AnalytiKEM *An American NuKEM Company*

AnalytiKEM Inc.
454 S. Anderson Road, BTC 532
Rock Hill, SC 29730
803/329-9690

TEST REPORT NO. A82387

July 8, 1992

Prepared for:

Engineering Tectonics
P.O. Box 11846
1720 Vargrave
Winston Salem, NC 27107

Attention: Jeffrey Wyatt

Project: Alleghany County

Reviewed &
Approved by: Gerald Miller, PhD for

Name: Carmine M. Fioriglio

Title: QA/QC Manager

AnalytiKEM

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AnalytiKEM

I. Certification

AnalytiKEM, Inc.
Current Certifications/Regulatory Approvals

Tabulated below are the current laboratory certifications that are held by each AnalytiKEM Laboratory. Analyses performed at multiple AnalytiKEM locations will be noted in the test report.

Cherry Hill, NJ		Rock Hill, SC		Houston Analytical, Tx	
State	Cert #	State	Cert #	State	Cert #
Arkansas	*	S. Carolina	46067	N. Dakota	R-006
Connecticut	PH-0715	N. Carolina	316	Oklahoma	8403
Florida	880985G	New Jersey	79795	Texas Water Commission *	
Massachusetts	NJ117			Louisiana *	
New Jersey	04012				
New York	10815				
N. Carolina	258				
N. Dakota	R-038				
Pennsylvania	68366				
S. Carolina	94004				
Tennessee	02908				
Vermont	*				

* No certification numbers are issued for these states.

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II. Definition of Terms

Term	Definition
D	Detected; result must be greater than zero.
DI	Deionized Water
J	Compound was detected at levels below the practical quantitation limit. The level reported is approximate.
MS/MSD	Matrix Spike/Matrix Spike Duplicate.
NA	Analysis not applicable to the sample matrix.
ND	Not Detected
NR	Not Requested
NTU	Nephelometric Turbidity Units
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
U	Compound was analyzed for but not detected. The preceding number is the practical quantitation limit for the compound.
ppb	Parts-per-billion; may be converted to ppm by dividing by 1,000.
ppm	Parts-per-million; may be converted to ppb by multiplying by 1,000.
ug/l	Micrograms of constituent per liter of sample; equivalent to parts-per-billion.
ug/kg	Micrograms of constituent per kilogram of sample; equivalent to parts-per-billion.
ug/kg dw	Micrograms of constituent per kilogram of sample reported on a dry weight basis.
CCC	Calibration Check Compound; used to verify the precision of a GC/MS calibration curve.
SPCC	System Performance Check Compound; used to verify the correct operation of a GC/MS instrument.
PQL	Practical Quantitation Limit; the minimum level at which compounds can be dependably quantitated.
B	Analyte detected in associated blank as well as the sample. It indicates possible/probable blank contamination.

III. Sample Designations

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AnalytiKEM Designation	Client Designation	Matrix	Date Sampled
A82387-1	MW-1	Aqueous	6/23/92
A82387-2	MW-2	Aqueous	6/23/92
A82387-3	MW-3	Aqueous	6/23/92

Note: Samples will be held for 30 days beyond the test report date unless otherwise requested.

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IV. Methodology

Volatiles

Method 5030, Purge and Trap, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, Second Edition, USEPA,

Method 8240, Gas Chromatography/Mass Spectrometry for Volatile Organics, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, Second Edition, USEPA,

IV. Methodology (Cont'd)

AnalytiKEM

Semivolatiles

Method 3510, Separatory Funnel Liquid-Liquid Extraction, Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW846, Second Edition, USEPA,

Method 8270, Gas Chromatography/Mass Spectrometry for Semivolatile Organics: Capillary Column Technique, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, Second Edition, USEPA.

General Chemistry

Method 405.1, Oxygen Demand (Biochemical), Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, USEPA, 1979.

Methods 410.1, 410.2, 410.3, Chemical Oxygen Demand, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, USEPA, 1979.

Method 9252, Chloride (Titrimetric, Mercuric Nitrate), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, Third Edition, USEPA, 1986, with all promulgated revisions.

Method 9200, Nitrate, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, Third Edition, USEPA, 1986, with all promulgated revisions.

Method 9040, pH Electrometric Measurement, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, Third Edition, USEPA, 1986, with all promulgated revisions.

Method 9038, Sulfate (Turbidimetric), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, Third Edition, USEPA, 1986, with all promulgated revisions.

