



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2  
290 BROADWAY  
NEW YORK, NY 10007-1866

10/22/97  
40-7102

Michael Weber, Chief  
Fuel Cycle Licensing Branch  
Nuclear Regulatory Commission  
Washington, DC 20555-0001

Dear Mr. Weber:

This letter serves to transmit to the U.S. Nuclear Regulatory Commission (NRC) the preliminary analytical results of soil samples collected by the U.S. Environmental Protection Agency (EPA) from the Newfield Landfill (Landfill) during June 1997. It should be noted that the Landfill is located adjacent to the Shieldalloy Metallurgical Corporation (Shieldalloy) Superfund Site (Site) in the Borough of Newfield, Gloucester County, New Jersey. As you are aware, Shieldalloy is currently licensed by the NRC to possess and store uranium, thorium and their associated decay products at the Site. Further, Shieldalloy's operations have resulted in the storage of radioactive slag and baghouse dust at the Site adjacent to the Landfill.

The above-mentioned June 1997 soil sampling event was conducted by EPA in an attempt to clarify whether the Landfill had been impacted by contaminant migration from the Site. As part of this sampling event, soil samples were collected at the approximate locations displayed on Figure 1. The results of gamma, gross alpha and beta analyses of these samples have been attached. Furthermore, the gross alpha analytical results are summarized below:

Sample Number	Gross Alpha, pCi/g	Sample Number	Gross Alpha, pCi/g
1	508	6	22.3
2	335	7	14.0, 15.1
3	18.8	8	<6.36
4	23.4	9	10
5	8.13	10	<7.04

Normal gross alpha levels observed in natural soils in central New Jersey range from 5 to 20pCi/g with results usually falling within the upper end of this range. Based upon these findings, EPA has determined that soil samples 1 and 2, which were collected immediately adjacent to the Site fence line, exhibit radiological contamination well above background. Furthermore, EPA believes that this data

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displays probable radiological contamination in soil samples 3, 4 and 6, which were collected on a road which runs parallel to the Site fence line.

Due to the proximity of the Landfill to the Site, and the presence of elevated gross alpha levels in soil samples collected immediately adjacent to the Site, EPA believes that the radiological contamination at the Landfill may have originated from the Site. Please note that EPA is currently analyzing the above-referenced soil samples for specific radioisotopes, which should shed more light on the origin of the radiological contamination at the Landfill. Once available, the results of the isotopic analysis will be provided to the NRC.

EPA believes that it may be beneficial at this time for the agencies with regulatory authority over environmental and radiation matters at the Site to jointly discuss the implications of the attached sampling results. Therefore, EPA recommends that a conference call be scheduled between the appropriate representatives of the NRC, EPA and the New Jersey Department of Environmental Protection to discuss these sampling results.

If you have any questions regarding this matter or wish to schedule a conference call to discuss the attached sampling results, please have your staff contact Joseph Gowers, the EPA Project Manager for the Site, at (212) 637-4413.

