101 RAW DATA

	Dry wt	U 234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0
2000	1.9	10.1	19	4.3	0.3	1	3.9	7.2	14	4.1	2.2	4	8.0	5.8	11	0.8	0.6	1	2.6	6.4	12	8.9
500	2.3	8.4	19	4.3	0.2	0	2.8	7.4	17	5.1	1.2	3	5.2	10.7	25	1.9	0.2	0	0.9	5.6	13	9.3
150	1.3	10.2	13	3.0	0.4	1	3.6	7.9	10	3.1	3.6	5	8.8	30.9	40	3.0	0.6	1	1.9	7.8	10	7.4
75	1.3	10.3	13	3.0	1.3	2	11.6	7.3	9	2.8	2.7	4	6.7	65.6	85	6.4	0.8	1	2.4	5.3	7	5.0
38	56.8	0.8	44	9.8	0.0	2	12.2	0.5	34	10.2	0.2	13	25.2	1.9	108	8.2	0.1	4	10.2	0.3	14	10.5
0.7	183.6	1.8	329	73.5	0.0	8	59.9	1.3	241	72.0	0.1	24	45.5	5.7	1048	79.2	0.2	35	81.7	0.4	80	58.7
Solids total	247.2		438	97.9		13	93.9		326	97.3		52	99.2		1318	99.6		43	99.7		136	99.8
Filtrate	2060	0.0	9	2.1	0.0	1	6.1	0.0	9	2.7	0.0	0	0.8	0.0	5	0.4	0.0	0	0.3	0.0	0	0.2
Total		1.8	447	100.0	0.1	14	100.0	1.4	334	100.0	0.2	53	100.0	5.4	1323	100.0	0.2	43	100.0	0.6	136	100.0
Raw	247.3	1.1	265		0.0	6		1.2	284		0.1	33		3.4	841		0.0	11		0.6	117	
DF			1.02			1.07			1.03			1.01			1.00			1.00			1.00	
Frac.Raw			1.69			2.27			1.17			1.58			1.57			3.96			1.16	
>150	5.5	9.4	52	11.6	0.3	1	10.2	7.4	41	12.2	2.1	12	21.9	13.8	76	5.7	0.4	2	5.4	6.3	35	25.7
38-150	58.1	1.0	57	12.8	0.1	3	23.8	0.8	44	13.1	0.3	17	31.8	3.3	194	14.6	0.1	5	12.6	0.4	21	15.5
<38	183.6	1.8	329	73.5	0.0	8	59.9	1.3	241	72.0	0.1	24	45.5	5.7	1048	79.2	0.2	35	81.7	0.4	80	58.7

BF302 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	1.4	32.1	45	0.5	2.4	3	0.8	27.1	38	0.4	6.2	9	14.3	1130.0	1582	1.9	2.9	4	5.9	29.1	41	1.9
2000	4.8	33.8	162	1.8	1.4	7	1.7	35.3	169	1.9	0.4	2	2.9	440.0	2112	2.5	0.6	3	4.5	50.2	241	11.3
500	8.0	49.4	395	4.6	2.7	22	5.4	51.6	413	4.7	1.1	9	14.2	912.0	7296	8.6	0.9	7	10.1	43.4	347	16.3
150	12.9	62.7	809	9.5	2.4	31	7.6	61.4	792	9.0	0.3	4	5.9	365.0	4709	5.5	0.2	3	4.0	5.9	77	3.6
75	12.6	42.6	537	6.3	2.0	25	6.1	41.6	524	5.9	0.5	7	10.9	268.0	3377	4.0	0.5	6	9.5	2.7	34	1.6
38	39.9	24.8	990	11.6	1.4	54	13.4	25.3	1009	11.4	0.2	8	13.6	256.0	10214	12.0	0.2	7	10.0	20.2	806	37.8
0.7	134.4	40.6	5443	63.7	1.9	253	62.6	42.6	5725	64.8	0.2	21	34.7	413.0	55507	65.3	0.3	38	55.4	4.3	581	27.2
Solids total	214.0		8381	98.1		394	97.7		8671	98.2		68	96.6		84797	99.8		67	99.4		2126	99.7
Filtrate	2550	0.1	164	1.9	0.0	9	2.3	0.1	158	1.8	0.0	2	3.5	0.1	205	0.2	0.0	0	0.6	0.0	7	0.3
Total		39.9	8545	100.0	1.9	404	100.0	41.3	8829	100.0	0.3	60	100.0	397.2	85001	100.0	0.3	68	100.0	10.0	2133	100.0
Raw	214.0	26.4	5437		1.3	287		26.0	5361		0.4	81		1060.0	226890		0.9	186		1.8	379	
DF			1.02			1.02			1.02			1.04			1.00			1.01			1.00	
Frac/Raw			1.57			1.41			1.65			0.74			0.37			0.36			5.63	
>150	27.1	52.1	1411	16.5	2.3	63	15.5	52.1	1412	16.0	0.8	22	37.4	579.3	15699	18.5	0.6	17	24.5	26.0	706	33.1
38-150	52.5	29.1	1526	17.9	1.5	79	19.6	29.2	1534	17.4	0.3	15	24.5	268.9	13691	16.0	0.3	13	19.4	16.0	840	39.4
<38	134.4	40.6	5443	63.7	1.9	253	62.6	42.6	5725	64.8	0.2	21	34.7	413.0	55507	65.3	0.3	38	55.4	4.3	581	27.2

131772

HR301 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	3.4	2.4	8	0.0	0.2	1	0.0	2.3	8	0.0	0.7	2	1.8	112.0	381	0.1	0.1	0	0.1	2.3	8	0.7
2000	1.3	24.0	31	0.1	1.4	2	0.1	23.2	30	0.1	1.5	2	1.5	530.0	689	0.2	0.6	1	0.3	47.9	62	5.3
600	7.9	62.4	493	1.4	3.1	24	1.4	61.8	488	1.4	0.9	7	5.9	3460.0	27334	8.7	2.7	21	9.2	24.0	190	16.2
150	4.6	118.0	543	1.6	5.6	26	1.4	121.0	557	1.6	0.4	2	1.6	2860.0	13156	4.2	2.1	10	4.2	21.6	99	8.5
75	3.4	166.0	564	1.7	7.9	27	1.5	163.0	554	1.6	1.6	5	4.2	5310.0	18054	5.8	5.0	17	7.3	23.1	79	6.7
38	37.6	47.9	1796	5.3	2.2	83	4.6	47.9	1796	5.2	0.2	9	6.7	489.0	18338	5.9	0.1	4	1.8	9.0	338	28.9
0.7	168.0	182.0	30576	89.8	9.7	1630	90.9	184.0	30912	89.9	0.6	93	73.2	1400.0	235200	75.1	1.0	175	75.9	2.3	390	33.3
Solids total	226.1		34012	99.9		1792	99.9		34345	99.9		121	94.8		313151	100.0		228	98.9		1165	99.5
Filtrate	1950	0.0	34	0.1	0.0	1	0.1	0.0	28	0.1	0.0	7	5.2	0.1	110	0.0	0.0	2	1.1	0.0	6	0.6
Total		150.6	34046	100.0	7.9	1794	100.0	152.0	34373	100.0	0.6	128	100.0	1385.5	313262	100.0	1.0	230	100.0	5.2	1171	100.0
Raw	226.1	135.0	30523		8.4	1895		144.0	32568		0.4	95		2530.0	572029		1.5	332		4.0	904	
DF			1.00			1.00			1.00			1.06			1.00			1.01			1.01	
Frac/Raw			1.12			0.95			1.06			1.34			0.55			0.69			1.29	
> 150	17.2	62.5	1075	3.2	3.1	53	3.0	63.0	1083	3.2	0.8	14	10.7	2416.3	41560	13.3	1.8	32	13.8	20.9	359	30.6
38-150	40.9	57.7	2361	6.9	2.7	110	6.1	57.5	2350	6.8	0.3	14	10.8	889.8	36392	11.6	0.5	21	9.2	10.2	416	35.6
< 38	168.0	182.0	30576	89.8	9.7	1630	90.9	184.0	30912	89.9	0.6	93	73.2	1400.0	235200	75.1	1.0	175	75.9	2.3	390	33.3

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SD301 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0
2000	1.4	78.4	110	1.9	3.0	4	1.6	75.5	106	1.8	3.2	4	16.8	2200.0	3080	6.3	1.6	2	5.6	64.7	91	10.0
600	3.8	88.8	341	5.8	4.7	18	6.3	94.6	359	6.0	1.0	4	13.7	111.0	422	0.9	0.6	2	5.1	92.1	350	38.5
150	3.0	116.0	348	5.9	4.9	15	5.2	105.0	315	5.3	0.9	3	9.3	301.0	903	1.8	0.2	1	1.4	24.4	73	8.0
75	2.9	130.0	377	6.4	6.0	17	6.1	130.0	377	6.3	0.9	3	9.5	3520.0	10208	20.7	2.9	8	21.6	10.6	31	3.4
38	50.9	4.0	203	3.4	0.2	9	3.1	4.0	205	3.4	0.1	4	15.2	29.4	1496	3.0	0.1	3	7.7	1.1	54	6.0
0.7	178.1	25.0	4453	75.2	1.2	216	76.3	25.4	4524	76.7	0.1	10	34.2	186.0	33127	67.3	0.1	23	68.5	1.7	308	33.9
Solids total	240.1		5831	98.5		278	98.6		6886	98.5		28	97.7		49236	100.0		39	99.8		907	99.7
Filtrate	2240	0.0	87	1.5	0.0	4	1.5	0.0	88	1.6	0.0	1	2.3	0.0	10	0.0	0.0	0	0.2	0.0	3	0.3
Total		24.6	5918	100.0	1.2	282	100.0	24.9	5973	100.0	0.1	28	100.0	205.1	49246	100.0	0.2	39	100.0	3.8	910	100.0
Raw	240.0	20.9	5015		1.0	247		20.7	4967		0.2	43		424.0	101746		0.4	90		33.1	7943	
DF			1.01			1.02			1.01			1.02			1.00			1.00			1.00	
Frac/Raw			1.18			1.14			1.20			0.67			0.48			0.43			0.11	
> 150	8.2	97.4	799	13.5	4.5	37	12.9	95.1	780	13.1	1.3	11	38.9	537.2	4405	8.9	0.6	5	12.1	62.7	514	56.5
38-150	53.8	10.8	580	9.8	0.5	26	8.3	10.8	582	9.7	0.1	7	24.7	217.6	11704	23.8	0.2	11	29.2	1.6	85	9.4
≤ 38	178.1	25.0	4453	75.2	1.2	216	76.3	25.4	4524	76.7	0.1	10	34.2	186.0	33127	67.3	0.1	23	68.5	1.7	308	33.9

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LV103 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	31.2	0.3	11	0.6	0.0	0	0.4	0.3	9	0.5	0.0	1	2.8	0.2	6	0.7	0.0	0	3.1	0.0	1	0.1
2000	34.6	1.1	37	2.2	0.0	1	0.8	0.9	31	1.8	0.1	4	7.7	0.6	22	2.3	0.0	1	6.2	0.1	3	0.4
600	26.6	3.9	103	6.0	0.2	6	6.6	2.9	76	4.6	0.1	3	5.7	10.0	264	27.8	0.1	3	17.4	0.3	9	1.3
150	11.8	3.2	38	2.2	0.2	3	2.7	2.9	34	2.0	0.1	1	2.3	2.3	27	2.8	0.0	0	1.3	0.6	7	0.9
75	4.1	7.8	32	1.9	0.4	2	1.7	6.8	28	1.6	0.2	1	2.2	13.7	56	5.9	0.2	1	5.0	0.7	3	0.4
38	39.7	2.3	90	5.2	0.3	11	11.1	2.0	80	4.7	0.1	5	11.4	0.5	18	1.9	0.0	0	3.2	0.8	32	4.4
0.7	164.4	8.3	1360	78.6	0.4	73	74.2	8.5	1394	81.6	0.2	26	56.0	3.3	544	57.1	0.0	7	49.8	4.1	676	92.3
Solids tot	312.3		1671	95.6		96	97.4		1663	96.7		40	88.2		938	98.4		12	86.1		730	99.8
Filtrate	2650	0.0	59	3.4	0.0	3	2.6	0.0	56	3.3	0.0	5	11.8	0.0	15	1.6	0.0	2	13.9	0.0	2	0.2
Total		5.5	1729	100.0	0.3	99	100.0	5.5	1709	100.0	0.1	46	100.0	3.1	953	100.0	0.0	14	100.0	2.3	732	100.0
Raw	312.6	5.1	1606		0.3	91		5.2	1622		0.1	34		1.4	450		0.0	7		0.1	18	
DF			1.04			1.03			1.03			1.13			1.02			1.16			1.00	
Frac/Raw			1.08			1.09			1.05			1.34			2.12			2.00			39.56	
> 150	104.1	1.8	189	10.9	0.1	10	10.6	1.6	151	8.8	0.1	8	18.6	3.1	319	33.6	0.0	4	28.1	0.2	19	2.6
38-150	43.8	2.8	122	7.0	0.3	13	12.7	2.5	108	6.3	0.1	6	13.7	1.7	74	7.8	0.0	1	8.2	0.8	35	4.8
< 38	164.4	8.3	1360	78.6	0.4	73	74.2	8.5	1394	81.6	0.2	26	56.0	3.3	544	57.1	0.0	7	49.8	4.1	676	92.3

HS101 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra 226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	3.9	3.0	12	0.6	0.2	1	0.7	2.6	10	0.5	0.6	2	7.6	11.8	46	0.6	0.3	1	5.1	1.0	4	0.1
2000	7.9	3.9	31	1.6	0.2	2	1.5	4.0	31	1.6	0.1	1	2.2	5.4	43	0.6	0.1	1	2.6	2.3	18	0.7
600	4.9	24.5	120	6.0	1.3	7	5.4	24.6	121	6.0	0.6	3	10.1	541.0	2651	35.2	0.9	4	20.6	21.8	107	3.8
150	3.7	12.8	47	2.4	0.7	3	2.2	12.2	45	2.2	0.2	1	2.4	19.0	70	0.9	0.1	0	1.2	6.8	25	0.9
75	1.9	16.8	32	1.6	0.8	2	1.3	17.4	33	1.6	1.3	2	8.0	485.0	922	12.2	0.7	1	6.0	15.1	29	1.0
38	71.0	1.6	115	5.8	0.1	6	5.3	1.9	134	6.7	0.1	6	18.7	2.6	187	2.5	0.0	1	4.3	1.8	126	4.5
0.7	190.8	8.0	1521	76.3	0.5	92	76.0	8.1	1538	76.2	0.1	14	45.3	18.7	3568	47.3	0.1	11	52.0	13.2	2519	89.0
Solids tot	284.1		1877	94.2		112	92.3		1912	94.8		29	94.3		7486	99.3		19	91.6		2828	100.0
Filtrate	2260	0.1	116	5.8	0.0	9	7.7	0.0	105	5.2	0.0	2	5.7	0.0	55	0.7	0.0	2	8.4	0.0	1	0.0
Total		7.0	1993	100.0	0.4	121	100.0	7.1	2017	100.0	0.1	31	100.0	26.5	7541	100.0	0.1	21	100.0	10.0	2829	100.0
Raw	284.2	6.5	1844		0.3	74		5.6	1603		0.1	16		11.9	3382		0.1	26		5.7	1611	
DF			1.06			1.08			1.05			1.06			1.01			1.09			1.00	
Frac/Raw			1.08			1.64			1.26			1.96			2.23			0.81			1.76	
>150	20.4	10.3	209	10.5	0.6	12	9.8	10.2	207	10.3	0.3	7	22.2	137.7	2810	37.3	0.3	6	29.3	7.6	155	5.5
38-150	72.9	2.0	147	7.4	0.1	8	6.6	2.3	167	8.3	0.1	8	26.7	15.2	1108	14.7	0.0	2	10.3	2.1	155	5.5
<38	190.8	8.0	1521	76.3	0.5	92	76.0	8.1	1538	76.2	0.1	14	45.3	18.7	3568	47.3	0.1	11	52.0	13.2	2519	89.0

LV302 RAW DATA

	Dry wt	U-234			U-235			U-238			Th-228			Th-230			Th-232			Ra-226		
Fraction	grams	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot	pCi/g	pCi	% tot
6300	1.2	3.8	5	0.2	1.0	1	1.2	3.7	4	0.2	2.4	3	9.1	78.0	94	0.5	1.1	1	6.5	2.4	3	0.1
2000	4.1	4.1	17	0.7	0.3	1	1.4	3.7	15	0.7	0.6	2	7.6	23.1	95	0.5	0.2	1	4.5	2.5	10	0.2
600	7.4	11.2	83	3.5	0.6	4	4.6	11.8	87	4.0	0.1	1	3.3	487.0	3604	20.5	0.5	3	16.1	24.9	184	4.1
150	12.4	8.7	108	4.5	0.4	5	4.9	9.0	112	5.1	0.1	1	4.7	148.0	1835	10.4	0.1	1	4.0	12.9	160	3.5
75	2.7	36.5	98	4.0	1.7	5	4.9	32.7	88	4.0	0.7	2	6.2	941.0	2541	14.4	0.8	2	10.8	81.2	219	4.8
38	73.4	2.5	181	7.6	0.1	9	9.6	2.4	175	7.9	0.0	3	10.8	4.6	338	1.9	0.0	1	3.4	2.9	211	4.6
0.7	157.6	11.7	1844	77.3	0.4	68	70.8	10.6	1671	75.6	0.1	15	45.8	54.4	8573	48.7	0.1	11	51.3	23.7	3736	82.3
Solids tot	258.8		2332	97.8		93	97.4		2152	97.4		28	87.4		17080	96.9		20	96.6		4522	99.7
Filtrate	2250	0.0	52	2.2	0.0	2	2.6	0.0	58	2.6	0.0	4	12.6	0.2	538	3.1	0.0	1	3.4	0.0	14	0.3
Total		9.2	2384	100.0	0.4	96	100.0	8.5	2210	100.0	0.1	32	100.0	68.1	17618	100.0	0.1	21	100.0	17.5	4536	100.0
Raw	258.9	7.2	1866		0.4	94		6.8	1771		0.1	36		53.9	13953		0.0	5		5.6	1437	
DF			1.02			1.03			1.03			1.14			1.03			1.04			1.00	
Frac/Raw			1.28			1.01			1.25			0.88			1.26			4.05			3.16	
> 150	26.1	8.4	212	8.9	0.5	12	12.1	8.7	219	9.9	0.3	8	24.6	224.2	5627	31.9	0.3	6	31.0	14.2	357	7.9
38 150	76.1	3.6	276	11.6	0.2	14	14.5	3.5	263	11.9	0.1	5	17.0	37.8	2879	16.3	0.0	3	14.3	5.6	430	9.5
< 38	157.6	11.7	1844	77.3	0.4	68	70.8	10.6	1671	75.6	0.1	15	45.8	54.4	8573	48.7	0.1	11	51.3	23.7	3736	82.3

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DOE FUSRAP - ST. LOUIS SITE TREATABILITY STUDY

INTERIM CHARACTERIZATION REPORT

APPENDIX C:

Summary Tables - Composite Sample Characterization

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Table C-1. Composite # SL1C Characterization Data

PARAMETER		Units	Solids Fractions (microns) >150	38-150	<38	Filtrate	Totals	Avg. Act. (Solids)
Partcle Size Distribution								
Measured weights		grams	20.5	60.9	196.9	2,450	278.3	
Measured fraction %		%	7.4	21.9	70.8		100.0	
Estimated fraction %		%	6.3	29.4	64.3			
Gross Activity (measured)								
Alpha	- conc.	pCi/g	84.0	121.8	413.9	0.5		330.4
	- activity	pCi	1,722	7,420	81,501	1,299	91,942	
	- % total	%	1.9	8.1	88.6	1.4	100.0	
Beta	- conc.	pCi/g	23.6	51.0	189.6	0.2		148.8
	- activity	pCi	483	3,107	37,322	490	41,402	
	- % total	%	1.2	7.5	90.1	1.2	100.0	
Total	- conc.	pCi/g	107.6	172.9	603.5	0.7		479.1
	- activity	pCi	2,205	10,527	118,823	1,789	133,343	
	- % total	%	1.7	7.9	89.1	1.3	100.0	
Alpha:Beta ratio		--	3.57	2.39	2.18	2.65		2.22
Isotopic Activity (estimated)								
Uranium	U-234	pCi/g	80.6	11.7	26.2	0.2		29.1
	U-235	pCi/g	4.1	0.6	1.3	0.0		1.5
	U-238	pCi/g	82.2	12.0	27.4	0.2		30.1
	Total U	pCi/g	166.9	24.3	54.9	0.4		60.7
Thorium	Th-228	pCi/g	0.2	0.3	0.1	0.0		0.2
	Th-230	pCi/g	54.2	135.3	50.8	0.0		69.9
	Th-232	pCi/g	0.1	0.1	0.1	0.0		0.1
Radium	Ra-226	pCi/g	13.6	9.8	12.4	0.0		11.9
Total isotopic activity		pCi/g	235.0	169.8	118.3	0.4		142.8
Alpha/beta:isotopic ratio		--	0.46	1.02	5.10	1.83		3.36

Whole/Raw Sample Data: wet wt. = 321.6 grams

#	Moisture %	Solids grams	Gross Alpha pCi/g	Gross Alpha pCi	Gross Beta pCi/g	Gross Beta pCi	Total pCi/g	Total pCi	Frac/raw Ratio
A	13.5	278.2	418.4	116,395	129.1	35,900	547.5	152,295	0.88
B	12.3	281.9	418.4	117,956	129.1	36,381	547.5	154,337	0.86

Note: All solids data (weight, activity, etc.) is reported on a dry weight basis, except where noted.

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Table C-2. Composite # SL2C Characterization Data

PARAMETER		Units	Solids Fractions (microns) >150	38-150	<38	Filtrate	Totals	Avg. Act. (Solids)
Partcle Size Distribution								
Measured weights		grams	25.3	45.4	188.2	2,970	258.9	
Measured fraction %		%	9.8	17.5	72.7		100.0	
Estimated fraction %		%	11.4	22.6	66.0			
Gross Activity (measured)								
Alpha	- conc.	pCi/g	221.2	253.2	860.0	0.2		693.5
	- activity	pCi	5,596	11,494	161,843	624	179,556	
	- % total	%	3.1	6.4	90.1	0.3	100.0	
Beta	- conc.	pCi/g	64.3	89.1	310.4	0.1		248.7
	- activity	pCi	1,626	4,046	58,410	297	64,378	
	- % total	%	2.5	6.3	90.7	0.5	100.0	
Total	- conc.	pCi/g	285.4	342.3	1170.3	0.3		942.2
	- activity	pCi	7,221	15,540	220,252	921	243,934	
	- % total	%	3.0	6.4	90.3	0.4	100.0	
Alpha:Beta Ratio		--	3.44	2.84	2.77	2.10		2.79
Isotopic Activity (estimated)								
Uranium	U-234	pCi/g	69.4	12.7	33.5	0.1		30.0
	U-235	pCi/g	3.5	0.7	1.2	0.0		1.3
	U-238	pCi/g	70.2	12.5	26.4	0.1		25.9
	Total U	pCi/g	143.1	25.9	61.1	0.2		57.2
Thorium	Th-228	pCi/g	0.3	0.4	0.2	0.0		0.3
	Th-230	pCi/g	522.4	431.5	233.5	0.1		286.4
	Th-232	pCi/g	1.0	5.3	0.4	0.0		1.4
Radium	Ra-226	pCi/g	74.4	23.1	37.8	0.0		35.5
Total isotopic activity		pCi/g	741.2	486.2	333.0	0.3	0.0	380.8
Alpha/beta:isotopic ratio		--	0.39	0.70	3.51	1.03		2.47

Whole/Raw Sample Data: wet wt. = 306.8 grams

#	Moisture %	Solids grams	Gross Alpha pCi/g	Gross Alpha pCi	Gross Beta pCi/g	Gross Beta pCi	Total pCi/g	Total pCi	Frac/raw Ratio
A	15.6	258.9	663.4	171,791	209.3	54,191	872.7	225,981	1.08
B	14.3	263.1	663.4	174,518	209.3	55,051	872.7	229,569	1.06

Note: All solids data (weight, activity, etc.) is reported on a dry weight basis, except where noted.

