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SECTION THREE

RESULTS FOR BASE-LINE AND 30 DAY CURE ANALYSES

SECTION THREE
RESULTS FOR BASE-LINE AND 30 DAY CURE ANALYSIS

A results summary for Base-Line and 30 Day Cure Treatability Study sampling activities conducted by Kiber and BNL is presented below in Sections 3.1 and 3.2, respectively. These data are further summarized in Tables 3-1 - 3-20. For comparison purposes, all sample data was compared to New York Department of Environmental Conservation (NYDEC) Cleanup Objective Standards and New Jersey Department of Environmental Protection (NJDEP) Non Residential Soil Cleanup standards. A discussion of the effectiveness of ACT reagent mixture SWT-25 (25% mixture) as a means of reducing chemical contamination in Newtown Creek sediment is presented in Section 4. Untreated sediment and 30 day cure analytical results are summarized in Tables 3-1 - 3-21.

3.1 UNTREATED SEDIMENT SAMPLE RESULTS SUMMARY

A summary of the contaminant nature for untreated Newtown Creek sediment is presented below by parameter group.

3.1.1 Untreated Sediment Total VOC and TCLP VOC Analysis

Acetone and Methylene Chloride were the only volatile organic compounds VOCs detected in untreated sediment by Kiber. Both compounds were detected at concentrations which exceeded respective NYDEC Standards. The concentration for methylene chloride in untreated sediment also exceeded the NJDEP Standard for this compound. Because these compounds are common laboratory contaminants, use of these data should be with caution. BNL did not submit untreated sediment for VOC laboratory analysis. A summary of untreated sediment sample VOC analysis data is presented in Table 3-1.

A review of TCLP VOC analysis of untreated sediment conducted by BNL indicates that VOCs were

Table 3-1

Total Volatile Organic Compounds
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters Total VOAs	NYDEC SOIL CLEANUP OBJECTIVE (ug/kg)	NJDEP Non Residential Soil Cleanup Standard : (ug/kg)	Kiber Untreated Rslts. (ug/kg)	SWT-25 30 DAY Cure (ug/kg)
(1) Acetone	200	1,000,000	1900 J	110
Benzene	60	13,000	<3,300	<24
Bromodichloromethane	NA	46,000	<3,300	<24
Bromoform	NA	370,000	<3,300	<24
Bromomethane	NA	1,000,000	<3,300	<24
2-Butanone (MEK)	300	1,000,000	<6,600	67
Carbon Disulfide	2,700	NA	<3,300	<24
Carbon Tetrachloride	600	4,000	<3,300	<24
Chlorobenzene	1,700	680,000	<3,300	<24
Chloroethane	1,900	NA	<6,600	<47
Chloroform	300	28,000	<3,300	<24
Chloromethane	NA	1,000,000	<6,600	<47
Dibromochloromethane	N/A	1,000,000	<3,300	<24
1,1-Dichloroethane	200	1,000,000	<3,300	<47
1,2-Dichloroethane	100	24,000	<3,300	<24
1,1-Dichloroethene	400	150,000	<3,300	<24
1,2-Dichloroethene	300	1,000,000	<3,300	<24
1,2-Dichloropropane	300	43,000	<3,300	<24
cis-1,3-Dichloropropene	NA	NA	<3,300	<24
trans-1,3-Dichloropropene	NA	NA	<3,300	<24
Ethylbenzene	5,500	1,000,000	<3,300	12J
2-Hexanone	NA	NA	<3,300	11J
(1) Methylene Chloride	100	210,000	6,600	190
4-Methyl-2-pentanone (MIBK)	1,000	1,000,000	<3,300	23J
Styrene	NA	97,000	<3,300	<24
1,1,2,2-Tetrachloroethane	600	NA	<3,300	<24
Tetrachloroethene	1,400	NA	<3,300	<24
Toluene	1,500	1,000,000	<3,300	100
1,1,1-Trichloroethane	800	1,000,000	<3,300	<24
1,1,2-Trichloroethane	NA	420,000	<3,300	<24
Trichloroethene (TCE)	700	54,000	<6,600	<47
Vinyl Acetate	NA	NA	<3,300	<24
Vinyl Chloride	200	7,000	<6,600	<47
Xylene (total)	1,200	1,000,000	<3,300	56

J = Estimated Value

1) = Values often represent laboratory contamination, and as such, should be considered with caution.

not detected. Base-line sample TCLP VOC analysis was not conducted by Kiber. A summary of untreated sediment sample TCLP VOC analysis data is presented in Table 3-2.

3.1.2 Untreated Sediment Total Semi-Volatile Organic Compounds (SVOC) and TCLP SVOC Analysis

BNL submitted untreated sediment samples for Total Semi-volatile organic compounds (SVOC) and Polyaromatic Hydrocarbon (PAH) analysis. However Kiber submitted untreated sediment for PAH analysis only. A discussion of untreated sediment sample PAH results is presented first, followed by the results for remaining Total SVOCs as sampled by BNL.

The PAH compounds Benzo(a)anthracene, Benzo(B)flouranthene, Benzo(k)flouranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene and chrysene were detected at concentrations which exceed NYDEC standards in the results for both Kiber and BNL analysis. Dibenzo(a,h)anthracene and Dibenzofuran were not detected, however method detection limits for these compounds exceeded NYDEC standards in the untreated sediment analysis results for BNL. All other PAH compounds were detected at concentrations below respective NYDEC standards where they exist. A summary of untreated sediment sample PAH SVOC analysis data is presented below and in Table 3-3.

Benzo(a)anthracene and Benzo(a)pyrene were the only PAH compounds to exceed NJDEP standards in both the Kiber and BNL samples. Benzo(b)flouranthene was detected above NJDEP in the untreated sediment analysis performed by Kiber. Benzo(k)flouranthene and Dibenzo(a,h)anthracene were not detected in the untreated sediment analysis performed by Kiber. However, the detection limits exceeded the NJDEP standards for these compounds. No other PAH compounds exceeded NJDEP standards in untreated samples submitted by Kiber and BNL.

Total SVOC compounds did not exceed NYDEC or NJDEP cleanup standards. A summary of untreated sediment total SVOC analysis results are presented in Table 3-4.