Method 160.1, Total Dissolved Solids (Dried at 180 degrees C), Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, USEPA, 1979.

Method 9060, Total Organic Carbon, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, Third Edition, USEPA, 1986, with all promulgated revisions.

Method 340.2, Fluoride (Potentiomentric, Ion Selective Electrode), Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, USEPA, 1979.

V. Analytical Results

AnalytiKEM

Volatile Organics

Parameter	Method Blank	A82387-1 MW-1	A82387-2 MW-2	A82387-3 MW-3
		Sample Designation		
Chloromethane	< 10	< 10	< 10	< 10
Bromomethane	< 10	< 10	< 10	< 10
Vinyl Chloride	< 10	< 10	< 10	< 10
Chloroethane	< 10	< 10	< 10	< 10
Methylene Chloride	< 5.0	30	< 5.0	< 5.0
2-Propanone (Acetone)	< 100	< 100	< 100	< 100
Carbon Disulfide	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	< 5.0	< 5.0	< 5.0	< 5.0
trans-1,2-Dichloroethene	< 5.0	< 5.0	< 5.0	< 5.0
Chloroform	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	< 5.0	< 5.0	< 5.0	< 5.0
2-Butanone (MEK)	< 100	< 100	< 100	< 100
1,1,1-Trichloroethane	< 5.0	< 5.0	< 5.0	< 5.0
Carbon Tetrachloride	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Acetate	< 50	< 50	< 50	< 50
Bromodichloromethane	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	< 5.0	< 5.0	< 5.0	< 5.0
trans-1,3-Dichloropropene	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	< 5.0	< 5.0	< 5.0	< 5.0
2-Chloroethyl Vinyl Ether	< 10	< 5.0	< 5.0	< 5.0
Bromoform	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone (MIBK)	< 50	< 50	< 50	< 50
Hexanone	< 50	< 50	< 50	< 50
Tetrachloroethene	< 5.0	< 1.0	< 5.0	< 5.0
1,1,2,2-Tetrachloroethane	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	< 5.0	56	< 5.0	< 5.0
Chlorobenzene	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	< 5.0	6.5	< 5.0	< 5.0
Styrene	< 5.0	< 5.0	< 5.0	< 5.0
m,p-Xylene	< 5.0	21	< 5.0	< 5.0
o,p-Xylene	< 5.0	57	< 5.0	< 5.0
Units	(ug/l)	(ug/l)	(ug/l)	(ug/l)

V. Analytical Results (Cont'd)

AnalytiKEM

Semivolatile Organics (Page 1 of 2)

Parameter	Method Blank	A82387-1 MW-1	A82387-2 MW-2	A82387-2 MW-3
	Sample Designation			
N-Nitrosodimethylamine	< 5.0	< 10	< 10	< 10
Phenol	< 5.0	< 10	< 10	< 10
Bis(2-chloroethyl) Ether	< 5.0	< 10	< 10	< 10
2-Chlorophenol	< 5.0	< 10	< 10	< 10
1,3-Dichlorobenzene	< 5.0	< 10	< 10	< 10
1,4-Dichlorobenzene	< 5.0	< 10	< 10	< 10
Benzyl Alcohol	< 5.0	< 10	< 10	< 10
1,2-Dichlorobenzene	< 5.0	< 10	< 10	< 10
2-Methylphenol	< 5.0	< 10	< 10	< 10
Bis(2-chloroisopropyl) Ether	< 5.0	< 10	< 10	< 10
3,4-Methylphenol	< 5.0	< 10	< 10	< 10
N-Nitrosodipropylamine	< 5.0	< 10	< 10	< 10
Hexachloroethane	< 5.0	< 10	< 10	< 10
Nitrobenzene	< 5.0	< 10	< 10	< 10
Isophorone	< 5.0	< 10	< 10	< 10
2-Nitrophenol	< 5.0	< 10	< 10	< 10
2,4-Dimethylphenol	< 5.0	< 10	< 10	< 10
Benzoic Acid	< 25	< 50	< 50	< 50
Bis(2-chloroethoxy)methane	< 5.0	< 10	< 10	< 10
2,4-Dichlorophenol	< 5.0	< 10	< 10	< 10
1,2,4-Trichlorobenzene	< 5.0	< 10	< 10	< 10
Naphthalene	< 5.0	< 10	< 10	< 10
4-Chloroaniline	< 5.0	< 10	< 10	< 10
Hexachlorobutadiene	< 5.0	< 10	< 10	< 10
4-Chloro-3-methylphenol	< 5.0	< 10	< 10	< 10
Hexachlorocyclopentadiene	< 5.0	< 10	< 10	< 10
4-Chloro-3-methylphenol	< 5.0	< 10	< 10	< 10
2-Methylnapthalene	< 5.0	< 10	< 10	< 10
Hexachlorocyclopentadiene	< 5.0	< 10	< 10	< 10
2,4,6-Trichlorophenol	< 5.0	< 10	< 10	< 10
2,4,5-Trichlorophenol	< 25	< 50	< 50	< 50
2-Chloronaphthalene	< 5.0	< 10	< 10	< 10
2-Nitroanline	< 25	< 50	< 50	< 50
Dimethyl Phthalate	< 5.0	< 10	< 10	< 10
Acenaphthylene	< 5.0	< 10	< 10	< 10
3-Nitroaniline	< 25	< 50	< 50	< 50
Acenaphthene	< 5.0	< 10	< 10	< 10
2,4-Dinitrophenol	< 25	< 50	< 50	< 50
Units	(ug/l)	(ug/l)	(ug/l)	(ug/l)