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Table C-3. Composite # SL3C Characterization Data

PARAMETER		Units	Solids Fractions (microns) >150	38-150	<38	Filtrate	Totals	Avg. Act. (Solids)
Partcle Size Distribution								
Measured weights		grams	9.8	42.7	208.1	2,790	260.6	
Measured fraction %		%	3.8	16.4	79.9		100.0	
Estimated fraction %		%	4.4	19.0	76.6			
Gross Activity (measured)								
Alpha	- conc.	pCi/g	709.5	187.1	1567.2	0.2		1310.6
	- activity	pCi	6,953	7,991	326,126	474	341,544	
	- % total	%	2.0	2.3	95.5	0.1	100.0	
Beta	- conc.	pCi/g	260.2	79.3	472.4	0.1		401.5
	- activity	pCi	2,550	3,386	98,313	391	104,639	
	- % total	%	2.4	3.2	94.0	0.4	100.0	
Total	- conc.	pCi/g	969.7	266.4	2039.6	0.3		1712.1
	- activity	pCi	9,503	11,377	424,439	865	446,183	
	- % total	%	2.1	2.5	95.1	0.2	100.0	
Alpha:Beta Ratio		--	2.73	2.36	3.32	1.21		3.26
Isotopic Activity (estimated)								
Uranium	U-234	pCi/g	116.8	24.4	122.6	0.1		106.8
	U-235	pCi/g	6.0	1.2	4.5	0.0		4.1
	U-238	pCi/g	116.1	24.2	85.9	0.1		77.2
	Total U	pCi/g	238.9	49.8	213.0	0.2		188.1
Thorium	Th-228	pCi/g	1.1	0.2	0.3	0.0		0.3
	Th-230	pCi/g	4306.3	757.9	802.0	0.1		961.2
	Th-232	pCi/g	3.7	0.6	0.7	0.0		0.8
Radium	Ra-226	pCi/g	26.4	6.5	5.5	0.0		6.9
Total isotopic activity		pCi/g	4576.4	815.0	1021.5	0.3	0.0	1157.3
Alpha/beta:isotopic ratio		--	0.21	0.33	2.00	1.03		1.48

Whole/Raw Sample Data: wet wt. = 302.5 grams

#	Moisture %	Solids grams	Gross Alpha pCi/g	Gross Alpha pCi	Gross Beta pCi/g	Gross Beta pCi	Total pCi/g	Total pCi	Frac/raw Ratio
A	13.9	260.6	1562.6	407,214	300.9	78,416	1863.5	485,630	0.92
B	18.0	247.9	1562.6	387,409	300.9	74,602	1863.5	462,011	0.97

Note: All solids data (weight, activity, etc.) is reported on a dry weight basis, except where noted.

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Table C-4. Composite # BF1C Characterization Data

PARAMETER		Units	Solids Fractions (microns) >150	38-150	<38	Filtrate	Totals	Avg. Act. (Solids)
Partcle Size Distribution								
Measured weights		grams	49.4	75.0	145.4	2,810	269.8	
Measured fraction %		%	18.3	27.8	53.9		100.0	
Estimated fraction %		%	14.7	28.5	56.8			
Gross Activity (measured)								
Alpha	- conc.	pCi/g	135.1	42.6	78.9	0.1		80.0
	- activity	pCi	6,672	3,192	11,475	253	21,592	
	- % total	%	30.9	14.8	53.1	1.2	100.0	
Beta	- conc.	pCi/g	34.7	27.0	41.4	0.1		37.5
	- activity	pCi	1,713	2,027	6,022	365	10,127	
	- % total	%	16.9	20.0	59.5	3.6	100.0	
Total	- conc.	pCi/g	169.7	69.6	120.3	0.2		117.6
	- activity	pCi	8,385	5,219	17,497	618	31,719	
	- % total	%	26.4	16.5	55.2	1.9	100.0	
Alpha:Beta Ratio		--	3.90	1.58	1.91	0.69		2.13
Isotopic Activity (estimated)								
Uranium	U-234	pCi/g	10.1	11.9	28.1	0.0		15.9
	U-235	pCi/g	1.0	0.7	1.3	0.0		0.8
	U-238	pCi/g	8.6	12.5	29.1	0.0		16.3
	Total U	pCi/g	19.7	25.1	58.5	0.0		33.0
Thorium	Th-228	pCi/g	3.8	0.3	0.3	0.0		0.3
	Th-230	pCi/g	121.3	15.1	4.8	0.0		12.9
	Th-232	pCi/g	1.4	0.1	0.1	0.0		0.1
Radium	Ra-226	pCi/g	3.5	4.6	1.8	0.0		2.0
Total isotopic activity		pCi/g	149.7	45.2	65.5	0.0	0.0	48.3
Alpha/beta:isotopic ratio		--	1.13	1.54	1.84	--		2.43

Whole/Raw Sample Data: wet wt. = 300.7 grams

#	Moisture %	Solids grams	Gross Alpha pCi/g	Gross Alpha pCi	Gross Beta pCi/g	Gross Beta pCi	Total pCi/g	Total pCi	Frac/raw Ratio
A	10.3	269.7	97.6	26,325	39.1	10,554	136.7	36,880	0.86
B	10.1	270.4	97.6	26,387	39.1	10,579	136.7	36,966	0.86

Note: All solids data (weight, activity, etc.) is reported on a dry weight basis, except where noted.

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Table C-5. Composite # BF3C Characterization Data

PARAMETER		Units	Solids Fractions (microns) >150	38-150	<38	Filtrate	Totals	Avg. Act. (Solids)
Partcle Size Distribution								
Measured weights		grams	9.4	49.9	176.5	3,060	235.8	
Measured fraction %		%	4.0	21.2	74.9		100.0	
Estimated fraction %		%	6.5	24.8	68.7			
Gross Activity (measured)								
Alpha	- conc.	pCi/g	424.6	221.9	502.5	0.1		440.8
	- activity	pCi	3,991	11,075	88,697	184	103,946	
	- % total	%	3.8	10.7	85.3	0.2	100.0	
Beta	- conc.	pCi/g	96.0	96.9	146.1	0.1		135.5
	- activity	pCi	903	4,837	25,792	428	31,960	
	- % total	%	2.8	15.1	80.7	1.3	100.0	
Total	- conc.	pCi/g	520.6	318.9	648.7	0.2		576.4
	- activity	pCi	4,893	15,912	114,488	612	135,906	
	- % total	%	3.6	11.7	84.2	0.5	100.0	
Alpha:Beta Ratio		--	4.42	2.29	3.44	0.43		3.25
Isotopic Activity (estimated)								
Uranium	U-234	pCi/g	70.7	32.5	82.5	0.0		71.7
	U-235	pCi/g	3.3	1.6	4.3	0.0		3.7
	U-238	pCi/g	70.1	32.5	84.0	0.0		72.7
	Total U	pCi/g	144.1	66.6	170.8	0.0		148.1
Thorium	Th-228	pCi/g	1.0	0.2	0.3	0.0		0.3
	Th-230	pCi/g	1178.0	455.0	666.0	0.0		663.0
	Th-232	pCi/g	1.0	0.3	0.5	0.0		0.5
Radium	Ra-226	pCi/g	36.5	9.3	2.8	0.0		6.3
Total isotopic activity		pCi/g	1360.6	531.4	840.4	0.0	0.0	818.2
Alpha/beta:isotopic ratio		--	0.38	0.60	0.77	--		0.70

Whole/Raw Sample Data: wet wt. = 300.7 grams

#	Moisture %	Solids grams	Gross Alpha pCi/g	Gross Alpha pCi	Gross Beta pCi/g	Gross Beta pCi	Total pCi/g	Total pCi	Frac/raw Ratio
A	21.6	235.7	1290.5	304,222	270.0	63,659	1560.5	367,881	0.37
B	21.1	237.2	1290.5	306,085	270.0	64,049	1560.5	370,134	0.37
C	21.6	235.7	900.7	212,332	361.5	85,233	1262.2	297,564	0.46
D	21.1	237.2	900.7	213,632	361.5	85,754	1262.2	299,386	0.45

Note: All solids data (weight, activity, etc.) is reported on a dry weight basis, except where noted.

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Table C-6. Composite # LV1C Characterization Data

PARAMETER		Units	Solids Fractions (microns) >150	38-150	<38	Filtrate	Totals	Avg. Act. (Solids)
Partcle Size Distribution								
Measured weights		grams	22.5	52.3	195.4	3,250	270.2	
Measured fraction %		%	8.3	19.4	72.3		100.0	
Estimated fraction %		%	13.4	19.1	67.5			
Gross Activity (measured)								
Alpha	- conc.	pCi/g	19.6	14.6	64.4	0.1		52.4
	- activity	pCi	440	764	12,586	358	14,147	
	- % total	%	3.1	5.4	89.0	2.5	100.0	
Beta	- conc.	pCi/g	9.4	15.7	26.6	0.2		24.8
	- activity	pCi	212	821	5,194	488	6,714	
	- % total	%	3.2	12.2	77.4	7.3	100.0	
Total	- conc.	pCi/g	29.0	30.3	91.0	0.3		77.2
	- activity	pCi	652	1,585	17,779	845	20,861	
	- % total	%	3.1	7.6	85.2	4.1	100.0	
Alpha:Beta Ratio		--	2.08	0.93	2.42	0.73		2.11
Isotopic Activity (estimated)								
Uranium	U-234	pCi/g	6.0	2.4	8.1	0.0		6.3
	U-235	pCi/g	0.3	0.2	0.5	0.0		0.4
	U-238	pCi/g	5.8	2.4	8.3	0.0		6.3
	Total U	pCi/g	12.1	5.0	16.9	0.0		13.0
Thorium	Th-228	pCi/g	0.2	0.1	0.1	0.0		0.1
	Th-230	pCi/g	70.4	8.4	11.0	0.0		14.8
	Th-232	pCi/g	0.2	0.0	0.1	0.0		0.1
Radium	Ra-226	pCi/g	3.9	1.5	8.7	0.0		6.2
Total isotopic activity		pCi/g	86.8	15.0	36.8	0.0	0.0	34.2
Alpha/beta:isotopic ratio		--	0.33	2.02	2.47	--		2.26

Whole/Raw Sample Data: wet wt. = 300.9 grams

#	Moisture %	Solids grams	Gross Alpha pCi/g	Gross Alpha pCi	Gross Beta pCi/g	Gross Beta pCi	Total pCi/g	Total pCi	Frac/raw Ratio
A	10.2	270.2	174.9	47,249	49.3	13,308	224.1	60,556	0.34
B	14.7	256.7	174.9	44,886	49.3	12,642	224.1	57,529	0.36
C	10.2	270.2	44.8	12,111	21.5	5,818	66.4	17,928	1.16
D	14.7	256.7	44.8	11,505	21.5	5,527	66.4	17,032	1.22

Note: All solids data (weight, activity, etc.) is reported on a dry weight basis, except where noted.

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Table C-7. Composite # LV3C Characterization Data

PARAMETER		Units	Solids Fractions (microns) >150	38-150	<38	Filtrate	Totals	Avg. Act. (Solids)
Partcle Size Distribution								
Measured weights		grams	12.9	53.7	189.9	3,020	256.5	
Measured fraction %		%	5.0	20.9	74.0		100.0	
Estimated fraction %		%	5.3	28.0	66.7			
Gross Activity (measured)								
Alpha	- conc.	pCi/g	25.7	31.0	257.9	0.1		199.5
	- activity	pCi	332	1,666	48,966	211	51,175	
	- % total	%	0.6	3.3	95.7	0.4	100.0	
Beta	- conc.	pCi/g	10.0	24.2	144.5	0.1		114.2
	- activity	pCi	128	1,300	27,448	423	29,299	
	- % total	%	0.4	4.4	93.7	1.4	100.0	
Total	- conc.	pCi/g	35.7	55.2	402.4	0.2		313.7
	- activity	pCi	460	2,965	76,414	634	80,474	
	- % total	%	0.6	3.7	95.0	0.8	100.0	
Alpha:Beta Ratio		--	2.58	1.28	1.78	0.50		1.75
Isotopic Activity (estimated)								
Uranium	U-234	pCi/g	8.4	3.6	11.7	0.0		9.2
	U-235	pCi/g	0.5	0.2	0.4	0.0		0.4
	U-238	pCi/g	8.7	3.5	10.6	0.0		8.5
	Total U	pCi/g	17.6	7.3	22.7	0.0		18.1
Thorium	Th-228	pCi/g	0.3	0.1	0.1	0.0		0.1
	Th-230	pCi/g	224.2	37.8	54.4	0.2		68.1
	Th-232	pCi/g	0.3	0.0	0.1	0.0		0.1
Radium	Ra-226	pCi/g	14.2	5.6	23.7	0.0		17.5
Total isotopic activity		pCi/g	256.6	50.8	101.0	0.2	0.0	103.9
Alpha/beta:isotopic ratio		--	0.14	1.09	3.98	--		3.02

Whole/Raw Sample Data: wet wt. = 302.0 grams

#	Moisture %	Solids grams	Gross Alpha pCi/g	Gross Alpha pCi	Gross Beta pCi/g	Gross Beta pCi	Total pCi/g	Total pCi	Frac/raw Ratio
A	15.1	256.4	160.6	41,172	63.4	16,245	223.9	57,418	1.40
B	17.1	250.4	160.6	40,207	63.4	15,865	223.9	56,072	1.44
C	15.1	256.4	158.4	40,606	96.7	24,786	255.0	65,392	1.23
D	17.1	250.4	158.4	39,654	96.7	24,205	255.0	63,859	1.26

Note: All solids data (weight, activity, etc.) is reported on a dry weight basis, except where noted.

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DOE FUSRAP - ST. LOUIS SITE TREATABILITY STUDY

INTERIM CHARACTERIZATION REPORT

APPENDIX D:

Laboratory Analytical Reports

NOTE: Laboratory Analytical Reports Are Contained in Volume 2

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RUST CLEMSON TECHNICAL CENTER

DOE FUSRAP - ST. LOUIS SITE
TREATABILITY STUDY

INTERIM CHARACTERIZATION REPORT

VOLUME 2 of 2

Prepared by

Rust Federal Services - Clemson Technical Center
Anderson, SC

January 16, 1995

SLC2 131772

Clemson Technical Center, INC.

Clemson Research Park

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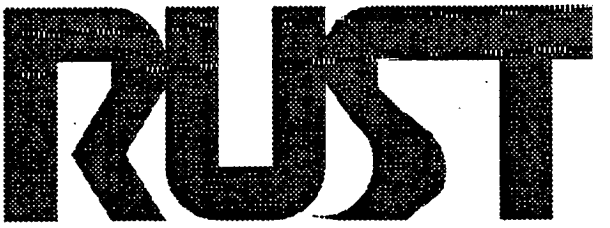


Analytical Results

Submission ID: 100004056

Project Name/ID: SAIC FUSRAP

Client Name: TD&D

Client Location: ANDERSON, SC

CTC Sample ID:	200013718	200013719	200013720		
Client Sample ID:	SL102-6300UM	SL102-2000UM	SL102-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	30-SEP-94	30-SEP-94	30-SEP-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0 *	0.8198	.9098		g/cc
Percent Moisture	-	-	-		pct

* Rejected due to insufficient sample.

RADIUM-226 - SOLID					
Radium-226, As Ra-226	0.662	10.3	26.4	.1	pci/g

COMMENTS:

200013718 -
RA-226= 0.662 PCG +/- 0.100 PCG (MDC= 0.145 PCG)
AS 10/27/94
200013719 -
RA-226= 10.3 PCG +/- 0.137 PCG (MDC= 0.0574 PCG)
AS 10/27/94
200013720 -
RA-226= 26.4 PCG +/- 0.131 PCG (MDC= 0.0214 PCG)
AS 11/1/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	< 1.5	< 1.5	1.5	pci/g
Th-230	10.9	122	109	1.5	pci/g
Th-232	< 1.5	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013718 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.207 0.240 0.207
TH-230 10.9 2.08 0.208
TH-232 0.207 0.240 0.207
AS 10/19/94
200013719 -
All units in pCi/l
Th-228 -0.0537 +/- 0.456 MDC=1.19
Th-230 122 +/- 16.0 MDC=0.468
Th-232 0.204 +/- 0.236 MDC=0.204
rws 10/30/94

200013720 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.149 0.362 0.497
TH-230 109 15.7 0.423
TH-232 0.00 0.00 0.0916
AS 10/19/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004056

CTC Sample ID:	200013718	200013719	200013720		
Client Sample ID:	SL102-6300UM	SL102-2000UM	SL102-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	30-SEP-94	30-SEP-94	30-SEP-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	658	66.1	106	1.5	pci/g
U-235	34.8	3.25	5.39	1.5	pci/g
U-238	669	67.6	107	1.5	pci/g

COMMENTS:

200013718 -
U3334 658 PCG +/- 63.8 PCG MDA=0.524 PCG
U235 34.8 PCG +/- 4.31 PCG MDA=0.497 PCG
U238 669 PCG +/- 64.8 PCG MDA=0.353 PCG
RWS 10/10/94
200013719 -
U3334 66.1 PCG +/- 5.89 PCG MDA=0.113 PCG
U235 3.25 PCG +/- 0.519 PCG MDA=0.118 PCG
U238 67.6 PCG +/- 6.03 PCG MDA=0.120 PCG
RWS 10/10/94
200013720 -
U3334 106 PCG +/- 9.74 PCG MDA=0.0836 PCG
U235 5.39 PCG +/- 0.669 PCG MDA=0.0688 PCG
U238 107 PCG +/- 9.88 PCG MDA=0.0630 PCG
RWS 10/10/94

PQL = Practical Quantitation Limit

CTC Sample ID:	200013721	200013722	200013723		
Client Sample ID:	SL102-150UM	SL102-75UM	SL102-38UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	30-SEP-94	30-SEP-94	30-SEP-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0.8984	0.6697	1.136		g/cc
Percent Moisture	-	-	-		pct
RADIUM-226 - SOLID					
Radium-226, As Ra-226	16.4	26.2	5.37	.1	pci/g

COMMENTS:

200013721 -
RA-226= 16.4 PCG +/- 0.171 PCG (MDC= 0.0297 PCG)
AS 10/27/94
200013722 -
RA-226= 26.2 PCG +/- 0.348 PCG (MDC= 0.0759 PCG)
AS 10/27/94
200013723 -
RA-226= 5.37 PCG +/- 0.0835 PCG (MDC= 0.0213 PCG)
AS 10/27/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	< 1.5	< 1.5	1.5	pci/g
Th-230	49.4	111	37.4	1.5	pci/g
Th-232	< 1.5	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013721 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.221 0.150 0.0738
TH-230 49.4 6.94 0.0738
TH-232 0.123 0.111 0.0737
AS 10/19/94
200013722 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.246 0.788 1.08
TH-230 111 15.3 0.178
TH-232 0.0591 0.118 0.177
AS 10/19/94
200013723 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.0312 0.130 0.181
TH-230 37.4 4.12 0.0297
TH-232 0.0395 0.0397 0.0296
AS 10/19/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004056

CTC Sample ID:	200013721	200013722	200013723
Client Sample ID:	SL102-150UM	SL102-75UM	SL102-38UM
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94
Date Sampled:	30-SEP-94	30-SEP-94	30-SEP-94

Parameter	Result	Result	Result	PQL	Unit
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	133	169	9.67	1.5	pci/g
U-235	6.49	8.24	< 1.5	1.5	pci/g
U-238	137	177	9.68	1.5	pci/g

COMMENTS:

200013721 -
U3334 133 PCG +/- 12.6 PCG MDA=0.0992 PCG
U235 6.49 PCG +/- 0.799 PCG MDA=0.0866 PCG
U238 137 PCG +/- 13.0 PCG MDA=0.0702 PCG
RWS 10/10/94
200013722 -
U3334 169 PCG +/- 15.5 PCG MDA=0.163 PCG
U235 8.24 PCG +/- 1.04 PCG MDA=0.0959 PCG
U238 177 PCG +/- 16.2 PCG MDA=0.106 PCG
RWS 10/10/94

200013723 -
U3334 9.67 PCG +/- 0.844 PCG MDA=0.0317 PCG
U235 0.546 PCG +/- 0.0884 PCG MDA=0.00799 PCG
U238 9.68 PCG +/- 0.845 PCG MDA=0.00648 PCG
RWS 10/10/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004056

CTC Sample ID:	200013724	200013725	200013726		
Client Sample ID:	SL102-0.7UM	SL102-FILTRATE	SL102-RAW		
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	30-SEP-94	30-SEP-94	30-SEP-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0.9436	-	1.188		g/cc
Percent Moisture	-	-	(4.81) RERUN 12% Second time		pct
RADIUM-226 - LIQUID					
Radium 226, As Ra-226	-	< .5	-	.5	pci/l

COMMENTS:

200013725 -
RA-226= -0.0153 PCL +/- 0.106 PCL (MDC=0.183 PCL)
AS 11/1/94

RADIUM-226 - SOLID					
Radium-226, As Ra-226	14.3	-	14.9	.1	pci/g

COMMENTS:

200013724 -
RA-226= 14.3 PCG +/- 0.137 PCG (MDC= 0.0218 PCG)
AS 10/27/94
200013726 -
RA-226= 14.9 PCG +/- 0.0737 PCG (MDC= 0.0120 PCG)
AS 11/1/94

THORIUM ALPHA ISOTOPIC - SRS					
Th-228	-	< 1	-	1	pci/l
Th-230	-	9.35	-	1	pci/l
Th-232	-	< 1	-	1	pci/l

COMMENTS:

200013725 -
ISOTOPE CONC(PCL) ERROR(PCL) MDC(PCL)
TH-228 -0.0397 0.254 0.400
TH-230 9.35 1.39 0.264
TH-232 0.0507 0.0718 0.0760
AS 10/19/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	-	< 1.5	1.5	pci/g
Th-230	49.7	-	61.5	1.5	pci/g

PQL = Practical Quantitation Limit

CTC Sample ID:	200013724	200013725	200013726		
Client Sample ID:	SL102-0.7UM	SL102-FILTRATE	SL102-RAW		
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	30-SEP-94	30-SEP-94	30-SEP-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**

URANIUM ALPHA ISOTOPIC - SOLID (continued):

U235 2.75 PCG +/- 0.363 PCG MDA=0.0404 PCG
U238 48.7 PCG +/- 4.77 PCG MDA=0.0421 PCG
RWS 10/10/94

PQL = Practical Quantitation Limit

13/772

RUST

Submission Id: 100004056

Report Date Nov 17, 1994

Laboratory Manager — Date 11-17-94

Martha Jo Cahill
Project Manager — Date 11-17-94

Clemson Technical Center

Clemson Research Park
101 Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Client TD+D

Location CTC

Project/Number 26427

Sample Type(s) LIQUID + SOLID

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 25 g PLASTIC BOTTLE	250 g PLASTIC BOTTLE	1 LITER PLASTIC	125 ml Plast Bottle					TOTAL	REMARKS
SL102-6300um	9/30/94 @1200	13718	1								1	
SL102-2000um		13719	1								1	
SL102-500um		13720	1								1	
SL102-150um		13721	1								1	
SL102-75um		13722	1								1	
SL102-38um		13723	1 DW			1					1	
SL102-0.7um		13724		1							1	
SL102-FILTRATE		13725			1						1	
SL102-RAW	↓	13726		1							1	
												Sub. 4056

Total No. of Containers 9

Sampled By D Wilson

Relinquished by: D Wilson Organization: CTC-TD+D

Date: 9/30/94 10/5/94 Time: 1300

Received by: William A Tant Organization: CTC

Date: 10/5/94 Time: 1300

Relinquished by: _____ Organization: _____

Date: _____ Time: _____

Received by: _____ Organization: _____

Date: _____ Time: _____

Relinquished by: _____ Organization: _____

Date: _____ Time: _____

Received by: _____ Organization: _____

Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

13172

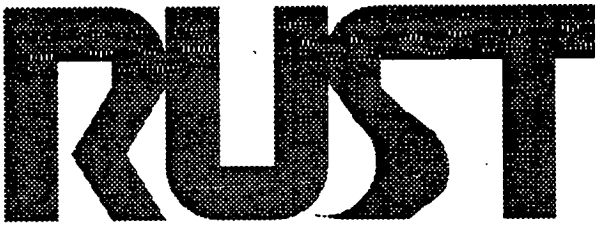
13/772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

SL104



Analytical Results

AMENDED 11/29/94

Submission ID: 100004055

Project Name/ID: SAIC FUSRAP

Client Name: TD&D

Client Location: ANDERSON, SC

RUST

Submission Id: 100004055

CTC Sample ID:	200013709	200013710	200013711		
Client Sample ID:	SL104-6300UM	SL104-2000UM	SL104-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0*	1.44	1.141		g/cc
Percent Moisture	-	-	-		pct

* Insufficient sample to perform Bulk Density.