Table 3-2

Toxicity Characteristics Leaching Procedure Total Volatile Organic Compounds
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters (TCLP) VOAs	RCRA Non-Hazardous Standard (mg/l)	Brookhaven Untreated Results (mg/l)	Brookhaven Treated Results (mg/l)	SWT-25 30 DAY Cure (mg/l)
Benzene	< 0.5	<0.20000	<0.20000	<0.0050
Carbon Tetrachloride	< 0.5	<0.20000	<0.20000	<0.0050
Chlorobenzene	< 100	<0.20000	<0.20000	<0.0050
1,4-Dichlorobenzene	< 7.5	<0.20000	<0.20000	NA
1,2-dichloroethane	< 0.5	<0.20000	<0.20000	<0.0050
1,1-Dichloroethene	NA	<0.20000	<0.20000	<0.0050
Methyl ethyl ketone	< 200	<5.00000	<5.00000	0.046
Tetrachloroethene	NA	<0.20000	<0.20000	<0.0050
Vinyl Chloride	< 0.2	<0.10000	<0.10000	<0.010

NA = Not Available

Table 3-3

Polyaromatic Hydrocarbon Semivolatile Organic Hydrocarbon Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters	NYDEC SOIL CLEANUP OBJECTIVE (ug/kg)	NJDEP Non Residential Soil Cleanup Standard : (ug/kg)	RFP Results (ug/kg)	Brookhaven Untreated Results Average (ug/kg)	Brookhaven Treated Results Average (ug/kg)	Kiber Untreated Results (ug/kg)	SWT-25 30 Day Cure (ug/kg)
Total PAH'S							
Acenaphthene	50,000	10,000,000	750	1,042.33	569.10	2,500J	300J
Acenaphthylene	41,000	NSE	1,670	1,288.50	1,450.95	< 27,000	230J
Anthracene	50,000	10,000,000	5,820	3,702.17	2,677.90	7,600J	1,100J
Benzo(a)anthracene	224*	4,000	6,190	4,484.17	3,576.80	8,500J	1,600J
Benzo(b)fluoranthene	1,100	4,000	5,480	2,922.17	3,237.15	8,100J	1,300J
Benzo(k)fluoranthene	1,100	4,000	1,660	1,107.33	1,172.30	< 27,000	760J
Benzo(g,h,i)perylene	50,000	NSE	1,600	1,254.33	406.15	< 27,000	540J
Benzo(a)pyrene	61*	660	3,390	2,550.83	2,067.50	5,000J	1,000J
Chrysene	400	40,000	6,050	4,564.33	4,281.35	7,300J	1,800
Dibenzo(a,h)anthracene	14*	660	560	397.00	84.60	< 27,000	< 1,800
Dibenzofuran	6,200	NSE		1,172.00	574.50	< 27,000	220J
Fluoranthene	50,000	10,000,000	9,570	10,323.67	8,811.90	20,000J	3,800
Fluorene	50,000	10,000,000	880	1,389.17	899.95	3,200J	< 1,800
Indeno(1,2,3-cd)pyrene	3,200	4,000	1,870	1,075.67	718.70	2,400J	< 1,800
2-Methylnaphthalene	36,400	NSE		2,304.00	526.45	2,000J	320J
Naphthalene	13,000	4,200,000	2,140	2,728.67	549.70	2,300J	330J
Phenanthrene	50,000	NSE	3,080	6,586.00	4,849.35	13,000J	2,500
Pyrene	50,000	10,000,000	8,670	7,101.67	5,643.40	19,000J	3,400

J = Estimated Value
 * = or MDL
 NSE=No Standard Established

Table 3-4

Total Semivolatile Organic Compounds Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters SEMI-VOAs	NJDEP Non Residential Soil Cleanup Standard : (ug/kg)	Brookhaven Untreated Results Ave. (ug/kg)	Brookhaven Treated Results Ave. (ug/kg)
Phenol	10,000,000	638.00	570.30
bis(2-Chloroethyl)ether	3,000	754.50	926.00
2-Chlorophenol	5,200,000	691.67	934.85
1,3-Dichlorobenzene	10,000,000	507.33	810.15
1,4-Dichlorobenzene	10,000,000	517.00	776.25
1,2-Dichlorobenzene	10,000,000	573.67	858.00
Benzyl Alcohol	10,000,000	1,378.33	2,757.85
2,2'-oxybis(1-Chloropropane)	NA	864.17	833.40
2-Methylphenol	10,000,000	875.50	1,059.15
3/4-Methylphenol	10,000,000	1,389.67	1,064.50
N-Nitroso-di-n-propylamine	600,000	1,091.50	1,253.00
Hexachloroethane	100,000	1,243.83	1,324.00
Nitrobenzene	50,000	570.83	847.95
Isophorone	10,000,000	334.99	495.50
2-Nitrophenol	NA	1,054.67	1,852.00
2,4-Dimethylphenol	10,000,000	717.17	1,004.00
bis(2-Chloroethoxy)methane	NA	631.83	930.30
Benzoic acid	NA	1,335.17	1,479.75
2,4-dichlorophenol	3,100,000	884.33	1,206.40
1,2,4-Trichlorobenzene	1,200,000	829.17	928.00
Naphthalene	4,200,000	2,728.67	549.70
4-Chloroaniline	4,200,000	1,002.83	806.75
Hexachlorobutadiene	210,000	711.33	1,047.95
4-Chloro-3-methylphenol	NA	839.17	1,518.00
2-Methylnaphthalene	NA	2,304.00	526.45
Hexachlorocyclopentadiene	7,300,000	668.33	1,053.50
2,4,6-Trichlorophenol	270,000	843.17	1,673.00
2,4,5-Trichlorophenol	10,000,000	796.00	925.40
2-Chloronaphthalene	NA	369.67	616.50
2-Nitroaniline	NA	1,092.17	2,546.00
Dimethylphthalate	10,000,000	312.17	625.50
2,6-Dinitrotoluene	NA	1,388.00	3,082.50
2,4-Dinitrotoluene	NA	1,011.68	1,985.10
Acenaphthylene	NA	1,288.50	1,450.95
3-Nitroaniline	NA	1,350.33	3,411.30
Acenaphthene	10,000,000	1,042.99	569.10
2,4-Dinitrophenol	2,100,000	2,467.33	5,055.55
4-Nitrophenol	NA	1,618.17	1,889.05
Dibenzofuran	NA	1,172.00	574.50
Diethylphthalate	10,000,000	276.17	571.75
4-Chlorophenyl-phenylether	NA	540.33	995.35
Fluorene	10,000,000	1,389.17	899.95
4-Nitroaniline	NA	1,319.00	2,202.90
4,6-Dinitro-2-methylphenol	NA	1,731.33	2,364.35
N-Nitrosodiphenylamine	600,000	583.17	970.10
4-Bromophenyl-phenylether	NA	1,016.17	1,993.90

NA = Not Available

Table 3-4 (Continued)