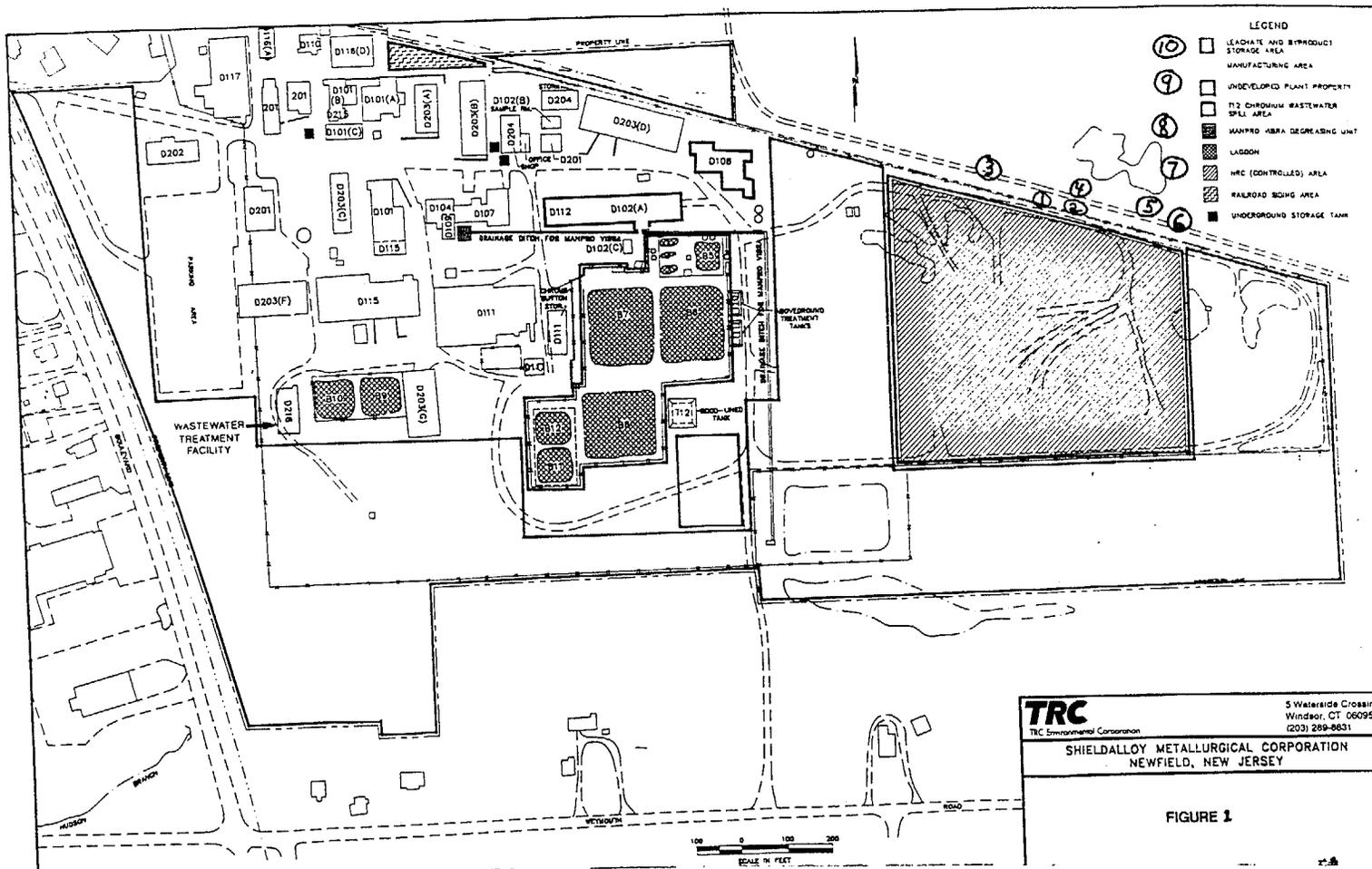
Sincerely yours,



Carole Petersen, Chief  
New Jersey Remediation Branch

Attachments

cc: H. Astwood, NRC  
B. Venner, NJDEP  
D. Gaffigan, NJDEP  
T. Amidon, NJDEP





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF RADIATION AND INDOOR AIR  
National Air and Radiation Environmental Laboratory  
540 South Morris Avenue, Montgomery, AL 36115-2601  
(334) 270-3400

September 10, 1997

**MEMORANDUM**

**SUBJECT:** Radioanalytical Results for  
Newfield Landfill Site  
Soil Samples

**FROM:** John Griggs, Chief *John Griggs*  
Monitoring and Analytical Services Branch

**TO:** Mark P. Winslow, Coordinator  
Radiation Health and Safety Program

Attached are the results of gamma and gross alpha and beta analyses on soil samples collected at Newfield Landfill Site. The samples constitute NAREL batch number 97-00121. The results of further analyses will be sent as they are completed.

Radiochemical analyses usually require the subtraction of an instrument background measurement for a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the results, please contact me at (334) 270-3450.

/ Attachments

cc: Paul Giardina, EPA/Region 2, w/o attachments  
Mary Clark, (6601J), w/o attachments  
Sam T. Windham, NAREL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

CASE NARRATIVE

GAMMA SPECTROMETRY RESULTS

Project Name: Newfield Landfill

NAREL Batch #: 97-00121

I. RECEIPT

A. Sample Information

<u>NAREL Sample ID</u>	<u>Client Sample ID</u>	<u>Sample Matrix</u>	<u>Date Collected</u>	<u>Date Received</u>	<u>Date Analyzed</u>
R2NL 97.05384	NF1	Soil	06/23/97	06/25/97	07/29/97
R2NL 97.05385	NF2	Soil	06/23/97	06/25/97	08/06/97
R2NL 97.05386	NF3	Soil	06/23/97	06/25/97	07/16/97
R2NL 97.05387	NF4	Soil	06/23/97	06/25/97	07/16/97
R2NL 97.05388	NF5	Soil	06/23/97	06/25/97	07/16/97
R2NL 97.05389	NF6	Soil	06/23/97	06/25/97	07/28/97
R2NL 97.05390	NF7	Soil	06/23/97	06/25/97	07/28/97
R2NL 97.05391	NF8	Soil	06/23/97	06/25/97	07/16/97
R2NL 97.05392	NF9	Soil	06/23/97	06/25/97	07/17/97
R2NL 97.05393	NF10	Soil	06/23/97	06/25/97	07/17/97

B. Documentation

Exceptions: No exceptions were encountered.