RADIUM-226 - SOLID

Radium-226, As Ra-226	1.28	1.60	8.61	.1	pci/g

COMMENTS:

200013709 -
RA-226= 1.28 PCG +/- 0.0305 PCG (MDC=5.14E-4 PCG)
AS 10/27/94
200013710 -
RA-226= 1.60 PCG +/- 0.0302 PCG (MDC= 0.0133 PCG)
AS 10/27/94
200013711 -
RA-226= 8.61 PCG +/- 0.110 PCG (MDC= 0.0336 PCG)
AS 10/27/94

THORIUM ALPHA ISOTOPIC - SOLID

Th-228	< 1.5	< 1.5	< 1.5	1.5	pci/g
Th-230	2.82	2.42	30.4	1.5	pci/g
Th-232	< 1.5	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013709 -
All units in pCi/g
Th-228 0.160 +/- 0.186 MDC=0.372
Th-230 2.82 +/- 0.518 MDC=0.139
Th-232 0.429 +/- 0.175 MDC=0.112
rws 10/30/94

200013710 -

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.0492	0.134	0.190
TH-230	2.42	0.442	0.0413
TH-232	0.000	0.000	0.0412

AS 10/18/94
200013711 -

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	-0.0867	0.367	0.513
TH-230	30.4	3.21	0.0594
TH-232	0.0988	0.0888	0.0593

AS 10/19/94

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013709	200013710	200013711		
Client Sample ID:	SL104-6300UM	SL104-2000UM	SL104-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	< 1.5	2.77	11.7	1.5	pci/g
U-235	< 1.5	< 1.5	< 1.5	1.5	pci/g
U-238	< 1.5	2.49	12.1	1.5	pci/g

COMMENTS:

200013709 -
U3334 0.862 PCG +/- 0.158 PCG MDA=0.0570 PCG
U235 0.0761 PCG +/- 0.0537 PCG MDA=0.0781 PCG
U238 0.782 PCG +/- 0.149 PCG MDA=0.0517 PCG
RWS 10/10/94

200013710 -
U3334 2.77 PCG +/- 0.319 PCG MDA=0.0441 PCG
U235 0.147 PCG +/- 0.0586 PCG MDA=0.0383 PCG
U238 2.49 PCG +/- 0.295 PCG MDA=0.0351 PCG
RWS 10/10/94

200013711 -
U3334 11.7 PCG +/- 1.12 PCG MDA=0.107 PCG
U235 0.622 PCG +/- 0.168 PCG MDA=0.105 PCG
U238 12.1 PCG +/- 1.15 PCG MDA=0.0849 PCG
RWS 10/10/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004055

CTC Sample ID:	200013712	200013713	200013714		
Client Sample ID:	SL104-150UM	SL104-75UM	SL104-38UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0	0	1.253		g/cc
Percent Moisture	-	-	-		pct
RADIUM-226 - SOLID					
Radium-226, As Ra-226	21.7	57.4	4.45	.1	pci/g

COMMENTS:

200013712 -
RA-226= 21.7 PCG +/- 0.231 PCG (MDC= 0.0597 PCG)
AS 10/27/94
200013713 -
RA-226= 57.4 PCG +/- 0.536 PCG (MDC= 0.122 PCG)
AS 10/27/94
200013714 -
RA-226= 4.45 PCG +/- 0.0483 PCG (MDC= 0.0127 PCG)
AS 10/27/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	13.4	< 1.5	1.5	pci/g
Th-230	211	7760	46.8	1.5	pci/g
Th-232	< 1.5	8.23	< 1.5	1.5	pci/g

COMMENTS:

200013712 -
All units in pCi/g
Th-228 0.396 +/- 0.320 MDC=0.542
Th-230 211 +/- 21.0 MDC=0.255
Th-232 0.343 +/- 0.238 MDC=0.254
rws 10/30/94

200013713 -

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	13.4	23.0	30.2
TH-230	7760	982	4.95
TH-232	8.23	7.43	4.94

AS 10/19/94
200013714 -

ISOTOPE	CONC(PCL)	ERROR(PCL)	MDC(PCL)
TH-228	0.141	0.134	0.163
TH-230	46.8	4.87	0.0864
TH-232	0.0671	0.0696	0.0862

AS 10/19/94

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013712	200013713	200013714		
Client Sample ID:	SL104-150UM	SL104-75UM	SL104-38UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	05-OCT-94	05-OCT-94	05-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	35.6	57.4	4.04	1.5	pci/g
U-235	2.08	3.21	< 1.5	1.5	pci/g
U-238	37.2	60.0	4.09	1.5	pci/g

COMMENTS:

200013712 -
U3334 35.6 PCG +/- 3.24 PCG MDA=0.142 PCG
U235 2.08 PCG +/- 0.413 PCG MDA=0.111 PCG
U238 37.2 PCG +/- 3.37 PCG MDA=0.0810 PCG
RWS 10/10/94

200013713 -
U3334 57.4 PCG +/- 5.56 PCG MDA=0.319 PCG
U235 3.21 PCG +/- 0.711 PCG MDA=0.234 PCG
U238 60.0 PCG +/- 5.79 PCG MDA=0.190 PCG
RWS 10/10/94

200013714 -
U3334 4.04 PCG +/- 0.389 PCG MDA=0.0367 PCG
U235 0.260 PCG +/- 0.0617 PCG MDA=0.0323 PCG
U238 4.09 PCG +/- 0.394 PCG MDA=0.0282 PCG
RWS 10/10/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004074

CTC Sample ID:	200013751	200013752	200013753		
Client Sample ID:	SL203-0.7UM	SL203-FILTRATE	SL203-RAW		
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	1.06	-	1.49		g/cc
Percent Moisture	-	-	19.9		pct
RADIUM-226 - LIQUID					
Radium 226, As Ra-226	-	5.62	-	.5	pci/l

COMMENTS:

200013752 -
RA-226= 5.62 PCL +/- 0.221 PCL (MDC= 0.204 PCL)
AS 11/1/94

RADIUM-226 - SOLID					
Radium-226, As Ra-226	32.1	-	-	.1	pci/g

COMMENTS:

200013751 -

RA-226= 32.1 PCG +/- 0.155 PCG (MDC= 7.50E-3 PCG)
AS 11/14/94

THORIUM ALPHA ISOTOPIC - SRS					
Th-228	-	< 1	-	1	pci/l
Th-230	-	190	-	1	pci/l
Th-232	-	< 1	-	1	pci/l

COMMENTS:

200013752 -
All units in pCi/l
Th-228 0.503 +/- 0.877 MDC=1.91
Th-230 190 +/- 23.0 MDC=0.884
Th-232 0.232 +/- 0.428 MDC=0.932
rws 10/30/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	-	< 1.5	1.5	pci/g
Th-230	248	-	147	1.5	pci/g
Th-232	< 1.5	-	< 1.5	1.5	pci/g

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013751	200013752	200013753
Client Sample ID:	SL203-0.7UM	SL203-FILTRATE	SL203-RAW
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94

Parameter	Result	Result	Result	PQL	Unit
THORIUM ALPHA ISOTOPIC - SOLID (continued):					

COMMENTS:

200013751 -
All units are pCi/g
Th-228 0.222 +/- 0.163 MDC=0.283
Th-230 248 +/- 28.8 MDC=0.144
Th-232 0.227 +/- 0.120 MDC=0.0454
rws 10/30/94

200013753 -
All units are in pCi/g
Th-228 0.0581 +/- 0.0795 MDC=0.165
Th-230 147 +/- 13.3 MDC=0.0981
Th-232 0.261 +/- 0.104 MDC=0.0483
rws 10/30/94

URANIUM ALPHA ISOTOPIC - LIQUID					
U-234	-	34.5	-	1	pci/l
U-235	-	1.73	-	1	pci/l
U-238	-	32.5	-	1	pci/l

COMMENTS:

200013752 -
All units are PCi/L

ISOTOPE	Activity	Error	MDC
U-234	34.5	3.43	0.0657
U-235	1.73	0.458	0.0813
U-238	32.5	3.26	0.238

AS 11/3/94

URANIUM ALPHA ISOTOPIC - SOLID					
U-234	41.2	-	37.5	1.5	pci/g
U-235	< 1.5	-	1.52	1.5	pci/g
U-238	30.8	-	34.9	1.5	pci/g

COMMENTS:

200013751 -
ALL UNITS ARE PCI/G
U-234 = 41.2 +/- 4.42 MDC = 0.0860
U-235 = 1.44 +/- 0.281 MDC = 0.0294

PQL = Practical Quantitation Limit

RUST

Submission Id: 100004074

CTC Sample ID:	200013751	200013752	200013753		
Client Sample ID:	SL203-0.7UM	SL203-FILTRATE	SL203-RAW		
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**

URANIUM ALPHA ISOTOPIC - SOLID (continued):

U-238 = 30.8 +/- 3.34 MDC = 0.0239
AS 10/17/94
200013753 -
ISOTOPE MDC(PCL)
U-234 0.0269
U-235 0.120
U-238 0.127
AS 10/18/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004074

Report Date Nov 21, 1994

Laboratory Manager — Date 11-21-94

Project Manager — Date 11-21-94

Clemson Technical Center

Clemson Research Park
100 Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Client TD+D

Location CTC

Project/Number FUSRAP/26427

Sample Type(s) LIQUID + SOLID

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 1 LITER PLAS	250ml PLASS	125ml PLAS	25 ml PLAS					TOTAL	REMARKS
SL203-6300um	10-5-94@	13745				1					1	
SL203-2000um	1500	13746				1					1	
SL203-500um		13747				1					1	
SL203-150um		13748				1					1	
SL203-75um		13749				1					1	
SL203-38um		13750			1						1	
SL203-0.7um		13751		1							1	
SL203-FILTRATE		13752	1								1	
SL203-RAW		13753			1						1	
												4074

Total No. of Containers 9

Sampled By Dennis Wilson

Relinquished by: Dennis Wilson Organization: TD+D
Date: 10-10-94 Time: 10:30

Received by: William Batt Organization: CTC
Date: 10/10/94 Time: 10:50

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

RUST

Submission Id: 100004074

CTC Sample ID:	200013745	200013746	200013747		
Client Sample ID:	SL203-6300UM	SL203-2000UM	SL203-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
rws 10/30/94					
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	< 1.5	< 1.5	5.70	1.5	pci/g
U-235	< 1.5	< 1.5	< 1.5	1.5	pci/g
U-238	< 1.5	< 1.5	5.45	1.5	pci/g

COMMENTS:

200013745 -
ALL UNITS ARE PCI/G
U-234 = 0.423 +/- 0.0922 MDC = 0.0409
U-235 = 0.0373 +/- 0.0266 MDC = 0.0140
U-238 = 0.443 +/- 0.0946 MDC = 0.0410
AS 10/17/94
200013746 -
All units are pCi/g
U-234 = 1.18 +/- 0.177 MDC = 0.0433 PCG
U-235 = 0.0839 +/- 0.0414 MDC =0.0148 PCG
U-238 = 1.09 +/- 0.165 0.0120 PCG
AS 10/17/94
200013747 -
ALL UNITS ARE PCI/G
U-234 = 5.70 +/- 0.625 MDC = 0.0622
U-235 = 0.305 +/- 0.0970 MDC = 0.0213
U-238 = 5.45 +/- 0.602 MDC = 0.0624
AS 10/17/94

PQL = Practical Quantitation Limit

RUST

Submission Id: 100004074

CTC Sample ID:	200013748	200013749	200013750		
Client Sample ID:	SL203-150UM	SL203-75UM	SL203-38UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	7.98	21.8	8.97	1.5	pci/g
U-235	< 1.5	< 1.5	< 1.5	1.5	pci/g
U-238	8.18	22.6	9.28	1.5	pci/g

COMMENTS:

200013748 -
ALL UNITS ARE PCI/G
U-234 = 7.98 +/- 0.835 MDC = 0.0160
U-235 = 0.428 +/- 0.113 MDC = 0.0198
U-238 = 8.18 +/- 0.854 MDC = 0.0160
AS 10/17/94
200013749 -
ALL UNITS ARE PCI/G
U-234 = 21.8 +/- 2.39 MDC = 0.0439
U-235 = 1.11 +/- 0.325 MDC = 0.196
U-238 = 22.6 +/- 2.47 MDC = 0.159
AS 10/17/94
200013750 -
ALL UNITS ARE PCI/G
U-234 = 8.97 +/- 0.984 MDC = 0.0919
U-235 = 0.514 +/- 0.154 MDC = 0.0314
U-238 = 9.28 +/- 1.01 MDC = 0.120
AS 10/17/94

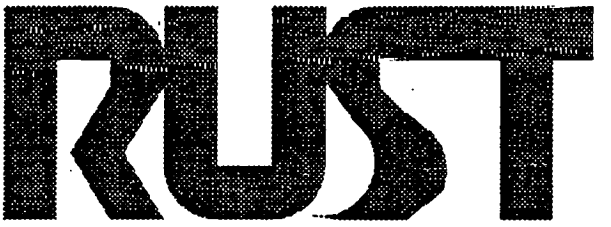
PQL = Practical Quantitation Limit

SL204 131172

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Analytical Results

Submission ID: 100004075

Project Name/ID: 26427 FUSRAP

Client Name: TD&D

Client Location: ANDERSON, SC

131772

RUST

Submission Id: 100004075

Report Date Nov 17, 1994

Laboratory Manager — Date 11-17-94

Martha Jo Cahill
Project Manager — Date 11-17-94

Clemson Technical Center

Clemson Research Park
100 Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Client TD+D
Location CTC
Project/Number FUSRAP/26427
Sample Type(s) LIQUID + SOLID

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 1 LITER PLAS	250ml PLAS	125ml PLAS	25ml PLAS					TOTAL	REMARKS
SL204-6300um	10-5-94@	13754				1					1	
SL204-2000um	1500	13755				1					1	
SL204-500um	↓	13756				1					1	
SL204-150um		13757				1					1	
SL204-75um		13758				1					1	
SL204-38um		13759			1						1	
SL204-0.7um		13760		1							1	
SL204-FILTRATE		13761	1								1	
SL204-RAW	↓	13762			1						1	
												4075

Total No. of Containers 9

Sampled By Dennis Widmer

Relinquished by: Dennis Widmer Organization: TD+D
Date: 10-10-94 Time: 10:30

Received by: [signature] Organization: CTC
Date: 10/10/94 Time: 10.50

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

131772

RUST

Submission Id: 100004075

CTC Sample ID:	200013754	200013755	200013756		
Client Sample ID:	SL204-6300UM	SL204-2000UM	SL204-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	5.10	168	172	1.5	pci/g
U-235	< 1.5	7.38	9.94	1.5	pci/g
U-238	5.15	168	176	1.5	pci/g

COMMENTS:

200013754 -
ALL UNITS ARE PCI/G
U-234 = 5.10 +/- 0.671 MDC = 0.0334
U-235 = 0.179 +/- 0.101 MDC = 0.0412
J-238 = 5.15 +/- 0.681 MDC = 0.121
AS 10/18/94
200013755 -
ALL UNITS ARE PCI/G
U-234 = 168 +/- 20.1 MDC = 0.0895
U-235 = 7.38 +/- 1.35 MDC = 0.111
U-238 = 168 +/- 20.2 MDC = 0.421
AS 10/18/94
200013756 -
ALL UNITS ARE PCI/G
U-234 = 172 +/- 20.3 MDC = 0.339
U-235 = 9.94 +/- 1.69 MDC = 0.116
U-238 = 176 +/- 20.8 MDC = 0.0941
AS 10/18/94

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013757	200013758	200013759		
Client Sample ID:	SL204-150UM	SL204-75UM	SL204-38UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	211	158	9.60	1.5	pci/g
U-235	10.4	8.04	< 1.5	1.5	pci/g
U-238	214	163	8.77	1.5	pci/g

COMMENTS:

200013757 -
ALL UNITS ARE PCI/G
U-234 = 211 +/- 23.7 MDC = 0.106
U-235 = 10.4 +/- 1.77 MDC = 0.131
U-238 = 214 +/- 24.0 MDC = 0.106
AS 10/18/94
200013758 -
ALL UNITS ARE PCI/G
U-234 = 158 +/- 16.4 MDC = 0.424
U-235 = 8.04 +/- 1.48 MDC = 0.145
U-238 = 163 +/- 17.0 MDC = 0.118
AS 10/18/94
200013759 -
ALL UNITS ARE PCI/G
U-234 = 9.60 +/- 1.00 MDC = 0.0754
U-235 = 0.568 +/- 0.149 MDC = 0.0258
U-238 = 8.77 +/- 0.927 MDC = 0.0209
AS 10/18/94

PQL = Practical Quantitation Limit

131772

Submission Id: 100004075

RUST

CTC Sample ID:	200013754	200013755	200013756		
Client Sample ID:	SL204-6300UM	SL204-2000UM	SL204-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0 *	.972	1.08		g/cc
Percent Moisture	-	-	-		pct

* Rejected due to insufficient sample.

RADIUM-226 - SOLID					
Radium-226, As Ra-226	9.22	39.1	177	.1	pci/g

COMMENTS:

200013754 -
RA-226= 9.22 PCG +/- 0.128 PCG (MDC= 0.0176 PCG)
AS 11/14/94
200013755 -
RA-226= 39.1 PCG +/- 0.245 PCG (MDC= 0.0153 PCG)
AS 11/14/94
200013756 -
RA-226= 177 PCG +/- 0.765 PCG (MDC= 0.0221 PCG)
AS 11/14/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	< 1.5	< 1.5	1.5	pci/g
Th-230	21.2	181	53.2	1.5	pci/g
Th-232	< 1.5	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013754 -
All units are in pCi/g
Th-228 0.125 +/- 0.134 MDC=0.260
Th-230 21.2 +/- 2.23 MDC=0.118
Th-232 0.0685 +/- 0.0725 MDC=0.110
rws 10/30/94

200013755 -
All units are in pCi/g
Th-228 0.0385 +/- 0.256 MDC=0.648
Th-230 181 +/- 24.3 MDC=0.270
Th-232 0.337 +/- 0.242 MDC=0.126
rws 10/30/94

200013756 -
All units are in pCi/g
Th-228 0.431 +/- 0.423 MDC=0.785
Th-230 53.2 +/- 6.14 MDC=0.246
Th-232 0.426 +/- 0.229 MDC=0.273
rws 10/30/94

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013757	200013758	200013759		
Client Sample ID:	SL204-150UM	SL204-75UM	SL204-38UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	.664	.603	1.15		g/cc
Percent Moisture	-	-	-		pct
RADIUM-226 - SOLID					
Radium-226, As Ra-226	458	344	16.5	.1	pci/g

COMMENTS:

200013757 -
RA-226= 458 PCG +/- 1.43 PCG (MDC=0.0299 PCG)
AS 11/14/94
200013758 -
RA-226= 344 PCG +/- 1.60 PCG (MDC= 0.0497 PCG)
AS 11/14/94
200013759 -
RA-226= 16.5 PCG +/- 0.121 PCG (MDC= 8.89E-3 PCG)
AS 11/14/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	1.72	2.55	< 1.5	1.5	pci/g
Th-230	5110	10100	102	1.5	pci/g
Th-232	8.79	18.6	< 1.5	1.5	pci/g

COMMENTS:

200013757 -
All units in pCi/g
Th-228 1.72 +/- 0.419 MDA=0.401
Th-230 5110 +/- 466 MDA=0.211
Th-232 8.79 +/- 1.12 MDA=0.105
rws 10/30/94

200013758 -
All units in pCi/g
Th-228 2.55 +/- 0.419 MDA=0.331
Th-230 10100 +/- 802 MDA=0.115
Th-232 18.6 +/- 1.73 MDA=0.0910
rws 10/30/94

200013759 -
All units in pCi/g
Th-228 0.102 +/- 0.0511 MDA=0.0725
Th-230 102 +/- 8.48 MDA=0.0318
Th-232 0.237 +/- 0.0638 MDA=0.0317
rws 10/30/94

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013760	200013761	200013762		
Client Sample ID:	SL204-0.7UM	SL204-FILTRATE	SL204-RAW		
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	1.18	-	1.18		g/cc
Percent Moisture	-	-	9.62		pct
RADIUM-226 - LIQUID					
Radium 226, As Ra-226	-	1.18	-	.5	pci/l

COMMENTS:

200013761 -
RA-226= 1.18 PCL +/- 0.116 PCL (MDC= 0.153 PCL)
AS 11/1/94

RADIUM-226 - SOLID					
Radium-226, As Ra-226	43.5	-	10.5	.1	pci/g

COMMENTS:

200013760 -
RA-226= 43.5 PCG +/- 0.285 PCG (MDC=0.0126 PCG)
AS 11/14/94
200013762 -
RA-226= 10.5 PCG +/- 0.207 PCG (MDC= 0.0579 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SRS					
Th-228	-	< 1	-	1	pci/l
Th-230	-	91.7	-	1	pci/l
Th-232	-	5.09	-	1	pci/l

COMMENTS:

200013761 -
All units in pCi/l

Th-228 0.436 +/- 1.15 MDA=2.33
Th-230 91.7 +/- 9.90 MDA=1.01
Th-232 5.09 +/- 1.34 MDA=0.781
rws 10/30/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	-	< 1.5	1.5	pci/g

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013760	200013761	200013762
Client Sample ID:	SL204-0.7UM	SL204-FILTRATE	SL204-RAW
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94

Parameter	Result	Result	Result	PQL	Unit
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
Th-230	219	-	53.0	1.5	pci/g
Th-232	< 1.5	-	< 1.5	1.5	pci/g

COMMENTS:

200013760 -
All units in pCi/g
Th-228 0.0838 +/- 0.308 MDC=0.630
Th-230 219 +/- 25.0 MDC=0.218
Th-232 0.532 +/- 0.207 MDC=0.131
rws 10/19/94
200013762 -
All units in pCi/g

Th-228 -0.0299 +/- 0.142 MDA=0.343
Th-230 53.0 +/- 7.66 MDA=0.168
Th-232 0.184 +/- 0.125 MDA=0.135
rws 10/19/94

URANIUM ALPHA ISOTOPIC - LIQUID					
U-234	-	90.6	-	1	pci/l
U-235	-	4.35	-	1	pci/l
U-238	-	87.2	-	1	pci/l

COMMENTS:

200013761 -
ALL UNITS ARE pCi/L
ISOTOPE ACTIVITY ERROR MDC
U-234 90.6 9.34 0.207
U-235 4.35 0.787 0.256
U-238 87.2 9.00 0.0574
AS 11/3/94

URANIUM ALPHA ISOTOPIC - SOLID					
U-234	25.8	-	31.1	1.5	pci/g
U-235	< 1.5	-	< 1.5	1.5	pci/g
U-238	22.0	-	31.5	1.5	pci/g

COMMENTS:

200013760 -
ALL UNITS ARE PCI/G
U-234 = 25.8 +/- 2.66 MDC = 0.0230

PQL = Practical Quantitation Limit

CTC Sample ID:	200013760	200013761	200013762		
Client Sample ID:	SL204-0.7UM	SL204-FILTRATE	SL204-RAW		
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD		
Date Received:	10-OCT-94	10-OCT-94	10-OCT-94		
Date Sampled:	05-OCT-94	05-OCT-94	05-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**

URANIUM ALPHA ISOTOPIC - SOLID (continued):

U-235 = 1.02 +/- 0.221 MDC = 0.0284
U-238 = 22.0 +/- 2.29 MDC = 0.0230
AS 10/18/94
200013762 -
ALL UNITS ARE PCI/G

ISOTOPE	RESULT	ERROR	MDC
U-234	31.1	3.06	0.0222
U-235	1.46	0.268	0.0274
U-238	31.5	3.10	0.0222

AS 10/18/94

PQL = Practical Quantitation Limit

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RUST

Final Analytical Report

CTC Sample ID:	200013798
Client Sample ID:	SL303-6300UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

Sample Id: 200013798 **Client No:** SL303-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS: Insufficient sample to perform Bulk Density.

