ENVIRONMENTAL
PROJECT CONTROL

63 Great Road
Maynard
Massachusetts
01754

TEL: 978-897-0033
FAX: 978-897-8578

Via Overnight Mail

February 11, 2000

Anna Krasko
Office of Site Remediation & Restoration
Region I—New England
U. S. Environmental Protection Agency
1 Congress Street, Suite 1100-HBO
Boston, Massachusetts 02114-2023

RE: West Trench Waste Characterization Data
Picillo Farm Site, Coventry Rhode Island
EPC Reference No.: 30.02/msg.1088B

Dear Anna,

On behalf of the PRP Group, and in accordance with Paragraph 26 of the Consent Decree, this letter submits the enclosed waste characterization report prepared by Gradient.

If you have questions regarding this submittal, we can discuss them during the next regularly scheduled weekly project status call. If your need is time sensitive, call at your convenience.

Sincerely,

Michael S. Gitten, P.E.
Project Coordinator

Enclosures

Cc: Laurie Grandchamp (RIDEM)

ENVIRONMENTAL
PROJECT CONTROL

By mail

bcc: David Anderson (Ashland Chemical)
Charles M. Brown (Cytec Industries)
Perry C. Howard (American Home Products Co.)
Edward Kolodziej (General Electric Co.)
Stephen W. Leermakers (Ashland Chemical)
D. Michael Light (Solutia)
Perry Russo (GAF)
Margaret Tribble (American Home Products)
Celeste Wills (GAF)
Eric Berry (Thompson Coburn)
David B. Graham (Baker & Hostetler)
Barry S. Neuman (Shaw Pittman)
David Rifkind (General Electric)

Paul Mazurkiewicz (OBG)
Craig Lizotte (Envirogen)
Peter Nangeroni (ESS)
Cheryl Warren (URS Greiner Woodward-Clyde)
Dallas Wait (Gradient)

Gradient
CORPORATION

February 11, 2000

Mr. Michael Gitten
Environmental Project Control
63 Great Road
Maynard, MA 01754

Re: Waste Characterization
Picillo Pig Farm Superfund Site
Coventry, Rhode Island

Dear Mr. Gitten:

Please pass this letter to the United States Environmental Protection Agency (USEPA) on behalf of the Picillo Farm Potentially Responsible Party (PRP) Group regarding waste characterization.

During August of 1999, trench excavation activities in the west leg of the Northwest Trench at the Picillo Farm Site unearthed an area containing an unanticipated product resembling a "sausage like" material with the consistency of a "hardened epoxy". Information regarding the nature, extent and management approach for this area is detailed in a field memo (FM-031) prepared by Envirogen, dated September 2, 1999.

At the time the area containing this material was discovered, Envirogen obtained analytical services from O'Brien & Gere Laboratories, Inc. (OBG), located in Syracuse, New York, to initiate chemical characterization of the material. A soil and product sample were analyzed, in part, for volatile organic compounds using EPA Method 8260. The product sample was also analyzed for semivolatile organics by EPA Method 8270 (subcontracted to Life Sciences Laboratories, East Syracuse, NY). Results of the volatile organic analysis of the product sample indicate the presence of part per million (ppm) concentrations of halogenated solvents (methylene chloride, chloroform, 1,1,1-trichloroethane, trichloroethene, tetrachlorethene, and 1,2-dichlorobenzene) and aromatic solvents (benzene, ethyl benzene, xylene, and 1,2,4-trimethlylbenzene). In addition, part per thousand (ppt) concentrations of the aromatic volatile compounds toluene and styrene were also present. Semivolatile organic data indicates ppm levels of phenol are also present in the product sample. The unvalidated data report is attached to Envirogen's field memo, dated September 2, 1999.

Additional Testing

Following discussions with EPC regarding a more rigorous analysis of the material, Gradient recommended that additional materials characterization be performed to aid with the development of a management approach. On October 12, 1999 Envirogen dug and collected representative product material from soil in the west leg of the Northwest Trench. Sample collection was observed by Dallas Wait of Gradient. Gradient retained Analytical Answers, located in Woburn, Massachusetts, to conduct the materials testing. Specifically, the following testing was performed on a product sample collected at the Picillo site:

238 Main Street, Cambridge, MA 02142 • (617) 395-5000 • fax: (617) 395-5001 • www.gradientcorp.com

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- Base polymer characterization using micro-Fourier Transform Infrared Spectroscopy (FTIR)
- Total Solids (filler) analysis by gravimetric ashing
- Filler identification (size, shape, and qualitative distribution) by Scanning Electron Microscopy (SEM) and Energy Dispensive X-ray Spectroscopy (EDS)

The results of the testing, dated October 26, 1999 (Report No. 38001), are attached to this report.

Results of Material Testing

The gravimetric ashing procedure indicated that about 76 weight percent of the product consists of noncombustible matter. SEM/EDS analysis of the ashed residue suggest that the predominant constituent is calcium carbonate.

In an attempt to characterize the remaining 24 weight percent "volatile" constituents, both bulk product samples and solvent (dichloromethane) extracted product samples were analyzed by micro-FTIR. The infrared absorption spectra of the "volatile" organic fraction of the product indicates the presence of diallyl phthalate (DAP) resin. Analytical Answers used a library of approximately 20,000 spectra as a resource for spectral matching.

If you have any questions about this data report, please do not hesitate to contact me.

Sincerely,

GRADIENT CORPORATION

A. Dallas Wait, Ph.D.
Principal
Environmental Chemistry

Attachments

Analytical Answers, Inc.
The information you need...when you need it ®

October 26, 1999

Mr. Dallas Wait
Gradient Corporation
44 Brattle Street
Cambridge, MA 02138

Report No: 38001 **P.O. No:** Project 799744

PURPOSE OF ANALYSIS:

Characterization of the polymer and inorganic fillers in a white polymer "rope".

SAMPLES:

One (1) one-gallon size metal can, bearing custody seal 52199. Within the metal can, two (2) clear glass screw cap jars both identified as "solid waste, west leg of northwest trench", and sampled at "345" and "350" [sic] respectively.

Material from the "350" jar was analyzed.

METHOD OF ANALYSIS:

Gravimetric Ashing
Scanning Electron Microscopy (SEM)
Energy Dispersive X-Ray Spectroscopy (EDS)
Micro-Fourier Transform Infrared Spectroscopy (FTIR)

CONCLUSIONS:

The sample contains 76.0 weight percent noncombustible matter ("ash").

The elemental analysis, the FTIR analysis, and morphological observations, suggest that the bulk of the sample is crushed calcium carbonate.

Traces (estimated few percent or less) of common minerals are also present. Contamination with natural soil materials is possible.

FTIR analyses also indicate that diallyl phthalate (DAP) resin is present in the sample. The DAP was extracted from the bulk material with dichloromethane solvent.

RECOMMENDATIONS:

Broad mineral identifications such as calcium carbonate are based on combined morphological and elemental analyses. If confirmation and more specific identifications are needed, polarized light microscopy and/or X-ray diffraction (XRD) analyses are recommended.

RESULTS:

General:

Both glass jars were opened and visually inspected. The material in both is visually similar, consisting mostly of elongate lumps of white to slightly gray, solid, firm textured material. Probing with a small spatula revealed this material would split with an "earthy" fracture, and some crumbling, but no dust. A similar "chemical" odor was noted in both jars. Selection of jar "350" was arbitrary. Portions of the light colored material were removed from several of the larger lumps, taking care to exclude as much dark soil and other recognizably dissimilar matter as possible.

Gravimetric Analysis:

A weighed quantity of sample material was ashed in an open porcelain crucible. When heated, the lumps of sample material darkened to a brown-black color and emitted white smoke, but showed no tendency to melt or flow. Heating was continued until the lumps had lost their dark color. The lumps were broken up with a spatula, to confirm that no incompletely ashed matter was concealed, then cooled and weighed.