II. ANALYSIS

A. Holding Times: No limits on holding times were set.

B. Preparation  
Exceptions: No exceptions were encountered.

C. Analytical  
Exceptions: No exceptions were encountered.

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C PDR

D. General  
Information:

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

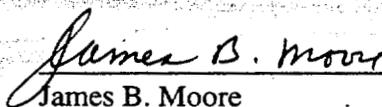
Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Th-234, Pa-234m, Ra-226, and U-235 are subject to greater possible error than other commonly reported radionuclides. It should be noted that this potential error is not included in the two-sigma counting error which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

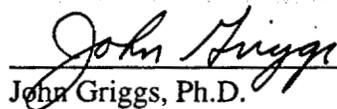
III. QUALITY CONTROL

All replicate analyses met NAREL QC criteria.

IV. I certify that this data package complies with the terms and conditions of the Quality Assurance Project Plan, both technically and for completeness, other than the exceptions detailed above. Release of the data contained in this package has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

  
James B. Moore  
Quality Assurance Coordinator

9/8/97  
Date

  
John Griggs, Ph.D.  
Chief, Monitoring  
and Analytical Services Branch

9/8/97  
Date

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name: Newfield Landfill Client Sample ID: NE1  
NAREL Sample #: R2NL 97.05384 NAREL Batch #: 97-00121  
 - Date Collected: 06/23/97 Wet weight: 280.5 g  
 Date Received: 06/25/97 Dry weight: 216.1 g  
 Date Analyzed: 07/29/97 Ash weight: 173.3 g  
 Method: EPA 901.1 Vol/Wt Prepared: 159.0 gdry  
 Matrix: Soil Activity units: pCi/gdry  
 Detector ID: GE11

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		1.30E+00
Be-7	8.06E-01	4.40E-01	
Bi-212	1.57E+01	5.12E-01	
Bi-214	6.46E+00	8.73E-02	
Co-60	ND		5.79E-02
Cs-137	6.59E-02	3.07E-02	
I-131	ND		1.06E+00
K-40	4.47E+00	3.51E-01	
Pa-234m*	5.15E+00	2.34E+00	
Pb-211	2.46E+00	7.33E-01	
Pb-212	1.65E+01	1.13E-01	
Pb-214	7.04E+00	8.24E-02	
Ra-223	2.48E-01	1.65E-01	
Ra-224	1.94E+01	9.27E-01	
Ra-226*	9.89E+00	8.21E-01	
Ra-228	1.60E+01	1.44E-01	
Rn-219	7.04E-01	2.07E-01	
Rn-220	2.81E+01	1.97E+01	
Th-228	1.10E+01	6.81E+00	
Th-234*	3.03E+00	5.14E-01	
Tl-208	5.26E+00	5.98E-02	
U-235*	3.27E-01	4.86E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF2</u>
NAREL Sample #:	<u>R2NL 97.05385</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>676.1 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>646.2 g</u>
Date Analyzed:	<u>08/06/97</u>	Ash weight:	<u>581.6 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>119.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE04</u>		

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		2.77E+00
Be-7	1.00E+00	4.57E-01	
Bi-212	1.13E+01	6.51E-01	
Bi-214	4.50E+00	1.08E-01	
Co-60	ND		8.43E-02
Cs-137	ND		8.94E-02
I-131	ND		2.78E+00
K-40	1.98E+00	4.61E-01	
Pa-234m*	3.66E+00	3.00E+00	
Pb-212	1.20E+01	1.19E-01	
Pb-214	5.01E+00	9.42E-02	
Ra-223	6.64E-01	2.18E-01	
Ra-224	1.09E+01	9.39E-01	
Ra-226*	2.05E+00	7.61E-01	
Ra-228	1.11E+01	1.78E-01	
Rn-219	8.85E-01	2.54E-01	
Th-228	8.59E+00	8.68E+00	
Th-234*	3.86E+00	6.06E-01	
Tl-208	3.75E+00	7.50E-02	
U-235*	4.49E-01	4.52E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NE3</u>
NAREL Sample #:	<u>R2NL 97.05386</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>1084.0 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>1083.4 g</u>
Date Analyzed:	<u>07/16/97</u>	Ash weight:	<u>1044.4 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>638.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE04</u>		