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	8.22 pci/g	.1 pci/g	11/15/94

COMMENTS:

RA-226= 8.22 PCG +/- 0.105 PCG (MDC= 0.0224 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/03/94
Th-230	37.7 pci/g	1.5 pci/g	11/17/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/03/94

COMMENTS:

All units are pci/gram:

TH-228 0.0.0444 +/- 0.289 MDC = 0.396
TH-230 37.7 +/- 4.19 MDC = 0.258
TH-232 0.140 +/- 0.115 MDC = 0.0698

AS 11/17/94

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Sample Id: 200013798 **Client No:** SL303-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	3.69 pci/g	1.5 pci/g	11/13/94
U-235	< 1.5 pci/g	1.5 pci/g	11/13/94
U-238	4.36 pci/g	1.5 pci/g	11/13/94

COMMENTS:

All units are in pCi/g
U3334 3.69 +/- 0.383 MDC=0.0640
U-235 0.209 +/- 0.0728 MDC=0.0501
U-238 4.36 +/- 0.436 MDC=0.0327
rws 11/14/94

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Sample Id: 200013798 **Client No:** SL303-6300UM

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CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 21, 1994

W J Banks for Gpw 12/5/94

Lab Manager

131772

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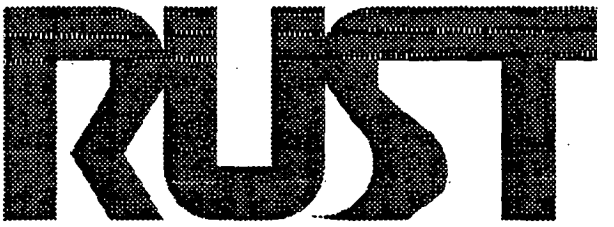

Final Analytical Report

CTC Sample ID:	200013799
Client Sample ID:	SL303-2000UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

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Sample Id: 200013799 **Client No:** SL303-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.23 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	27.8 pci/g	.1 pci/g	11/15/94

COMMENTS:

RA-226= 27.8 PCG +/- 0.164 PCG (MDC= 0.0161 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	15.5 pci/g	1.5 pci/g	11/17/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	-0.162	0.426	0.579
TH-230	15.5	1.96	0.248
TH-232	0.0671	0.0777	0.0671

AS 11/17/94

131112

Sample Id: 200013799 **Client No:** SL303-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	16.8 pci/g	1.5 pci/g	11/13/94
U-235	< 1.5 pci/g	1.5 pci/g	11/13/94
U-238	17.1 pci/g	1.5 pci/g	11/13/94

COMMENTS:

All units are in pCi/g
U3334 16.8 +/- 1.49 MDC=0.0427
U-235 0.817 +/- 0.134 MDC=0.0408
U-238 17.1 +/- 1.51 MDC=0.0231
rws 11/13/94

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Sample Id: 200013799 **Client No:** SL303-2000UM

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Report Date Nov 21, 1994

W J Banks for JW 12-5-94

Lab Manager

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Final Analytical Report

CTC Sample ID:	200013800
Client Sample ID:	SL303-500UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.04 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	16.7 pci/g	.1 pci/g	11/15/94

COMMENTS:

RA-226= 16.7 PCG +/- 0.110 PCG (MDC=0.0121 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	3890 pci/g	1.5 pci/g	11/17/94
Th-232	2.95 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.795	0.353	0.330
TH-230	3890	415	0.331
TH-232	2.95	0.573	0.0582

AS 11/17/94

Sample Id: 200013800 **Client No:** SL303-500UM

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	47.4 pci/g	1.5 pci/g	11/13/94
U-235	2.60 pci/g	1.5 pci/g	11/13/94
U-238	49 pci/g	1.5 pci/g	11/13/94

COMMENTS:

All units are in pCi/g
U3334 47.4 +/- 3.26 MDC=0.0720
U-235 2.60 +/- 0.277 MDC=0.0461
U-238 49.0 +/- 3.36 MDC=0.0262
rws 11/13/94

131772

Sample Id: 200013800 **Client No:** SL303-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 21, 1994

W J Baskin for JW 12-5-94

Lab Manager

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Final Analytical Report

CTC Sample ID:	200013801
Client Sample ID:	SL303-150UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013801 **Client No:** SL303-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.57 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	9.17 pci/g	.1 pci/g	11/15/94

COMMENTS:

RA-226= 9.17 PCG +/- 0.148 PCG (MDC= 0.0393 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	1170 pci/g	1.5 pci/g	11/17/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.135	0.299	0.375
TH-230	1170	99.0	0.351
TH-232	0.845	0.239	0.0461

AS 11/17/94

131772

Sample Id: 200013801 **Client No:** SL303-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	156 pci/g	1.5 pci/g	11/13/94
U-235	6.93 pci/g	1.5 pci/g	11/13/94
U-238	148 pci/g	1.5 pci/g	11/13/94

COMMENTS:

All units are in pCi/g
U3334 156 +/- 11.3 MDC=0.0716
U-235 6.93 +/- 0.655 MDC=0.0479
U-238 148 +/- 10.7 MDC=0.0555
rws 11/13/94

Sample Id: 200013801 **Client No:** SL303-150UM

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Report Date Nov 21, 1994

W J Baskin for JW 12-5-94

Lab Manager

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Final Analytical Report

CTC Sample ID:	200013802
Client Sample ID:	SL303-75UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

Sample Id: 200013802 **Client No:** SL303-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.50 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	12.6 pci/g	.1 pci/g	11/15/94

COMMENTS:

RA-226= 12.6 PCG +/- 0.142 PCG (MDC= 0.0264 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	2.10 pci/g	1.5 pci/g	12/01/94
Th-230	13700 pci/g	1.5 pci/g	12/01/94
Th-232	8.14 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 2.10 +/- 0.940 (MDC= 1.01)
TH-230= 13700 +/- 1530 (MDC= 0.661)
TH-232= 8.14 +/- 1.66 (MDC= 0.177)
AS 12/1/94

131772

Sample Id: 200013802 **Client No:** SL303-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	228 pci/g	1.5 pci/g	11/13/94
U-235	11.1 pci/g	1.5 pci/g	11/13/94
U-238	228 pci/g	1.5 pci/g	11/13/94

COMMENTS:

All units are in pCi/g
U3334 228 +/- 19.3 MDC=0.131
U-235 11.1 +/- 1.18 MDC=0.109
U-238 228 +/- 19.3 MDC=0.101
rws 11/13/94

131772

Sample Id: 200013802 **Client No:** SL303-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 5, 1994

WJ Baskin for JW 12-5-94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013803
Client Sample ID:	SL303-38UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013803 **Client No:** SL303-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.08 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	6.73 pci/g	.1 pci/g	11/15/94

COMMENTS:

RA-226= 6.73 PCG +/- 0.0577 PCG (MDC= 8.25E-3 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	198 pci/g	1.5 pci/g	11/17/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 -0.0236 0.194 0.260
TH-230 198 19.8 0.291
TH-232 0.170 0.0867 0.0319
AS 11/17/94

131772

Sample Id: 200013803 **Client No:** SL303-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	8.99 pci/g	1.5 pci/g	11/14/94
U-235	< 1.5 pci/g	1.5 pci/g	11/14/94
U-238	9.02 pci/g	1.5 pci/g	11/14/94

COMMENTS:

All units are in pCi/g
U3334 8.99 +/- 1.08 MDC=0.0846
U-235 0.423 +/- 0.160 MDC=0.0861
U-238 9.02 +/- 1.09 MDC=0.0754
rws 11/14/94

131772

Sample Id: 200013803 **Client No:** SL303-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 21, 1994

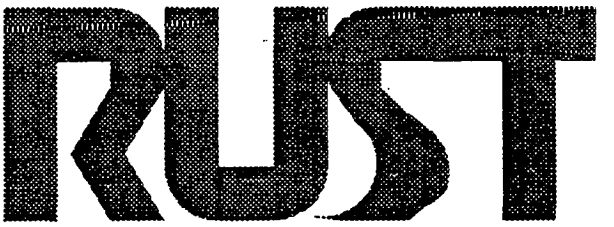
W J Baskin for JW 12-5-94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013804
Client Sample ID:	SL303-0.7UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

Sample Id: 200013804 **Client No:** SL303-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.19 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	1.69 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 1.69 PCG +/- 0.0470 PCG (MDC=0.0116 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	554 pci/g	1.5 pci/g	11/17/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.341	0.261	0.310
TH-230	554	68.9	0.205
TH-232	0.403	0.187	0.0604

AS 11/17/94

131772

Sample Id: 200013804 **Client No:** SL303-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	58.2 pci/g	1.5 pci/g	11/14/94
U-235	2.98 pci/g	1.5 pci/g	11/14/94
U-238	59.8 pci/g	1.5 pci/g	11/14/94

COMMENTS:

All units are in pCi/g
U3334 58.2 +/- 6.17 MDC=0.0921
U-235 2.98 +/- 0.522 MDC=0.0937
U-238 59.8 +/- 6.34 MDC=0.0820
rws 11/14/94

131772

Sample Id: 200013804 **Client No:** SL303-0.7UM

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Report Date Nov 21, 1994

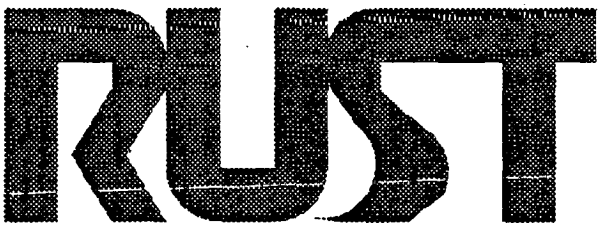
W J Baskin for JW 12-5-94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013805
Client Sample ID:	SL303-FILTRATE
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	LIQUID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013805 **Client No:** SL303-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - LIQUID	Result	PQL	Date
Radium 226, As Ra-226	2.79 pci/l	.5 pci/l	11/16/94

COMMENTS:

RA-226= 2.79 PCL +/- 0.199 PCL (MDC= 0.115 PCL)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SRS	Result	PQL	Date
Th-228	< 1 pci/l	1 pci/l	11/17/94
Th-230	71.0 pci/l	1 pci/l	11/17/94
Th-232	< 1 pci/l	1 pci/l	11/17/94

COMMENTS:

ISOTOPE	CONC(PCL)	ERROR(PCL)	MDC(PCL)
TH-228	-0.452	0.604	0.963
TH-230	71.0	8.82	0.421
TH-232	0.0415	0.0830	0.124

AS 11/17/94

131772

Sample Id: 200013805 **Client No:** SL303-FILTRATE

URANIUM ALPHA ISOTOPIC - LIQUID	Result	PQL	Date
U-234	109 pci/l	1 pci/l	11/14/94
U-235	4.70 pci/l	1 pci/l	11/14/94
U-238	113 pci/l	1 pci/l	11/14/94

COMMENTS:

All units are in pCi/l
U3334 109 +/- 11.5 MDC=0.284
U-235 4.70 +/- 0.953 MDC=0.204
U-238 113 +/- 12.0 MDC=0.165
rws 11/14/94

131772

Sample Id: 200013805 **Client No:** SL303-FILTRATE

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CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 21, 1994

W J Bashi for JW 12/5/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013806
Client Sample ID:	SL303-RAW
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131172

Sample Id: 200013806 **Client No:** SL303-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Percent Moisture	11.96 pct	10/25/94
Bulk Density	1.10 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	1.02 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 1.02 PCG +/- 0.0326 PCG (MDC= 9.12E-3 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	1830 pci/g	1.5 pci/g	11/17/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.555	0.312	0.329
TH-230	1830	258	0.330
TH-232	0.941	0.313	0.0642

AS 11/17/94

Sample Id: 200013806 **Client No:** SL303-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	45.3 pci/g	1.5 pci/g	11/14/94
U-235	2.31 pci/g	1.5 pci/g	11/14/94
U-238	44.6 pci/g	1.5 pci/g	11/14/94

COMMENTS:

All units are in pCi/g
U3334 45.3 +/- 4.95 MDC=0.0857
U-235 2.31 +/- 0.417 MDC=0.0829
U-238 44 6 +/- 4.87 MDC=0.0300
rws 11/14/94

131772

Sample Id: 200013806 **Client No:** SL303-RAW

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Report Date Nov 21, 1994

WD Baskin for JW 12/5/94

Lab Manager

Clemson Technical Center

Clemson Research Park
101 Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Client SAIC

Location CTC

Project/Number FUSRAP / 264277

Sample Type(s) SOLIDS / LIQUIDS

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 25 ml HDPE BOTTLE	125 HDPE BOTTLE	1 LITER HDPE BOTTLE						TOTAL	REMARKS
SL303-6300um	10-18-94@1200	13798	1								1	
SL303-2000um	"	13799	1								1	
SL303-500um	"	13800	1								1	
SL303-150um	"	13801	1								1	
SL303-75um	"	13802	1								1	
SL303-38um	"	13803		1							1	
SL303-0.7um	"	13804		1							1	
SL303-Filtrate	"	13805			1						1	
SL303-RAW	↓	13806		1							1	
												Sub. 4084

Total No. of Containers 9

Sampled By Dennis Wade

Relinquished by: Dennis Wade Organization: CTC
Date: 10-18-94 Time: _____

Received by: Walter Bat Organization: CTC
Date: 10/18/94 Time: 13:00

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Method: _____ (attach shipping bill, if any) Shipping Container ID _____

Information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013781
Client Sample ID:	SL304-6300UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013781 **Client No:** SL304-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS: Insufficient sample to perfrom Bulk Density

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	< .1 pci/g	.1 pci/g	11/08/94

COMMENTS:

RA-226= -0.0647 PCG +/- 0.343 PCG (MDC= 0.611 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	10/30/94
Th-230	45.1 pci/g	1.5 pci/g	10/30/94
Th-232	< 1.5 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
Th-228 0.230 +/- 1.78 MDC=3.84
Th-230 45.1 +/- 7.59 MDC=2.43
Th-232 0.404 +/- 0.572 MDC=0.605
rws 10/30/94

131772

Sample Id: 200013781 **Client No:** SL304-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	3.58 pci/g	1.5 pci/g	10/30/94
U-235	< 1.5 pci/g	1.5 pci/g	10/30/94
U-238	2.92 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
U-3334 3.58 +/- 1.74 MDC=1.64
U-235 1.05 +/- 1.03 MDC=1.36
U-238 2.92 +/- 1.51 MDC=0.940
rws 10/30/94

131772

Sample Id: 200013781 **Client No:** SL304-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 10, 1994

W J Baskin for JW 12/5/94

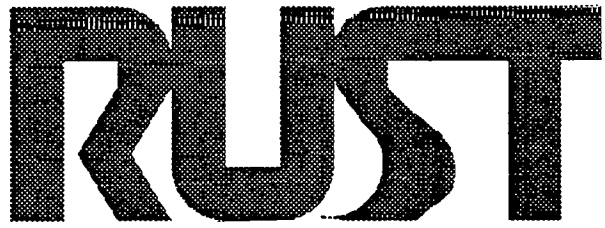
Lab Manager

131112

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013782
Client Sample ID:	SL304-2000UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

/31772

Sample Id: 200013782 **Client No:** SL304-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS: Insufficient sample to perform Bulk Desity.

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	18.1 pci/g	.1 pci/g	11/08/94

COMMENTS:

RA-226= 18.1 PCG +/- 0.640 PCG (MDC= 0.307 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	1.62 pci/g	1.5 pci/g	10/30/94
Th-230	285 pci/g	1.5 pci/g	10/30/94
Th-232	< 1.5 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
Th-228 1.62 +/- 1.08 MDC=1.78
Th-230 285 +/- 29.3 MDC=0.780
Th-232 0.624 +/- 0.500 MDC=0.657
rws 10/30/94

131772

Sample Id: 200013782 **Client No:** SL304-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	89.2 pci/g	1.5 pci/g	10/30/94
U-235	5.38 pci/g	1.5 pci/g	10/30/94
U-238	91.7 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
U-3334 89.2 +/- 10.7 MDC=0.862
U-235 5.38 +/- 1.77 MDC=0.619
U-238 91.6 +/- 10.9 MDC=0.725
rws 10/30/94

131772

Sample Id: 200013782 **Client No:** SL304-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 10, 1994

W J Baskin for JW 11/5/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013783
Client Sample ID:	SL304-500UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013783 **Client No:** SL304-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.59 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	106 pci/g	.1 pci/g	11/08/94

COMMENTS:

RA-226= 106 PCG +/- 0.778 PCG (MDC= 0.0834 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	10/30/94
Th-230	2800 pci/g	1.5 pci/g	10/30/94
Th-232	< 1.5 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g
Th-228 1.39 +/- 0.608 MDC=0.898
Th-230 2800 +/- 273 MDC=0.432
Th-232 1.34 +/- 0.442 MDC=0.100
rws 10/30/94

131772

Sample Id: 200013783 **Client No:** SL304-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	118 pci/g	1.5 pci/g	10/30/94
U-235	6.83 pci/g	1.5 pci/g	10/30/94
U-238	120 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
U-3334 118 +/- 13.8 MDC=0.465
U-235 6.83 +/- 1.60 MDC=0.438
U-238 119 +/- 14.0 MDC=0.323
rws 10/30/94

131772

Sample Id: 200013783 **Client No:** SL304-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 10, 1994

W J Backus for JW 12/5/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013784
Client Sample ID:	SL304-150UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

Sample Id: 200013784 **Client No:** SL304-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.45 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	3.72 pci/g	.1 pci/g	11/08/94

COMMENTS:

RA-225= 3.72 +/- 0.117 PCG (MDC= 0.0505 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	2.43 pci/g	1.5 pci/g	10/30/94
Th-230	13800 pci/g	1.5 pci/g	10/30/94
Th-232	12.7 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
Th-228 2.43 +/- 0.415 MDC=0.250
Th-230 13800 +/- 1310 MDC=0.106
Th-232 12.7 +/- 1.42 MDC=0.113
rws 10/30/94

131772

Sample Id: 200013784 **Client No:** SL304-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	272 pci/g	1.5 pci/g	10/30/94
U-235	13.6 pci/g	1.5 pci/g	10/30/94
U-238	271 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
U-3334 272 +/- 38.3 MDC=0.580
U-235 13.6 +/- 2.86 MDC=0.402
U-238 271 +/- 38.2 MDC=0.542
rws 10/30/94

131772

Sample Id: 200013784 **Client No:** SL304-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 10, 1994

W J Baskin for JW 12/5/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013785
Client Sample ID:	SL304-75UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013785 **Client No:** SL304-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.54 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	37.9 pci/g	.1 pci/g	11/08/94

COMMENTS:

RA-226= 37.9 PCG +/- 0.560 PCG (MDC= 0.119 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	10/30/94
Th-230	4490 pci/g	1.5 pci/g	10/30/94
Th-232	4.5 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
Th-228 0.910 +/- 0.675 MDC=1.17
Th-230 4490 +/- 396 MDC=0.663
Th-232 4.50 +/- 1.01 MDC=0.288
rws 10/30/94

131772

Sample Id: 200013785 **Client No:** SL304-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	279 pci/g	1.5 pci/g	11/09/94
U-235	15.3 pci/g	1.5 pci/g	10/30/94
U-238	281 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
U-3334 279 +/- 34.3 MDC=0.896
U-235 15.3 +/- 3.26 MDC=0.571
U-238 281 +/- 34.5 MDC=0.737
rws 10/30/94

131772

Sample Id: 200013785 **Client No:** SL304-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 10, 1994

W Baskin for JW 12/5/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013786
Client Sample ID:	SL304-38UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013786 **Client No:** SL304-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.63 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	3.82 pci/g	.1 pci/g	11/08/94

COMMENTS:

RA-226= 3.82 PCG +/- 0.0754 PCG (MDC= 0.0212 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	10/30/94
Th-230	331 pci/g	1.5 pci/g	10/30/94
Th-232	< 1.5 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
Th-228 0.193 +/- 0.145 MDC=0.249
Th-230 331 +/- 31.4 MDC=0.104
Th-232 0.411 +/- 0.142 MDC=0.0962
rws 10/30/94

131772

Sample Id: 200013786 **Client No:** SL304-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	11.9 pci/g	1.5 pci/g	10/30/94
U-235	< 1.5 pci/g	1.5 pci/g	10/30/94
U-238	11.3 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
U-234 11.9 +/- 1.29 MDC= 0.0696
U-235 0.581 +/- 0.167 MDC= 0.0631
U-238 11.3 +/- 1.23 MDC= 0.0585
rws 10/30/94

131712

Sample Id: 200013786 **Client No:** SL304-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 10, 1994

W Baskin for JW 12/5/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013787
Client Sample ID:	SL304-0.7UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013787 **Client No:** SL304-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.17 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	9.39 pci/g	.1 pci/g	11/08/94

COMMENTS:

RA-226= 9.39 PCG +/- 0.0580 PCG (MDC= 0.0109 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	10/30/94
Th-230	1050 pci/g	1.5 pci/g	10/30/94
Th-232	< 1.5 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
Th-228 0.163 +/- 0.182 MDC=0.341
Th-230 1050 +/- 118 MDC=0.128
Th-232 0.981 +/- 0.271 MDC=0.0467
rws 10/30/94

131772

Sample Id: 200013787 **Client No:** SL304-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	187 pci/g	1.5 pci/g	10/30/94
U-235	6.08 pci/g	1.5 pci/g	10/30/94
U-238	112 pci/g	1.5 pci/g	10/30/94

COMMENTS:

All units are in pCi/g.
U-3334 187 +/- 24.6 MDC=0.263
U-235 6.08 +/- 1.20 MDC=0.184
U-238 112 +/- 14.9 MDC=0.149
rws 10/30/94

131772

Sample Id: 200013787 **Client No:** SL304-0.7UM

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Report Date Nov 10, 1994

W J Baskin for gw 12/5/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013788
Client Sample ID:	SL304-FILTRATE
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	LIQUID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013788 **Client No:** SL304-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - LIQUID	Result	PQL	Date
Radium 226, As Ra-226	6.00 pci/l	.5 pci/l	11/08/94

COMMENTS:

RA-226= 6.00 PCL +/- 0.177 PCL (MDC= 0.131 PCL)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SRS	Result	PQL	Date
Th-228	< 1 pci/l	1 pci/l	11/03/94
Th-230	107 pci/l	1 pci/l	11/03/94
Th-232	< 1 pci/l	1 pci/l	11/03/94

COMMENTS:

ALL UNITS ARE PCI/G
TH-228 -0.287 +/- 0.637 MDC = 1.78
TH-230 107 +/- 16.3 MDC = 0.628
TH-232 0.0630 +/- 0.248 MDC = 0.686
JDL 11/9/94

131772

Sample Id: 200013788 **Client No:** SL304-FILTRATE

URANIUM ALPHA ISOTOPIC - LIQUID	Result	PQL	Date
U-234	18.4 pci/l	1 pci/l	11/03/94
U-235	< 1 pci/l	1 pci/l	11/03/94
U-238	17.2 pci/l	1 pci/l	11/03/94

COMMENTS:

All units pci/l
U-233/234 18.4 +/- 2.18 MDC = 0.144
U-235 0.986 +/- 0.330 MDC = 0.148
U-238 17.2 +/- 2.05 MDC = 0.144

JW 11-3-94

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013789
Client Sample ID:	SL304-RAW
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	18-OCT-94
Date Sampled:	18-OCT-94

131772

Sample Id: 200013789 **Client No:** SL304-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Percent Moisture	16.78 pct	10/25/94
Bulk Density	0.94 g/cc	10/26/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	8.33 pci/g	.1 pci/g	11/08/94

COMMENTS:

RA-226= 8.33 PCG +/- 0.0767 PCG (MDC= 0.0103 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	262 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 0.156 +/- 0.126 (MDC= 0.172)
TH-230= 262 +/- 28.7 (MDC= 0.130)
TH-232= 0.346 +/- 0.117 (MDC= 0.0266)
AS 12/1/94

131772

Sample Id: 200013789 **Client No:** SL304-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	69.8 pci/g	1.5 pci/g	11/03/94
U-235	2.74 pci/g	1.5 pci/g	11/03/94
U-238	59.1 pci/g	1.5 pci/g	11/03/94

COMMENTS:

All units are pci/gram

U-233/234 69.8 +/- 8.75 MDC = 0.103
U-235 2.74 +/- 0.529 MDC = 0.00819
U-238 59.1 +/- 7.44 MDC = 0.00730

JW 11-3-94

131772

Sample Id: 200013789 **Client No:** SL304-RAW

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Report Date Dec 5, 1994

W J Baskin for JW 12/5/94

Lab Manager

Clemson Technical Center

Clemson Research Park
Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Client SAIC

Location CTC

Project/Number FUSRAP / 26427

Sample Type(s) SOLIDS / LIQUIDS

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 250ml HDPE BOTTLE	125ml HDPE BOTTLE	1 LITER HDPE BOTTLE						TOTAL	REMARKS
SL304-6300um	10-18-94@1210	13781	1								1	
SL304-2000um	↓	13782	1								1	
SL304-500um		13783	1								1	
SL304-150um		13784	1								1	
SL304-75um		13785	1								1	
SL304-38um		13786		1							1	
SL304-0.7um		13787		1							1	
SL304-FILTRATE		13788			1						1	
SL304-RAW	↓	13789		1							1	
												Sub. 4082

Total No. of Containers 9

Sampled By Dennis Wilder

Relinquished by: Dennis Wilder Organization: CTC
Date: 10-18-94 Time: _____

Received by: Willie Burt Organization: CTC
Date: 10/18/94 Time: 1300

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

131712

131772

Clemson Technical Center, INC.
Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Analytical Results

Submission ID: 100004081

Project Name/ID: 26427

Client Name: FUSRAP-TDD

Client Location: ANDERSON, SC

RUST

CTC Sample ID:	200013773	200013774	200013775		
Client Sample ID:	SD101-2000UM	SD101-500UM	SD101-150UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	18-OCT-94	18-OCT-94	18-OCT-94		
Date Sampled:	18-OCT-94	18-OCT-94	18-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	- *	0.89	- *		g/cc
Percent Moisture	-	-	-		pct

* Insufficient sample to perform Bulk Density.