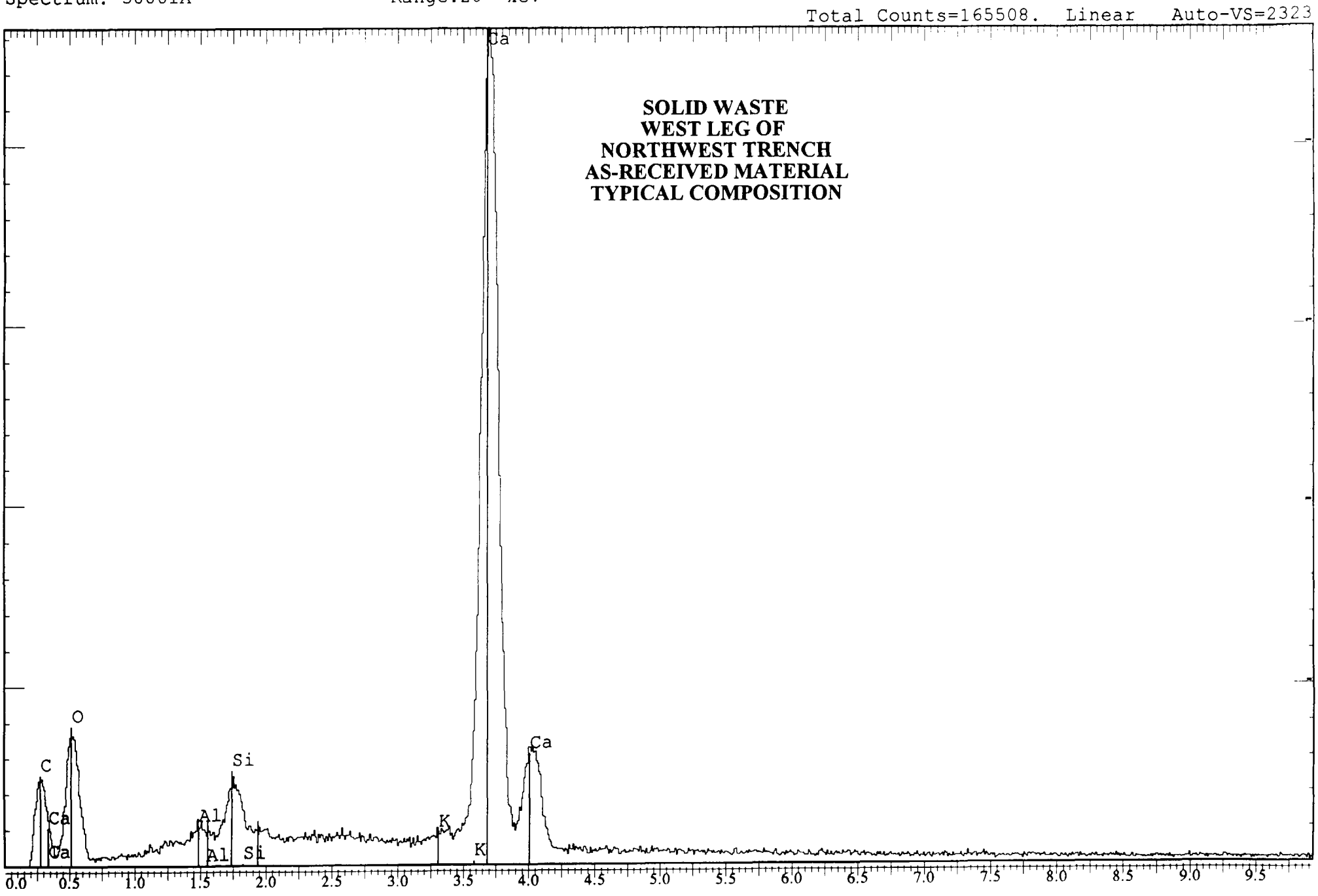
We find:

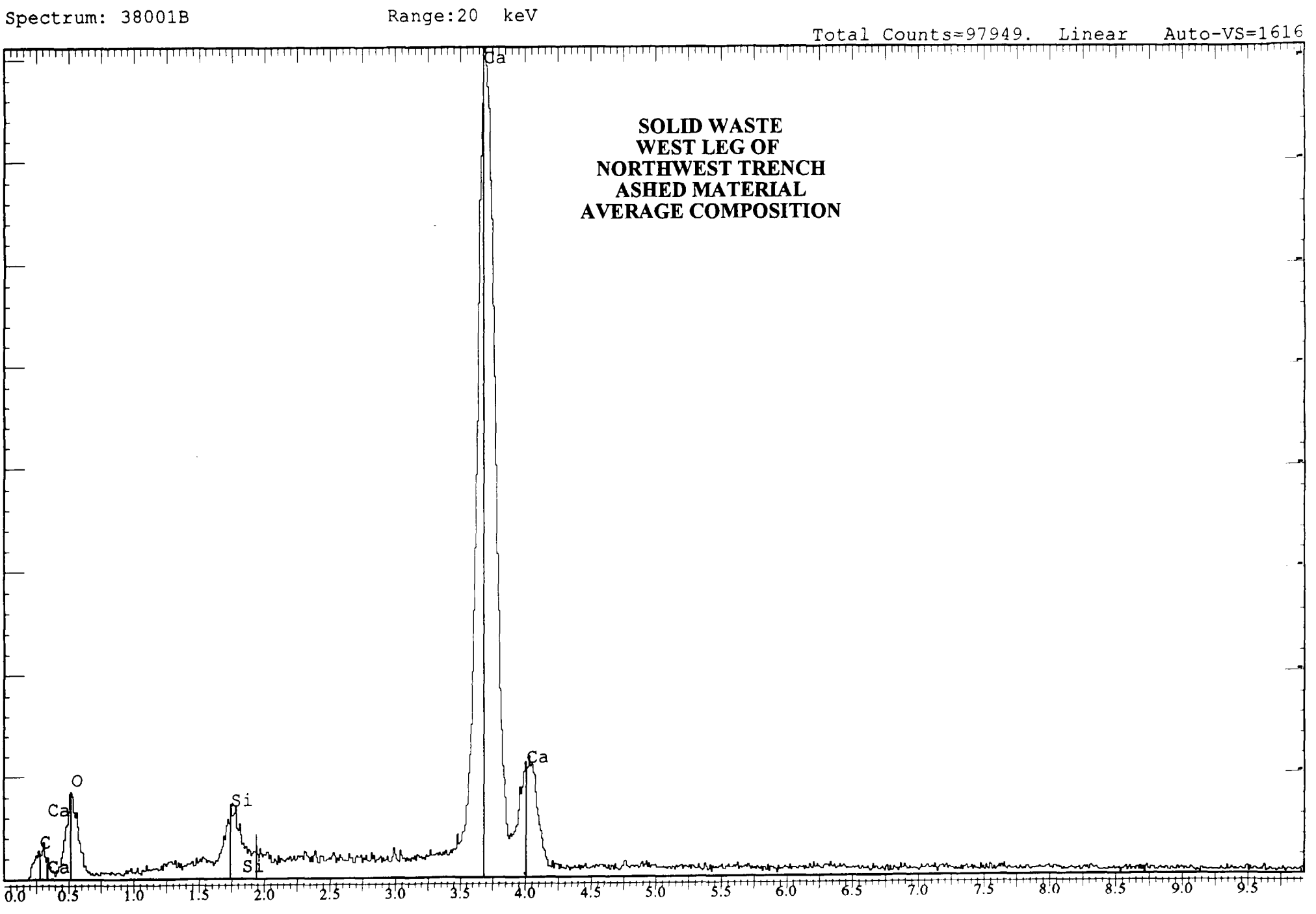
noncombustible residue ("ash") = 76.0 weight percent of the original sample.

Scanning Electron Microscopy (SEM)/Energy Dispersive X-Ray Spectroscopy (EDS):

The ashed residue was further crushed and mixed to obtain a dusty, somewhat gritty textured, white powder. A portion of this powder, together with a fragment retained from a lump of fresh material, were supported on conductive tape and vacuum coated with evaporated graphite.

