IT CORPORATION
A Member of The IT Group

TREATABILITY TESTING REPORT FOR THE THERMAL TREATMENT OF CHLORINATED VOLATILE ORGANIC-CONTAMINATED MATERIAL FROM SITE 89 AT MARINE CORPS BASE CAMP LEJEUNE

Prepared By:

IT Technology Applications Laboratories
Knoxville, TN

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Treatability Program Manager

March 27, 2000
IT Project 803011

1.0 OBJECTIVE

The objective of the bench-scale thermal treatability study was to determine the final soil treatment temperature required to desorb the volatile organic contaminants of concern. The proposed remedial treatment goals for the site are presented in Table 1.

Table 1. Proposed Treatment Goal for Camp Lejeune Site 3

Parameter	Treatability Study Treatment Goal
1,1,2,2-Tetrachloroethane (PCA)	3.2 mg/kg
Trichloroethene (TCE)	58 mg/kg
Tetrachloroethene (PCE)	12 mg/kg
Vinyl Chloride	0.34 mg/kg

SAMPLE CHARACTERIZATION

A 5-gallon bucket containing representative soil material from Site 89 was received at IT's Technology Development Laboratory on March 9, 2000. The sample was logged in, homogenized, and stored at 4°C until needed for testing. Portions of the homogenized sample material were analyzed for the parameters listed in Tables 2 through 4.

Table 2. Physical Characterization of the Site 89 Soil

Parameter	Result
Solids Content (%)	87.8
Ash Content (%)	87.5
BTU (btu/lb)	29.4

Table 3. Particle Size Analysis for Site 89 Soil

Diameter (mm)	Percent Passing	Diameter (mm)	Percent Passing
75.0	100.0	0.075	35.6
37.5	100.0	0.0485	21.7
19.0	100.0	0.0346	19.4
9.5	99.3	0.0221	17.2
4.75	99.2	0.0129	14.2
2.00	99.1	0.0092	12.7
0.850	98.8	0.0065	11.2
0.425	97.2	0.0046	10.5
0.250	94.2	0.0032	9.0
0.149	73.5	0.0014	7.5
0.106	48.7		

Table 4. Chemical Characterization of the Site 89 Soil

Parameter	Concentration (mg/kg)
TCE	<25
PCE	<25
Vinyl Chloride	<25
PCA	310

Note: All other volatile organics were less than 25 mg/kg

The difference between the solids and ash content indicate that the amount of organic material in the sample is small (0.3%). The low BTU content of the material suggests that there is little combustible organics present in the sample. The moisture content (100% - solids content) indicates that the sample contains approximately 12.25% water by weight, which must be volatilized by the LTTD system.

The particle size distribution indicates that a large percentage (35.6%) of the solids in the Site 89 sample material was less than 0.075 mm. in diameter Typically, material finer than 0.075 mm has the potential to be collected in the LTTD air pollution control system as baghouse dust.

The data in Table 4 indicates that the only volatile organic contaminant present in the sample at appreciable concentrations is 1,1,2,2-trichloroethane. However, this compound has similar volatilization characteristics to the contaminants of concern. The removal of 1,1,2,2-tetrachloroethane can be used to evaluate the efficacy of the thermal treatment.

Thermal Treatability Testing

Portions of the untreated sample were treated in a muffle furnace. The testing produced final treated temperatures of 225°F, 250°F, 300°F, and 350°F within residence times of 5 to 15 minutes. The treated material were removed from the muffle furnace at the end of the residence time and immediately quenched. The treated material from each run was analyzed for VOCs (Table 5).

Table 5. Concentrations of Volatile Organics in the Thermally Treated Site 89 Soil

Thermal Run	4	1	2	3
Final Soil Temperature (°F)	221	250	300	350
Run Time	15	12	10	8
Parameter	**Screening Concentration (mg/kg)**			
TCE	<0.025	<0.025	<0.025	<0.025
PCE	<0.025	<0.025	<0.025	<0.025
Vinyl Chloride	<0.025	<0.025	<0.025	<0.025
1,1,2,2-Tetrachloroethane	1.43	<0.025	<0.025	<0.025

Based on the results in Table 5, samples of Thermal Runs 1 (2194-025-2) and 4 (2194-030-2) were submitted to an outside laboratory for analysis for VOCs. The results of the outside laboratory confirm IT's screening results (Appendix A).