V. Analytical Results (Cont'd)

AnalytiKEM

Semivolatile Organics (Page 2 of 2)

Parameter	Method Blank	A82387-1 MW-1	A82387-2 MW-2	A82387-3 MW-3
	Sample Designation			
4-Nitrophenol	< 25	< 50	< 50	< 50
Dibenzofuran	< 5.0	< 10	< 10	< 10
2,4-Dinitrotoluene	< 5.0	< 10	< 10	< 10
2,6-Dinitrotoluene	< 5.0	< 10	< 10	< 10
Diethyl Phthalate	< 5.0	24	< 10	< 10
4-Chlorophenyl Phenyl Ether	< 5.0	< 10	< 10	< 10
Fluorene	< 5.0	< 10	< 10	< 10
4-Nitroaniline	< 25	< 50	< 50	< 50
4,6-Dinitro-2-methylphenol	< 25	< 50	< 50	< 50
N-Nitrosodiphenylamine	< 5.0	< 10	< 10	< 10
4-Bromophenyl Phenyl Ether	< 5.0	< 10	< 10	< 10
Hexachlorobenzene	< 5.0	< 10	< 10	< 10
Pentachlorophenol	< 5.0	< 10	< 10	< 10
Phenanthrene	< 5.0	< 10	< 10	< 10
Anthracene	< 5.0	< 10	< 10	< 10
Dibutyl Phthalate	< 5.0	< 10	< 10	< 10
Fluoranthene	< 5.0	< 10	< 10	< 10
Benzidine	< 25	< 50	< 50	< 50
Pyrene	< 5.0	< 10	< 10	< 10
Butylbenzyl Phthalate	< 5.0	< 10	< 10	< 10
3,3'-Dichlorobenzidine	< 10	< 20	< 20	< 20
Benzo(a)anthracene	< 5.0	< 10	< 10	< 10
Bis(2-ethylhexyl) Phthalate	9.8	10	10	21
Chrysene	< 5.0	< 10	< 10	< 10
Dioctyl Phthalate	< 5.0	< 10	< 10	< 10
Benzo(b)fluoranthene	< 5.0	< 10	< 10	< 10
Benzo(k)fluoranthene	< 5.0	< 10	< 10	< 10
Benzo(a)pyrene	< 5.0	< 10	< 10	< 10
Indeno(1,2,3-cd)pyrene	< 5.0	< 10	< 10	< 10
Dibenzo(a,h)anthracene	< 5.0	< 10	< 10	< 10
Benzo(g,h,i)perylene	< 5.0	< 10	< 10	< 10
Units	(ug/l)	(ug/l)	(ug/l)	(ug/l)

A82387

sults (Cont'd)

AnalytiKEM AnalytiKEM

	Sample Designation				
	Method Blank	A82387-1 MW-1	A82387-2 MW-2	A82387-3 MW-3	
l	< 10	< 10	< 10	< 10	
	< 200	< 200	< 200	< 200	
l	< 10	< 10	< 10	< 10	
al	< 50	< 50	< 50	< 50	
	< 50	< 50	< 50	< 50	
	< 100	66,000	1,900	260	
	< 50	< 50	< 50	< 50	
	< 15	6,400	92	< 15	
l	< 2.0	< 2.0	< 2.0	< 2.0	
al	< 10	< 10	< 10	< 10	
	< 40	< 40	< 40	< 40	
	< 20	< 20	< 20	< 20	
	(ug/l)	(ug/l)	(ug/l)	(ug/l)	

ca

351-11

7-3

5.55

0;
0*
4;
4*
0 U
0
0 U
0 U
0

1)

cals analysis was performed at our Cherry Hill, NJ facility.