RADIUM-226 - SOLID					
Radium-226, As Ra-226	6.39	5.50	7.77	.1	pci/g

COMMENTS:

200013773 -
RA-226= 6.39 PCG +/- 0.283 PCG (MDC= 0.163 PCG)
AS 11/8/94
200013774 -
RA-226= 5.50 PCG +/- 0.235 PCG (MDC= 0.132 PCG)
AS 11/8/94
200013775 -
RA-226= 7.77 PCG +/- 0.184 PCG (MDC= 0.123 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	2.20	< 1.5	3.56	1.5	pci/g
Th-230	5.78	10.7	30.9	1.5	pci/g
Th-232	< 1.5	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013773 -
All units are in pCi/g
Th-228 2.20 +/- 0.833 MDC=1.20
Th-230 5.78 +/- 1.06 MDC=0.411
Th-232 0.592 +/- 0.318 MDC=0.322
rws 10/30/94

200013774 -
All units are in pCi/g.
Th-228 1.18 +/- 0.551 MDC=0.756
Th-230 10.7 +/- 1.61 MDC=0.325
Th-232 0.160 +/- 0.192 MDC=0.325
rws 10/30/94

200013775 -
All units are in pCi/g
Th-228 3.56 +/- 0.903 MDC= 1.15
Th-230 30.9 +/- 3.09 MDC=0.391
Th-232 0.617 +/- 0.284 MDC=0.231
rws 10/30/94

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013773	200013774	200013775		
Client Sample ID:	SD101-2000UM	SD101-500UM	SD101-150UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	18-OCT-94	18-OCT-94	18-OCT-94		
Date Sampled:	18-OCT-94	18-OCT-94	18-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	10.1	8.39	10.2	1.5	pci/g
U-235	< 1.5	< 1.5	< 1.5	1.5	pci/g
U-238	7.15	7.40	7.85	1.5	pci/g

COMMENTS:

200013773 -
All units are in pCi/g
U-3334 10.1 +/- 1.78 MDC=0.419
U-235 0.244 +/- 0.312 MDC=0.575
U-238 7.15 +/- 1.43 MDC=0.362
rws 10/30/94

200013774 -
All units are in pCi/g
U-3334 8.39 +/- 1.50 MDC=0.305
U-235 0.263 +/- 0.259 MDC=0.340
U-238 7.40 +/- 1.38 MDC=0.235
rws 10/30/94

200013775 -
All units are in pCi/g.
U-3334 10.2 +/- 2.22 MDC=0.775
U-235 0.639 +/- 0.589 MDC=0.781
U-238 7.85 +/- 1.90 MDC=0.777
rws 10/30/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004081

CTC Sample ID:	200013776	200013777	200013778		
Client Sample ID:	SD101-75UM	SD101-38UM	SD101-0.7UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	18-OCT-94	18-OCT-94	18-OCT-94		
Date Sampled:	18-OCT-94	18-OCT-94	18-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	-*	1.09	1.12		g/cc
Percent Moisture	-	-	-		pct

* Insufficient sample to perform Bulk Density.

RADIUM-226 - SOLID					
Radium-226, As Ra-226	5.25	0.250	0.434	.1	pci/g

COMMENTS:

200013776 -
RA-226= 5.25 PCG +/- 0.179 PCG (MDC= 0.153 PCG)
AS 11/8/94
200013777 -
RA-226= 0.250 PCG +/- 0.0122 PCG (MDC= 0.0127 PCG)
AS 11/8/94
200013778 -
RA-226= 0.434 PCG +/- 0.0139 PCG (MDC= 0.0114 PCG)
AS 11/8/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	2.70	< 1.5	< 1.5	1.5	pci/g
Th-230	65.5	1.91	5.71	1.5	pci/g
Th-232	< 1.5	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013776 -
All units are in pCi/g
Th-228 2.70 +/- 1.17 MDC=1.64
Th-230 65.5 +/- 7.25 MDC=0.582
Th-232 0.782 +/- 0.457 MDC=0.196
rws 10/30/94

200013777 -
All units are in pCi/g.
Th-228 -0.0245 +/- 0.223 MDC=0.465
Th-230 1.91 +/- 0.389 MDC=0.200
Th-232 0.0238 +/- 0.0700 MDC=0.153
rws 10/30/94

200013778 -
All units are in pCi/g.
Th-228 0.165 +/- 0.151 MDC=0.260
Th-230 5.71 +/- 0.834 MDC=0.125
Th-232 0.190 +/- 0.106 MDC=0.0996
rws 10/30/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004081

CTC Sample ID:	200013776	200013777	200013778		
Client Sample ID:	SD101-75UM	SD101-38UM	SD101-0.7UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	18-OCT-94	18-OCT-94	18-OCT-94		
Date Sampled:	18-OCT-94	18-OCT-94	18-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	10.3	< 1.5	1.79	1.5	pci/g
U-235	< 1.5	< 1.5	< 1.5	1.5	pci/g
U-238	7.29	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013776 -
All units are in pCi/g.
U-3334 10.3 +/- 2.54 MDC=1.03
U-235 1.26 +/- 0.899 MDC=0.472
U-238 7.29 +/- 2.08 MDC=0.913
rws 10/30/94

200013777 -
All units are in pCi/g.
U-3334 0.775 +/- 0.178 MDC=0.0768
U-235 0.0370 +/- 0.0417 MDC=0.0611
U-238 0.602 +/- 0.155 MDC=0.0770
rws 10/30/94

200013778 -
All units are in pCi/g.
U-3334 1.79 +/- 0.326 MDC=0.0904
U-235 0.0726 +/- 0.0653 MDC=0.0925
U-238 1.31 +/- 0.265 MDC=0.0647
rws 10/30/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004083

CTC Sample ID:	200013790	200013791	200013792		
Client Sample ID:	SD301-2000UM	SD301-500UM	SD301-150UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	18-OCT-94	18-OCT-94	18-OCT-94		
Date Sampled:	18-OCT-94	18-OCT-94	18-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	-	0.62	0.53		g/cc
Percent Moisture	-	-	-		pct
RADIUM-226 - SOLID					
Radium-226, As Ra-226	64.7	92.1	24.4	.1	pci/g

COMMENTS:

200013790 -
RA-226= 64.7 PCG +/- 0.483 PCG (MDC= 0.109 PCG)
AS 11/8/94
200013791 -
RA-226= 92.1 PCG +/- 0.280 (MDC=0.0271 PCG)
AS 11/9/94
200013792 -
RA-226= 24.4 PCG +/- 0.272 PCG (MDC= 0.0302 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	5.35	< 1.5	< 1.5	1.5	pci/g
Th-230	2200	111	301	1.5	pci/g
Th-232	2.34	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013790 -
ALL UNITS IN pCi/g
Th-228 5.35 +/- 4.27 MDC=6.42
Th-230 2200 +/- 226 MDC=3.88
Th-232 2.34 +/- 2.29 MDC=3.13
rws 11/21/94

200013791 -
All units are pci/gram:

TH-228 0.815 +/- 0.992 MDC = 2.05
TH-230 111 +/- 16.2 MDC = 0.784
TH-232 0.523 +/- 0.458 MDC = 0.515

JW 11-3-94
200013792 -
All units are pci/gram:

TH-228 0.411 +/- 0.791 MDC = 1.77
TH-230 301 +/- 44.4 MDC = 0.735

PQL = Practical Quantitation Limit

CTC Sample ID:	200013790	200013791	200013792		
Client Sample ID:	SD301-2000UM	SD301-500UM	SD301-150UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	18-OCT-94	18-OCT-94	18-OCT-94		
Date Sampled:	18-OCT-94	18-OCT-94	18-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
TH-232 0.238 +/- 0.338 MDC = 0.356					
JW 11-3-94					
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	78.4	89.8	116	1.5	pci/g
U-235	2.99	4.66	4.88	1.5	pci/g
U-238	75.5	94.5	105	1.5	pci/g

COMMENTS:

200013790 -
All units are in pCi/g
U-234 78.4 +/- 9.92 MDC=0.759
U-235 2.99 +/- 1.27 MDC=0.588
U-238 75.5 +/- 9.62 MDC=0.548
rws 10/30/94

200013791 -
All units are pci/gram

U-234/235 89.8 +/- 9.86 MDC = 0.307
U-235 4.66 +/- 1.10 MDC = 0.249
U-238 94.5 +/- 10.3 MDC = 0.232

JW 11-3-94
200013792 -
All units are pci/gram:

U-234/235 116 +/- 13.3 MDC = 0.354
U-235 4.88 +/- 1.19 MDC = 0.347
U-238 105 +/- 12.2 MDC = 0.142

JW 11-3-94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004083

CTC Sample ID:	200013793	200013794	200013795		
Client Sample ID:	SD301-75UM	SD301-38UM	SD301-0.7UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	18-OCT-94	18-OCT-94	18-OCT-94		
Date Sampled:	18-OCT-94	18-OCT-94	18-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0.60	1.09	1.09		g/cc
Percent Moisture	-	-	-		pct
RADIUM-226 - SOLID					
Radium-226, As Ra-226	10.6	1.07	1.73	.1	pci/g

COMMENTS:

200013793 -
RA-226= 10.6 PCG +/- 0.101 PCG (MDC= 0.0188 PCG)
AS 11/15/94
200013794 -
RA-226= 1.07 PCG +/- 0.0161 PCG (MDC= 4.63E-3 PCG)
AS 11/15/94
200013795 -
RA-226= 1.73 PCG +/- 0.0194 PCG (MDC= 4.17E-3 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SOLID

Th-228	< 1.5	< 1.5	< 1.5	1.5	pci/g
Th-230	3520	29.4	186	1.5	pci/g
Th-232	2.89	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013793 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.928 0.740 O.849
TH-230 3.52E+3 317 0.346
TH-232 2.89 0.654 0.0934
AS 11/17/94
200013794 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.0464 0.125 0.170
TH-230 29.4 3.34 0.130
TH-232 0.0587 0.0529 0.0352
AS 11/17/94
200013795 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.0904 0.0914 0.109
TH-230 186 15.7 0.0227
TH-232 0.128 0.0823 0.0838
AS 11/17/94

PQL = Practical Quantitation Limit

RUST

CTC Sample ID:	200013793	200013794	200013795		
Client Sample ID:	SD301-75UM	SD301-38UM	SD301-0.7UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	18-OCT-94	18-OCT-94	18-OCT-94		
Date Sampled:	18-OCT-94	18-OCT-94	18-OCT-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	130	3.98	25	1.5	pci/g
U-235	5.99	< 1.5	< 1.5	1.5	pci/g
U-238	130	4.03	25.4	1.5	pci/g

COMMENTS:

200013793 -
All units are in pCi/g
U3334 130 +/- 10.2 MDC=0.153
U-235 5.99 +/- 0.685 MDC=0.0962
U-238 130 +/- 10.2 MDC=0.0780
rws 11/13/94

200013794 -
All units are in pCi/g
U3334 3.98 +/- 0.347 MDC=0.0254
U-235 0.174 +/- 0.0409 MDC=0.0229
U-238 4.03 +/- 0.351 MDC=0.00488
rws 11/13/94
200013795 -
All units are in pCi/g
U3334 25.0 +/- 1.92 MDC=0.0223
U-235 1.21 +/- 0.134 MDC=0.0175
U-238 25.4 +/- 1.95 MDC=0.0142
rws 11/13/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004083

CTC Sample ID:	200013796	200013797			
Client Sample ID:	SD301-FILTRATE	SD301-RAW			
Waste Type:	LIQUID/RAD	SOLID/RAD			
Date Received:	18-OCT-94	18-OCT-94			
Date Sampled:	18-OCT-94	18-OCT-94			
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	-	0.90			g/cc
Percent Moisture	-	22.88			pct
RADIUM-226 - LIQUID					
Radium 226, As Ra-226	1.12	-		.5	pci/l

COMMENTS:

200013796 -
RA-226= 1.12 PCL +/- 0.0541 PCL (MDC= 0.0413 PCL)
AS 11/15/94

RADIUM-226 - SOLID					
Radium-226, As Ra-226	-	33.1		.1	pci/g

COMMENTS:

200013797 -
RA-226= 33.1 PCG +/- 0.402 PCG (MDC= 0.0438 PCG)
AS 11/15/94

THORIUM ALPHA ISOTOPIC - SRS					
Th-228	< 1	-		1	pci/l
Th-230	4.65	-		1	pci/l
Th-232	< 1	-		1	pci/l

COMMENTS:

200013796 -
ISOTOPE CONC(PCL) ERROR(PCL) MDC(PCL)
TH-228 0.378 0.471 0.573
TH-230 4.65 0.895 0.463
TH-232 0.0272 0.0544 0.0815
AS 11/17/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	-	< 1.5		1.5	pci/g
Th-230	-	424		1.5	pci/g
Th-232	-	< 1.5		1.5	pci/g

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004083

CTC Sample ID:	200013796	200013797
Client Sample ID:	SD301-FILTRATE	SD301-RAW
Waste Type:	LIQUID/RAD	SOLID/RAD
Date Received:	18-OCT-94	18-OCT-94
Date Sampled:	18-OCT-94	18-OCT-94

Parameter	Result	Result	Result	PQL	Unit
THORIUM ALPHA ISOTOPIC - SOLID					

COMMENTS:

200013797 -
ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.145 0.276 0.355
TH-230 424 48.0 0.0628
TH-232 0.376 0.182 0.0627
AS 11/17/94

URANIUM ALPHA ISOTOPIC - LIQUID					
U-234	39	-		1	pci/l
U-235	1.89	-		1	pci/l
U-238	39.1	-		1	pci/l

COMMENTS:

200013796 -
All units are in pCi/l
U3334 39.0 +/- 3.08 MDC=0.0652
U-235 1.89 +/- 0.243 MDC=0.0698
U-238 39.1 +/- 3.09 MDC=0.0457
rws 11/13/94

URANIUM ALPHA ISOTOPIC - SOLID					
U-234	-	20.9		1.5	pci/g
U-235	-	< 1.5		1.5	pci/g
U-238	-	20.7		1.5	pci/g

COMMENTS:

200013797 -
All units are in pCi/g
U3334 20.9 +/- 1.76 MDC=0.0284
U-235 1.03 +/- 0.130 MDC=0.0293
U-238 20.7 +/- 1.74 MDC=0.0254
rws 11/13/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004083

Report Date Nov 28, 1994

W J Baker for J W Westcott
Laboratory Manager

11/28/94
Date

Martha Jo Cahill
Project Manager

11-28-94
Date

BF 101/102

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013842
Client Sample ID:	BF101-6300UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

Sample Id: 200013842 **Client No:** BF101-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	* 0 g/cc	11/03/94

COMMENTS:

* Insufficient sample to perform.

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.623 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 0.623 PCG +/- 0.0806 PCG (MDC= 0.0716 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	15.6 pci/g	1.5 pci/g	11/17/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 -0.506 1.09 1.70
TH-230 15.6 2.87 1.59
TH-232 0.232 0.269 0.232
HIGH ERROR AND MDC DUE TO SMALL SAMPLE VOLUME
AS 11/17/94

131772

Sample Id: 200013842 **Client No:** BF101-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	1.56 pci/g	1.5 pci/g	11/14/94
U-235	< 1.5 pci/g	1.5 pci/g	11/14/94
U-238	< 1.5 pci/g	1.5 pci/g	11/14/94

COMMENTS:

All units are in pCi/g
U3334 1.56 +/- 0.590 MDC=0.400
U-235 0.105 +/- 0.179 MDC=0.351
U-238 1.05 +/- 0.474 MDC=0.285
rws 11/14/94

131112

Sample Id: 200013842 **Client No:** BF101-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 21, 1994

W. T. Baskin for JW 11/28/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013843
Client Sample ID:	BF102-2000UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

13112

Sample Id: 200013843 **Client No:** BF102-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date
No FINGERPRINT Tests Requested		

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	↓ 0 g/cc	11/03/94

COMMENTS:

↓ Insufficient sample to perform.

SPECTROSCOPY	Result	Date
No SPECTROSCOPY Tests Requested		

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	2.84 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 2.84 PCG +/- 0.885 PCG (MDC= 1.17 PCG)
HIGH MDC DUE TO LOW SAMPLE VOLUME.
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	771 pci/g	1.5 pci/g	11/17/94
Th-232	7.67 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 -10.6 23.1 35.6
TH-230 771 107 15.6
TH-232 7.67 6.91 4.60
HIGH ERROR AND MDC DUE TO SMALL SAMPLE VOLUME
AS 11/17/94

131772

Sample Id: 200013843 **Client No:** BF102-2000UM

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	10.4 pci/g	1.5 pci/g	11/14/94
U-235	4.01 pci/g	1.5 pci/g	11/14/94
U-238	5.32 pci/g	1.5 pci/g	11/14/94

COMMENTS:

All units are in pCi/g
U3334 10.4 +/- 6.38 MDC=7.42
U-235 4.01 +/- 4.72 MDC=8.18
U-238 5.32 +/- 4.49 MDC=5.62
MDC's are elevated due to the small sample volume available.
rws 11/14/94

131772

Sample Id: 200013843 **Client No:** BF102-2000UM

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CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 21, 1994

W. Baskin for J. Wi 11/28/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013844
Client Sample ID:	BF102-500UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013844 **Client No:** BF102-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	* 0 g/cc	11/03/94

COMMENTS:

* Insufficient sample to perform.

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 SOLID	Result	PQL	Date
Radium-226, As Ra-226	1.82 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 1.82 PCG +/- 0.297 PCG (MDC= 0.301 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/17/94
Th-230	47.9 pci/g	1.5 pci/g	11/17/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/17/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(MDC)
TH-228	-7.78	9.98	16.2
TH-230	47.9	18.6	18.1
TH-232	0.00	0.00	2.22

HIGH ERROR AND MDC DUE TO SMALL SAMPLE VOLUME
AS 11/17/94

131772

Sample Id: 200013844 **Client No:** BF102-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	3.45 pci/g	1.5 pci/g	11/14/94
U-235	< 1.5 pci/g	1.5 pci/g	11/14/94
U-238	4.25 pci/g	1.5 pci/g	11/14/94

COMMENTS:

All units are in pCi/g
U3334 3.45 +/- 1.69 MDC=1.52
U-235 MDC=1.63
U-238 4.25 +/- 1.86 MDC=1.39
rws 11/14//94

131772

Sample Id: 200013844 **Client No:** BF102-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 21, 1994

W. J. Baskin for JW 11/28/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013845
Client Sample ID:	BF102-150UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013845 **Client No:** BF102-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	* 0 g/cc	11/03/94

COMMENTS:

* Insufficient sample to perform.

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	2.94 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 2.94 PCG +/- 0.103 PCG (MDC= 0.0546 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	3.34 pci/g	1.5 pci/g	11/22/94
Th-230	4.29 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ALL UNITS PCI/GRAM.

TH-228 3.34 +/- 1.72 MDC = 1.56
TH-230 4.29 +/- 2.08 MDC = 2.01
TH-232 0.800 +/- 0.721 MDC = 0.480

131772

Sample Id: 200013845 **Client No:** BF102-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 28, 1994

11/28/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013846
Client Sample ID:	BF102-75UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013846 **Client No:** BF102-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0 g/cc	11/03/94

COMMENTS:

Insufficient sample to perform.