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		1.76E-01
Be-7	1.55E+00	1.15E-01	
Bi-212	4.61E-01	1.15E-01	
Bi-214	3.82E-01	2.34E-02	
Co-60	ND		1.85E-02
Cs-137	1.21E-02	7.38E-03	
I-131	ND		1.04E-01
K-40	1.34E+00	1.73E-01	
Pb-212	5.68E-01	2.29E-02	
Pb-214	4.29E-01	2.11E-02	
Ra-224	3.21E-01	1.84E-01	
Ra-226*	1.06E+00	2.49E-01	
Ra-228	5.35E-01	2.82E-02	
Tl-208	1.81E-01	1.15E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF4</u>
NAREL Sample #:	<u>R2NL 97.05387</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>904.0 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>903.4 g</u>
Date Analyzed:	<u>07/16/97</u>	Ash weight:	<u>885.3 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>633.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE05</u>		

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		1.86E-01
Be-7	1.04E+00	9.36E-02	
Bi-212	7.71E-01	1.03E-01	
Bi-214	5.58E-01	2.58E-02	
Co-60	ND		1.59E-02
Cs-137	1.25E-02	6.52E-03	
I-131	ND		1.10E-01
K-40	2.16E+00	1.50E-01	
Pa-234m*	9.33E-01	1.24E+00	
Pb-212	7.79E-01	2.55E-02	
Pb-214	6.22E-01	2.44E-02	
Ra-224	5.80E-01	2.05E-01	
Ra-226*	1.19E+00	2.84E-01	
Ra-228	6.72E-01	3.00E-02	
Th-234*	3.69E-01	1.98E-01	
Tl-208	2.42E-01	1.45E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF5</u>
NAREL Sample #:	<u>R2NL 97.05388</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>656.6 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>656.3 g</u>
Date Analyzed:	<u>07/16/97</u>	Ash weight:	<u>640.5 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>325.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE06</u>		

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		1.68E-01
Be-7	1.21E+00	9.30E-02	
Bi-212	4.11E-01	9.40E-02	
Bi-214	2.36E-01	2.54E-02	
Co-60	ND		1.52E-02
Cs-137	1.18E-02	6.36E-03	
I-131	ND		1.05E-01
K-40	1.31E+00	1.78E-01	
Pb-212	3.69E-01	2.85E-02	
Pb-214	2.74E-01	2.42E-02	
Ra-224	2.76E-01	2.35E-01	
Ra-226*	5.64E-01	2.58E-01	
Ra-228	3.65E-01	2.44E-02	
Tl-208	1.14E-01	1.32E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF6</u>
<u>NAREL</u> Sample #:	<u>R2NL 97.05389</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>510.0 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>509.6 g</u>
Date Analyzed:	<u>07/28/97</u>	Ash weight:	<u>484.1 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>288.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE06</u>		

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		4.71E-01
Be-7	7.26E-01	1.31E-01	
Bi-212	8.77E-01	1.39E-01	
Bi-214	5.76E-01	3.39E-02	
Co-60	ND		2.25E-02
Cs-137	4.90E-02	9.74E-03	
I-131	ND		3.90E-01
K-40	2.73E+00	2.28E-01	
Pb-212	9.99E-01	3.62E-02	
Pb-214	6.50E-01	3.08E-02	
Ra-223	5.97E-02	5.04E-02	
Ra-224	7.70E-01	3.19E-01	
Ra-226*	1.28E+00	3.21E-01	
Ra-228	9.10E-01	3.79E-02	
Tl-208	3.22E-01	1.76E-02	
U-235*	7.85E-02	1.91E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF7</u>
NAREL Sample #:	<u>R2NL 97.05390</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>655.5 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>655.1 g</u>
Date Analyzed:	<u>07/28/97</u>	Ash weight:	<u>639.4 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>359.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE05</u>		

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		3.08E-01
Be-7	1.16E+00	1.05E-01	
Bi-212	3.50E-01	1.09E-01	
Bi-214	2.95E-01	2.55E-02	
Co-60	ND		1.77E-02
Cs-137	3.38E-02	7.13E-03	
I-131	ND		2.70E-01
K-40	1.64E+00	1.69E-01	
Pb-212	4.12E-01	2.29E-02	
Pb-214	3.40E-01	2.27E-02	
Ra-224	2.72E-01	1.76E-01	
Ra-226*	6.48E-01	2.60E-01	
Ra-228	3.80E-01	2.77E-02	
Th-234*	2.83E-01	1.85E-01	
Tl-208	1.36E-01	1.44E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF7</u>
NAREL Sample #:	<u>R2NL 97.05390X</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>655.5 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>655.1 g</u>
Date Analyzed:	<u>07/17/97</u>	Ash weight:	<u>639.4 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>359.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE02</u>		