Total Semivolatile Organic Compounds Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters SEMI-VOAs	NJDEP Non Residential Soil Cleanup Standard : (ug/kg)	Brookhaven Untreated Results Ave. (ug/kg)	Brookhaven Treated Results Ave. (ug/kg)
Hexachlorobenzene	2,000	779.000	1,369.23
Pentachlorophenol	24,000	1038.830	2,174.25
Penanthrene	NA	6566.000	4,849.35
Anthracene	170	3,702.17	2,677.90
Di-n-butyl phthalate	10,000,000	1,226.60	548.95
Fluranthene	10,000,000	10,323.67	8,811.90
Pyrene	10,000,000	7,101.67	5,643.40
ButylBenzylphthalate	10,000,000	1,473.17	666.15
3,3'-Dichlorobenzidine	NA	287.67	442.15
bis-2-ethylhexylphthalate	NA	48,830.83	27,248.65
Benzo(a)anthracene	4,000	4,484.17	3,576.80
Chrysene	40,000	4,564.99	4,281.35
Di-n-octylphthalate	10,000,000	NA	73.25
Benzo(b)fluoranthene	NA	2,922.17	3,237.15
Benzo(k)fluoranthene	4,000	1,107.33	1,172.30
Benzo(a)pyrene	660	2,550.83	2,067.50
Indeno(1,2, 3-cd)pyrene	4,000	1,075.67	718.70
Dibenz(a,h)anthracene	660	397.00	84.60
Benzo(ghi)perylene	NA	1,254.33	406.15
Benzo(e)pyrene	NA	2,125.50	1,894.10
Perylene	NA	948.50	622.60
TOTAL SEMIVOA's	-----	24,653,107.54	21,366,877.92

NA = Not Available

Neither PAHs nor SVOCs were detected in the results for TCLP analysis conducted by BNL. Untreated TCLP sediment analysis was not conducted by Kiber. A summary of untreated sediment sample total SVOC TCLP and PAH SVOC analysis data is presented in Tables 3-5 and 3-6, respectively.

3.1.3 Untreated Sediment Total Pesticides and TCLP Pesticides Analysis

The results for Kiber pesticides analysis detected only 4,4'-DDD (140 µg/kg) at a concentration below NYDEC and NJDEP standards. The pesticide compounds Dieldrin, 4,4'-DDD, Aldrin and 4,4'-DDE were detected in the untreated sample analyzed by BNL. The results for Dieldrin and Aldrin in the BNL sample exceed respective NYDEC standards. However, the results for these compounds did not exceed NJDEP standards. A summary of untreated sediment sample pesticides analysis data is presented in Table 3-7.

Pesticides were not detected in the results for untreated sediment TCLP pesticides analysis conducted by BNL. Untreated sediment TCLP pesticides analysis was not conducted by Kiber. A summary of untreated sediment sample TCLP pesticides analysis data is presented in Table 3-8.

3.1.4 Untreated Sediment Total Herbicides and TCLP Herbicides Analysis

Herbicide compounds were not detected in the results for either Kiber or BNL analysis. A summary of untreated sediment sample herbicides analysis data is presented in Table 3-9.

Herbicides were not detected in the results for untreated sediment TCLP herbicides analysis conducted by BNL. Untreated sediment TCLP herbicides analysis was not conducted by Kiber. A summary of untreated sediment sample TCLP herbicides analysis data is presented in Table 3-10.

Table 3-5

Toxicity Characteristics Leaching Procedure Semivolatile Organic Compounds Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters SEMI-VOAs (TCLP)	RCRA Non-Hazardous Standard (mg/l)	Brookhaven Untreated Results Ave. (mg/l)	Brookhaven Treated Results Ave. (mg/l)	SWT-25 30 Day Cure (mg/l)
Hexachloroethane	3.00	<0.10000	<0.10000	<0.0067
Nitrobenzene	2.00	<0.10000	<0.10000	<0.0067
hexachlorobutadiene	0.50	<0.10000	<0.10000	<0.0067
2,4-Dinitrotoluene	0.13	<0.10000	<0.10000	<0.0067
Hexachlorobenzene	0.13	<0.10000	<0.10000	<0.0067
2,4,6-Trichlorophenol	2.00	<0.10000	<0.10000	<0.0067
2,4,5-Trichlorophenol	400.00	<0.10000	<0.10000	<0.0067
Pentachlorophenol	100.00	<0.25000	<0.25000	<0.0067
Pyridine	5.00	<0.25000	<0.25000	<0.0067
o-Cresol	200.00	<0.10000	<0.10000	<0.0067
m,p-Cresols	200.00	<0.10000	<0.10000	0.01
Total Cresols	200.00	<0.10000	<0.10000	0.01

NA = Not Available

Table 3-6

Toxicity Characteristics Leaching Procedure PAH-SVOC Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters TCCLP PAH'S	RCRA Non-Hazardous Standard (mg/l)	Brookhaven Untreated Results Average (mg/l)	Brookhaven Treated Results Average (mg/l)	SWT-25 30 Day Cure (mg/l)
Naphthalene	NA	<0.10000	<0.10000	0.0023J
2-Methylnaphthalene	NA	<0.10000	<0.10000	0.0013J
Acenaphthylene	NA	<0.10000	<0.10000	<0.0067
Acenaphthene	NA	<0.10000	<0.10000	0.0012J
Dibenzofuran	NA	<0.10000	<0.10000	<0.0067
Fluorene	NA	<0.10000	<0.10000	<0.0067
Phenanthrene	NA	<0.10000	<0.10000	<0.0067
Anthracene	NA	<0.10000	<0.10000	<0.0067
Fluoranthene	NA	<0.10000	<0.10000	<0.0067
Pyrene	NA	<0.10000	<0.10000	<0.0067
Benzo(a)anthracene	NA	<0.10000	<0.10000	<0.0067
Chrysene	NA	<0.10000	<0.10000	<0.0067
Benzo(b)floranthene	NA	<0.10000	<0.10000	<0.0067
Benzo(k)fluranthene	NA	<0.10000	<0.10000	<0.0067
Benzo(a)pyrene	NA	<0.10000	<0.10000	<0.0067
Indeno(123-cd)pyrene	NA	<0.10000	<0.10000	<0.0067
Dibenz(a,h)anthracene	NA	<0.10000	<0.10000	<0.0067
Benzo(ghi)perylene	NA	<0.10000	<0.10000	<0.0067