CONCLUSIONS

The soil sample from Site 89 had low levels of organic contamination. and only 1,1,2,2-tetrachloroethane was detected in the sample. The low BTU content of the material suggests that there is little combustible organics present in the sample. The moisture content (100% - solids content) indicates that the sample contains approximately 12.25% water by weight.

The particle size distribution indicates that there is a potential for a large amount of the Site 89 material to be collected in the LTTD air pollution control system as baghouse dust.

The data in Table 5 indicates that the volatile organic contamination present in the Site 89 soil material can be thermally desorbed if the final treated soil temperature reaches 225°F. Treatment of the Site 89 soil material with this final soil temperature removed 99% of the 1,1,2,2,-tetrachloroethane contamination. A higher final treated soil temperature may be considered to ensure that all of the volatile organics are desorbed during the treatment.

As with most treatability and laboratory studies, the results of this study were obtained under laboratory conditions using composite samples. Full scale processing under field conditions and/or variability in the materials to be treated may result in treated material which varies from the treated material produced under laboratory conditions or the use of additional reagents, equipment and/or processing time to produce a similar treated material to that produced under laboratory conditions.

APPENDIX A

ANALYTICAL REPORTS

Microbac Laboratories, Inc.
Kenwill Division
505 East Broadway Avenue Maryville, TN 37804
865/977-1200 Fax: 865/984-8616

CERTIFICATE OF ANALYSIS # 9915-00114 Page 1

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. 1003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-025-2 TREATED SOIL					
[Volatile Organics]			SW846 8260		
DICHLORODIFLUOROMETHANE	<0.005	MG/KG		3/21/00	JLB
VINYL CHLORIDE	<0.010	MG/KG		3/21/00	JLB
CHLOROMETHANE	<0.010	MG/KG		3/21/00	JLB
BROMOMETHANE	<0.010	MG/KG		3/21/00	JLB
CHLOROETHANE	<0.010	MG/KG		3/21/00	JLB
TRICHLOROFLUOROMETHANE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
METHYLENE CHLORIDE	<0.050	MG/KG		3/21/00	JLB
ACETONE	<0.050	MG/KG		3/21/00	JLB
ACROLEIN	<0.050	MG/KG		3/21/00	JLB
1,2 DIBROMOETHANE	<0.005	MG/KG		3/21/00	JLB
CARBON DISULFIDE	<0.010	MG/KG		3/21/00	JLB
ACRYLONITRILE	<0.050	MG/KG		3/21/00	JLB
TRANS-1,2-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
METHYL-T-BUTYL ETHER	<0.050	MG/KG		3/21/00	JLB
2-BUTANONE (MEK)	<0.050	MG/KG		3/21/00	JLB
CIS-1,2-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
BROMOCHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
CHLOROFORM	<0.005	MG/KG		3/21/00	JLB
2,2-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
1,1,1-TRICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
CARBON TETRACHLORIDE	<0.005	MG/KG		3/21/00	JLB
BENZENE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
TRICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
DIBROMOMETHANE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
BROMODICHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
2-CHLOROETHYL VINYL ETHER	<0.050	MG/KG		3/21/00	JLB

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KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number:

Subject: CAMP LEJEUNE / 303011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-025-2 TREATED SOIL					
CIS-1,3-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
HEXANE	<0.005	MG/KG		3/21/00	JLB
TOLUENE	<0.005	MG/KG		3/21/00	JLB
TRANS-1,3-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
1,1,2-TRICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
1,3-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
DIBROMOCHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
1,2-DIBROMOETHANE (EDB)	<0.005	MG/KG		3/21/00	JLB
TETRACHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
4-ISOPROPYLTOLUENE	<0.010	MG/KG		3/21/00	JLB
1,1,1,2-TETRACHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
CHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
ISOPROPYLBENZENE	<0.005	MG/KG		3/21/00	JLB
ETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
M-XYLENE / P-XYLENE	<0.010	MG/KG		3/21/00	JLB
O-XYLENE	<0.005	MG/KG		3/21/00	JLB
STYRENE	<0.005	MG/KG		3/21/00	JLB
BROMOFORM	<0.005	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
BROMOBENZENE	<0.005	MG/KG		3/21/00	JLB
N-PROPYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,1,2,2-TETRACHLOROETHANE	0.76	MG/KG		3/21/00	JLB
2-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
3-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
4-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
1,3,5-TRIMETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
TERT-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2,4-TRIMETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
SEC-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,3-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
1,4-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB

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Permit Number:

Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-025-2 TREATED SOIL					
N-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2,4-TRICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
NAPHTHALENE	<0.005	MG/KG		3/21/00	JLB
HEXACHLOROBUTADIENE	<0.005	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
DCA SURROGATE RECOVERY	86	%		3/21/00	JLB
TOL-D8 SURROGATE RECOVERY	99	%		3/21/00	JLB
BFB SURROGATE RECOVERY	101	%		3/21/00	JLB
SAMPLE: 2 2194-024-2 FEED SOIL					
[Volatile Organics]			SW846 8260		
DICHLORODIFLUOROMETHANE	<25	MG/KG		3/21/00	JLB
VINYL CHLORIDE	<25	MG/KG		3/21/00	JLB
CHLOROMETHANE	<25	MG/KG		3/21/00	JLB
BROMOMETHANE	<25	MG/KG		3/21/00	JLB
CHLOROETHANE	<25	MG/KG		3/21/00	JLB
TRICHLOROFLUOROMETHANE	<25	MG/KG		3/21/00	JLB
1,1-DICHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
METHYLENE CHLORIDE	<25	MG/KG		3/21/00	JLB
ACETONE	<25	MG/KG		3/21/00	JLB
ACROLEIN	<25	MG/KG		3/21/00	JLB
1,2 DIBROMOETHANE	<25	MG/KG		3/21/00	JLB
CARBON DISULFIDE	<25	MG/KG		3/21/00	JLB
ACRYLONITRILE	<25	MG/KG		3/21/00	JLB
TRANS-1,2-DICHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
1,1-DICHLOROETHANE	<25	MG/KG		3/21/00	JLB
METHYL-T-BUTYL ETHER	<25	MG/KG		3/21/00	JLB
2-BUTANONE (MEK)	<25	MG/KG		3/21/00	JLB
CIS-1,2-DICHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
BROMOCHLOROMETHANE	<25	MG/KG		3/21/00	JLB
CHLOROFORM	<25	MG/KG		3/21/00	JLB

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Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 2 2194-024-2 FEED SOIL					
2,2-DICHLOROPROPANE	<25	MG/KG		3/21/00	JLB
1,1,1-TRICHLOROETHANE	<25	MG/KG		3/21/00	JLB
1,1-DICHLOROPROPYLENE	<25	MG/KG		3/21/00	JLB
CARBON TETRACHLORIDE	<25	MG/KG		3/21/00	JLB
BENZENE	<25	MG/KG		3/21/00	JLB
1,2-DICHLOROETHANE	<25	MG/KG		3/21/00	JLB
TRICHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
DIBROMOMETHANE	<25	MG/KG		3/21/00	JLB
1,2-DICHLOROPROPANE	<25	MG/KG		3/21/00	JLB
BROMODICHLOROMETHANE	<25	MG/KG		3/21/00	JLB
2-CHLOROETHYL VINYL ETHER	<25	MG/KG		3/21/00	JLB
CIS-1,3-DICHLOROPROPYLENE	<25	MG/KG		3/21/00	JLB
HEXANE	<25	MG/KG		3/21/00	JLB
TOLUENE	<25	MG/KG		3/21/00	JLB
TRANS-1,3-DICHLOROPROPYLENE	<25	MG/KG		3/21/00	JLB
1,1,2-TRICHLOROETHANE	<25	MG/KG		3/21/00	JLB
1,3-DICHLOROPROPANE	<25	MG/KG		3/21/00	JLB
DIBROMOCHLOROMETHANE	<25	MG/KG		3/21/00	JLB
1,2-DIBROMOETHANE (EDB)	<25	MG/KG		3/21/00	JLB
TETRACHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
4-ISOPROPYLTOLUENE	<25	MG/KG		3/21/00	JLB
1,1,1,2-TETRACHLOROETHANE	<25	MG/KG		3/21/00	JLB
CHLOROBENZENE	<25	MG/KG		3/21/00	JLB
ISOPROPYLBENZENE	<25	MG/KG		3/21/00	JLB
ETHYLBENZENE	<25	MG/KG		3/21/00	JLB
M-XYLENE / P-XYLENE	<25	MG/KG		3/21/00	JLB
O-XYLENE	<25	MG/KG		3/21/00	JLB
STYRENE	<25	MG/KG		3/21/00	JLB
BROMOFORM	<25	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROPROPANE	<25	MG/KG		3/21/00	JLB
BROMOBENZENE	<25	MG/KG		3/21/00	JLB
N-PROPYLBENZENE	<25	MG/KG		3/21/00	JLB