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		2.49E-01
Be-7	1.12E+00	1.21E-01	
Bi-212	4.07E-01	1.42E-01	
Bi-214	3.12E-01	3.41E-02	
Co-60	ND		2.33E-02
Cs-137	3.47E-02	9.52E-03	
I-131	ND		1.20E-01
K-40	1.63E+00	2.47E-01	
Pb-212	3.94E-01	2.70E-02	
Pb-214	3.32E-01	2.52E-02	
Ra-224	4.67E-01	2.16E-01	
Ra-226*	7.73E-01	2.70E-01	
Ra-228	3.82E-01	3.16E-02	
Th-234*	2.23E-01	1.91E-01	
Tl-208	1.37E-01	1.29E-02	
U-235*	5.20E-02	1.58E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF8</u>
NAREL Sample #:	<u>R2NL 97.05391</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>1204.2 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>1010.9 g</u>
Date Analyzed:	<u>07/16/97</u>	Ash weight:	<u>998.8 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>697.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE11</u>		

**Analytical Results**

Nuclide	Activity	2 $\sigma$ Uncertainty	MDC
Ba-140	ND		8.75E-02
Be-7	1.89E+00	7.09E-02	
Bi-212	2.21E-01	5.60E-02	
Bi-214	1.75E-01	1.28E-02	
Co-60	ND		8.41E-03
Cs-137	1.74E-02	3.88E-03	
I-131	ND		5.33E-02
K-40	9.44E-01	8.67E-02	
Pa-234m*	4.24E-01	3.42E-01	
Pb-212	1.84E-01	1.37E-02	
Pb-214	1.93E-01	1.27E-02	
Ra-224	1.11E-01	1.07E-01	
Ra-226*	3.95E-01	1.54E-01	
Ra-228	1.77E-01	1.45E-02	
Tl-208	5.74E-02	7.44E-03	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name: Newfield Landfill Client Sample ID: NF9  
 NAREL Sample #: R2NL 97.05392 NAREL Batch #: 97-00121  
 Date Collected: 06/23/97 Wet weight: 983.6 g  
 Date Received: 06/25/97 Dry weight: 983.6 g  
 Date Analyzed: 07/17/97 Ash weight: 956.0 g  
 Method: EPA 901.1 Vol/Wt Prepared: 644.0 gdry  
 Matrix: Soil Activity units: pCi/gdry  
 Detector ID: GE04

**Analytical Results**

Nuclide	Activity	2σ Uncertainty	MDC
Ba-140	ND		1.74E-01
Be-7	9.70E-01	9.32E-02	
Bi-212	3.08E-01	9.75E-02	
Bi-214	2.73E-01	2.07E-02	
Co-60	ND		1.46E-02
Cs-137	2.07E-02	7.17E-03	
I-131	ND		9.86E-02
K-40	2.38E+00	1.90E-01	
Pb-212	3.33E-01	1.94E-02	
Pb-214	3.05E-01	1.94E-02	
Ra-224	2.19E-01	1.76E-01	
Ra-226*	6.26E-01	2.19E-01	
Ra-228	2.95E-01	2.27E-02	
Th-234*	5.73E-01	1.54E-01	
Tl-208	1.08E-01	9.25E-03	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA SPECTROMETRY RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF10</u>
NAREL Sample #:	<u>R2NL 97.05393</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Wet weight:	<u>1011.6 g</u>
Date Received:	<u>06/25/97</u>	Dry weight:	<u>1010.7 g</u>
Date Analyzed:	<u>07/17/97</u>	Ash weight:	<u>980.4 g</u>
Method:	<u>EPA 901.1</u>	Vol/Wt Prepared:	<u>310.0 gdry</u>
Matrix:	<u>Soil</u>	Activity units:	<u>pCi/gdry</u>
Detector ID:	<u>GE03</u>		

**Analytical Results**

Nuclide	Activity	2 $\sigma$ Uncertainty	MDC
Ba-140	ND		1.86E-01
Be-7	1.39E+00	1.10E-01	
Bi-212	4.26E-01	1.09E-01	
Bi-214	3.11E-01	2.52E-02	
Co-60	ND		1.78E-02
Cs-137	2.57E-02	7.47E-03	
I-131	ND		1.11E-01
K-40	1.97E+00	1.93E-01	
Pb-212	3.79E-01	2.37E-02	
Pb-214	3.44E-01	2.46E-02	
Ra-224	3.92E-01	1.77E-01	
Ra-226*	8.26E-01	2.76E-01	
Ra-228	3.32E-01	2.84E-02	
Tl-208	1.05E-01	1.60E-02	
U-235*	5.29E-02	1.52E-02	

Notes: ND = Not Detected.