J = Estimated Value

Table 3-7

Total Pesticide Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters	NYDEC SOIL CLEANUP OBJECTIVE (ug/kg)	NJDEP Non Residential Soil Cleanup Standard (ug/kg)	RFP Results (ug/kg)	Brookhaven Untreated Results Average (ug/kg)	Brookhaven Treated Results Average (ug/kg)	Kiber Untreated Results (ug/kg)	SWT-25 30 Day Cure (ug/kg)
Total Pesticides							
alpha-BHC	110	NA	NA	<14.47	<27.35	< 200	<53
gamma-BHC (Lindane)	60	NA	ND	<14.47	<27.35	< 200	<53
Heptachlor	100	650	ND	<14.47	<27.35	< 400	<53
Endosulfan I	900	310,000	ND	<14.47	<27.35	< 990	<53
Endrin	100	1,000,000	NA	<28.90	<54.70	< 400	<110
Dieldrin	44	180	35.71	74.45	<54.70	< 200	<110
4,4'- DDD	2,900	12,000	120.57	162.10	580.30	140J	<110
4,4' - DDT	2,100	9,000	ND	<28.90	96.80	< 400	<110
Methoxychlor	***	5,200,000	NA	<144.59	<273.50	< 600	<530
beta-BHC	200	NA	NA	<14.47	<27.35	< 200	<53
delta-BHC	300	NA	NA	<14.47	<27.35	< 200	<53
Aldrin	41	NA	ND	75.02	<27.35	< 200	<53
Heptachlor epoxide	20	NA	ND	<14.47	<27.35	< 400	<53
4,4' -DDE	2,100	NA	63.43	150.57	265.40	< 400	<110
Endosulfan II	900	NA	35.38	<28.90	<54.70	< 990	<110
Endrin aldehyde	NA	NA	NA	<28.90	<54.70	< 400	<110
Endosulfan sulfate	1,000	NA	23.75	<28.90	<54.70	< 990	<110
Endrin Ketone	N/A	NA	NA	NA	NA	< 400	<110
alpha-Chlordane	540	NA	51.94	<14.47	42.25	< 1,000	<53
gamma-chlordane	540	NA	NA	<14.47	<27.35	< 1,000	<53
Toxaphene	NA	200	NA	<1445.15	<2735.00	< 4,000	<2,700
TOTAL PESTICIDES				462.14	984.75		

NA = Not Available
 *** = Total Pesticides <10 mg/kg
 J = Estimated Value
 ND = Non-Detect

Table 3-8

Toxicity Characteristics Leaching Procedure Pesticides Analysis
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters TCLP Pesticides	RCRA Non-Hazardous Standard (mg/l)	Brookhaven Untreated Results Average (mg/l)	Brookhaven Treated Results Average (mg/l)	Kiber Treated Results (mg/l)
Chlorodane	< 0.03	<0.00500	<0.00500	<0.00013
Endrin	< 0.02	<0.00050	<0.00050	<0.00027
Heptachlor	< 0.008	<0.00050	<0.00050	<0.00013
Heptachlor epoxide	NA	<0.00050	<0.00050	<0.00013
Lindane	< 0.4	<0.00050	<0.00050	<0.00013
Methoxychlor	< 10.0	<0.00100	<0.00100	<0.00130
Toxaphene	< 0.5	<0.01000	<0.01000	<0.00670

NA = Not Available

Table 3-9

Total Furans Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters	NYDEC SOIL CLEANUP OBJECTIVE (ug/kg)	NJDEP Non Residential Soil Cleanup Standard (ug/kg)	RFP Results (ug/kg)	Brookhaven Untreated Results (ug/kg)	Brookhaven Treated Results (ug/kg)	Kiber Untreated Results (ug/kg)	SWT-25 30 Day Cure (ug/kg)
Total Herbicides	500	3,100,000	NA	<200	<200	<165	<170
2,4-D	NA	NA	NA	NA	NA	<610	<17
2,4-DB	700	NA	NA	<50	<50	<134	<1.3
2,4,5-TP (Silvex)	1,900	10,000,000	NA	<50	<50	<330	<330
2,4,5-T	NA	NA	NA	NA	NA	<3,886	<83
Dalapon	NA	NA	NA	NA	NA	<181	<26
Dicamba	NA	NA	NA	NA	NA	<436	<17
Dichloroprop	NA	NA	NA	NA	NA	<47	<130
Dinoseb	NA	NA	NA	NA	NA	<167,000	<1,700
MCPA	NA	NA	NA	NA	NA	<129,000	<2,300
MCPP	NA	NA	NA	NA	NA		

Table 3-10

Toxicity Characteristics Leaching Procedure Herbicides Analysis
BREP Bench-Scale Treatability Study
MARCOR Environmental Services, Inc.

Analytical Parameters TCLP Herbicides	Brookhaven Untreated Results (ug/l)	Brookhaven Treated Results (ug/l)	SWT-25 30 Day Cure (ug/l)
2, 4-D	<100.00	<100.00	<0.05
2, 4, 5-TP (Silvex)	<10.00	<10.00	<0.10

3.1.5 Untreated Sediment Total PCB and TCLP PCB Analysis

All PCBs, with the exception of 33' 44' 55'-Hexa were detected in the results for BNL untreated sediment analysis. The total PCB concentration detected was well below the NJDEP standard of 2000 $\mu\text{g}/\text{kg}$ for total PCBs. Because the Kiber results did not report PCBs results on a compound specific basis (Kiber data report PCBs as Aroclors only), these results are not included in this report. A summary of untreated sediment sample PCB analysis data is presented in Table 3-11.

All PCB compounds with the exception of 33' 44' 5-Penta, 33' 44' 55' Hexa, and 22' 33' 44' 55' 6 Nona were detected in the BNL TCLP results. A total TCLP PCBs concentration of 0.04443 $\mu\text{g}/\text{l}$ is reported in the BNL results. A summary of untreated sediment sample TCLP PCB analysis data is presented in Table 3-12.

3.1.6 Untreated Sediment Total Dioxins and TCLP Dioxins Analysis

All dioxin compounds (with the exception of 1,2,3,6,7,8-HxCDD which was not detected in the Kiber untreated sample) were detected in untreated samples analyzed by Kiber and BNL. Dioxin sample concentrations ranged between 41.25 pg/g for 2,3,7,8-TCDD (BNL sample) and 17,463.33 pg/g for 1,2,3,4,6,7,8,9-OCDD (BNL sample). In general, total detected dioxin values in the Kiber and BNL samples were similar (26,820 pg/g [Kiber] versus 26,529.16 pg/g [BNL]). On a compound by compound basis, however, appreciable differences were noted in the results for both laboratories. There are no established NYDEC or NJDEP standards for these compounds. A summary of untreated sediment sample dioxins analysis data is presented in Table 3-13.

The dioxin compounds 1,2,3,4,6,7,8-HpCDD and 1,2,3,4,6,7,8,9-OCDD were detected in the TCLP results for untreated sediment by BNL. The total dioxin concentration was 0.03786 ng/l . No RCRA standard has been established for dioxins. Untreated sediment TCLP dioxins analysis was not conducted by Kiber. A summary of untreated sediment TCLP dioxins analysis data is presented in

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Table 3-11

Polychlorinated Biphenyl Analyses
BREP Bench-Scale Treatability Study
MARCOR Environmental Services, Inc.