VI. Quality Control Data (Cont'd)

AnalytiKEM

Volatile Organics

Aqueous Surrogate Recovery Data

Sample Designation	Surrogate Recovery 1,2-Dichloroethane-d_4 (50 ppb)	Toluene-d_8 (50 ppb)	4-Bromofluorobenzene (50 ppb)
Method Blank	101	104	101
A82351-11 Spike	93	97	91
A82351-11 Spike Dup.	93	97	92
A82387-1	97	104	103
A82387-2	97	103	103
A82387-3	99	103	101
Units	(%)	(%)	(%)
Control Limits	76-114	88-110	86-115

0 out of 18 surrogate recoveries are outside control limits.

VI. Quality Control Data (Cont'd)

AnalytiKEM

Semivolatile Organics

Aqueous Matrix Spike/Matrix Spike Duplicate Recovery Data

Sample Spiked A82387-1

Parameter	Amount of Spike	Recovery MS	MSD	RPD
1,4-Dichlorobenzene	50	47	44	6
N-Nitrosodipropylamine	50	52	44	17
1,2,4-Trichlorobenzene	50	53	50	6
Acenaphthene	50	65	57	13
2,4-Dinitrotoluene	50	45	46	2
Pyrene	50	77	65	17
Phenol	100	*	*	--
Phenol ϕ	100	27	--	--
2-Chlorophenol	100	*	*	--
2-Chlorophenol ϕ	100	44	--	--
4-Chloro-3-methylphenol	100	*	*	--
4-Chloro-3-methylphenol ϕ	100	51	--	--
4-Nitrophenol	100	9	10	12
4-Nitrophenol ϕ	100	12	--	--
Pentachlorophenol	100	12	24	67
Pentachlorophenol ϕ	100	48	--	--
Units	(ug)	(%)	(%)	(%)

ϕ Spike performed on DI Water.

* Not Recovered.

VI. Quality Control Data (Cont'd)

AnalytiKEM

Semivolatile Organics

Aqueous Surrogate Recovery Data

Sample Designation	Surrogate Recovery 2-Fluorophenol (50 ug Added)	Phenol-d_5 (50 ug Added)	2,4,6-Tribromophenol (50 ug Added)
Method Blank	38	29	56
A82387-1 Spike	0.5	0.3	4.7
A82837-1 Spike Dup.	0.3	0	6.5
A82837-1	1.9	0.5	0
A82837-2	28	26	53
A82837-3	42	32	58
Units	(%)	(%)	(%)
Control Limits	10-90	10-90	10-142

Sample Designation	Surrogate Recovery Nitrobenzene-d_5 (100 ug Added)	2-Fluorobiphenyl (100 ug Added)	Terphenyl-d_{14} (100 ug Added)
Method Blank	57	69	78
A82837-1 Spike	53	67	76
A82837-1 Spike Dup.	48	57	62
A82837-1	52	64	82
A82837-2	50	62	76
A82837-3	64	80	90
Units	(%)	(%)	(%)
Control Limits	10-133	10-165	10-175

9 out of 36 surrogate recoveries are outside control limits.

VI. Quality Control Data (Cont'd)

AnalytiKEM

Metals

Aqueous Matrix Spike/Matrix Spike Duplicate Recovery Data

Parameter	Sample Spiked	Amount of Spike	Recovery MS	MSD	RPD
Arsenic	A82837-2	100	97	103	6
Barium	A82837-1	300	103	97	6
Cadmium	A82837-1	300	102	98	4
Chromium	A82837-1	300	104	97	7
Copper	A82837-1	300	98	94	4
Iron	A82837-1	300	95	93	2
Lead	A82837-1	300	101	95	6
Maganese	A82837-1	20	91	91	0
Mercury	A82837-3	300	114	105	8
Selenium	A82837-1	100	87	99	13
Selenium	DI Water	100	82	--	--
Silver	A27816-1	300	82	86	5
Zinc	A82387-1	300	104	97	7
Units		(ug)	(%)	(%)	(%)