An asterisk (\*) indicates a nuclide for which the reported activity may be significantly over- or underestimated.

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GAMMA REPLICATE SUMMARY**

Project Name: Newfield Landfill Client Sample ID: NF7  
 NAREL Sample #: R2NL 97.05390X NAREL Batch #: 97-00121  
 Sample Date Analyzed: 07/28/97 Sample Detector ID: GE05  
 Repl. Date Analyzed: 07/17/97 Repl. Detector ID: GE02  
 Method: EPA 901.1 Activity Units: pCi/gdry  
 Matrix: Soil

Nuclide	Sample Activity	Sample 2σ Error	Replicate Activity	Replicate 2σ Error	RPD	Z Score
Be-7	1.16E+00	1.05E-01	1.12E+00	1.21E-01	3.51	0.35
Bi-212	3.50E-01	1.09E-01	4.07E-01	1.42E-01	15.06	0.61
Bi-214	2.95E-01	2.55E-02	3.12E-01	3.41E-02	5.60	0.56
Cs-137	3.38E-02	7.13E-03	3.47E-02	9.52E-03	2.63	0.14
K-40	1.64E+00	1.69E-01	1.63E+00	2.47E-01	0.61	0.05
Pb-212	4.12E-01	2.29E-02	3.94E-01	2.70E-02	4.47	0.54
Pb-214	3.40E-01	2.27E-02	3.32E-01	2.52E-02	2.38	0.27
Ra-224	2.72E-01	1.76E-01	4.67E-01	2.16E-01	52.77	1.38
Ra-228	3.80E-01	2.77E-02	3.82E-01	3.16E-02	0.52	0.06
Tl-208	1.36E-01	1.44E-02	1.37E-01	1.29E-02	0.73	0.07

Comments:

9710270135 971017  
 PDR ADOCK 04007102  
 C PDR

beta results should be used as gross approximations  
of the alpha and beta activity present.

III. QUALITY CONTROL

A. Replicate Results: All replicate analyses met NAREL QC criteria.

IV. I certify that this data package complies with the terms and conditions of the Quality Assurance Project Plan, both technically and for completeness, other than the exceptions detailed above. Release of the data contained in this package has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

James B. Moore 9/8/97  
James B. Moore Date  
Quality Assurance Coordinator

John Griggs 9/8/97  
John Griggs, Ph.D. Date  
Chief, Monitoring  
and Analytical Services Branch

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GROSS ALPHA AND BETA ANALYTICAL RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NE1</u>
NAREL Sample #:	<u>R2NL 97.05384</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Matrix:	<u>Soil</u>
Date Received:	<u>06/25/97</u>	Wet weight:	<u>280.5 g</u>
Date Analyzed:	<u>07/30/97</u>	Dry weight:	<u>216.1 g</u>
Analyst:	<u>ZW</u>	Ash weight:	<u>173.3 g</u>
Method:	<u>EERF 00-01</u>	Vol/Wt Prepared:	<u>0.1000 gash</u>
Detector ID:	<u>T2A1</u>	Activity units:	<u>pCi/gdry</u>

**Analytical Results**

Analysis	Activity	2σ Uncertainty	MDC
Gross α	5.08E+02	± 3.34E+01	4.61E+00
Gross β	2.17E+02	± 9.62E+00	7.31E+00

**QA/QC Reference Samples**

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GROSS ALPHA AND BETA ANALYTICAL RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF2</u>
NAREL Sample #:	<u>R2NL 97.05385</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Matrix:	<u>Soil</u>
Date Received:	<u>06/25/97</u>	Wet weight:	<u>676.1 g</u>
Date Analyzed:	<u>07/30/97</u>	Dry weight:	<u>646.2 g</u>
Analyst:	<u>ZW</u>	Ash weight:	<u>581.6 g</u>
Method:	<u>EERF 00-01</u>	Vol/Wt Prepared:	<u>0.1000 gash</u>
Detector ID:	<u>T2A2</u>	Activity units:	<u>pCi/gdry</u>

**Analytical Results**

Analysis	Activity	2σ Uncertainty	MDC
Gross α	3.35E+02	± 3.02E+01	6.22E+00
Gross β	1.08E+02	± 7.68E+00	6.73E+00