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.124 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 0.124 PCG +/- 0.0403 PCG (MDC= 0.0601 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	4.75 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 -0.382 2.43 4.17
TH-230 4.75 3.17 3.56
TH-232 0.00 0.00 0.849
HIGH MDC AND ERROR DUE TO SMALL SAMPLE VOLUME.
AS 11/22/94

131772

Sample Id: 200013846 **Client No:** BF102-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	< 1.5 pci/g	1.5 pci/g	11/14/94
U-235	< 1.5 pci/g	1.5 pci/g	11/14/94
U-238	< 1.5 pci/g	1.5 pci/g	11/14/94

COMMENTS:

All units are in pCi/g
U3334 0.629 +/- 0.602 MDC=1.02
U-235 0.304 +/- 0.424 MDC=0.751
U-238 0.767 +/- 0.558 MDC=0.475
rws 11/14/94

131772

Sample Id: 200013846 **Client No:** BF102-75UM

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CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 28, 1994

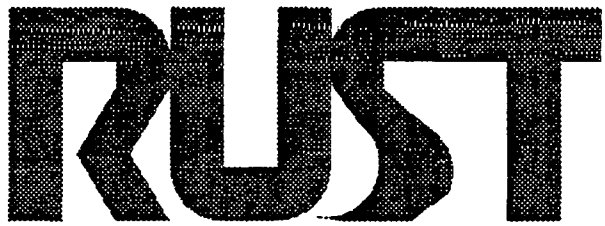
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013847
Client Sample ID:	BF102-38UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013847 **Client No:** BF102-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.05 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.244 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 0.244 PCG +/- 9.66E-3 PCG (MDC= 5.70E-3 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.184	0.431	0.615
TH-230	0.314	0.231	0.258
TH-232	0.0264	0.0529	0.0792

AS 11/22/94

131772

Sample Id: 200013847 **Client No:** BF102-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	< 1.5 pci/g	1.5 pci/g	11/14/94
U-235	< 1.5 pci/g	1.5 pci/g	11/14/94
U-238	< 1.5 pci/g	1.5 pci/g	11/14/94

COMMENTS:

All units are in pCi/g
U3334 0.177 +/- 0.0806 MDC=0.0634
U-235 0.0294 +/- 0.0362 MDC=0.0504
U-238 0.232 +/- 0.0915 MDC=0.0523

rws 11/14/94

131772

Sample Id: 200013847 **Client No:** BF102-38UM

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Report Date Nov 28, 1994

W. J. Bisko for JW 11/28/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013848
Client Sample ID:	BF102-0.7UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013848 **Client No:** BF102-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.08 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	< .1 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 0.0208 PCG +/- 3.33E-3 PCG (MDC= 4.24E=3 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.0537	0.235	0.382
TH-230	0.483	0.298	0.297
TH-232	0.00	0.00	0.0911

AS 11/22/94

131772

Sample Id: 200013848 **Client No:** BF102-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	< 1.5 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	< 1.5 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	0.583	0.156	0.0826
U-235	0.0128	0.0834	0.132
U-238	0.449	0.129	0.0245

AS 11/18/94

131772

Sample Id: 200013848 **Client No:** BF102-0.7UM

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Report Date Nov 28, 1994

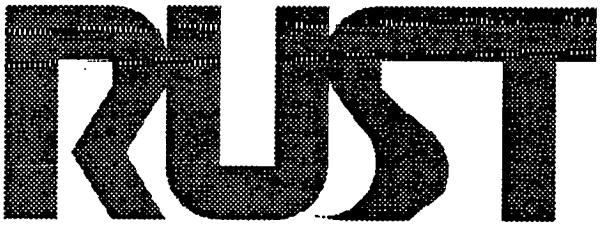
W. J Baskin for JW 11/28/94

Lab Manager

131712

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013849
Client Sample ID:	BF102-FILTRATE
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	LIQUID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013849 **Client No:** BF102-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - LIQUID	Result	PQL	Date
Radium 226, As Ra-226	< .5 pci/l	.5 pci/l	11/16/94

COMMENTS:

RA-226= 0.0286 PCL +/- 0.0348 PCL (MDC= 0.0584 PCL)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SRS	Result	PQL	Date
Th-228	< 1 pci/l	1 pci/l	11/22/94
Th-230	1.44 pci/l	1 pci/l	11/22/94
Th-232	< 1 pci/l	1 pci/l	11/22/94

COMMENTS:

ISOTOPE CONC(PCL) ERROR(PCL) MDC(PCL)
TH-228 0.232 0.307 0.431
TH-230 1.44 0.466 0.103
TH-232 -3.98E-3 0.174 0.334
AS 11/22/94

131772

Sample Id: 200013849

Client No: BF102-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - LIQUID	Result	PQL	Date
U-234	< 1 pci/l	1 pci/l	11/18/94
U-235	< 1 pci/l	1 pci/l	11/18/94
U-238	< 1 pci/l	1 pci/l	11/18/94

COMMENTS:

ISOTOPE	CONC(PCL)	ERROR(PCL)	MDC(PCL)
U-234	0.684	0.324	0.282
U-235	0.125	0.234	0.348
U-238	0.195	0.148	0.0834

AS 11/18/94

131772

Sample Id: 200013849 **Client No:** BF102-FILTRATE

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Report Date Nov 28, 1994

W. J. Baskin for JW 11/28/94

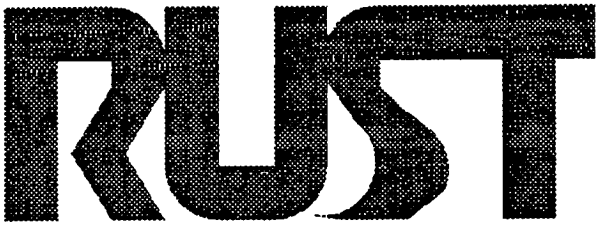
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013850
Client Sample ID:	BF102-RAW
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013850 **Client No:** BF102-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Percent Moisture	23.8 pct	11/03/94
Bulk Density	0.82 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	< .1 pci/g	.1 pci/g	11/16/94

COMMENTS:

RA-226= 0.0771 PCG +/- 6.86E-3 PCG (MDC= 6.88E-3 PCG)
AS 11/16/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.250	0.694	1.03
TH-230	0.775	0.668	0.835
TH-232	0.00	0.00	0.170

AS 11/22/94

131772

Sample Id: 200013850 **Client No:** BF102-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	< 1.5 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	< 1.5 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	1.40	0.348	0.162
U-235	0.138	0.105	0.0591
U-238	0.622	0.211	0.0479

AS 11/18/94

131772

Sample Id: 200013850 **Client No:** BF102-RAW

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Report Date Nov 28, 1994

W. Baskin for JLC 11/28/94

Lab Manager

Clemson Technical Center

Clemson Research Park
Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Client SAIC

Location CTC

Project/Number FUSRAP / 26427

Sample Type(s) LIQUID / SOLID

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 23ML HDPE BOTTLES	125 HDPE BOTTLES	250ML HDPE BOTTLES	1 LITER HDPE BOTTLES					TOTAL	REMARKS
BF101-6300um	11/1/94 @ 1125	13842	1								1	
BF102-2000um		13843	1								1	
BF102-500um		13844	1								1	
BF102-152um		13845	1								1	
BF102-75um		13846	1								1	
BF102-36um		13847		1							1	
BF102-0.7um		13848			1						1	
BF102-FILTRATE		13849				1					1	
BF102-RAW		13850		1							1	
												Sub. 4091

Total No. of Containers 9

Sampled By Dennis Wilson

Relinquished by: Dennis Wilson Organization: CTC
Date: 11-1-94 Time: 1500

Received by: William Boyd Organization: CTC
Date: 11/01/94 Time: 1300

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

13177

BF302

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

RUST

Analytical Results

Submission ID: 100004094

Project Name/ID: 26427

Client Name: FUSRAP-TDD

Client Location: ANDERSON, SC

CTC Sample ID:	200013869	200013870	200013871		
Client Sample ID:	BF302-6300UM	BF302-2000UM	BF302-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	01-NOV-94	01-NOV-94	01-NOV-94		
Date Sampled:	01-NOV-94	01-NOV-94	01-NOV-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0 *	0.44	0.44		g/cc
Percent Moisture	-	-	-		pct

* Rejected due to insufficient sample.

RADIUM-226 - SOLID					
Radium-226, As Ra-226	29.1	50.2	43.4	.1	pci/g

COMMENTS:

200013869 -
RA-226= 29.1 PCG +/- 0.707 PCG (MDC= 0.215 PCG)
AS 11/21/94
200013870 -
RA-226= 50.2 PCG +/- 0.274 PCG (MDC= 0.0192 PCG)
AS 11/21/94
200013871 -
RA-226= 43.4 PCG +/- 0.309 PCG (MDC= 0.0159 PCG)
AS 11/22/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	1.51	< 1.5	< 1.5	1.5	pci/g
Th-230	1130	440	912	1.5	pci/g
Th-232	< 1.5	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013869 -
All units are in pCi/g.
Th-228 1.51 +/- 7.81 MDC=12.3
Th-230 1130 +/- 124 MDC=4.48
Th-232 -0.186 +/- 2.92 MDC=5.71
rws 11/30/94

200013870 -
ALL UNITS IN PCI/G.

TH-228= 0.657 +/- 0.617 (MDC= 0.734)
TH-230= 440 +/- 38.8 (MDC= 0.594)
TH-232= 0.638 +/- 0.306 (MDC= 0.106)
AS 11/29/94
200013871 -
ALL UNITS IN PCI/G.

TH-228= 1.07 +/- 0.454 (MDC= 0.423)
TH-230= 912 +/- 90.6 (MDC= 0.0760)
TH-232= 0.859 +/- 0.307 (MDC= 0.0758)

PQL = Practical Quantitation Limit

CTC Sample ID:	200013869	200013870	200013871		
Client Sample ID:	BF302-6300UM	BF302-2000UM	BF302-500UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	01-NOV-94	01-NOV-94	01-NOV-94		
Date Sampled:	01-NOV-94	01-NOV-94	01-NOV-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
AS 11/29/94					
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	32.1	33.8	49.4	1.5	pci/g
U-235	2.40	< 1.5	2.72	1.5	pci/g
U-238	27.1	35.3	51.6	1.5	pci/g

COMMENTS:

200013869 -
ALL UNITS IN PCI/G.

U-233/234= 32.1 +/- 7.83 (MDC= 3.83)
U-235= 2.40 +/- 2.15 (MDC= 1.44)
U-238= 27.1 +/- 7.15 (MDC= 3.84)
AS 11/28/94
200013870 -
ALL UNITS IN PCI/G.

U-233/234= 33.8 +/- 3.89 (MDC= 0.420)
U-235= 1.44 +/- 0.581 (MDC= 0.519)
U-238= 35.3 +/- 4.03 (MDC= 0.110)
AS 11/28/94
200013871 -
ALL UNITS IN PCI/G.

U-233/234= 49.4 +/- 5.43 (MDC= 0.195)
U-235= 2.72 +/- 0.652 (MDC= 0.303)
U-238= 51.6 +/- 5.65 (MDC= 0.0745)
AS 11/28/94

PQL = Practical Quantitation Limit

RUST

Submission Id: 100004094

CTC Sample ID:	200013872	200013873	200013874		
Client Sample ID:	BF302-150UM	BF302-75UM	BF302-38UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	01-NOV-94	01-NOV-94	01-NOV-94		
Date Sampled:	01-NOV-94	01-NOV-94	01-NOV-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0.51	0.58	0.77		g/cc
Percent Moisture	-	-	-		pct
RADIUM-226 - SOLID					
Radium-226, As Ra-226	5.94	2.71	20.2	.1	pci/g

COMMENTS:

200013872 -
RA-226= 5.94 PCG +/- 0.257 PCG (MDC= 0.0828 PCG)
AS 11/28/94
200013873 -
RA-226= 2.71 PCG +/- 0.0780 PCG (MDC= 0.0294 PCG)
AS 11/28/94
200013874 -
RA-226= 20.2 PCG +/- 0.138 PCG (MDC= 0.0130 PCG)
AS 11/22/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	< 1.5	< 1.5	1.5	pci/g
Th-230	365	268	256	1.5	pci/g
Th-232	< 1.5	< 1.5	< 1.5	1.5	pci/g

COMMENTS:

200013872 -
ALL UNITS IN PCI/G.

TH-228= -0.0760 +/- 0.384 (MDC= 0.553)
TH-230= 365 +/- 38.5 (MDC= 0.0883)
TH-232= 0.206 +/- 0.157 (MDC= 0.0881)
AS 11/29/94
200013873 -
All units are in pCi/g.
Th-228 0.523 +/- 0.389 MDC=0.478
Th-230 268 +/- 28.5 MDC=0.124
Th-232 0.509 +/- 0.343 MDC=0.374
rws 11/30/94

200013874 -
ALL UNITS IN PCI/G.

TH-228= 0.228 +/- 0.323 (MDC= 0.410)
TH-230= 256 +/- 27.8 (MDC= 0.410)
TH-232= 0.172 +/- 0.131 (MDC= 0.0736)

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004094

CTC Sample ID:	200013872	200013873	200013874		
Client Sample ID:	BF302-150UM	BF302-75UM	BF302-38UM		
Waste Type:	SOLID/RAD	SOLID/RAD	SOLID/RAD		
Date Received:	01-NOV-94	01-NOV-94	01-NOV-94		
Date Sampled:	01-NOV-94	01-NOV-94	01-NOV-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
THORIUM ALPHA ISOTOPIC - SOLID (continued):					
AS 11/29/94					
URANIUM ALPHA ISOTOPIC - SOLID					
U-234	62.7	42.6	24.8	1.5	pci/g
U-235	2.37	1.97	< 1.5	1.5	pci/g
U-238	61.4	41.6	25.3	1.5	pci/g

COMMENTS:

200013872 -
ALL UNITS IN PCI/G.

U-233/234= 62.7 +/- 6.22 (MDC= 0.0661)
U-235= 2.37 +/- 0.553 (MDC= 0.0817)
U-238= 61.4 +/- 6.10 (MDC= 0.0662)
AS 11/28/94
200013873 -
ALL UNITS IN PCI/G.

U-233/234= 42.6 +/- 4.79 (MDC= 0.316)
U-235= 1.97 +/- 0.602 (MDC= 0.310)
U-238= 41.6 +/- 4.69 (MDC= 0.252)
AS 11/28/94
200013874 -
ALL UNITS IN PCI/G.

U-233/234= 24.8 +/- 2.46 (MDC= 0.229)
U-235= 1.36 +/- 0.365 (MDC= 0.0667)
U-238= 25.3 +/- 2.50 (MDC= 0.142)
AS 11/28/94

PQL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004094

CTC Sample ID:	200013875	200013876	200013877		
Client Sample ID:	BF302-0.7UM	BF302-FILTRATE	BF302-RAW		
Waste Type:	SOLID/RAD	LIQUID/RAD	SOLID/RAD		
Date Received:	01-NOV-94	01-NOV-94	01-NOV-94		
Date Sampled:	01-NOV-94	01-NOV-94	01-NOV-94		
Parameter	**Result**	**Result**	**Result**	**PQL**	**Unit**
WET CHEMISTRY					
Bulk Density	0.90	-	0.84		g/cc
Percent Moisture	-	-	35.1		pct
RADIUM-226 - LIQUID					
Radium 226, As Ra-226	-	2.68	-	.5	pci/l

COMMENTS:

200013876 -
RA-226= 2.68 PCL +/- 0.107 PCL (MDC= 0.0543 PCL)
AS 11/22/94

RADIUM-226 - SOLID					
Radium-226, As Ra-226	4.32	-	1.77	.1	pci/g

COMMENTS:

200013875 -
RA-226= 4.32 PCG +/- 0.0574 PCG (MDC= 0.0104 PCG)
AS 11/22/94
200013877 -
RA-226= 1.77 PCG +/- 0.0253 PCG (MDC= 4.91E-3 PCG)
AS 11/22/94

THORIUM ALPHA ISOTOPIC - SRS					
Th-228	-	< 1	-	1	pci/l
Th-230	-	80.2	-	1	pci/l
Th-232	-	< 1	-	1	pci/l

COMMENTS:

200013876 -
ALL UNITS IN PCI/L.

TH-228= 0.0237 +/- 1.09 (MDC= 1.63)
TH-230= 80.2 +/- 9.80 (MDC= 1.63)
TH-232= 0.229 +/- 0.325 (MDC= 0.344)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID					
Th-228	< 1.5	-	< 1.5	1.5	pci/g

POL = Practical Quantitation Limit

131772

RUST

Submission Id: 100004094

Report Date Dec 2, 1994

Laboratory Manager — Date 12-2-94

Martha J. Cahill
Project Manager — Date 12-2-94

131172
HR102

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013851
Client Sample ID:	HR102-6300UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013851 **Client No:** HR102-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS: Insufficient sample to perform Bulk Density.

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.122 pci/g	.1 pci/g	11/22/94

COMMENTS:

RA-226= 0.122 PCG +/- 0.0132 PCG (MDC=0.0104 PCG)
AS 11/22/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 0.0598 0.214 0.332
TH-230 0.970 0.320 0.0677
TH-232 0.0225 0.0451 0.0676
AS 11/22/94

131772

Sample Id: 200013851 **Client No:** HR102-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	3.89 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	3.84 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	3.89	0.553	0.0300
U-235	0.284	0.122	0.0370
U-238	3.84	0.549	0.0300

AS 11/18/94

131772

Sample Id: 200013851 **Client No:** HR102-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 28, 1994

W J Bistrin for JW 11/28/94

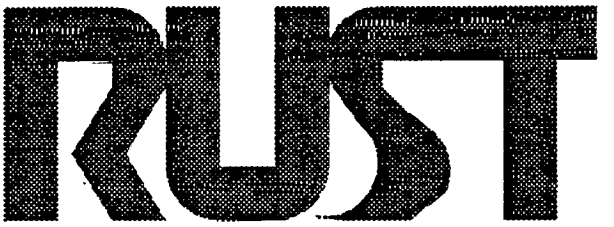
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013852
Client Sample ID:	HR102-2000UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013852 **Client No:** HR102-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.95 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.378 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.378 PCG +/- 0.0188 PCG (MDC=6.49E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.0423	0.157	0.244
TH-230	0.426	0.202	0.162
TH-232	0.00	0.00	0.0494

AS 11/22/94

131772

Sample Id: 200013852 **Client No:** HR102-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	24.2 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	24.4 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	24.2	3.06	0.0745
U-235	1.24	0.242	0.0211
U-238	24.4	3.09	0.0171

AS 11/18/94

131772

Sample Id: 200013852 **Client No:** HR102-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 28, 1994

W Baskin for JW 11/28/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013853
Client Sample ID:	HR102-500UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013853 **Client No:** HR102-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.06 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.104 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.104 PCG +/- 5.49E-3 PCG (MDC=3.12E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	-0.110	0.375	0.590
TH-230	1.35	0.460	0.261
TH-232	0.00	0.00	0.0796

AS 11/22/94

131772

Sample Id: 200013853 **Client No:** HR102-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	23.4 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	23.6 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	23.4	2.39	0.0223
U-235	1.15	0.233	0.0276
U-238	23.6	2.42	0.0224

AS 11/18/94

131772

Sample Id: 200013853 **Client No:** HR102-500UM

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Report Date Nov 28, 1994

W. J. Baskin for JCW 11/28/94

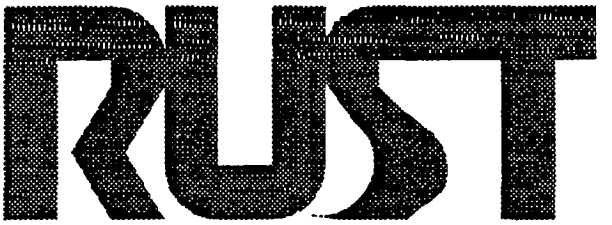
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013854
Client Sample ID:	HR102-150UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131722

Sample Id: 200013854 **Client No:** HR102-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.81 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	4.06 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 4.06 PCG +/- 0.0437 PCG (MDC= 5.62E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	121 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	0.224	0.489	0.724
TH-230	121	21.3	0.725
TH-232	0.342	0.266	0.147

AS 11/22/94

131772

Sample Id: 200013854 **Client No:** HR102-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	4.54 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	4.37 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	4.54	0.636	0.153
U-235	0.318	0.139	0.0434
U-238	4.37	0.613	0.0352

AS 11/18/94

131772

Sample Id: 200013854 **Client No:** HR102-150UM

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Report Date Nov 28, 1994

W Baxter for JCW 11/28/94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013855
Client Sample ID:	HR102-75UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013855 **Client No:** HR102-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.58 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	9.89 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 9.89 PCG +/- 0.0635 PCG (MDC= 4.89E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	18.0 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 -0.152 0.275 0.455
TH-230 18.0 2.44 0.426
TH-232 0.0432 0.0614 0.0649
AS 11/22/94

131772

Sample Id: 200013855 **Client No:** HR102-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	39.4 pci/g	1.5 pci/g	11/18/94
U-235	2.05 pci/g	1.5 pci/g	11/18/94
U-238	40.0 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	39.4	4.50	0.0395
U-235	2.05	0.427	0.0488
U-238	40.0	4.57	0.0396

AS 11/18/94

131772

Sample Id: 200013855 **Client No:** HR102-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 28, 1994

W. D Baskin for JW 11/28/94

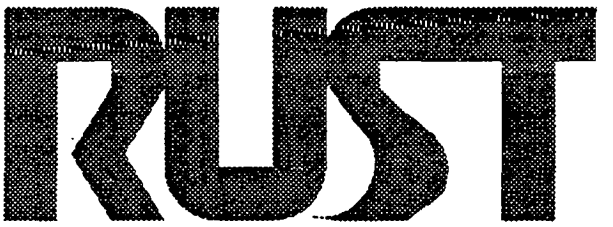
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013856
Client Sample ID:	HR102-38UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013856 **Client No:** HR102-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.85 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	13.9 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 13.9 PCG +/- 0.0735 PCG (MDC= 4.65E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	46.3 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE CONC(PCG) ERROR(PCG) MDC(PCG)
TH-228 -0.193 0.253 0.424
TH-230 46.3 5.55 0.187
TH-232 0.0761 0.0766 0.0571
AS 11/22/94

131772

Sample Id: 200013856 **Client No:** HR102-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	33.6 pci/g	1.5 pci/g	11/18/94
U-235	1.87 pci/g	1.5 pci/g	11/18/94
U-238	35.7 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	33.6	3.85	0.181
U-235	1.87	0.405	0.120
U-238	35.7	4.08	0.0974

AS 11/18/94

131772

Sample Id: 200013856 **Client No:** HR102-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 28, 1994

W J Baskin for JCW 11/28/94

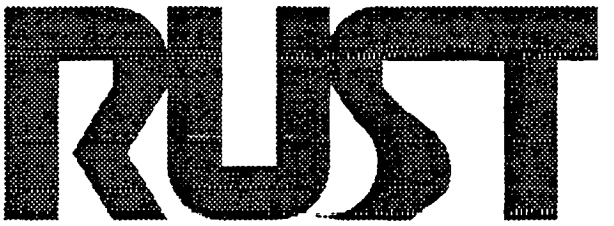
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013857
Client Sample ID:	HR102-0.7UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

/31772

Sample Id: 200013857 **Client No:** HR102-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.89 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	4.87 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 4.87 PCG +/- 0.0527 PCG (MDC= 6.81E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/22/94
Th-230	8.18 pci/g	1.5 pci/g	11/22/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
TH-228	-0.320	0.833	1.34
TH-230	8.18	2.30	1.50
TH-232	0.0639	0.128	0.192

AS 11/22/94

131772

Sample Id: 200013857 **Client No:** HR102-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	81.9 pci/g	1.5 pci/g	11/18/94
U-235	3.74 pci/g	1.5 pci/g	11/18/94
U-238	85.6 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	81.9	9.39	0.132
U-235	3.74	0.709	0.0664
U-238	85.6	9.80	0.0538

AS 11/18/94

131772

Sample Id: 200013857 **Client No:** HR102-0.7UM

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CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 28, 1994

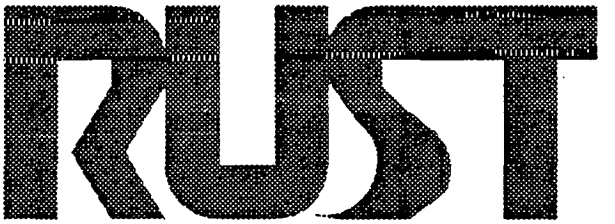
W. J Baskin for JW 11/28/94

Lab Manager

131712

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013858
Client Sample ID:	HR102-FILTRATE
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	LIQUID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013858 **Client No:** HR102-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - LIQUID	Result	PQL	Date
Radium 226, As Ra-226	2.47 pci/l	.5 pci/l	11/21/94

COMMENTS:

RA-226= 2.47 PCL +/- 0.107 PCL (MDC= 0.0515 PCL)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SRS	Result	PQL	Date
Th-228	< 1 pci/l	1 pci/l	11/21/94
Th-230	64.81 pci/l	1 pci/l	11/21/94
Th-232	< 1 pci/l	1 pci/l	11/21/94

COMMENTS:

ALL UNITS PCI/L
TH-228 0.254 +/- 0.632 MDC = 0.503
TH-230 64.8 +/- 6.23 MDC = 0.368
TH-23 -0.209 +/- 0.426 MDC = 0.368

131772

Sample Id: 200013858 **Client No:** HR102-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - LIQUID	Result	PQL	Date
U-234	76.4 pci/l	1 pci/l	11/18/94
U-235	3.98 pci/l	1 pci/l	11/18/94
U-238	77.2 pci/l	1 pci/l	11/18/94

COMMENTS:

ISOTOPE	CONC(PCL)	ERROR(PCL)	MDC(PCL)
U-234	76.4	7.86	0.223
U-235	3.98	0.789	0.0897
U-238	77.2	7.93	0.0727

AS 11/18/94

131772

Sample Id: 200013858 **Client No:** HR102-FILTRATE

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Report Date Nov 28, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013859
Client Sample ID:	HR102-RAW
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013859 **Client No:** HR102-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Percent Moisture	6.9 pct	11/03/94
Bulk Density	0.78 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	3.33 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 3.33PCG +/- 0.0622 PCG (MDC= 8.35E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/21/94
Th-230	8.34 pci/g	1.5 pci/g	11/21/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/21/94

COMMENTS:

ALL UNITS PCI/G

TH-228 0.0501 +/- 0.332 MDC = 0.253
TH-230 8.34 +/- 1.17 MDC = 0.253
TH-232 0.0904 +/- 0.0744 MDC = 0.0452
RWS 11/23/94

131772

Sample Id: 200013859 **Client No:** HR102-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	29.0 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	28.3 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	29.0	3.12	0.100
U-235	1.48	0.320	0.0404
U-238	28.3	3.05	0.0328

AS 11/18/94

131772

Sample Id: 200013859 **Client No:** HR102-RAW

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Report Date Nov 28, 1994

W J Bierkin for JCW 11/28/94

Lab Manager

Clemson Technical Center

Clemson Research Park
Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Client SAIC

Location CTC

Project/Number FUSRAP / 26427

Sample Type(s) LIQUID + SOLID

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 25 ml HDPE BOTTLES	125 ml HDPE BOTTLES	1 LITER HDPE BOTTLES						TOTAL	REMARKS
HR102-6300um	11/1/94@1115	21.13851	1								1	
HR102-2000um		13852	1								1	
HR102-500um		13853	1								1	
HR102-150um		13854	1								1	
HR102-75um		13855	1								1	
HR102-38um		13856	1								1	
HR102-0.7um		13857	1								1	
HR102-FILTRATE		13858			1						1	
HR102-RAW		13859		1							1	
												Sub ID
												10:00 4617

Total No. of Containers 9

Sampled By Dennis Wade

Relinquished by: Dennis Wade Organization: CTC
Date: 11/1/94 Time: 1300

Received by: William Batt Organization: CTC
Date: 1300 Time: 11/01/94

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

13172

12/1/2
HR301

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013878
Client Sample ID:	HR301-6300UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013878 **Client No:** HR301-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS: Insufficient sample to perform Bulk Density.