Analytical Parameters PCBs	Brookhaven Untreated Results (ug/kg)	Brookhaven Treated Results (ug/kg)
2-Mono	57.33	2-Mono
44'-Di	64.67	73.80
244'-Tri	168.17	129.00
22' 55'-Tetra	269.33	120.20
33' 44'-Tetra	13.83	19.40
2344' 5-Penta	6.00	7.65
233' 44'-Penta	66.67	76.30
33' 44' 5-Penta	0.50	1.30
233' 44' 5-Hexa	17.12	18.50
33' 44' 55'-Hexa	<0.50	0.09
22' 344' 55' -Hepta	73.37	91.25
22' 33' 44' 55' -Octa	17.17	20.30
22' 33' 44' 55' 6-Nona	11.93	11.00
Deca	7.20	8.15
TOTAL PCB ANALYSIS	773.29	576.94

Table 3-12

Toxicity Characteristics Leaching Procedure Polychlorinated Biphenyl Analysis
BREP Bench-Scale Treatability Study
MARCOR Environmental Services, Inc.

Analytical Parameters PCBs	Brookhaven Untreated Results (ug/l)	Brookhaven Treated Results (ug/l)
2-Mono	0.02803	0.01650
44'-Di	0.00342	0.00700
244'-Tri	0.00583	0.01350
22' 55'-Tetra	0.00307	0.01045
33' 44'-Tetra	0.00024	0.00152
2344' 5-Penta	0.00012	0.00200
233' 44'-Penta	0.00108	0.00453
33' 44' 5-Penta	<0.00004	0.00020
233' 44' 5-Hexa	0.00031	0.00300
33' 44' 55'-Hexa	<0.00006	<0.00017
22' 344' 55' -Hepta	0.00194	0.01700
22' 33' 44' 55' -Octa	0.00039	0.00400
22' 33' 44' 55' 6-Nona	<0.00019	0.00200
Deca	<0.00014	0.00200
TOTAL PCB ANALYSIS	0.04443	0.08370

Table 3-13

Total Dioxins Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters	NYDEC SOIL CLEANUP OBJECTIVE (pg/g)	NJDEP Non Residential Soil Cleanup Standard : (pg/g)	RFP Results (pg/g)	Brookhaven Untreated Results Average (pg/g)	Brookhaven Treated Results Average (pg/g)	Kiber Untreated Rslts. (pg/g)	SWT-25 30 Day Cure (pg/g)
** 2,3,7,8-TCDD	N/A	NA	9.83	41.52	17.25	80	<150
1,2,3,7,8-PeCDD	NA	NA	28.3	60.15	61.10	120	<1,040
1,2,3,6,7,8-HxCDD	NA	NA	97.7	141.67	352.00	<100	<224
1,2,3,4,7,8-HxCDD	NA	NA	36.9	49.22	157.00	150	<74.8
1,2,3,7,8,9-HxCDD	NA	NA	96.4	133.60	255.50	250	<224
1,2,3,4,6,7,8-HpCDD	NA	NA	2,133	2,091.67	2,745.00	1,650	2,250
1,2,3,4,6,7,8,9-OCDD	NA	NA	15,369	17,463.33	14,270.00	19,000	16,400
Total TCDD	NA	NA	NA	246.10	158.00	350	<150
Total PeCDD	NA	NA	NA	378.17	521.50	940	<1,040
Total HxCDD	NA	NA	NA	1,370.00	4,100.00	750	3,070
Total HpCDD	NA	NA	NA	4,450.00	8,875.00	3,530	8,050
Total (all)	NA	NA	269	26,529.16	31,512.35	2,040	11,120

** NOTE :

TCDD = tetrachlorodibenzo-p-dioxin
 PeCDD = Pentachlorodibenzo-p-dioxin
 HxCDD = Hexachlorodibenzo-p-dioxin
 HpCDD = Heptachlorodibenzo-p-dioxin
 OCDD = Octachlorodibenzo-p-dioxin
 N/A = Not Available

Table 3-14.

3.1.7 Untreated Sediment Total Furans and TCLP Furans Analysis

All furan compounds (with the exception of 2,3,4,6,7,8-HxCDF which was not detected in the Kiber untreated sample) were detected in the untreated samples analyzed by Kiber and BNL. Concentrations ranged between 23.23 ng/kg for 1,2,3,7,8,9-HxCDF (BNL sample) and 4,968.33 ng/kg for 1,2,3,4,6,7,8-HpCDF (BNL sample). The total detected furan concentration for the Kiber sample was somewhat greater than the result for BNL (36,450 ng/kg [Kiber] versus 28,724.3 ng/kg [BNL]). There are no established NYDEC or NJDEP standards for these compounds. A summary of untreated sediment sample furans analysis data is presented in Table 3-15.

The furan compounds 1,2,3,4,7,8-HxCDF, 2,3,4,6,7,8-HxCDF and 1,2,3,4,6,7,8-HpCDF were detected in the BNL TCLP results for untreated sediment. The total detected furan concentration was 0.0385 ng/l. No RCRA standard has been established for furans. Untreated sediment TCLP furans analysis was not conducted by Kiber. A summary of untreated sediment sample TCLP furans analysis data is presented in Table 3-16.

3.1.8 Untreated Sediment Total TAL Metals and TCLP Metals Analysis

A review of Kiber and BNL untreated sediment TAL metals results report the presence of numerous metal analytes at concentrations which exceed NYDEC and/or NJDEP standards (Table 3-17). The following metal analytes were detected in untreated sediment by BNL, but not Kiber: Sb, Ag, Be, Cd, As, Tl. With the exception of iron and aluminum which were detected at high concentrations in the results for the Kiber sample, but not requested for analysis by BNL, the results for BNL analyses, in general, were higher than those for Kiber on an element by element basis. A summary of untreated sediment sample metals analysis data is presented in Table 3-18.

Table 3-14

Toxicity Characteristics Leaching Procedure Dioxins Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters TCLP Dioxins	RCRA Non-Hazardous Standard (ng/l)	Brookhaven Untreated Results (ng/l)	Brookhaven Treated Results Average (ng/l)
** 2,3,7,8-TCDD	NA	<0.00317	<0.00600
1,2,3,7,8-PeCDD	NA	<0.00717	<0.01150
1,2,3,6,7,8-HxCDD	NA	<0.00600	<0.01100
1,2,3,4,7,8-HxCDD	NA	<0.00700	<0.01100
1,2,3,7,8,9-HxCDD	NA	<0.00617	<0.01050
1,2,3,4,6,7,8-HpCDD	NA	0.00687	0.00900
1,2,3,4,6,7,8,9-OCDD	NA	0.03099	<0.02050
Total TCDD	NA	<0.00317	<0.00600
Total PeCDD	NA	<0.00717	<0.01150
Total HxCDD	NA	<0.00617	<0.01100
Total HpCDD	NA	<0.01167	0.02200
Total (All)	NA	0.03786	0.03100

** NOTE :

TCDD = tetrachlorodibenzo-p-dioxin
 PeCDD = Pentachlorodibenzo-p-dioxin
 HxCDD = Hexachlorodibenzo-p-dioxin
 HpCDD = Heptachlorodibenzo-p-dioxin
 OCDD = Octachlorodibenzo-p-dioxin
 N/A = Not Available