**QA/QC Reference Samples**

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GROSS ALPHA AND BETA ANALYTICAL RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF3</u>
NAREL Sample #:	<u>R2NL 97.05386</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Matrix:	<u>Soil</u>
Date Received:	<u>06/25/97</u>	Wet weight:	<u>1084.0 g</u>
Date Analyzed:	<u>07/30/97</u>	Dry weight:	<u>1083.4 g</u>
Analyst:	<u>ZW</u>	Ash weight:	<u>1044.4 g</u>
Method:	<u>EERF 00-01</u>	Vol/Wt Prepared:	<u>0.1000 gash</u>
Detector ID:	<u>T2A3</u>	Activity units:	<u>pCi/gdry</u>

**Analytical Results**

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	1.88E+01	$\pm 7.51E+00$	5.49E+00
Gross $\beta$	9.59E+00	$\pm 3.03E+00$	4.03E+00

**QA/QC Reference Samples**

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GROSS ALPHA AND BETA ANALYTICAL RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF4</u>
NAREL Sample #:	<u>R2NL 97.05387</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Matrix:	<u>Soil</u>
Date Received:	<u>06/25/97</u>	Wet weight:	<u>904.0 g</u>
Date Analyzed:	<u>07/30/97</u>	Dry weight:	<u>903.4 g</u>
Analyst:	<u>ZW</u>	Ash weight:	<u>885.3 g</u>
Method:	<u>EERF 00-01</u>	Vol/Wt Prepared:	<u>0.1000 gash</u>
Detector ID:	<u>T2A4</u>	Activity units:	<u>pCi/gdry</u>

**Analytical Results**

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	2.34E+01	$\pm$ 9.68E+00	1.05E+01
Gross $\beta$	6.93E+00	$\pm$ 2.92E+00	4.18E+00

**QA/QC Reference Samples**

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

GROSS ALPHA AND BETA ANALYTICAL RESULTS

Project Name: Newfield Landfill Client Sample ID: NF5  
NAREL Sample #: R2NL 97.05388 NAREL Batch #: 97-00121  
Date Collected: 06/23/97 Matrix: Soil  
Date Received: 06/25/97 Wet weight: 656.6 g  
Date Analyzed: 07/30/97 Dry weight: 656.3 g  
Analyst: ZW Ash weight: 640.5 g  
Method: EERF 00-01 Vol/Wt Prepared: 0.1000 gash  
Detector ID: T2B1 Activity units: pCi/gdry

Analytical Results

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	8.13E+00	$\pm$ 5.19E+00	5.98E+00
Gross $\beta$	3.53E+00	$\pm$ 2.35E+00	3.63E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GROSS ALPHA AND BETA ANALYTICAL RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF6</u>
NAREL Sample #:	<u>R2NL 97.05389</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Matrix:	<u>Soil</u>
Date Received:	<u>06/25/97</u>	Wet weight:	<u>510.0 g</u>
Date Analyzed:	<u>07/30/97</u>	Dry weight:	<u>509.6 g</u>
Analyst:	<u>ZW</u>	Ash weight:	<u>484.1 g</u>
Method:	<u>EERF 00-01</u>	Vol/Wt Prepared:	<u>0.1000 gash</u>
Detector ID:	<u>T2B2</u>	Activity units:	<u>pCi/gdry</u>

**Analytical Results**

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	2.23E+01	$\pm$ 8.01E+00	6.55E+00
Gross $\beta$	9.18E+00	$\pm$ 2.83E+00	3.72E+00

**QA/QC Reference Samples**

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GROSS ALPHA AND BETA ANALYTICAL RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF7</u>
<u>NAREL Sample #:</u>	<u>R2NL 97.05390</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Matrix:	<u>Soil</u>
Date Received:	<u>06/25/97</u>	Wet weight:	<u>655.5 g</u>
Date Analyzed:	<u>07/30/97</u>	Dry weight:	<u>655.1 g</u>
Analyst:	<u>ZW</u>	Ash weight:	<u>639.4 g</u>
Method:	<u>EERF 00-01</u>	Vol/Wt Prepared:	<u>0.1000 gash</u>
Detector ID:	<u>T2B3</u>	Activity units:	<u>pCi/gdry</u>

**Analytical Results**

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	1.40E+01	$\pm$ 6.68E+00	5.53E+00
Gross $\beta$	4.16E+00	$\pm$ 2.60E+00	3.98E+00