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	2.25 pci/g	.1 pci/g	11/22/94

COMMENTS:

RA-226= 2.25 PCG +/- 0.0601 PCG (MDC= 0.0212 PCG)
AS 11/22/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/30/94
Th-230	112 pci/g	1.5 pci/g	11/30/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
Th-228 -0.0145 +/- 0.825 MDC=1.34
Th-230 112 +/- 13.2 MDC=0.168
Th-232 0.112 +/- 0.159 MDC=0.168
rws 11/30/94

131772

Sample Id: 200013878 **Client No:** HR301-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	2.44 pci/g	1.5 pci/g	11/28/94
U-235	< 1.5 pci/g	1.5 pci/g	11/28/94
U-238	2.34 pci/g	1.5 pci/g	11/28/94

COMMENTS:

ALL UNITS IN PCI/G.

U-233/234= 2.44 +/- 0.642 (MDC= 0.350)
U-235= -0.0355 +/- 0.256 (MDC= 0.432)
U-238= 2.34 +/- 0.592 (MDC= 0.0964)
AS 11/28/94

131772

Sample Id: 200013878 **Client No:** HR301-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 2, 1994

W J Baskin for JW 12-5-94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013879
Client Sample ID:	HR301-2000UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

13177-

Sample Id: 200013879 **Client No:** HR301-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS: Insufficient sample to perform Bulk Density.

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	47.9 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 47.9 PCG +/- 0.760 (MDC= 0.0921)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/30/94
Th-230	530 pci/g	1.5 pci/g	11/30/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
Th-228 1.48 +/- 1.08 MDC=1.39
Th-230 530 +/- 49.3 MDC=0.973
Th-232 0.505 +/- 0.415 MDC=0.252
rws 11/30/94

131772

Sample Id: 200013879 **Client No:** HR301-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	24.0 pci/g	1.5 pci/g	11/28/94
U-235	< 1.5 pci/g	1.5 pci/g	11/28/94
U-238	23.2 pci/g	1.5 pci/g	11/28/94

COMMENTS:

ALL UNITS IN PCI/G.

U-233/234= 24.0 +/- 3.85 (MDC= 1.54)
U-235= 1.37 +/- 0.801 (MDC= 0.343)
U-238= 23.2 +/- 3.62 (MDC= 0.278)
AS 11/28/94

131772

Sample Id: 200013879 **Client No:** HR301-2000UM

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Report Date Dec 2, 1994

W J Baskin for JW 12-5-94

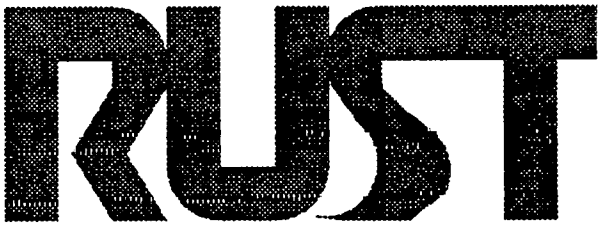
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013880
Client Sample ID:	HR301-500UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013880 **Client No:** HR301-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.62 g/cc	11/08/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	24.0 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 24.0 PCG +/- 0.283 (MDC= 0.0255)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/30/94
Th-230	3460 pci/g	1.5 pci/g	11/30/94
Th-232	2.69 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
Th-228 0.947 +/- 0.652 MDC=0.845
Th-230 3460 +/- 334 MDC=0.635
Th-232 2.69 +/- 0.720 MDC=0.126
rws 11/30/94

131772

Sample Id: 200013880 **Client No:** HR301-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	62.4 pci/g	1.5 pci/g	11/28/94
U-235	3.10 pci/g	1.5 pci/g	11/28/94
U-238	61.8 pci/g	1.5 pci/g	11/28/94

COMMENTS:

ALL UNITS IN PCI/G.

U-233/234= 62.4 +/- 6.71 (MDC= 0.408)
U-235= 3.10 +/- 0.813 (MDC= 0.139)
U-238= 61.8 +/- 6.65 (MDC= 0.112)
AS 11/28/94

131772

Sample Id: 200013880 **Client No:** HR301-500UM

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Report Date Dec 2, 1994

W J Baskin for J W 12-5-94

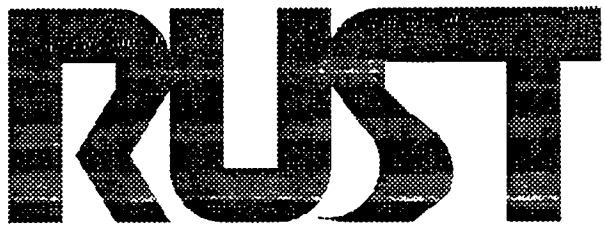
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013881
Client Sample ID:	HR301-150UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013881 **Client No:** HR301-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.35 g/cc	11/08/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	21.6 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 21.6 PCG +/- 0.227 PCG (MDC= 0.0183 PCG)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/30/94
Th-230	2860 pci/g	1.5 pci/g	11/30/94
Th-232	2.08 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g
Th-228 0.589 +/- 0.624 MDC=0.883
Th-230 2860 +/- 329 MDC=0.573
Th-232 2.08 +/- 0.685 MDC=0.149
rws 11/30/94

131772

Sample Id: 200013881 **Client No:** HR301-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	118 pci/g	1.5 pci/g	11/28/94
U-235	5.64 pci/g	1.5 pci/g	11/28/94
U-238	121 pci/g	1.5 pci/g	11/28/94

COMMENTS:

ALL UNITS IN PCI/G.

U-233/234= 118 +/- 12.0 (MDC= 0.0866)
U-235= 5.64 +/- 1.05 (MDC= 0.107)
U-238= 121 +/- 12.2 (MDC= 0.316)
AS 11/28/94

131772

Sample Id: 200013881 **Client No:** HR301-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

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Report Date Dec 2, 1994

W J Baskin for JW 12-5-94

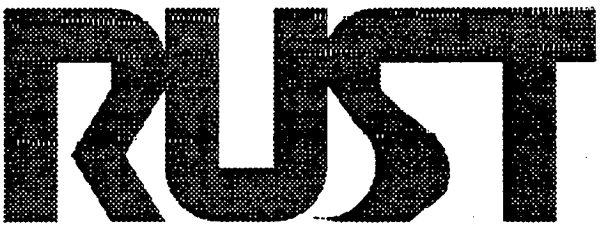
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013882
Client Sample ID:	HR301-75UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013882 **Client No:** HR301-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.44 g/cc	11/08/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	23.1 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 23.1 PCG +/- 0.266 PCG (MDC= 0.0234)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	1.57 pci/g	1.5 pci/g	11/30/94
Th-230	5310 pci/g	1.5 pci/g	11/30/94
Th-232	4.97 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
Th-228 1.57 +/- 0.403 MDC=0.323
Th-230 5310 +/- 456 MDC=0.154
Th-232 4.97 +/- 0.722 MDC=0.0511
rws 11/30/94

131772

Sample Id: 200013883 **Client No:** HR301-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

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Report Date Dec 2, 1994

W J Baskin for JW 12-5-94

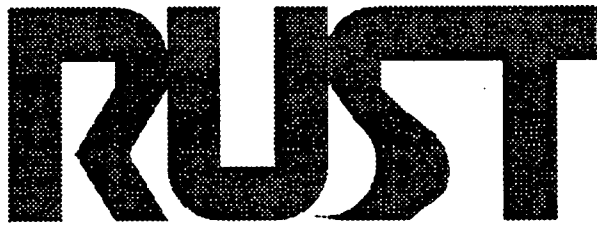
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013884
Client Sample ID:	HR301-0.7UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013884 **Client No:** HR301-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.97 g/cc	11/08/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	2.32 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 2.32 PCG +/- 0.0447 PCG (MDC= 6.58E-3 PCG)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/30/94
Th-230	1400 pci/g	1.5 pci/g	11/30/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are pCi/g.
Th-228 0.556 +/- 0.242 MDC=0.234
Th-230 1400 +/- 141 MDC=0.0522
Th-232 1.04 +/- 0.290 MDC=0.0521
rws 11/30/94

131772

Sample Id: 200013884 **Client No:** HR301-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	182 pci/g	1.5 pci/g	11/30/94
U-235	9.70 pci/g	1.5 pci/g	11/30/94
U-238	184 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 182 +/- 25.9 MDC=0.303
U235 9.70 +/- 1.87 MDC=0.374
U238 184 +/- 26.2 MDC=0.303
rws 11/30/94

131772

Sample Id: 200013884 **Client No:** HR301-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 2, 1994

W D Baskin for JW 12-5-94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013885
Client Sample ID:	HR301-FILTRATE
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	LIQUID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013885 **Client No:** HR301-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - LIQUID	Result	PQL	Date
Radium 226, As Ra-226	3.04 pci/l	.5 pci/l	11/29/94

COMMENTS:

RA-226= 3.04 PCL +/- 0.0889 PCL (MDC= 0.0340 PCL)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SRS	Result	PQL	Date
Th-228	< 1 pci/l	1 pci/l	12/02/94
Th-230	56.6 pci/l	1 pci/l	12/02/94
Th-232	< 1 pci/l	1 pci/l	12/02/94

COMMENTS:

All units are in pCi/l.
Th-228 -2.94 +/- 4.18 MDC=6.87
Th-230 56.6 +/- 10.6 MDC=0.801
Th-232 -0.533 +/- 1.07 MDC=2.55
rws 12/2/94

131772

Sample Id: 200013885 **Client No:** HR301-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - LIQUID	Result	PQL	Date
U-234	17.3 pci/l	1 pci/l	11/30/94
U-235	< 1 pci/l	1 pci/l	11/30/94
U-238	14.3 pci/l	1 pci/l	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 17.3 +/- 3.16 MDC=0.915
U235 0.750 +/- 0.617 MDC=0.375
U238 14.3 +/- 2.78 MDC=0.304
rws 11/30/94

131772

Sample Id: 200013885 **Client No:** HR301-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 5, 1994

W Bashi for JW 12-5-94

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013886
Client Sample ID:	HR301-RAW
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013886 **Client No:** HR301-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Percent Moisture	26.43 pct	11/09/94
Bulk Density	0.74 g/cc	11/08/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	4.00 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 4.00 PCG +/- 0.0337 PCG (MDC= 3.88E-3 PCG)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	2530 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 0.422 +/- 0.184 (MDC= 0.203)
TH-230= 2530 +/- 244 (MDC= 0.0974)
TH-232= 1.47 +/- 0.292 (MDC= 0.0332)
AS 12/1/94

131772

Sample Id: 200013886 **Client No:** HR301-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	135 pci/g	1.5 pci/g	11/30/94
U-235	8.38 pci/g	1.5 pci/g	11/30/94
U-238	144 pci/g	1.5 pci/g	12/02/94

COMMENTS:

All units are in pCi/g
u3334 135 +/- 17.7 MDC=0.341
U235 8.38 +/- 1.55 MDC=0.330
U238 144 +/- 18.8 MDC=0.268
rws 11/30/94

131772

Sample Id: 200013886 **Client No:** HR301-RAW

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CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 5, 1994

W J Baskin for J W 12-5-94

Lab Manager

Clemson Technical Center

Clemson Research Park
Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Client SAIC

Location CTC

Project/Number FUSRAP / 26427

Sample Type(s) LIQUID + SOLID

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 250ml HDPE BOTTLES	125ml HDPE BOTTLE	1 LITER HDPE BOTTLE						TOTAL	REMARKS
HR301-6300um	11/1/94@1110	13878	1								1	
HR301-2000um	↓	13879	1								1	
HR301-500um		13880	1								1	
HR301-150um		13881	1								1	
HR301-75um		13882	1								1	
HR301-38um		13883	1								1	
HR301-0.7um		13884	1		KDW						1	
HR301-FILTRATE		13885			1						1	
HR301-RAW	↓	13886		1							1	
												Sub. 4095

Total No. of Containers 9

Sampled By Dennis Wadyka

Relinquished by: Dennis Wadyka Organization: CTC
Date: 11/1/94 Time: 1300

Received by: William Burk Organization: CTC
Date: 11/01/94 Time: 1300

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

11/1/94

LV103

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013860
Client Sample ID:	LV103-6300UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013860 **Client No:** LV103-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS: Insufficient sample to perform Bulk Density.

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	< .1 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.0162 PCG +/- 3.06E-3 PCG (MDC= 3.00E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/21/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/21/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/21/94

COMMENTS:

ALL UNITS PCI/G

TH-228 0.0740 +/- 0.0976 MDC = 0.0814
TH-230 0.202 +/- 0.143 MDC = 0.109
TH-232 0.0146 +/- 0.0169 MDC = 0.0146

131712

Sample Id: 200013860 **Client No:** LV103-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	< 1.5 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	< 1.5 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	0.339	0.0774	0.0322
U-235	0.0129	0.0150	0.0129
U-238	0.294	0.0715	0.0322

AS 11/18/94

131772

Sample Id: 200013860 **Client No:** LV103-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

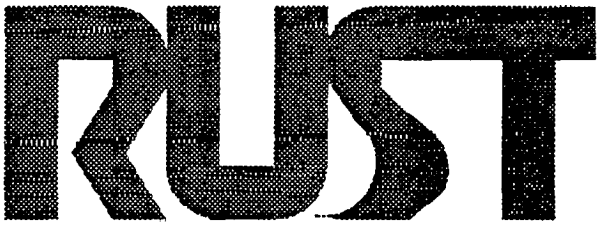
Report Date Dec 8, 1994

Lab Manager

131172

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013861
Client Sample ID:	LV103-2000UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013861 **Client No:** LV103-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.11 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	< .1 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.0770 PCG +/- 5.29E-3 PCG (MDC= 2.46E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/21/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/21/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/21/94

COMMENTS:

ALL UNITS PCI/G

TH-228 0.118 +/- 0.259 MDC = 0.205
TH-230 0.625 +/- 0.165 MDC = 0.0871
TH-232 0.0260 +/- 0.0234 MDC = 0.0156

/21112

Sample Id: 200013861 **Client No:** LV103-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	< 1.5 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	< 1.5 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	1.08	0.167	0.0384
U-235	0.0372	0.0330	0.0475
U-238	0.899	0.146	0.0109

AS 11/18/94

131772

Sample Id: 200013861 **Client No:** LV103-2000UM

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Report Date Nov 28, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013862
Client Sample ID:	LV103-500UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013862 **Client No:** LV103-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.00 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.346 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.346 PCG +/- 0.0189 PCG (MDC= 7.15E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/21/94
Th-230	9.98 pci/g	1.5 pci/g	11/21/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/21/94

COMMENTS:

ALL UNITS PCI/G

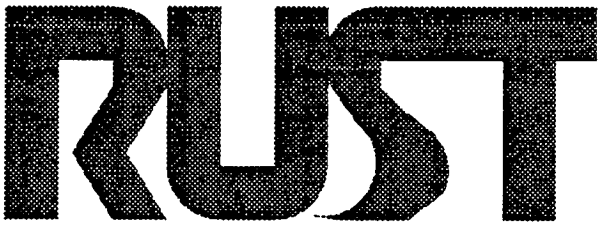
TH-228 0.174 +/- 0.245 MDC = 0.196
TH-230 9.98 +/- 1.15 MDC = 0.165
TH-232 0.0951 +/- 0.0536 MDC = 0.0220

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013863
Client Sample ID:	LV103-150UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013863 **Client No:** LV103-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.13 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.568 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.568 PCG +/- 0.0244 PCG (MDC= 7.36E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/21/94
Th-230	2.27 pci/g	1.5 pci/g	11/21/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/21/94

COMMENTS:

ALL UNITS PCI/G

TH-228 -0.0397 +/- 0.225 MDC = 0.181
TH-230 2.27 +/- 0.296 MDC = 0.0687
TH-232 0.0164 +/- 0.0164 MDC = 0.0123

131772

Sample Id: 200013863 **Client No:** LV103-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	3.24 pci/g	1.5 pci/g	11/22/94
U-235	< 1.5 pci/g	1.5 pci/g	11/22/94
U-238	2.92 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	3.24	0.500	0.0322
U-235	0.226	0.112	0.0398
U-238	2.92	0.465	0.0323

AS 11/22/94

131772

Sample Id: 200013863 **Client No:** LV103-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Nov 28, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013864
Client Sample ID:	LV103-75UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013864 **Client No:** LV103-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0 g/cc	11/03/94

COMMENTS:

Insufficient sample to perform.

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.723 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.723 PCG +/- 0.0247 PCG (MDC= 0.0102 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/21/94
Th-230	13.7 pci/g	1.5 pci/g	11/21/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/21/94

COMMENTS:

ALL UNITS PCI/G

TH-228 -0.0996 +/- 0.572 MDC = 0.498
TH-230 13.7 +/- 1.85 MDC = 0.372
TH-232 0.178 +/- 0.127 MDC = 0.0666

131772

Sample Id: 200013864 **Client No:** LV103-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	7.81 pci/g	1.5 pci/g	11/22/94
U-235	< 1.5 pci/g	1.5 pci/g	11/22/94
U-238	6.78 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	7.81	1.20	0.228
U-235	0.402	0.239	0.226
U-238	6.78	1.08	0.184

AS 11/22/94

131772

Sample Id: 200013864 **Client No:** LV103-75UM

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Report Date Nov 28, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013865
Client Sample ID:	LV103-38UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013865 **Client No:** LV103-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.05 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	0.818 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.818 PCG +/- 0.0148 PCG (MDC= 3.39E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/29/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/29/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/29/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 0.132 +/- 0.0831 (MDC= 0.0841)
TH-230= 0.457 +/- 0.146 (MDC= 0.110)
TH-232= 0.0154 +/- 0.0218 (MDC= 0.0231)
AS 11/29/94

131772

Sample Id: 200013865 **Client No:** LV103-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	2.26 pci/g	1.5 pci/g	11/18/94
U-235	< 1.5 pci/g	1.5 pci/g	11/18/94
U-238	2.02 pci/g	1.5 pci/g	11/18/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	2.26	0.382	0.125
U-235	0.276	0.123	0.0394
U-238	2.02	0.353	0.0787

AS 11/18/94

13177

Sample Id: 200013865 **Client No:** LV103-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 1, 1994

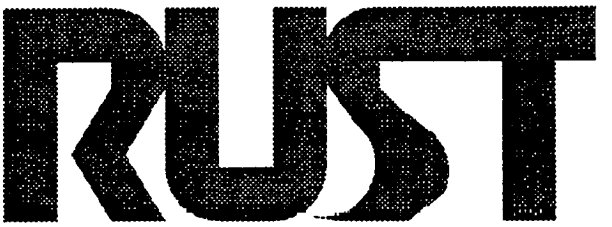
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013866
Client Sample ID:	LV103-0.7UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013866 **Client No:** LV103-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.90 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	4.11 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 4.11 PCG +/- 0.0221 PCG (MDC= 1.54E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/28/94
Th-230	3.31 pci/g	1.5 pci/g	11/28/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/28/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 0.156 +/- 0.110 (MDC= 0.122)
TH-230= 3.31 +/- 0.505 (MDC= 0.104)
TH-232= 0.0438 +/- 0.0362 (MDC= 0.0219)
AS 11/28/94

/31772

Sample Id: 200013866 **Client No:** LV103-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	8.27 pci/g	1.5 pci/g	11/22/94
U-235	< 1.5 pci/g	1.5 pci/g	11/22/94
U-238	8.48 pci/g	1.5 pci/g	11/22/94

COMMENTS:

ISOTOPE	CONC(PCG)	ERROR(PCG)	MDC(PCG)
U-234	8.27	0.930	0.0314
U-235	0.447	0.107	0.0158
U-238	8.48	0.952	0.0315

AS 11/22/94

131772

Sample Id: 200013866 **Client No:** LV103-0.7UM

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Report Date Dec 1, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

RUST

Final Analytical Report

CTC Sample ID:	200013867
Client Sample ID:	LV103-FILTRATE
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	LIQUID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013867 **Client No:** LV103-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - LIQUID	Result	PQL	Date
Radium 226, As Ra-226	0.656 pci/l	.5 pci/l	11/21/94

COMMENTS:

RA-226= 0.656 PCL +/- 0.0526 PCL (MDC= 0.0429 PCL)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SRS	Result	PQL	Date
Th-228	< 1 pci/l	1 pci/l	11/28/94
Th-230	5.79 pci/l	1 pci/l	11/28/94
Th-232	< 1 pci/l	1 pci/l	11/28/94

COMMENTS:

ALL UNITS IN PCI/L.