VI. Quality Control Data (Cont'd)

AnalytiKEM

General Chemistry

Aqueous Matrix Spike/Matrix Spike Duplicate Recovery Data

Parameter	Sample Spiked	Amount of Spike	Recovery MS	MSD	RPD
Nitrate-N	A82361-3	500	94	110	16
Sulfate	A73697-C	10,000	82	97	17
Chloride	A82409-2	50,000	97	97	1
Fluoride	A82387-2	500	99	103	4
Chemical Oxygen Demand	A82395-6	50,000	101	112	10
Units		(ug)	(%)	(%)	(%)

VI. Quality Control Data (Cont'd)

AnalytiKEM

General Chemistry

Aqueous Matrix Spike/Matrix Spike Duplicate Recovery Data

Parameter	Sample Spiked	Amount of Spike	Recovery MS	MSD	RPD
Biochemical Oxygen Demand	A82387-3	200	88	89	1
Total Organic Carbon	DI Water	10	87	88	1
Total Organic Halogen	A82395-4	5	92	97	5
Units		(ug)	(%)	(%)	(%)

AnalytiKEM An American NuKEM Company

10868

Chain-of-Custody Record

Program Area: Drinking Water Wastewater Groundwater Solid and Hazardous Waste

Client: ENGINEERING TECTONICS Sample Collector: RX

Project: ALLEGHANY CO. LANDFILL AnalytiKEM Contact: GLS

Laboratory	Sales Office
2324 Vernsdale Road Rock Hill, South Carolina 29731 (803) 324-5310 Fax: (803) 324-8378	454 South Anderson Road BTC 532 Rock Hill, South Carolina 29730 (803) 329-9690 Fax: (803) 329-9689

ITEM NUMBER	SAMPLE DESIGNATION	DATE	TIME	MATRIX	Grab or Composite	40 ml vials	950 ml Org. Pres.	950 ml Unpres.	125 ml HNO_3	250 ml H_2SO_4	ml NaOH	ml HCL	[illegible]	[illegible]	[illegible]	PARAMETERS
1	MW-1	6/23	2:15	H_2O	G	4		3	1	2			1	1	1	8240 8270 BOD COD
2	MW-2		2:35	↓	↓	4		3	1	2			1	1	1	TOC TOX TDS CHLORIDE
3	MW-3		2:55			4		3	1	2			1	1	1	FLOURIDE SULFATE NITRATE
4																AR BA CD CR CU FE
5																MN PB HG SE AG ZN
6																pH SPEC. COND
7																
8																
9																
10																

TRANSFER NUMBER	ITEM NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1	1-3	Rick Wiatt	Grady Lane	6-24-92	1411
2	1-3	Grady Lane	Daniel Pope	6-24-92	1624
3					
4					

REMARKS

CD 5.0 ppb DET LIMIT

Hg 1 ppb DET LIMIT

SAMPLER'S SIGNATURE Rick Wiatt

Reorder: PJ Associates 803-329-2300 White Laboratory Copy Yellow Client Copy AKEM #1 12-89

ET

ENGINEERING TECTONICS, P. A.

P.O. Box 11846 Winston-Salem, N.C. 27116

(919) 767-8807 Greensboro Direct 379-9537

INVOICE No. 8154

ALWAYS REFER TO ABOVE NUMBER

CUSTOMER CODE

INVOICE DATE

TO: Alleghany Co. Landfill
P.O. Box 366
Sparta, NC 38675

PLEASE RETURN DUPLICATE COPY WITH YOUR REMITTANCE

CUST. ORDER	REQN. NO.	JOB NO.	BILLED THRU DATE:	TERMS:
		88-102E	7-25-92	NET 10 DAYS

DESCRIPTION	UNIT PRICE	EXTENSON	TOTAL
Sampling and analysis of 3 monitoring wells for normal landfill parameters.	$600.00	$1800.00	
EPA method 8240 for volatile organics and EPA method 8270 for semi-volatile organics as mandated by NC DEM solid waste division	$800.00	$2400.00	
SUBTOTAL			$4200.00
		TOTAL	$4200.00

A FINANCE CHARGE OF 1.5% PER MONTH (18% ANNUALLY) WILL BE ADDED TO ALL INVOICES UNPAID AFTER 30 DAYS

DUPLICATE INVOICE — PLEASE RETURN THIS COPY WITH YOUR REMITTANCE