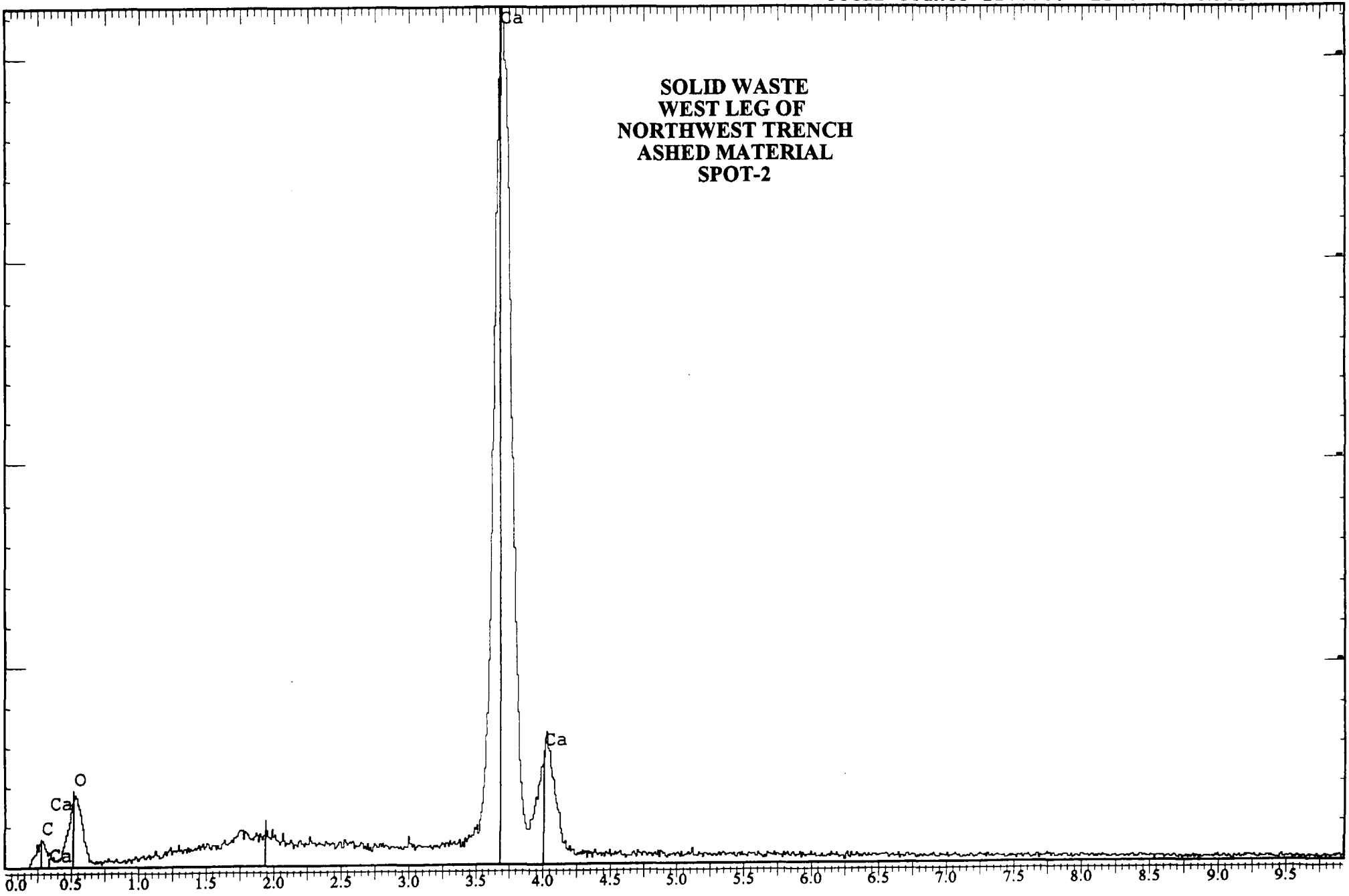
Micrograph M1 shows the typical fresh material. Note the granular texture, and occasional rhombic grains. EDS spectrum 38001A was averaged over the field of view in the micrograph, and shows calcium as the major peak, plus peaks for carbon, oxygen, aluminum, silicon, and potassium. The ashed material is similar to the fresh material in average composition. Please see EDS spectrum 38001B. Spot analyses on individual grains show the silicon, aluminum, and potassium peaks in the average composition spectrum originate in discrete grains (spectra


Spectrum: 38001A
Range:20 keV
Total Counts=165508. Linear Auto-VS=2323
SOLID WASTE
WEST LEG OF
NORTHWEST TRENCH
AS-RECEIVED MATERIAL
TYPICAL COMPOSITION
Ca
O
C
Si
Ca
Ca
Al
Al
Si
K
K
Ca
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5


Spectrum: 38001B
Range:20 keV
Total Counts=97949. Linear Auto-VS=1616
SOLID WASTE
WEST LEG OF
NORTHWEST TRENCH
ASHED MATERIAL
AVERAGE COMPOSITION
Ca
O
Ca
Si
C
Ca
Si
Ca
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5