TH-228= -0.772 +/- 2.98 (MDC= 4.06)
TH-230= 5.79 +/- 2.22 (MDC= 1.66)
TH-232= 0.758 +/- 0.683 (MDC= 0.455)
AS 11/28/94

131772

Sample Id: 200013867 **Client No:** LV103-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - LIQUID	Result	PQL	Date
U-234	22.1 pci/l	1 pci/l	11/22/94
U-235	< 1 pci/l	1 pci/l	11/22/94
U-238	21.1 pci/l	1 pci/l	11/22/94

COMMENTS:

ISOTOPE	CONC(PCL)	ERROR(PCL)	MDC(PCL)
U-234	22.1	2.67	0.0766
U-235	0.978	0.365	0.0947
U-238	21.1	2.57	0.0768

AS 11/22/94

131772

Sample Id: 200013867 **Client No:** LV103-FILTRATE

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Report Date Dec 1, 1994

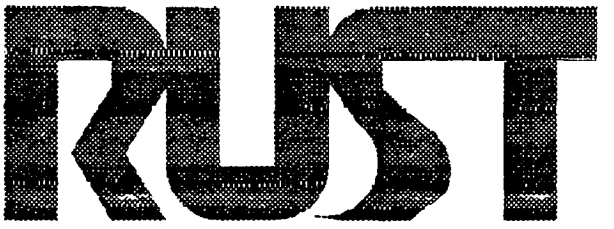
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013868
Client Sample ID:	LV103-RAW
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	01-NOV-94
Date Sampled:	01-NOV-94

131772

Sample Id: 200013868 **Client No:** LV103-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Percent Moisture	13.9 pct	11/03/94
Bulk Density	0.95 g/cc	11/03/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	< .1 pci/g	.1 pci/g	11/21/94

COMMENTS:

RA-226= 0.0592 PCG +/- 3.51E-3 PCG (MDC= 2.31E-3 PCG)
AS 11/21/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	11/29/94
Th-230	< 1.5 pci/g	1.5 pci/g	11/29/94
Th-232	< 1.5 pci/g	1.5 pci/g	11/29/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= -0.0278 +/- 0.141 (MDC= 0.219)
TH-230= 1.44 +/- 0.371 (MDC= 0.169)
TH-232= 0.0154 +/- 0.0309 (MDC= 0.0463)
AS 11/29/94

131772

Sample Id: 200013868 **Client No:** LV103-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	5.14 pci/g	1.5 pci/g	11/28/94
U-235	< 1.5 pci/g	1.5 pci/g	11/28/94
U-238	5.19 pci/g	1.5 pci/g	11/28/94

COMMENTS:

ALL UNITS IN PCI/G

U-233/234= 5.14 +/- 0.581 (MDC= 0.0482)
U-235= 0.290 +/- 0.0879 (MDC= 0.0181)
U-238= 5.19 +/- 0.586 (MDC= 0.0147)
AS 11/28/94

131772

Sample Id: 200013868 **Client No:** LV103-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 1, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013913
Client Sample ID:	LV302-RAW
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013913 **Client No:** LV302-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Percent Moisture	13.84 pct	11/22/94
Bulk Density	0.82 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	5.55 pci/g	.1 pci/g	12/13/94

COMMENTS:

RA-226= 5.55 PCG +/- 0.0298 PCG (MDC= 3.36E-3 PCG)
AS 12/13/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	53.9 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH228 -0.0854 +/- 0.151 MDC 0.280
TH230 53.9 +/- 7.19 MDC 0.334
TH232 0.0131 +/- 0.0263 MDC 0.0394
AS 12/1/94

131772

Sample Id: 200013913 **Client No:** LV302-RAW

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	7.21 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	6.84 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 7.21 +/- 0.757 MDC=0.0126
U235 0.365 +/- 0.0935 MDC=0.0156
U238 6.84 +/- 0.722 MDC=0.0127
rws 11/30/94

Clemson Technical Center

CHAIN-OF-CUSTODY RECORD

Clemson Research Park
Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

Client SAIC

Location CTC

Project/Number FUSRAP / 26427

Sample Type(s) HQ/SOL

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 125ml HDPE BOTTLE	125ml HDPE BOTTLE	1 LITER HDPE BOTTLE						TOTAL	REMARKS
LV302-6300um	11-8-94 0910	13905	1								1	
LV302-2000um		13906	1								1	
LV302-500um		13907	1								1	
LV302-150um		13908	1								1	
LV302-75um		13909	1								1	
LV302-38um		13910		1							1	
LV302-0.7um		13911		1							1	
LV302-FILTRATE		13912			1						1	
LV302-RAW		13913		1							1	
												Sub. 4102

Total No. of Containers 9

Sampled By Dennis Wolfe

Relinquished by: Dennis Wolfe Organization: CTC
Date: 11/8/94 Time: 1000

Received by: [signature] Organization: CTC
Date: 11/8/94 Time: 1500

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

11/10/94

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013914
Client Sample ID:	HS101-6300UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013914 **Client No:** HS101-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	1.03 pci/g	.1 pci/g	12/13/94

COMMENTS:

RA-226= 1.03 PCG +/- 0.0343 PCG (MDC= 0.0211 PCG)
AS 12/13/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/02/94
Th-230	11.8 pci/g	1.5 pci/g	12/02/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/02/94

COMMENTS:

All units are pCi/g
Th228 0.133 +/- 0.807 MDC 1.20
Th230 11.8 +/- 1.99 MDC 0.430
Th232 0.0894 +/- 0.336 MDC 0.551
rws 12/2/94

131772

Sample Id: 200013914 **Client No:** HS101-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	2.95 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	2.59 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 2.95 +/- 0.574 MDC=0.0651
U235 0.215 +/- 0.153 MDC=0.0805
U238 2.59 +/- 0.530 MDC=0.0652
rws 11/30/94

13172

Sample Id: 200013914 **Client No:** HS101-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 15, 1994

Lab Manager

131772

Sample Id: 200013916 **Client No:** HS101-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.73 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	21.8 pci/g	.1 pci/g	12/13/94

COMMENTS:

RA-226= 21.8 PCG +/- 0.151 PCG (MDC= 0.0219 PCG)
AS 12/13/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/02/94
Th-230	541 pci/g	1.5 pci/g	12/02/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/02/94

COMMENTS:

All units are in pCi/g.
Th228 1.03 +/- 0.957 MDC 1.27
Th230 541 +/- 61.2 MDC 0.148
Th232 0.886 +/- 0.429 MDC 0.148
rws 12/2/94

131772

Sample Id: 200013916 **Client No:** HS101-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	24.5 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	24.6 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 24.5 +/- 2.95 MDC=0.228
U235 1.33 +/- 0.468 MDC=0.360
U238 24.6 +/- 2.95 MDC=0.229
rws 11/30/94

131772

Sample Id: 200013917 **Client No:** HS101-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	12.8 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	12.2 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 12.8 +/- 1.67 MDC=0.359
U235 0.725 +/- 0.288 MDC=0.0806
U238 12.2 +/- 1.60 MDC=0.197
rws 11/30/94

131772

Sample Id: 200013917 **Client No:** HS101-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

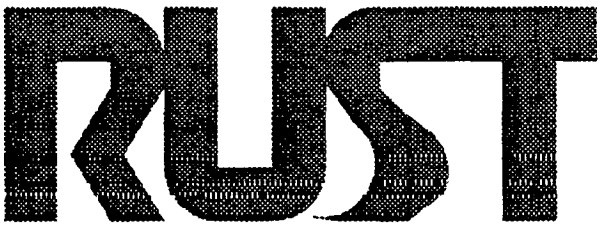
Report Date Dec 15, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013918
Client Sample ID:	HS101-75UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013918 **Client No:** HS101-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	15.1 pci/g	.1 pci/g	12/14/94

COMMENTS:

RA-226= 15.1 PCG +/- 0.127 PCG (MDC= 0.0241 PCG)
AS 12/14/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/02/94
Th-230	485 pci/g	1.5 pci/g	12/02/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/02/94

COMMENTS:

All units are in pCi/g.
Th-228 1.30 +/- 0.737 MDC=0.878
Th-230 485 +/- 47.9 MDC=0.657
Th-232 0.609 +/- 0.320 MDC=0.122
rws 12/2/94

131772

Sample Id: 200013918 **Client No:** HS101-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	16.8 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	17.4 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 16.8 +/- 2.44 MDC=0.588
U235 0.818 +/- 0.406 MDC=0.144
U238 17.4 +/- 2.49 MDC=0.117
rws 11/30/94

131712

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

RUST

Final Analytical Report

CTC Sample ID:	200013919
Client Sample ID:	HS101-38UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013919 **Client No:** HS101-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.26 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	1.78 pci/g	.1 pci/g	12/14/94

COMMENTS:

RA-226= 1.78 PCG +/- 0.0132 PCG (MDC= 2.24E-3 PCG)
AS 12/14/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/02/94
Th-230	2.63 pci/g	1.5 pci/g	12/02/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/02/94

COMMENTS:

All units are in pCi/g
Th-228 -0.0000927 +/- 0.103 MDC=0.163
Th-230 2.63 +/- 0.448 MDC=0.105
Th-232 0 +/- 0 MDC=0.0256
rws 12/2/94

131772

Sample Id: 200013919 **Client No:** HS101-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	1.62 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	1.89 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 1.62 +/- 0.212 MDC=0.0493
U235 0.0904 +/- 0.0412 MDC=0.0136
U238 1.89 +/- 0.236 MDC=0.0110
rws 11/30/94

131772

Sample Id: 200013919 **Client No:** HS101-38UM

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CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 20, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013920
Client Sample ID:	HS101-0.7UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013920 **Client No:** HS101-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.08 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	13.2 pci/g	.1 pci/g	12/14/94

COMMENTS:

RA-226= 13.2 PCG +/- 0.0368 PCG (MDC= 2.34E-3 PCG)
AS 12/14/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/02/94
Th-230	18.7 pci/g	1.5 pci/g	12/02/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/02/94

COMMENTS:

All units are in pCi/g
Th-228 0.151 +/- 0.116 MDC=0.147
Th-230 18.7 +/- 2.24 MDC=0.0692
Th-232 0.0577 +/- 0.0413 MDC=0.0216
rws 12/2/94

131772

Sample Id: 200013920 **Client No:** HS101-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	7.97 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	8.06 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 7.97 +/- 0.799 MDC=0.0444
U235 0.482 +/- 0.107 MDC=0.0430
U238 8.06 +/- 0.808 MDC=0.0116
rws 11/30/94

131772

Sample Id: 200013920 **Client No:** HS101-0.7UM

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Report Date Dec 20, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013921
Client Sample ID:	HS101-FILTRATE
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	LIQUID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013921 **Client No:** HS101-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - LIQUID	Result	PQL	Date
Radium 226, As Ra-226	< .5 pci/l	.5 pci/l	12/14/94

COMMENTS:

RA-226= 0.310 PCL +/- 0.0507 PCL (MDC= 0.0698 PCL)
AS 12/14/94

THORIUM ALPHA ISOTOPIC - SRS	Result	PQL	Date
Th-228	< 1 pci/l	1 pci/l	12/02/94
Th-230	24.5 pci/l	1 pci/l	12/19/94
Th-232	< 1 pci/l	1 pci/l	12/02/94

COMMENTS:

All units are in pCi/l.
Th-228 0.983 +/- 1.14 MDC=1.57
Th-230 24.5 +/- 5.07 MDC=2.02
Th-232 0.164 +/- 0.867 MDC=1.57
rws 12/2/94

131772

Sample Id: 200013921 **Client No:** HS101-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - LIQUID	Result	PQL	Date
U-234	51.2 pci/l	1 pci/l	11/30/94
U-235	4.10 pci/l	1 pci/l	11/30/94
U-238	46.3 pci/l	1 pci/l	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 51.2 +/- 7.01 MDC=2.06
U235 4.10 +/- 1.47 MDC=0.361
U238 46.3 +/- 6.39 MDC=0.883
rws 11/30/94

131772

Sample Id: 200013921 **Client No:** HS101-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 20, 1994

J. Wescott

Lab Manager

131772

Clemson Technical Center, INC.

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100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013922
Client Sample ID:	HS101-RAW
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

Clemson Technical Center

Clemson Research Park
Technology Drive
Anderson, SC 29625
(803) 646-2413
Fax # (803) 646-5311

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Client SAIC
Location CTC
Project/Number FUSRAP/ 26427
Sample Type(s) LIQUID + SOLID

SAMPLE IDENTITY	DATE SAMPLED/TIME	LIMS NUMBER	SAMPLE CONTAINER DESCRIPTION: 25ml HDPE Bottles	125ml HDPE Bottle	1 Liter HDPE Bottle						TOTAL	REMARKS
LV103-6300 um	11-1-94 @ 1100	13860	1								1	
LV103-2000 um		13861	1								1	
LV103-500 um		13862	1								1	
LV103-150 um		13863	1								1	
LV103-75um		13864	1								1	
LV103-38um		13865	1								1	
LV103-0.7um		13866	1								1	
LV103-FILTRATE		13867			1						1	
LV103-RAW		13868		1							1	
												336 - 453

Total No. of Containers 9

Sampled By Dennis Wheeler

Relinquished by: Dennis Wheeler Organization: CTC
Date: 11/1/94 Time: 1300

Received by: William Bost Organization: CTC
Date: 11/01/94 Time: 1300

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Relinquished by: _____ Organization: _____
Date: _____ Time: _____

Received by: _____ Organization: _____
Date: _____ Time: _____

Delivery Method: _____ (attach shipping bill, if any) Shipping Container ID _____

NOTE: All information concerning the date, time, analyst and method of analysis is recorded in bound log books at CTC and is available upon request.

11/1/94

131772
LV302

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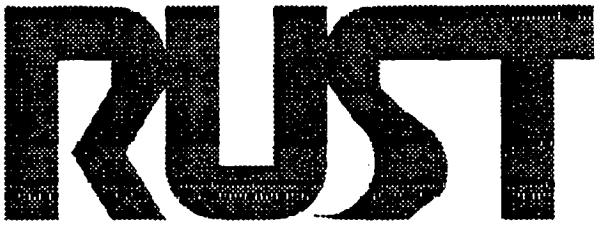
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013905
Client Sample ID:	LV302-6300UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013905 **Client No:** LV302-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	2.38 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 2.38 PCG +/- 0.0940 PCG (MDC= 0.0469 PCG)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	1.98 pci/g	1.5 pci/g	12/01/94
Th-230	78.0 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 1.98 +/- 3.09 (MDC= 4.84)
TH-230= 78.0 +/- 14.7 (MDC= 1.12)
TH-232= 1.11 +/- 1.29 (MDC= 1.11)
AS 12/1/94

131772

Sample Id: 200013905 **Client No:** LV302-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	3.79 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	3.65 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 3.79 +/- 1.45 MDC=1.03
U235 0.985 +/- 0.750 MDC=0.422
U238 3.65 +/- 1.34 MDC=0.342
rws 11/30/94

/31772

Sample Id: 200013905 **Client No:** LV302-6300UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

Report Date Dec 5, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013906
Client Sample ID:	LV302-2000UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013906 **Client No:** LV302-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.04 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	2.45 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 2.45 PCG +/- 0.0453 PCG (MDC= 0.0113 PCG)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	23.1 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= -0.493 +/- 0.633 (MDC= 1.18)
TH-230= 23.1 +/- 3.27 (MDC= 0.154)
TH-232= 0.125 +/- 0.260 (MDC= 0.450)
AS 12/1/94

131772

Sample Id: 200013906 **Client No:** LV302-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	4.14 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	3.69 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g
U3334 4.13 +/- 0.789 MDC=0.0811
U235 0.334 +/- 0.214 MDC=0.100
U238 3.69 +/- 0.734 MDC=0.0813
rws 11/30/94

131772

Sample Id: 200013906 **Client No:** LV302-2000UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

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Report Date Dec 5, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013907
Client Sample ID:	LV302-500UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013907 **Client No:** LV302-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.13 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	24.9 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 24.9 +/- 0.0933 PCG (MDC= 4.79E-3 PCG)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	487 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 0.212 +/- 0.203 (MDC= 0.287)
TH-230= 487 +/- 50.8 (MDC= 0.147)
TH-232= 0.450 +/- 0.179 (MDC= 0.0500)
AS 12/1/94

131772

Sample Id: 200013907 **Client No:** LV302-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	11.2 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	11.8 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All unots are in pCi/g.
U3334 11.2 +/- 1.18 MDC=0.0338
U235 0.590 +/- 0.197 MDC=0.126
U238 11.8 +/- 1.23 MDC=0.131
rws 11/30/94

131772

Sample Id: 200013907 **Client No:** LV302-500UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

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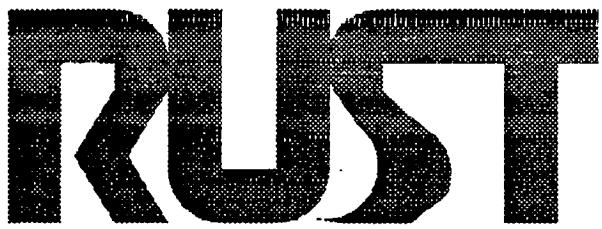
Report Date Dec 5, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013908
Client Sample ID:	LV302-150UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

13/772

Sample Id: 200013908 **Client No:** LV302-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.14 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	12.9 pci/g	.1 pci/g	11/29/94

COMMENTS:

RA-226= 12.9 PCG +/- 0.0509 PCG (MDC= 2.75E-3 PCG)
AS 11/29/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	148 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 0.0492 +/- 0.145 (MDC= 0.241)
TH-230= 148 +/- 17.9 (MDC= 0.0454)
TH-232= 0.0975 +/- 0.0982 (MDC= 0.133)
AS 12/1/94

131772

Sample Id: 200013908 **Client No:** LV302-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	8.67 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	9.04 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 8.67 +/- 0.904 MDC=0.0214
U235 0.378 +/- 0.120 MDC=0.0264
U238 9.04 +/- 0.936 MDC=0.0214
rws 11/30/94

131772

Sample Id: 200013908 **Client No:** LV302-150UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

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Report Date Dec 5, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625

Final Analytical Report

CTC Sample ID:	200013909
Client Sample ID:	LV302-75UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013909 **Client No:** LV302-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	0.64 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	81.2 pci/g	.1 pci/g	12/02/94

COMMENTS:

RA-226= 81.2 PCI/G +/- 0.258PCI/G (MDC= 0.0122 PCI/G)
AS 12/2/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	941 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH-228= 0.586 +/- 0.959 (MDC= 1.47)
TH-230= 941 +/- 109 (MDC= 1.01)
TH-232= 0.828 +/- 0.487 (MDC= 0.207)
AS 12/1/94

131772

Sample Id: 200013909 **Client No:** LV302-75UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	35.5 pci/g	1.5 pci/g	11/30/94
U-235	1.73 pci/g	1.5 pci/g	11/30/94
U-238	32.7 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 35.5 +/- 4.02 MDC=0.0955
U238 1.73 +/- 0.548 MDC=0.118
U238 32.7 +/- 3.75 MDC=0.289
rws 11/30/94

Sample Id: 200013909 **Client No:** LV302-75UM

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CERTIFICATION: Except as explicitly noted, all analytical data reported above were obtained under my direction and supervision. For Rust International, Inc. companies, sample preparation and analytical methods and analytical equipment specified or approved in the facility's waste analysis plan were used in conducting this analysis. This laboratory follows a quality assurance control program.

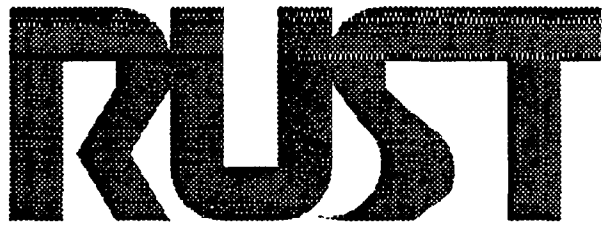
Report Date Dec 8, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013910
Client Sample ID:	LV302-38UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013910 **Client No:** LV302-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.04 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	2.87 pci/g	.1 pci/g	12/13/94

COMMENTS:

RA-226= 2.87 PCG +/- 0.0518 PCG (MDC= 0.0107 PCG)
AS 12/13/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	4.61 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH228 0.0181 +/- 0.0558 MDC 0.09420
TH230 4.61 +/- 0.654 MDC 0.132
TH232 0.0194 +/- 0.0225 MDC 0.0194
AS 12/1/94

131772

Sample Id: 200013910 **Client No:** LV302-38UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	2.46 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	2.38 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 2.46 +/- 0.297 MDC=0.0441
U238 0.125 +/- 0.0466 MDC=0.0121
U238 2.38 +/- 0.288 MDC=0.00984
rws 11/30/94

131772

Sample Id: 200013910 **Client No:** LV302-38UM

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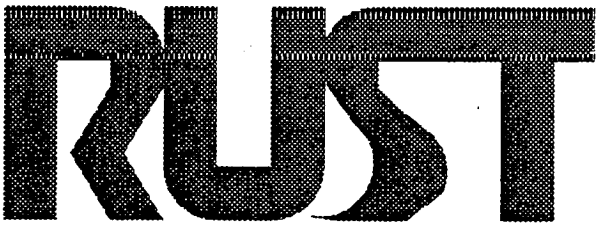
Report Date Dec 15, 1994

Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park
100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013911
Client Sample ID:	LV302-0.7UM
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	SOLID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

Sample Id: 200013911 **Client No:** LV302-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date
Bulk Density	1.01 g/cc	11/11/94

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - SOLID	Result	PQL	Date
Radium-226, As Ra-226	23.7 pci/g	.1 pci/g	12/13/94

COMMENTS:

RA-226= 23.7 PCG +/- 0.106 PCG (MDC= 5.47E-3 PCG)
AS 12/13/94

THORIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
Th-228	< 1.5 pci/g	1.5 pci/g	12/01/94
Th-230	54.4 pci/g	1.5 pci/g	12/01/94
Th-232	< 1.5 pci/g	1.5 pci/g	12/01/94

COMMENTS:

ALL UNITS IN PCI/G.

TH228 0.0249 +/- 0.112 MDC 0.186
TH230 54.4 +/- 6.16 MDC 0.176
TH232 0.0672 +/- 0.0513 MDC 0.0288
AS 12/1/94

131772

Sample Id: 200013911 **Client No:** LV302-0.7UM

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - SOLID	Result	PQL	Date
U-234	11.7 pci/g	1.5 pci/g	11/30/94
U-235	< 1.5 pci/g	1.5 pci/g	11/30/94
U-238	10.6 pci/g	1.5 pci/g	11/30/94

COMMENTS:

All units are in pCi/g.
U3334 11.7 +/- 1.20 MDC=0.0136
U235 0.430 +/- 0.106 MDC=0.0168
U238 10.6 +/- 1.10 MDC=0.0136
rws 11/30/94

131772

Sample Id: 200013911 **Client No:** LV302-0.7UM

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Report Date Dec 15, 1994

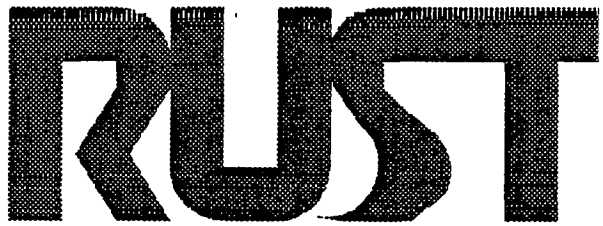
Lab Manager

131772

Clemson Technical Center, INC.

Clemson Research Park

100 Technology Drive, Anderson, SC 29625



Final Analytical Report

CTC Sample ID:	200013912
Client Sample ID:	LV302-FILTRATE
Project Name/ID:	26427
Client Name:	FUSRAP-TDD
Client Location:	ANDERSON, SC
Waste Type/Name:	LIQUID/RAD
Date Received:	08-NOV-94
Date Sampled:	08-NOV-94

131772

Sample Id: 200013912 **Client No:** LV302-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

FINGERPRINT	Result	Date

No FINGERPRINT Tests Requested

COMMENTS:

No FINGERPRINT Comments

WET CHEMISTRY	Result	Date

No WET CHEMISTRY Tests Requested

COMMENTS:

No WET CHEMISTRY Comments

SPECTROSCOPY	Result	Date

No SPECTROSCOPY Tests Requested

COMMENTS:

No SPECTROSCOPY Comments

RADIUM-226 - LIQUID	Result	PQL	Date
Radium 226, As Ra-226	6.11 pci/l	.5 pci/l	12/13/94

COMMENTS:

RA-226= 6.11 PCL +/- 0.145 PCL (MDC= 0.0670 PCL)
AS 12/13/94

THORIUM ALPHA ISOTOPIC - SRS	Result	PQL	Date
Th-228	< 1 pci/l	1 pci/l	12/01/94
Th-230	239 pci/l	1 pci/l	12/01/94
Th-232	< 1 pci/l	1 pci/l	12/01/94

COMMENTS:

ALL UNITS IN PCI/L.

TH228 -0.688 +/- 1.88 MDC 3.58
TH-230 239 +/- 30.9 MDC 3.04
TH-232 0.625 +/- 0.725 MDC 0.625
HIGH MDC DUE TO SMALL SAMPLE VOLUME.
AS 12/1/94

131772

Sample Id: 200013912 **Client No:** LV302-FILTRATE

This Report is intended for the use and benefit of Waste Management and its companies. No representation concerning significance of the reported data is made to any other person or entity.

URANIUM ALPHA ISOTOPIC - LIQUID	Result	PQL	Date
U-234	23.2 pci/l	1 pci/l	11/30/94
U-235	< 1 pci/l	1 pci/l	11/30/94
U-238	25.6 pci/l	1 pci/l	11/30/94

COMMENTS:

All units are in pCi/l.
U3334 23.2 +/- 3.51 MDC=0.926
U235 1.09 +/- 0.666 MDC=0.297
U238 25.6 +/- 3.74 MDC=0.241
rws 11/30/94

131772

Sample Id: 200013912 **Client No:** LV302-FILTRATE

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Report Date Dec 15, 1994

Lab Manager

Administrative Record for the Formerly Utilized Sites Remedial Action Program (FUSRAP) North St. Louis County Sites

St. Louis County, Missouri

US Army Corps of Engineers
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Site Management –
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Reference Documents

Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the St. Louis Site, Missouri

U.S. Department of Energy