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CERTIFICATE OF ANALYSIS # 9915-00114

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 6/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 2 2194-024-2 FEED SOIL					
1,1,2,2-TETRACHLOROETHANE	310	MG/KG		3/21/00	JLB
2-CHLOROTOLUENE	<25	MG/KG		3/21/00	JLB
3-CHLOROTOLUENE	<25	MG/KG		3/21/00	JLB
4-CHLOROTOLUENE	<25	MG/KG		3/21/00	JLB
1,3,5-TRIMETHYLBENZENE	<25	MG/KG		3/21/00	JLB
TERT-BUTYLBENZENE	<25	MG/KG		3/21/00	JLB
1,2,4-TRIMETHYLBENZENE	<25	MG/KG		3/21/00	JLB
SEC-BUTYLBENZENE	<25	MG/KG		3/21/00	JLB
1,3-DICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
1,4-DICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
1,2-DICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
N-BUTYLBENZENE	<25	MG/KG		3/21/00	JLB
1,2,4-TRICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
NAPHTHALENE	<25	MG/KG		3/21/00	JLB
HEXACHLOROBUTADIENE	<25	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
DCA SURROGATE RECOVERY	94	%		3/21/00	JLB
TOL-D8 SURROGATE RECOVERY	98	%		3/21/00	JLB
BFB SURROGATE RECOVERY	95	%		3/21/00	JLB
SAMPLE: 3 2194-030-2 TREATED SOIL					
[Volatile Organics]			SW846 8260		
DICHLORODIFLUOROMETHANE	<0.005	MG/KG		3/21/00	JLB
VINYL CHLORIDE	<0.010	MG/KG		3/21/00	JLB
CHLOROMETHANE	<0.010	MG/KG		3/21/00	JLB
BROMOMETHANE	<0.010	MG/KG		3/21/00	JLB
CHLOROETHANE	<0.010	MG/KG		3/21/00	JLB
TRICHLOROFLUOROMETHANE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
METHYLENE CHLORIDE	<0.050	MG/KG		3/21/00	JLB
ACETONE	<0.050	MG/KG		3/21/00	JLB

*** Certificate Continues On Next Page ***

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INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number:

Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 3 2194-030-2 TREATED SOIL					
ACROLEIN	<0.050	MG/KG		3/21/00	JLB
1,2 DIBROMOETHANE	<0.005	MG/KG		3/21/00	JLB
CARBON DISULFIDE	<0.010	MG/KG		3/21/00	JLB
ACRYLONITRILE	<0.050	MG/KG		3/21/00	JLB
TRANS-1,2-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
METHYL-T-BUTYL ETHER	<0.050	MG/KG		3/21/00	JLB
2-BUTANONE (MEK)	<0.050	MG/KG		3/21/00	JLB
CIS-1,2-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
BROMOCHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
CHLOROFORM	<0.005	MG/KG		3/21/00	JLB
2,2-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
1,1,1-TRICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
CARBON TETRACHLORIDE	<0.005	MG/KG		3/21/00	JLB
BENZENE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
TRICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
DIBROMOMETHANE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
BROMODICHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
2-CHLOROETHYL VINYL ETHER	<0.050	MG/KG		3/21/00	JLB
CIS-1,3-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
HEXANE	<0.005	MG/KG		3/21/00	JLB
TOLUENE	<0.005	MG/KG		3/21/00	JLB
TRANS-1,3-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
1,1,2-TRICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
1,3-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
DIBROMOCHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
1,2-DIBROMOETHANE (EDB)	<0.005	MG/KG		3/21/00	JLB
TETRACHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
4-ISOPROPYLTOLUENE	<0.010	MG/KG		3/21/00	JLB

*** Certificate Continues On Next Page ***

Microbac Laboratories, Inc.
Kenwill Division
505 East Broadway Avenue Maryville, TN 37804
865/977-1200 Fax: 865/984-8616