Table 3-15
 Total Furans Analyses
 BRP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters	NYDEC SOIL CLEANUP OBJECTIVE (pg/g)	NJDEP Non Residential Soil Cleanup Standard : (pg/g)	RFP Results (pg/g)	Brookhaven Untreated Results (Average) (pg/g)	Brookhaven Treated Results (Average) pg/g	Kiber Untreated Rstts. (pg/g)	SWT-25 30-Day Cure (pg/g)
** 2,3,7,8-TCDF	NA	NA	129.9	340.00	142.50	380	<128
1,2,3,7,8-PeCDF	NA	NA	111.9	310.83	128.50	400	<502
2,3,4,7,8-PeCDF	NA	NA	78.9	146.40	71.60	180	<609
1,2,3,6,7,8-HxCDF	NA	NA	141.5	464.00	198.50	2,420	<107
1,2,3,7,8,9-HxCDF	NA	NA	95.2	23.23	13.15	700	<171
1,2,3,4,7,8-HxCDF	NA	NA	398.4	1,303.33	567.00	270	<107
2,3,4,6,7,8-HxCDF	NA	NA	5.93	184.33	142.00	< 100	<267
1,2,3,4,6,7,8-HpCDF	NA	NA	1,844	4,968.33	2,060.00	5,150	2,250
1,2,3,4,7,8,9-HpCDF	NA	NA	71.4	110.52	45.20	100	<32.1
1,2,3,4,6,7,8,9-OCDF	NA	NA	1,170	4,418.33	1,385.00	4,190	1,450
Total TCDF	NA	NA	NA	2,371.67	1,145.00	2,730	445
Total PeCDF	NA	NA	NA	2,853.33	1,475.00	4,560	920
Total HxCDF	NA	NA	NA	5,175.00	2,220.00	9,360	1,310
Total HpCDF	NA	NA	NA	6,068.33	2,500.00	6,010	2,250
Total (All)	NA	NA	2203.1	16,468.33	7,340.00	22,660	4,925

** NOTE :

TCDF = Tetrachlorodibenzofuran
 PeCDF = Pentachlorodibenzofuran
 HxCDF = Hexachlorodibenzofuran
 HpCDF = Heptachlorodibenzofuran
 OCDF = Octachlorodibenzofuran
 NA = Not Available

Table 3-16

Total Dioxins Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters TCLP Furans	RCRA Non-Hazardous Standard (ng/l)	Brookhaven Untreated Results (Average) ng/l	Brookhaven Treated Results (Average) ng/l
** 2,3,7,8-TCDF	NA	<0.00233	<0.00500
1,2,3,7,8-PeCDF	NA	<0.00417	<0.00700
2,3,4,7,8-PeCDF	NA	<0.00400	<0.00650
1,2,3,6,7,8-HxCDF	NA	<0.00317	<0.00750
1,2,3,7,8,9-HxCDF	NA	<0.00467	<0.01000
1,2,3,4,7,8-HxCDF	NA	0.00533	<0.00950
2,3,4,6,7,8-HxCDF	NA	0.00467	0.00650
1,2,3,4,6,7,8-HpCDF	NA	0.00825	<0.00800
1,2,3,4,7,8,9-HpCDF	NA	<0.00650	<0.01100
1,2,3,4,6,7,8,9-OCDF	NA	<0.00883	<0.01650
Total TCDF	NA	<0.00233	<0.00500
Total PeCDF	NA	<0.00400	<0.00650
Total HxCDF	NA	0.01100	0.00800
Total HpCDF	NA	0.00925	<0.00900
Total (All)	NA	0.02025	0.00800

** NOTE :

TCDF = Tetrachlorodibenzofuran
 PeCDF = Pentachlorodibenzofuran
 HxCDF = Hexachlorodibenzofuran
 HpCDF = Heptachlorodibenzofuran
 OCDF = Octachlorodibenzofuran
 NA = Not Available

Table 3-17

Untreated Sediment Sample Metal Concentrations Which Exceed State Standards
BREP Bench-Scale Treatability Study
MARCOR Environmental Services, Inc.

Kiber Untreated Sediment		Brookhaven Untreated Sediment	
Exceeds NYDEC Cleanup Objective Standard	Exceeds NJDEP Non Residential Cleanup Standard	Exceeds NYDEC Cleanup Objective Standard	Exceeds NJDEP Non Residential Cleanup Standard
Cr, Cu, Fe, Hg, Ni, Se, Zn	Cu, Zn	As, Be, Cd, Cr, Cu, Hg, Ni, Se, Zn	As, Cu, Pb, Tl, Zn

Total Target Analyte List (TAL) Metal Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Table 3-18

Analytical Parameters	NYDEC SOIL CLEANUP OBJECTIVE (mg/kg)	NJDEP Non Residential Soil Cleanup Standard : (mg/kg)	RFP Results (mg/kg)	Brookhaven Untreated Results Average (mg/kg)	Brookhaven Treated Results Average (mg/kg)	Kiber Untreated Results (mg/kg)	SWT-25 30 Day Cure (mg/kg)
Total TAL Metals							
Aluminum	SB	NA	NA	NA	NA	17,000	14,000
Antimony	SB	340	NA	10.29	3.19	< 0.35	<0.37
Arsenic	7.5 or SB	2	5-33	33.48	17.95	< 1.1	<0.38
Barium	300 or SB	47,000	NA	NA	NA	210	180
Beryllium	0.16 or SB	1	NA	0.56	0.18	< 0.22	<0.23
Cadmium	1 or SB	100	1-20	37.05	13.90	< 0.75	19
Calcium	SB	NA	NA	NA	NA	9,800	95,000
Chromium	10 or SB	NA	305	376.67	159.50	340	180
Cobalt	30 or SB	NA	NA	NA	NA	15	10
Copper	25 or SB	600	61-770	1,171.67	437.50	1,000	540
Iron	2,000 or SB	NA	NA	NA	NA	31,000	23,000E
Lead	SB	600	68-554	617.00	280.00	560	300
Magnesium	SB	NA	NA	NA	NA	9,000	12,000E
Manganese	SB	NA	NA	NA	NA	310	730
Mercury	0.10	270	1-3	1.29 (Total)	1.29	3.1J	1.5
Nickel	13 or SB	2,400	12-140	297.50	124.50	260	140
Potassium	SB	NA	NA	NA	NA	5,100	3,000
Selenium	2 or SB	3,100	NA	3.24	2.37	25	<0.14
Silver	SB	4,100	2-3	18.42	7.11	< 0.41	8.1
Sodium	SB	NA	NA	NA	NA	14,000	10,000
Thallium	SB	2	NA	2.77	1.72	< 1.0	<0.36
Vanadium	150 or SB	7,100	NA	NA	NA	74	51
Zinc	20 or SB	1,500	104-1260	1,725.00	689.50	1,600	1,300
TOTAL METALS				4293.65	1738.71		

SB = Site Background
 E = Concentration exceeded calibration range
 NA = Not Available

Chromium was the only metal detected in the results for BNL TCLP analysis. A chromium concentration of 0.02833 mg/l was detected in the sample. The RCRA Non Hazardous TCLP standard for this element is 5 mg/l. Kiber did not perform an untreated sediment TCLP metals analysis. A summary of untreated sediment sample TCLP metals analysis data is presented in Table 3-19.

3.1.9 Untreated Sediment Physical Properties Analysis

Physical parameter testing was conducted by Kiber and BNL prior to treatment to determine the raw physical nature of Newtown Creek sediment. Moisture content (dry weight basis), bulk density and bulk specific gravity was analyzed by Kiber; total organic carbon, total solids, sulfides, reactive cyanide were analyzed by Brookhaven. pH was measured by both laboratories. A comparison of untreated sediment versus 30 day cure physical properties results is presented in Section 3.2.9.

Table 3-19

Toxicity Characteristics Leaching Procedure Metal Analyses
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

TCLP Metal Analyses	RCRA Non-Hazardous TCLP Standard (mg/l)	Brookhaven Untreated Results Average (mg/l)	Brookhaven Treated Results Average (mg/l)	SWT-25 30 Day Cure (mg/L)
Arsenic	5	<0.10000	<0.10000	<0.23
Barium	100	<0.50000	0.70000	0.28
Cadmium	1	<0.01000	0.40500	<0.02
Chromium	5	0.02833	0.33500	0.01J
Lead	5	<0.05000	0.23000	<0.17
Mercury	0	<0.00100	0.02600	0.006
Selenium	1	<0.10000	<0.10000	0.15
Silver	5	<0.01000	0.04000	0.08

3.2 30 DAY CURE SAMPLE RESULTS SUMMARY

A summary of results for the 30 day cure of ACT (SWT-25, 25% mixture) treated sediment is presented below. All comparisons are presented to reflect the performance of the ACT chemical fixation treatment against untreated sediment sample results presented above in Section 3.1.

3.2.1 Total VOC and TCLP VOC 30 Day Cure Analysis

Low levels of Acetone, 2-Butanone, Ethylbenzene, 2-Hexanone, Methylene Chloride, 4-Methyl-2-pentanone, Toluene and Xylenes were detected in the results for treated sample analysis conducted by Kiber. With the exception of acetone and methylene chloride which are common laboratory contaminant compounds, all other above referenced compounds were not detected in the untreated sample. The reason for these results has not been determined. A summary of 30 day cure sediment sample VOC analysis data is presented in Table 3-1.

Volatile organic compounds were not detected in the results for BNL TCLP analysis. The VOC compound Methyl Ethyl Ketone was detected at a low concentration well below TCLP regulatory standards in the Kiber results. A summary of 30 day cure sediment sample TCLP VOC analysis data is presented in Table 3-2.

3.2.2 Total SVOC and TCLP SVOC 30 Day Cure Analysis

A review of 30 Day Cure Kiber PAH data indicates that ACT has appreciably reduced the concentration of all PAH compounds. Concentrations for the compounds Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene and chrysene did, however, remain above NYDEC standards.

A similar trend was noted in the treated sample results for BNL PAH SVOC analysis. Exceptions include the results for Benzo(b)fluoranthene, Benzo(k)fluoranthene and Acenaphthylene which report

modest increases in concentration. The BNL treated sediment results for Benzo(a)pyrene, though reduced, remain above NJDEP cleanup standards. The BNL treated sediment results for Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Chrysene and Dibenzo(a,h)anthracene, though reduced in most cases, are still above NYDEC cleanup standards. A summary of 30 day cure sediment sample PAH-SVOC analysis data is presented in Table 3-3.

Conversely, the results for BNL SVOC data (non PAH compounds) report an increase in concentration for most compounds. The reason for these results has not been determined. Non PAH SVOC compounds in treated sediment did not exceed NYDEC or NJDEP standards. Additional testing will be required to confirm and explain the BREP Bench-Scale Study SVOC results. A summary of 30 day cure sediment sample total SVOC analysis data is presented in Table 3-4.

Low concentrations (below TCLP regulatory standards) for five (5) SVOC compounds were detected in the Kiber TCLP results. These results suggest that leachable concentrations for these compounds remain in a leachable state after ACT treatment. SVOCs were not detected in the results for BNL TCLP analysis. A summary of 30 day cure sediment sample TCLP total SVOC and TCLP PAH SVOC analysis data is presented in Tables 3-5 and 3-6, respectively.

3.2.3 Total Pesticides and TCLP Pesticides 30 Day Cure Analysis

The pesticide compound alpha-Chlordane was detected in the results for BNL results at a concentration of 42.25 ug/kg (below NYDEC and NJDEP cleanup standards). This compound was not detected in BNL untreated sample results. The reason for this result has not been determined. No other pesticide compounds were detected in the results for Kiber or BNL 30 day cure analysis. These data suggest, the results for alpha-Chlordane analysis not with standing, that ACT chemical fixation technology can effectively reduce pesticide compound concentrations in Newtown Creek sediment. A summary of 30 day cure sediment sample pesticides analysis data is presented in Table 3-7.

Pesticide compounds were not detected in the results for TCLP analysis conducted by BNL and Kiber. A summary of 30 day cure sediment sample TCLP pesticides analysis data is presented in Table 3-8.

3.2.4 Total Herbicides and TCLP Herbicides 30 Day Cure Analysis

Herbicide compounds were not detected in the BNL or Kiber treated results. Because herbicide compounds were not detected in the results for untreated sediment or 30 day cure analysis, the effectiveness of ACT treatment cannot be determined at this time. A summary of 30 day cure sediment sample herbicides analysis data is presented in Table 3-9.

Herbicide compounds were not detected in the results for TCLP analysis conducted by BNL and Kiber. A summary of 30 day cure sediment sample TCLP herbicides analysis data is presented in Table 3-10.

3.2.5 Total PCB and TCLP PCB 30 Day Cure Analysis

Most PCB compounds were detected in BNL treated sample results at concentrations which slightly exceed respective untreated sediment sample concentrations. Notable exceptions include the results for 244'-Tri (168.17 to 129.00 $\mu\text{g}/\text{kg}$) and 22'-55'-Tetra (269.33 to 120.20 $\mu\text{g}/\text{kg}$) which show marked reduction in concentration. The total PCB concentration in the treated sample (576.94 $\mu\text{g}/\text{kg}$) represents an approximate 20% reduction of these compounds from the results for the untreated sample with the majority of mass PCB reduction noted in the treatment effects on the above referenced compounds. The PCB compound 33' 44' 55'-Hexa (0.09 $\mu\text{g}/\text{kg}$) was not detected in the Base-Line sample results. These data suggest that the use of SWT-25 (25% mixture) for PCB reduction should be used with caution. A summary of 30 day cure sediment sample PCB analysis data is presented in Table 3-11.