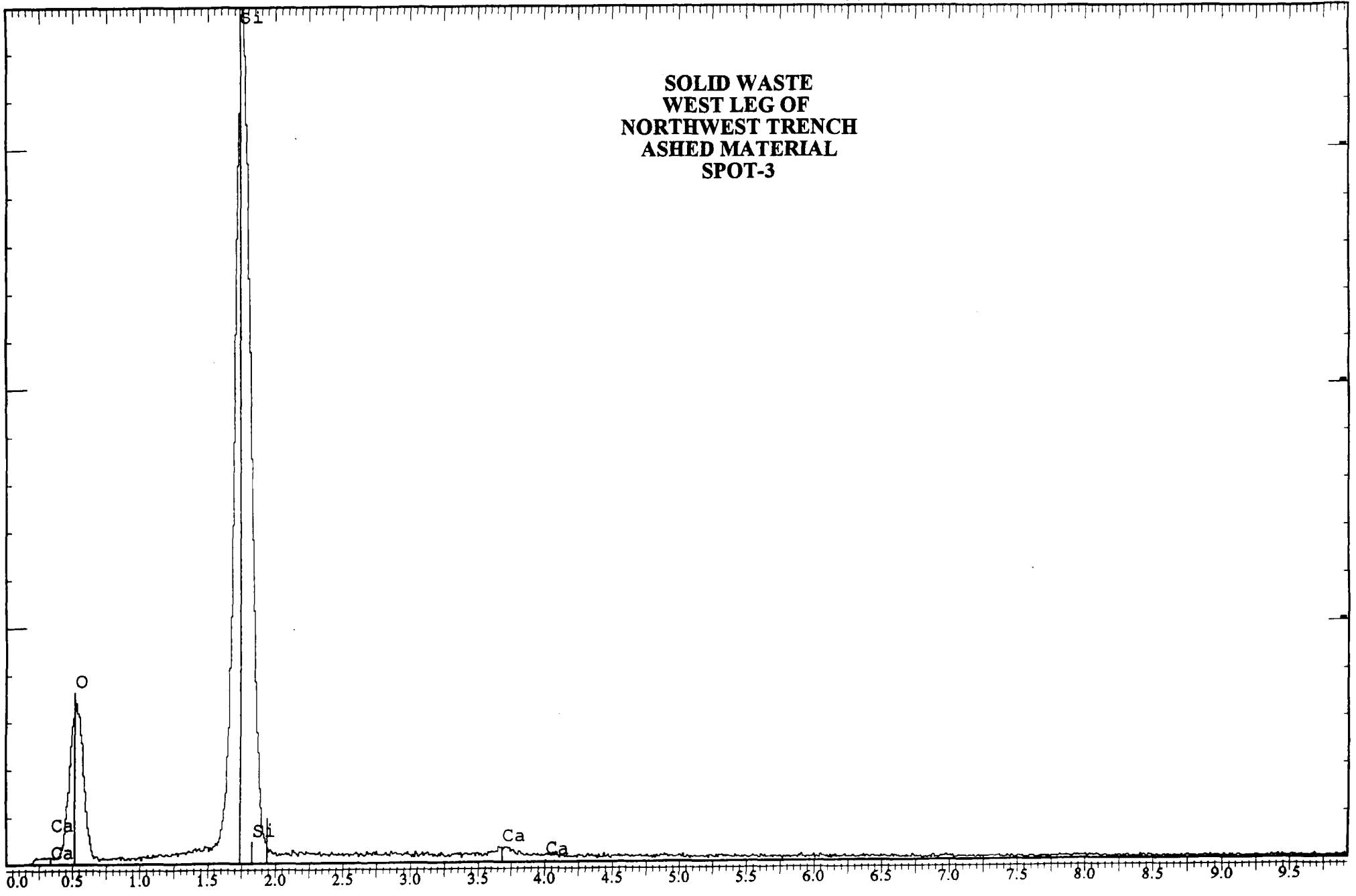
Spectrum: 38001D Range:20 keV

Total Counts=120390. Linear Auto-VS=2123

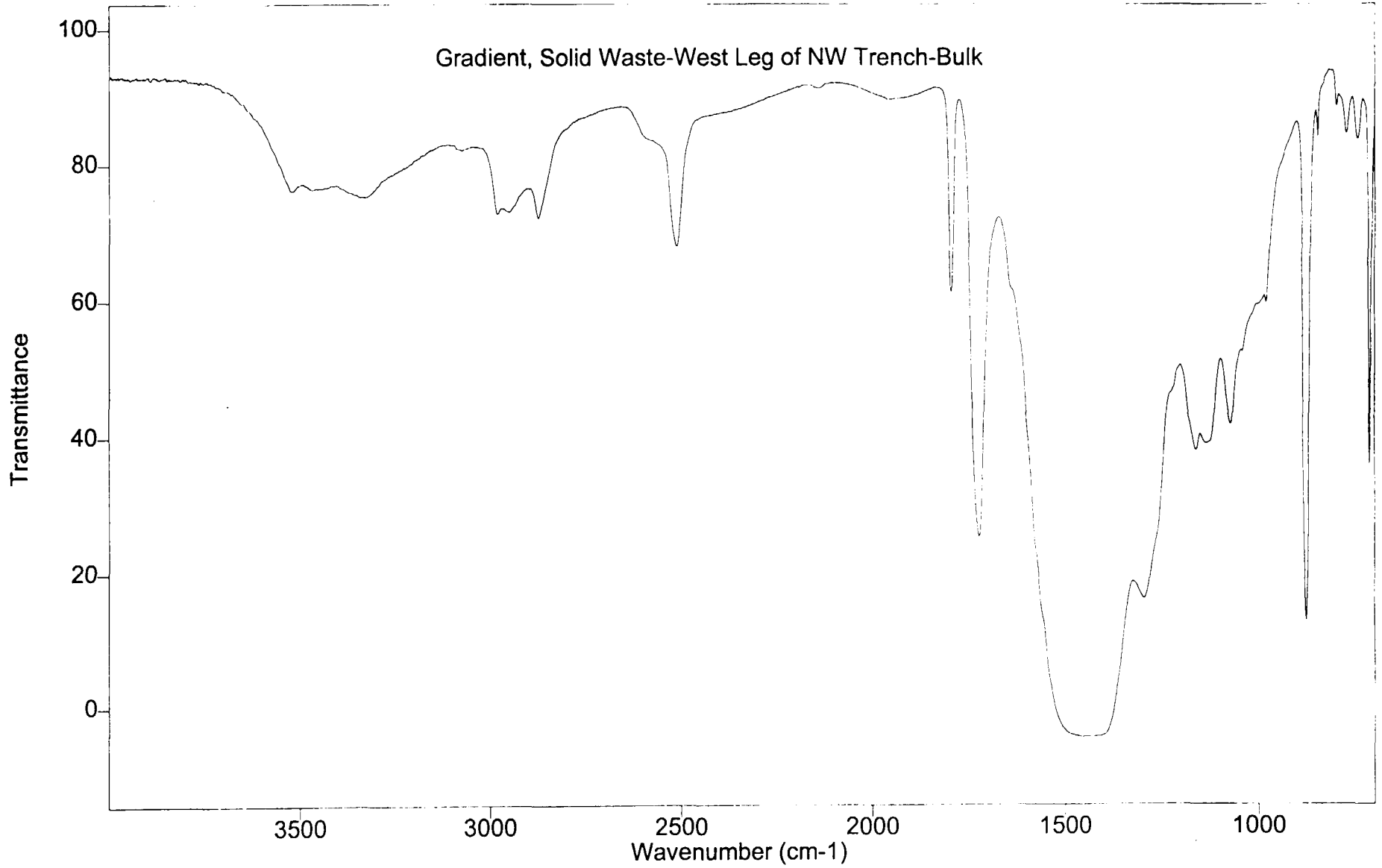


Spectrum: 38001E Range:20 keV

Total Counts=149707. Linear Auto-VS=3593



Analytical Answers, Inc. **FTIR Spectrum**



File # 1 : 38001_1

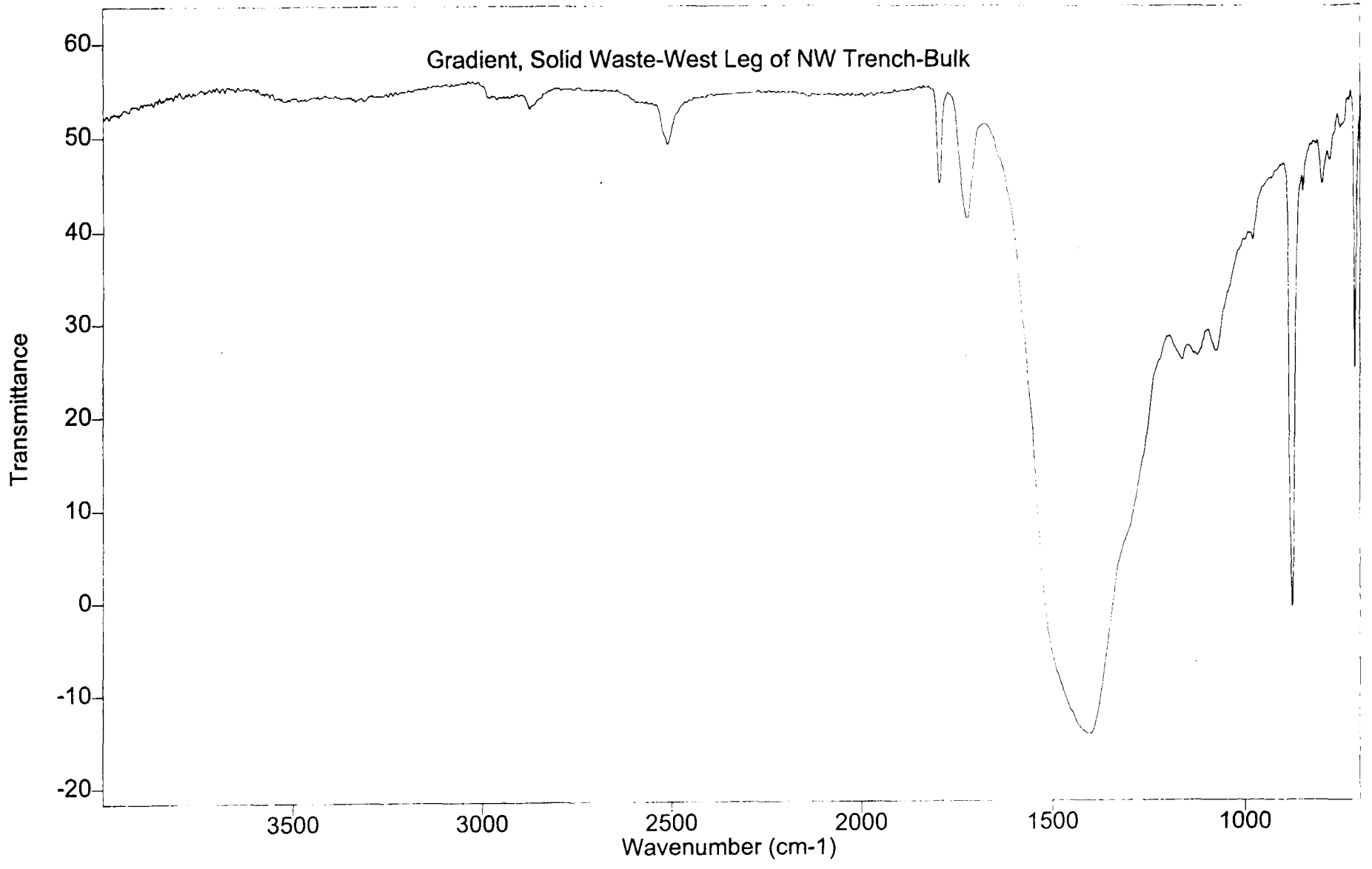
View Mode: Stacked

Number of Scans: 50

10/20/1999 Res=4cm-1

Comment: Gradient, Solid Waste-West Leg of NW Trench-Bulk