CERTIFICATE OF ANALYSIS # 9915-00114 Page 7

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 3 2194-030-2 TREATED SOIL					
1,1,1,2-TETRACHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
CHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
ISOPROPYLBENZENE	<0.005	MG/KG		3/21/00	JLB
ETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
M-XYLENE / P-XYLENE	<0.010	MG/KG		3/21/00	JLB
O-XYLENE	<0.005	MG/KG		3/21/00	JLB
STYRENE	<0.005	MG/KG		3/21/00	JLB
BROMOFORM	<0.005	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
BROMOBENZENE	<0.005	MG/KG		3/21/00	JLB
N-PROPYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,1,2,2-TETRACHLOROETHANE	2.90	MG/KG		3/21/00	JLB
2-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
3-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
4-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
1,3,5-TRIMETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
TERT-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2,4-TRIMETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
SEC-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,3-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
1,4-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
N-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2,4-TRICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
NAPHTHALENE	<0.005	MG/KG		3/21/00	JLB
HEXACHLOROBUTADIENE	<0.005	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
DCA SURROGATE RECOVERY	88	%		3/21/00	JLB
TOL-D8 SURROGATE RECOVERY	99	%		3/21/00	JLB
BFB SURROGATE RECOVERY	92	%		3/21/00	JLB

*** Certificate Continues On Next Page ***

Microbac Laboratories, Inc.
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CERTIFICATE OF ANALYSIS # 9915-00114

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304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

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PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH

RESPECTFULLY SUBMITTED: _____

MICROBAC LABORATORIES, INCORPORATED

APPENDIX B

PARTICLE SIZE ANALYSIS

PARTICLE-SIZE ANALYSIS
ASTM D 422

Project Name	Site 85 DRMO	Client Sample No.	TDL0855
Project No.	803011.01030140	IT Lab Sample No.	ETDC-8660

Specific Gravity = 2.65
assumed for calculations

Moisture Content = 14.1%
based on dry sample weight

SIEVE ANALYSIS

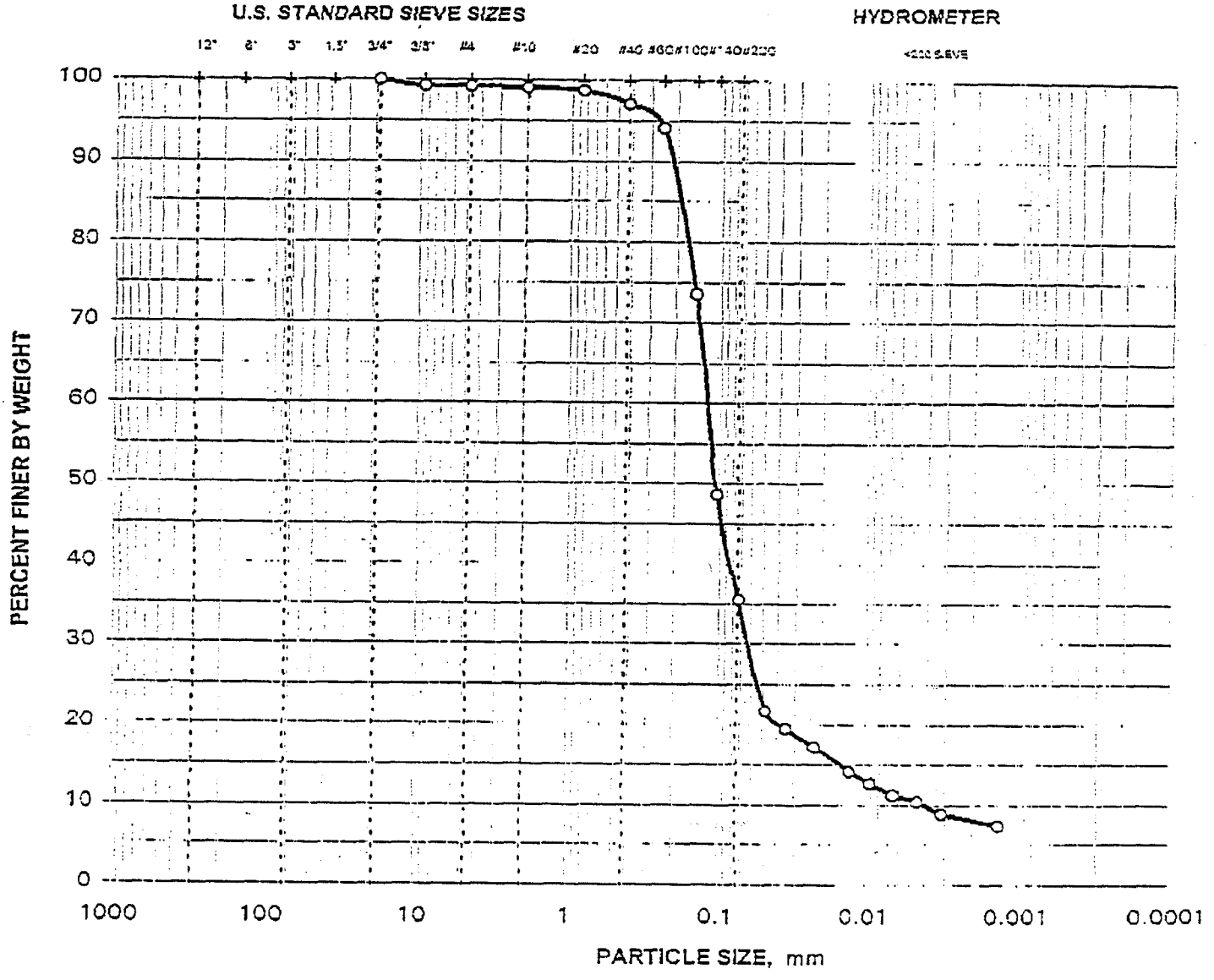
	Sieve No.	Diameter mm	Percent Finer
COARSE	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	100.0%
	0.375"	9.500	99.3%
	#4	4.750	99.2%
	#10	2.000	99.1%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	98.8%
	#40	0.425	97.2%
	#60	0.250	94.2%
	#100	0.149	73.5%
	#140	0.106	48.7%
	#200	0.075	35.6%