The concentration of total PCB compounds detected in the results for 30 day cure TCLP PCB analysis is the RCRA standards of 2 mg/l. Results for treated sample PCB TCLP results report a slight increase in concentration for most compound groups relative to Base-Line sample results. Most notable concentration reductions were noted in the -Mono, and -Tetra compound groups. A Total PCB TCLP concentration of 0.04443 $\mu\text{g/l}$ (versus an untreated sample Total PCB TCLP result of 0.08370 $\mu\text{g/l}$) was detected in the BNL treated sample results. These data indicate that PCBs remain in a leachable state after ACT treatment. A summary of 30 day cure sediment sample TCLP PCB analysis data is presented in Table 3-12.

3.2.6 Total Dioxins and TCLP Dioxins 30 Day Cure Analysis

BNL data reports that the treated waste concentrations for eight (8) of eleven (11) dioxin compounds were higher than the results for untreated sediment total dioxins analysis. A total dioxins concentration 31,512.35 pg/g (a total dioxins concentration of 26,529.16 pg/g was detected in BNL untreated sediment sample results) was detected in BNL 30 day cure sample results.

Kiber data on the other hand, report a reduction in dioxin concentration for seven (7) out of ten (10) compounds as a result of the ACT treatment process. The dioxin compound 1,2,3,6,7,8-HxCDD was not detected in Kiber Base-Line or 30 Day Cure sample results. The reason for the discrepancy between BNL and Kiber data cannot be determined at this time. A summary of 30 day cure sediment sample total dioxins analysis data is presented in Table 3-13.

The dioxin 1,2,3,4,6,7,8-HpCDD was the only compound detected in the results for BNL 30 day cure TCLP dioxins analysis. The concentration for this compound (0.00900 ng/l) was slightly greater than the results for untreated sediment TCLP dioxins analysis (0.00687 ng/l). A summary of 30 day cure sediment sample TCLP dioxins analysis data is presented in Table 3-14.

3.2.7 Total Furans and TCLP Furans 30 Day Cure Analysis

A review of the results for Kiber and BNL 30 day cure total furans analysis results indicate that total furan concentrations were reduced by approximately half of untreated sediment total furans analysis results for all compounds. These data suggest that ACT technology is effective in the reduction of furan compounds. A summary of 30 day cure sediment sample total furans analysis data is presented in Table 3-15.

The furan compound 2,3,4,6,7,8-HxCDF (0.00650 ng/kg) was detected in the results for BNL 30 day cure TCLP furans analysis. The concentration for 2,3,4,6,7,8-HxCDF (0.00650 ng/l) was slightly greater than the result for untreated sediment TCLP furans analysis (0.00467 ng/l). A summary of 30 day cure sediment sample TCLP furans analysis data is presented in Table 3-16.

3.2.8 Total TAL Metals and TCLP Metals 30 Day Cure Analysis

Results for BNL Total TAL metals analysis indicates that ACT technology was effective in reducing the concentration for most metal analytes. The lone exception was beryllium which was detected at a concentration slightly greater than the results for Base-Line sampling. In general, those metals which exceeded state regulatory criteria in the untreated sample were detected at concentrations which still exceed respective NYDEC Cleanup Objective standards. Arsenic was the only metal detected with a concentration (17.95 mg/kg) which exceeds the NJDEP standard (7.5 mg/kg). A summary of 30 day cure sediment sample state cleanup standard exceedences for Metals analysis is presented in Table 3-20.

The metals cadmium, calcium, iron, magnesium, manganese and silver were detected in the results for the Kiber 30 Day Cure sample at concentrations which exceed untreated sediment analysis values. Previously conducted experiments utilizing ACT technology has reported similar results for all above referenced metals with the exception of cadmium and silver. These results may represent a function

Table 3-20

30 Day Cure Metal Concentrations Which Exceed State Standards in Treated Sediment
BREP Bench-Scale Treatability Study
MARCOR Environmental Services, Inc.

Kiber Untreated Sediment		Brookhaven Untreated Sediment	
Exceeds NYDEC Cleanup Objective Standard	Exceeds NJDEP Non Residential Cleanup Standard	Exceeds NYDEC Cleanup Objective Standard	Exceeds NJDEP Non Residential Cleanup Standard
Cd, Cr, Cu, Fe, Ni, Hg, Zn	None	As, Cd, Cr, Cu, Hg, Ni, Se, Zn	As

of the components which comprise ACT reagent compounds. A summary of 30 day cure sediment sample metals analysis data is presented in Table 3-18.

An increase in BNL TCLP analysis was noted in the results for six (6) of eight (8) RCRA metals including barium, cadmium, chromium, lead, mercury and silver. Kiber data report similar results with the exception of Cd and Pb which were not detected. These data indicate that metals remain in leachable form after treatment with ACT. A summary of Base-Line TCLP Metals data is presented in Table 3-18.

3.2.9 Physical Properties 30 Day Cure Analysis

Review of available 30 day cure physical properties testing reveals that ACT technology can substantially lower total organic carbon (73,200 to 57.5 mg/kg [BNL]) and sulfides (7,833.33 to 230 mg/kg [BNL]) concentrations in 30 day cure Newtown Creek sediment. The corresponding Kiber total organic carbon concentration in treated sediment was 8,800 mg/kg. The results for pH analysis reports an increase in sediment pH (10.495 [BNL] and 10.53 [Kiber]); untreated pH values ranged between 7.90 (BNL) and 7.42 (Kiber). The percent total solids for treated sediment increased significantly after treatment (33.05 to 74.5%) over untreated sediment results (as reported by BNL). A summary of untreated and 30 day cure sediment sample physical properties analysis data is presented in Table 3-21.

Table 3-21

Chemical Analyses and Physical Properties
 BREP Bench-Scale Treatability Study
 MARCOR Environmental Services, Inc.

Analytical Parameters	Parameter Units	RFP Results	Brookhaven Untreated Results Average	Brookhaven Treated Results	Kiber Untreated Results	SWT-25 30 Day Cure
Total Organic Carbon	mg/kg	23,000-79,000	73,200	5,755	5,700.00	8,800
Total Solids	%	NA	33.05	74.5	NA	NA
Sulfides	mg/kg	NA	7,833.33	230.0	NA	5.9
Reactive Cyanide	mg/kg	NA	NA	NA	NA	2.5
pH	s.u.	7.38-7.76	7.90	10,495	7.31	10.53
Moisture Content, Dry Basis	%	NA	NA	NA	194	NA
Bulk Density	lb/cu. ft.	NA	NA	NA	71	NA
Bulk Specific Gravity	---	NA	NA	NA	1.1	NA

* NA = Not Applicable