Analytical Answers, Inc. **FTIR Spectrum**



File # 1 : 38001_2

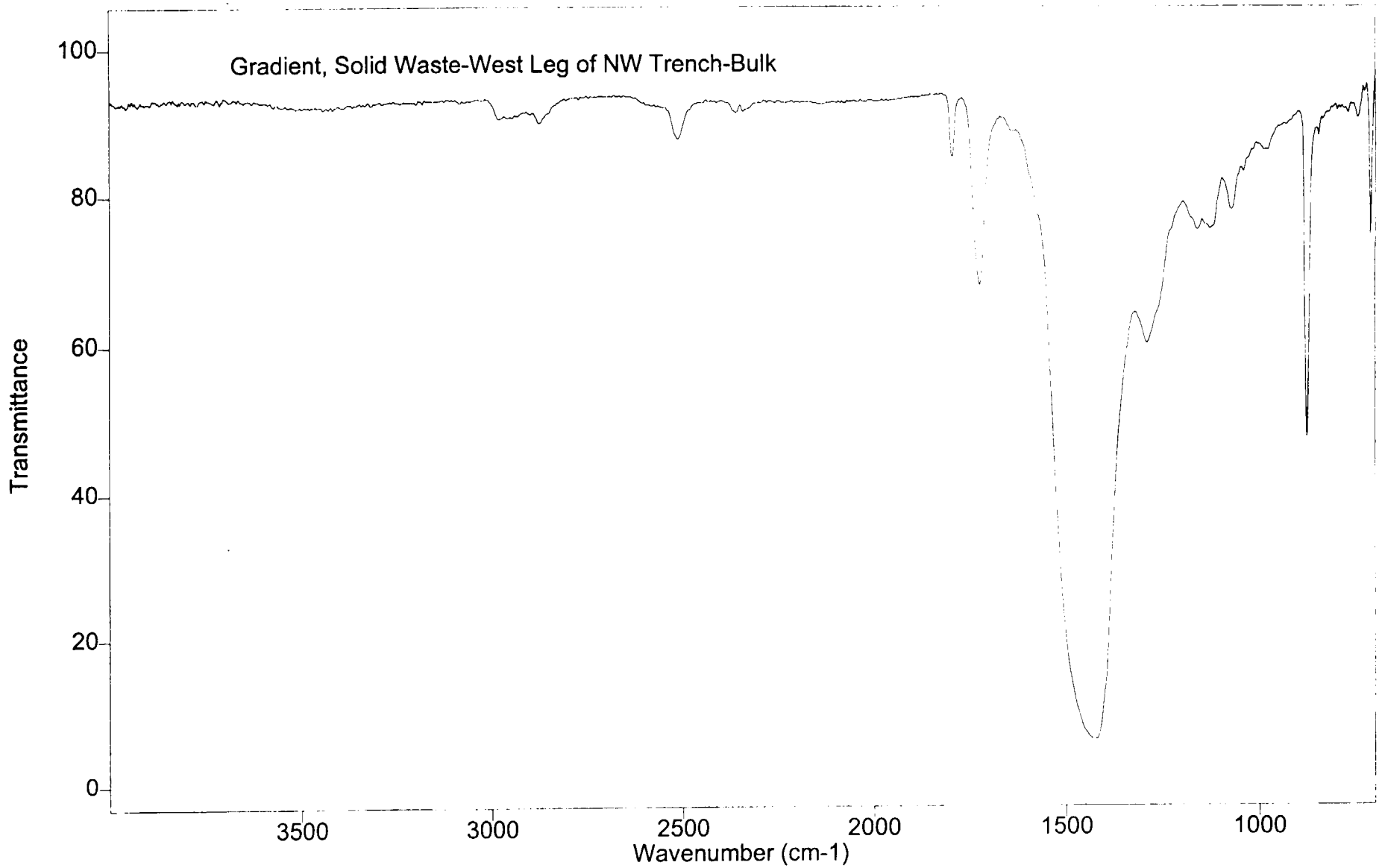
View Mode: Stacked

Number of Scans: 50

10/20/1999 Res=4cm-1

Analytical Answers, Inc.

FTIR Spectrum



File # 1 : 38001_3

View Mode: Stacked

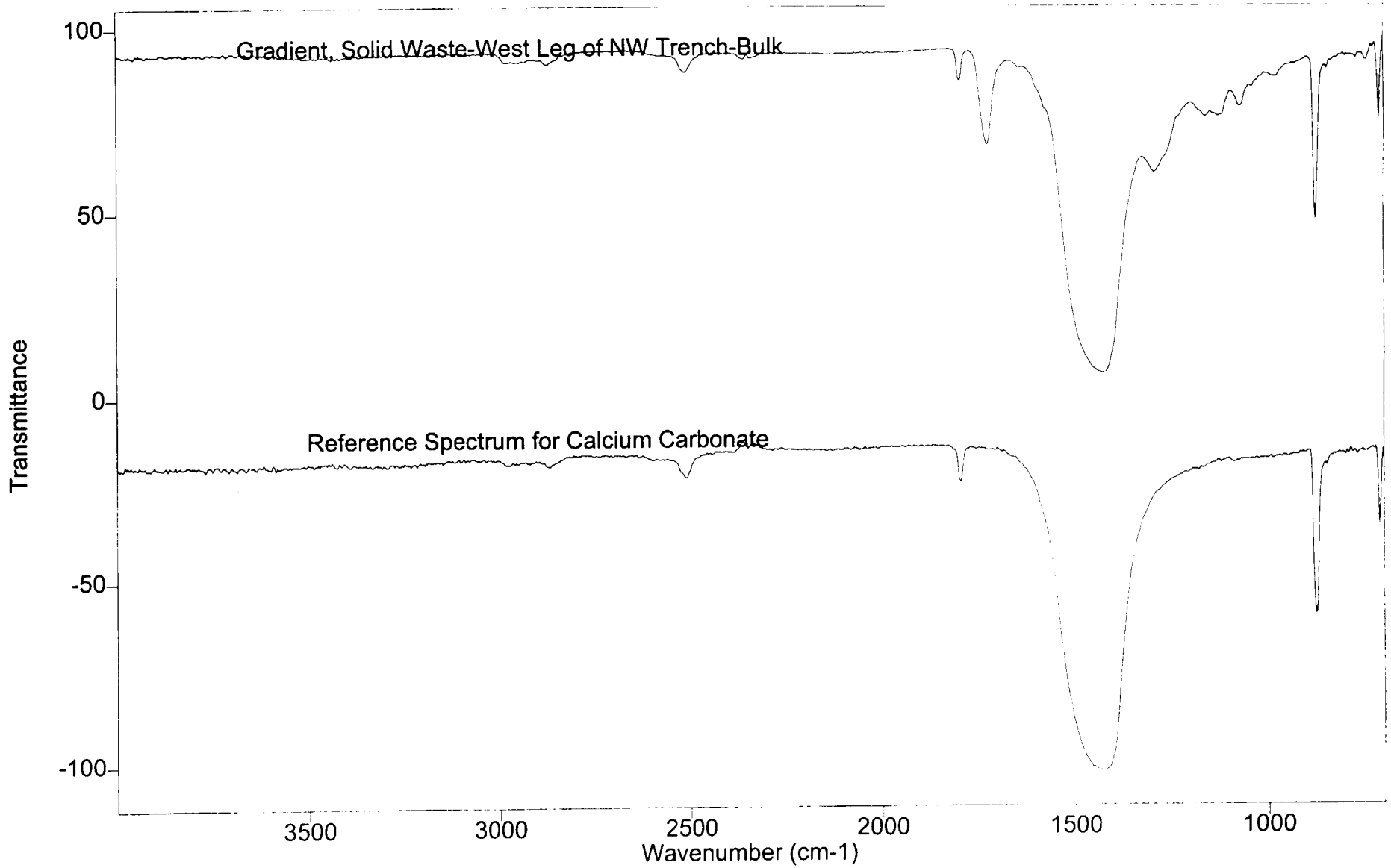
Number of Scans: 50

10/20/1999 Res=4cm-1

Comment: Gradient, Solid Waste-West Leg of NW Trench-Bulk

Analytical Answers, Inc.

FTIR Spectrum



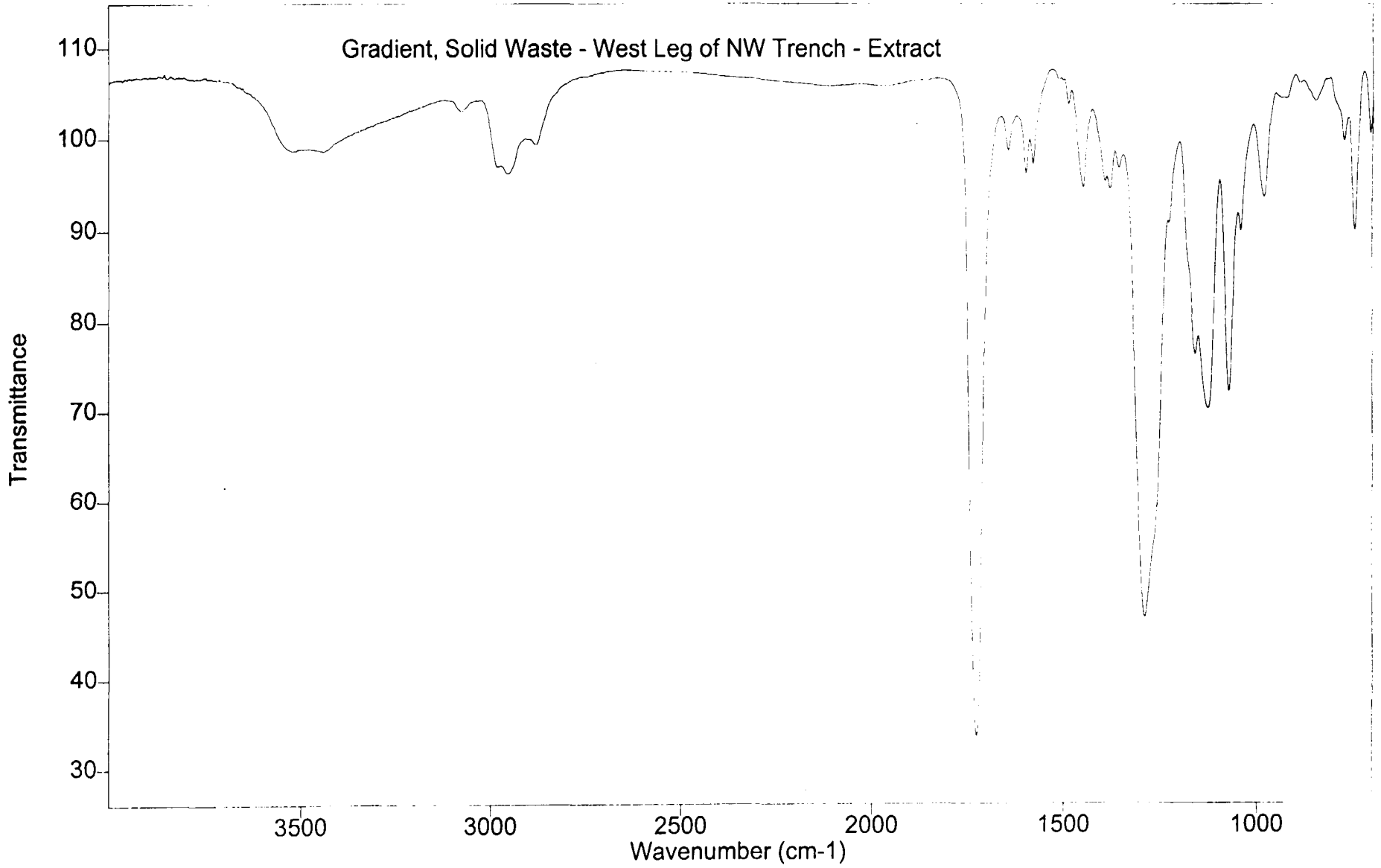
File # 1 : 38001_3

Number of Scans: 50

View Mode: Stacked

10/20/1999 Res=4cm-1

Analytical Answers, Inc. **FTIR Spectrum**



File # 1 : 38001_4

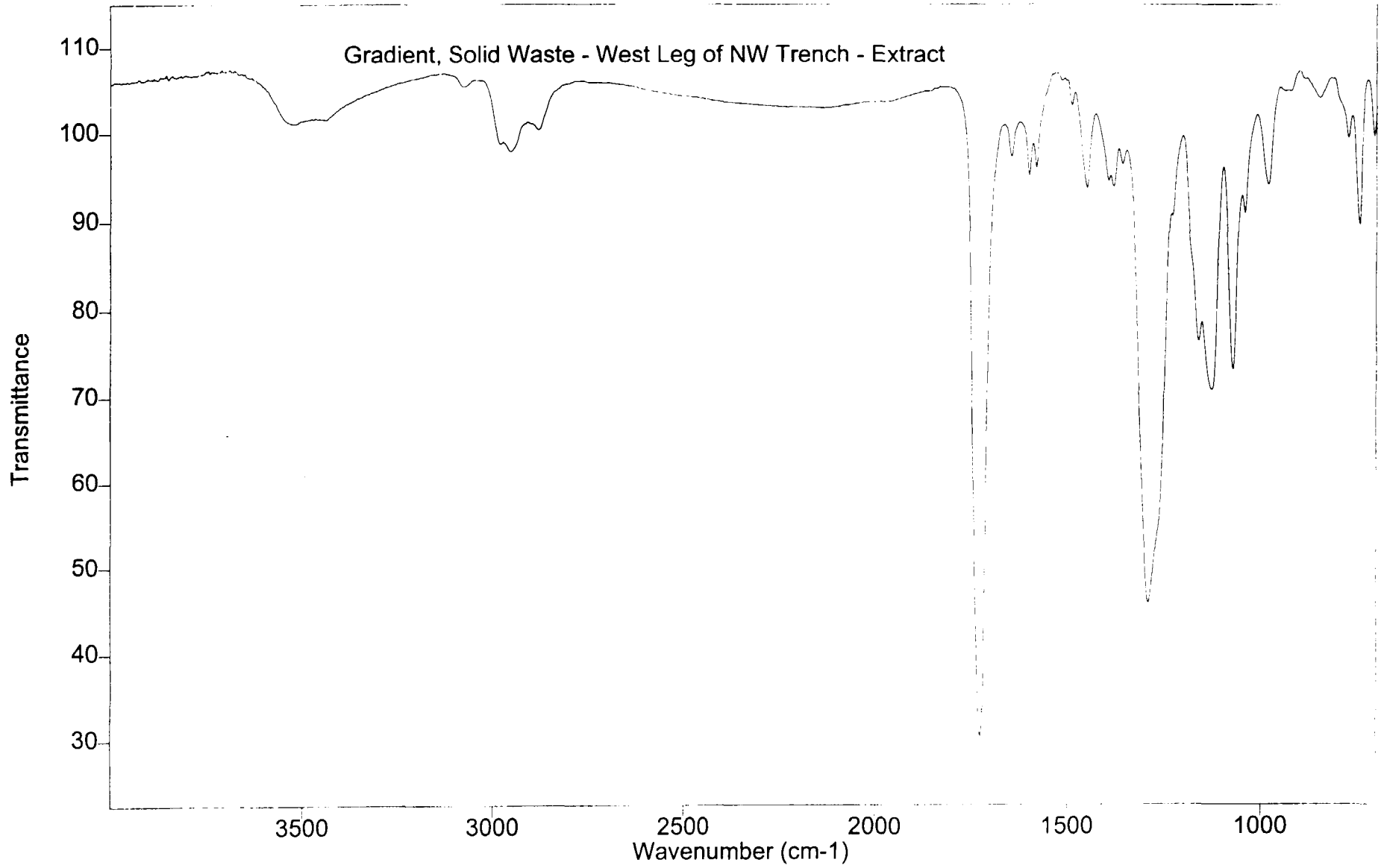
View Mode: Stacked

Number of Scans: 50

10/20/1999 Res=4cm-1

Comment: Gradient, Solid Waste - West Leg of NW Trench - Extract

Analytical Answers, Inc. **FTIR Spectrum**



File # 1 : 38001_5

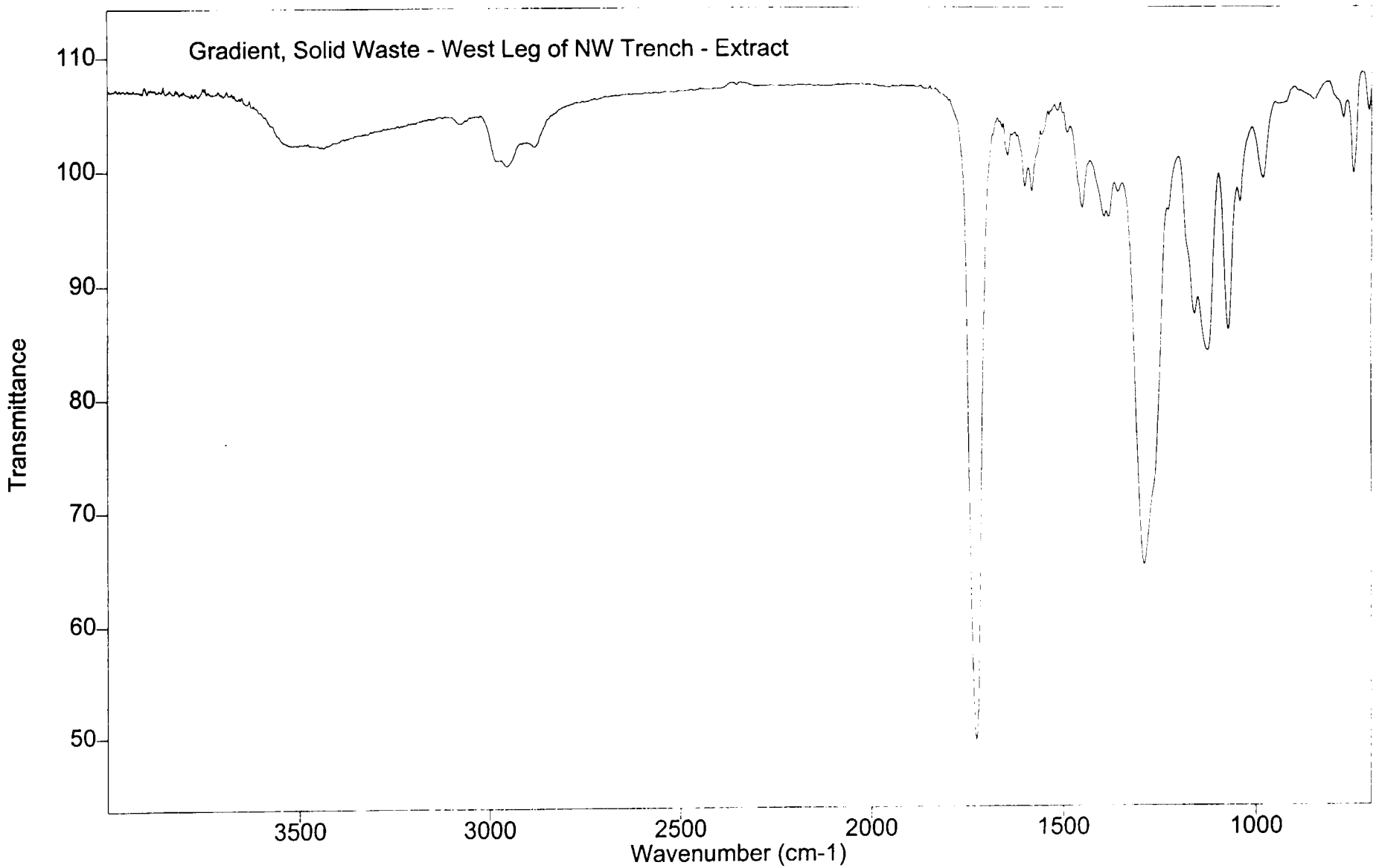
Number of Scans: 50

Comment: Gradient, Solid Waste - West Leg of NW Trench - Extract

View Mode: Stacked

10/20/1999 Res=4cm-1

Analytical Answers, Inc. **FTIR Spectrum**



File # 1 : 38001_6

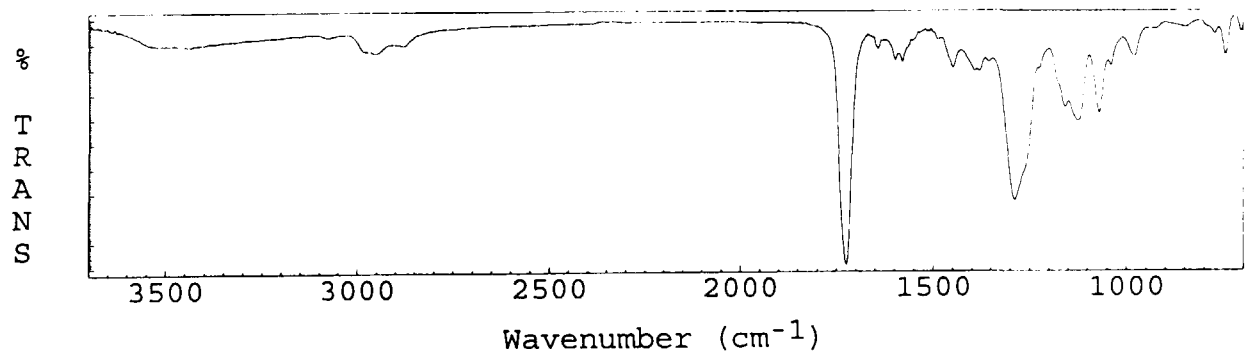
View Mode: Stacked

Number of Scans: 50

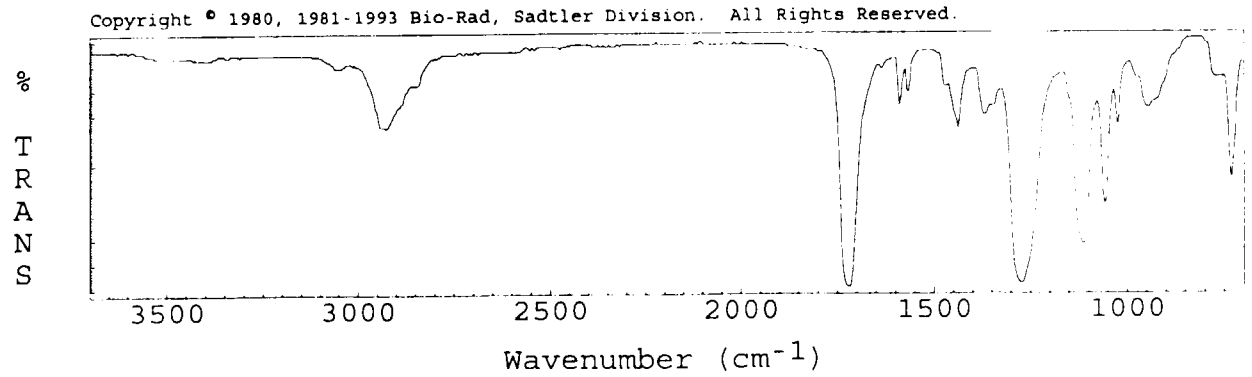
10/20/1999 Res=4cm-1

Comment: Gradient, Solid Waste - West Leg of NW Trench - Extract

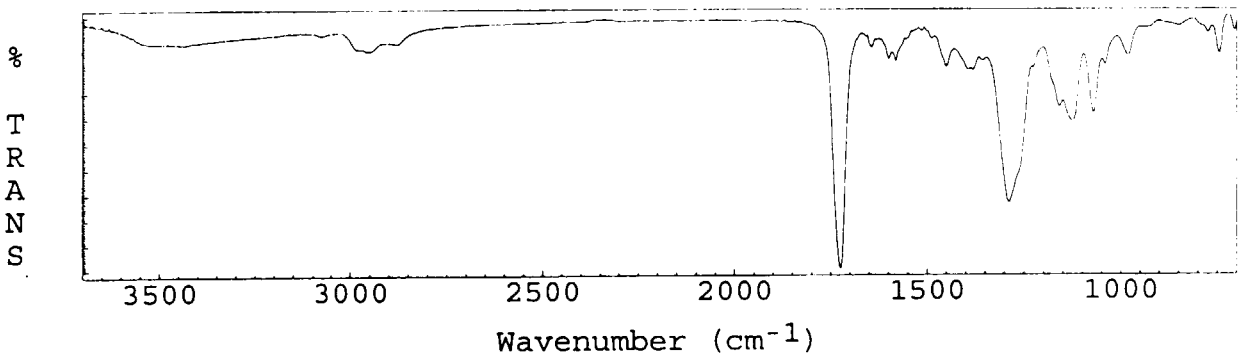
Gradient, Solid Waste - West Leg of NW Trench - Extract



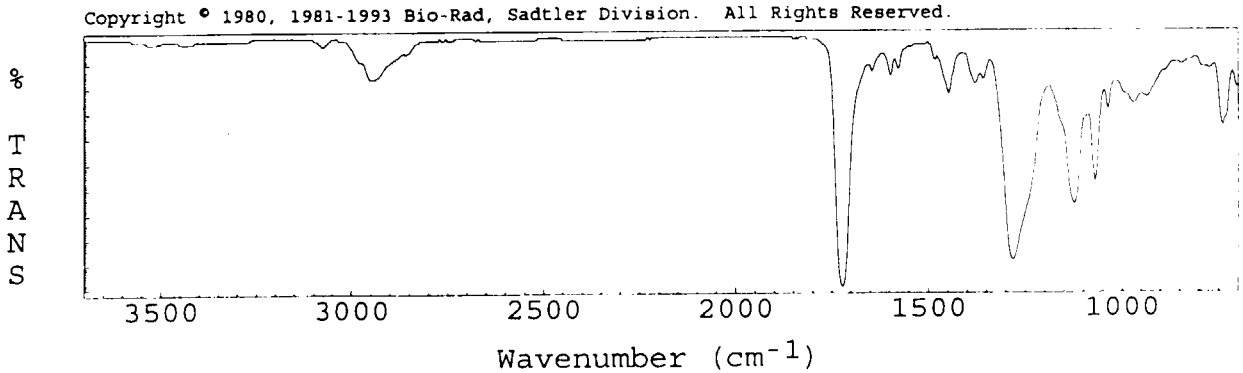
OL1238 DAPON 35 RESIN*DIALLYL PHTHALATE



Gradient, Solid Waste - West Leg of NW Trench - Extract



OM1637 COSMIC DAP H41



38001C, E), rather than being more homogeneously included with the high calcium material, such as that shown in spectrum 38001D.

The combination of morphology and composition give us useful clues to the identities of the major constituents and the particles. The angular and occasionally rhombic shapes, striated surfaces, and the EDS spectrum suggest crushed calcium carbonate as the major constituent of the sample (see recommendations, above). Grain 1 has both the flake like shape and EDS composition typical of common micas, such as biotite or muscovite. Grain 3 shows a conchoidal fracture and only silicon and oxygen in its EDS spectrum. This is probably quartz. Given the provenance of the sample, and the relatively small amounts of the minor minerals, contamination with natural soil is a possibility which must be considered.

Micro-Fourier Transform Infrared Spectroscopy (FTIR):

Small portions of each sample or extract were placed on an infrared transparent pellet for analysis. All spectra were collected in transmission mode at a resolution of 4 wavenumbers over the mid-IR region of 4000-700 wavenumbers. The absorption band doublet at 2340 wavenumbers, when present, is due to atmospheric carbon dioxide.

The major component in the bulk sample, which was characterized in spectra 38001_1, _2 and _3, is calcium carbonate. A printout comparing a spectrum of the solid waste and a spectrum for calcium carbonate and illustrating the similarity of the spectra is attached.

The solvent dichloromethane (DCM) was employed to extract organic material from the inorganic (calcium carbonate) portion of the sample. After solvent was deposited on the solid sample, an oily substance separated from the inorganic portion. After the solvent evaporated, the remaining residues were characterized in spectra 38001_4, _5 and _6. The spectral data indicate the presence of diallyl phthalate (DAP) resin. Printouts comparing a spectrum of the extract with spectra for representative DAP resins and illustrating the similarity of the spectra is attached. Representative DAP materials include Dapon 35 resin (Mesa Plastics Co.) and DAP H41 (Cosmic).

In two examples brand name materials were cited. Although the library spectrum match cites a brand name, this does not necessarily mean that the sample analyzed is the brand name material. A spectral match indicates that the sample analyzed may either be the same material as the brand name material or belongs to a class of materials similar to the brand name material.

The enclosed data sheets further describe the Scanning Electron Microscopy (SEM), Energy Dispersive X-Ray Spectroscopy (EDS) and Micro-Fourier Transform Infrared Spectroscopy (FTIR) analytical techniques.

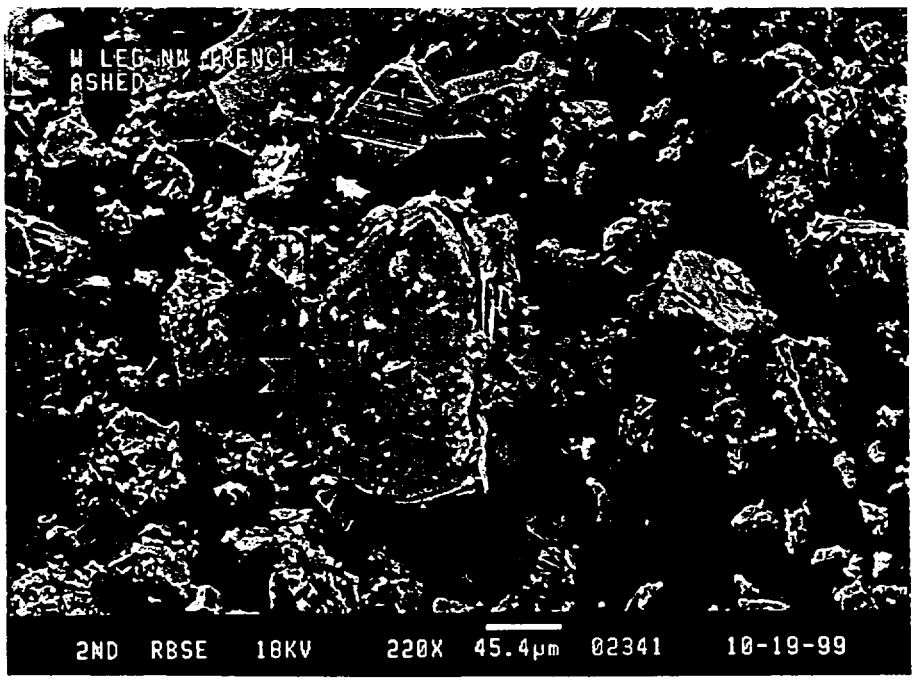
Drew R. Killius
Senior Materials Scientist

Eleanor Stickles, Ph.D.
Senior Chemist

DRK:EMS:ljr

Enclosures:	Samples:	2, hold for further analysis
	Micrographs:	2
	Spectra:	9 FTIR, 5 EDS
	Data Sheet:	3
	Evaluation:	1

M1 210X
Robinson Backscattered Electron (RBSE) micrograph of solid waste from the west leg of the northwest trench, showing typical fresh material. EDS spectrum 38001A was averaged over this field of view.



M2 220X
Robinson Backscattered Electron (RBSE) micrograph of solid waste from the west leg of the northwest trench, showing particles from the ashed material. EDS spectra 38001C, D, and E were obtained from the grains marked with red arrows.