HYDROMETER ANALYSIS

	Diameter mm	Percent Finer
HYDROMETER		
	0.04851	21.7%
	0.03463	19.4%
	0.02207	17.2%
	0.01291	14.2%
	0.00918	12.7%
	0.00653	11.2%
	0.00464	10.5%
	0.00319	9.0%
	0.00135	7.5%

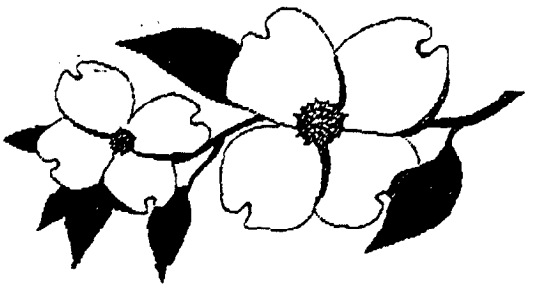
Site 85 DRMO



CLIENT SAMPLE NO.: TDL0855

IT LAB SAMPLE NO.: ETDC-8660

BOULDERS	COBBLES	GRAVEL		SAND			
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT 2 - 75 microns CLAY <2 microns



Technology Applications
304 Directors Drive
Knoxville, TN 37923
Phone: 865.690.3211
FAX 865.694.9573
IT CORPORATION
A member of the IT Group

Please note Area Code Changed from 423 to 865 November 1, 1999

F A C S I M I L E

To: JIM DUNN From: PAUL IBAR

910-457-1809

Fax Number: _____

Number of Pages: 2 (including cover sheet)

Date: 4/3/00

Remarks: JIM - HERE'S THE INFORMATION ON THE RECENT SAMPLE FROM SITE 89

Please Return to Sender

The information contained in and transmitted with this facsimile is intended only for the individual or entity designated above. If you have received this facsimile in error, please notify the sender immediately for instructions.

G:\FORMSFORMS\BLNKFXCV.DOC\MS\dh

Screening levels of Volatile Organics Prior to and After LTTD Treatment

Sample	Untreated				Treated at 225°F for 10 minutes residence time			
	PCA	PCE	TCE	VC	PCA	PCE	TCE	VC
	Concentration (mg/kg)							
A	3,405	92	21	<5	15.1	<0.05	<0.05	<0.05
B	12,510	102	222	<5	23.3	<0.05	<0.05	<0.05
C	2,783	9	35	<5	5.23	<0.05	<0.05	<0.05
D	3,185	11	44	<5	13.9	<0.05	0.91	<0.05
E	4,379	23	186	<5	11.6	<0.05	<0.05	<0.05
F	939	<5	21	<5	74.3	<0.05	<0.05	<0.05