**QA/QC Reference Samples**

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments: \_\_\_\_\_

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

GROSS ALPHA AND BETA ANALYTICAL RESULTS

Project Name: Newfield Landfill Client Sample ID: NE7  
NAREL Sample #: R2NL 97.05390X NAREL Batch #: 97-00121  
Date Collected: 06/23/97 Matrix: Soil  
Date Received: 06/25/97 Wet weight: 655.5 g  
Date Analyzed: 07/30/97 Dry weight: 655.1 g  
Analyst: ZW Ash weight: 639.4 g  
Method: EERF 00-01 Vol/Wt Prepared: 0.1000 gash  
Detector ID: T2B4 Activity units: pCi/gdry

Analytical Results

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	1.51E+01	$\pm$ 7.11E+00	6.20E+00
Gross $\beta$	5.64E+00	$\pm$ 2.74E+00	4.04E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GROSS ALPHA AND BETA ANALYTICAL RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF8</u>
NAREL Sample #:	<u>R2NL 97.05391</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Matrix:	<u>Soil</u>
Date Received:	<u>06/25/97</u>	Wet weight:	<u>1204.2 g</u>
Date Analyzed:	<u>07/30/97</u>	Dry weight:	<u>1010.9 g</u>
Analyst:	<u>ZW</u>	Ash weight:	<u>998.8 g</u>
Method:	<u>EERF 00-01</u>	Vol/Wt Prepared:	<u>0.1000 gash</u>
Detector ID:	<u>T1A1</u>	Activity units:	<u>pCi/gdry</u>

**Analytical Results**

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	2.76E+00	$\pm$ 3.79E+00	6.36E+00
Gross $\beta$	3.91E+00	$\pm$ 2.47E+00	3.77E+00

**QA/QC Reference Samples**

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**GROSS ALPHA AND BETA ANALYTICAL RESULTS**

Project Name:	<u>Newfield Landfill</u>	Client Sample ID:	<u>NF9</u>
NAREL Sample #:	<u>R2NL 97.05392</u>	NAREL Batch #:	<u>97-00121</u>
Date Collected:	<u>06/23/97</u>	Matrix:	<u>Soil</u>
Date Received:	<u>06/25/97</u>	Wet weight:	<u>983.6 g</u>
Date Analyzed:	<u>07/30/97</u>	Dry weight:	<u>983.6 g</u>
Analyst:	<u>ZW</u>	Ash weight:	<u>956.0 g</u>
Method:	<u>EERF 00-01</u>	Vol/Wt Prepared:	<u>0.1000 gash</u>
Detector ID:	<u>T1A3</u>	Activity units:	<u>pCi/gdry</u>

**Analytical Results**

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	1.00E+01	$\pm$ 6.24E+00	7.13E+00
Gross $\beta$	4.69E+00	$\pm$ 2.71E+00	4.11E+00

**QA/QC Reference Samples**

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments: \_\_\_\_\_

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

GROSS ALPHA AND BETA ANALYTICAL RESULTS

Project Name: Newfield Landfill Client Sample ID: NF10  
NAREL Sample #: R2NL 97.05393 NAREL Batch #: 97-00121  
Date Collected: 06/23/97 Matrix: Soil  
Date Received: 06/25/97 Wet weight: 1011.6 g  
Date Analyzed: 07/30/97 Dry weight: 1010.7 g  
Analyst: ZW Ash weight: 980.4 g  
Method: EERF 00-01 Vol/Wt Prepared: 0.1000 gash  
Detector ID: T1A4 Activity units: pCi/gdry

Analytical Results

Analysis	Activity	2 $\sigma$ Uncertainty	MDC
Gross $\alpha$	2.43E+00	$\pm$ 3.98E+00	7.04E+00
Gross $\beta$	3.89E+00	$\pm$ 2.58E+00	3.99E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Replicate 1	R2NL 97.05390X
Replicate 2	

Comments:



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

GROSS ALPHA/BETA REPLICATE SUMMARY

Project Name: Newfield Landfill Client Sample ID: NF7  
NAREL Sample #: R2NL 97.05390X NAREL Batch #: 97-00121  
Sample Date Analyzed: 07/30/97 Sample Detector ID: T2B3  
Repl. Date Analyzed: 07/30/97 Repl. Detector ID: T2B4  
Analyst: ZW Matrix: Soil  
Method: EERF 00-01 Activity Units: pCi/gdry

Analysis	Sample Activity	Sample 2 $\sigma$ Error	Replicate Activity	Replicate 2 $\sigma$ Error	RPD	Z Score
Gross $\alpha$	1.40E+01	$\pm 6.68E+00$	1.51E+01	$\pm 7.11E+00$	8.05	0.20
Gross $\beta$	4.16E+00	$\pm 2.60E+00$	5.64E+00	$\pm 2.74E+00$	30.28	0.77

Comments: