N00129.AR.000600
NSB NEW LONDON
5090.3a

Brown & Root Environmental

Foster Plaza VII
661 Andersen Drive
Pittsburgh, PA 15220-2745

(412) 921-7090
FAX. (412) 921-4040

C-49-12-7-188

December 23, 1997

Brown & Root Environmental Project Number 7237

Mr. Mark Lewis
Connecticut Department of Environmental Protection
Water Management Bureau
Permitting, Enforcement, and Remediation Division
Federal Remediation Program
79 Elm Street
Hartford, Connecticut 06106-5127

Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Order No. 0260

Subject: Calculated CTDEP Remediation Standards
Lower Subase Remedial Investigation
Naval Submarine Base - New London, Groton, Connecticut

Dear Mr. Lewis:

In preparation of the Lower Subase Remedial Investigation (RI) Report, Brown & Root (B&R) Environmental has calculated Remediation Standards following the State of Connecticut Remediation Standard Regulations of January 1996. Standards were developed for all chemicals that were analyzed for during the RI sampling and analysis program that did not have previously established CTDEP standards. The intent of this memo is to identify the sources of the standards to be used in the RI Report and to identify those values which have been developed by B&R Environmental using the State guidance.

Background information and the calculated Remediation Standards are provided in Table 1 and Table 2, respectively, which are enclosed. Table 1 summarizes the basis for the chemical-specific remediation standards (i.e., promulgated, calculated, or calculated using a surrogate) to be included in the RI. The calculated soil Direct Exposure and Pollutant Mobility standards, as well as the Groundwater Standard, are provided in Table 2.

It should be noted that pollutant mobility and groundwater standards for GA classified groundwater are provided in Table 2 for completeness. The groundwater at the Lower Subase is classified as GB, therefore standards applicable to GB classified groundwater will be emphasized in the Lower Subas RI R port.

B&R Environmental intends on using these criteria, as well as Region III RBCs, as part of the human health risk assessment for the Lower Subase RI to screen for chemicals of potential concern. Therefore, B&R Environmental, on the behalf of the United States Navy, requests that the CTDEP review and approve the standards in Table 2. It is hoped that prior approval of the criteria will alleviate unnecessary revisions to the RI Report in the future and expedite any additional risk-related work required by the State (i.e., application for use of alternative criteria).

Due to the current time constraints for preparing the Lower Subase RI, it is requested that the CTDEP complete their review by no later than January 16, 1997. If you have any questions regarding the information provided in the tables or the schedule for the review please contact Mr. Mark Evans at (610) 595-0567 (ext. 162) or me at (412) 921-8244.

Very truly yours,

Corey A. Rich

Corey A. Rich, P.E.
Project Manager

Enclosure(s)

c: Mr. Mark Evans, NORTHDIV
Mr. Richard Conant, NSB-NLON Environmental
Ms. Karen Smecker, B&R Environmental
File: CTO 0260

TABLE 1

SOURCE OF CONNECTICUT REMEDIATION STANDARDS
CTO 260 LOWER SUBASE RI
NEW LONDON, GROTON, CONNECTICUT

Chemical	CAS Number	Chemical Fraction	Basis of Value to be Used in RI Report		
			Promulgated Value[1]	Calculated Value[2]	Surrogate Calculated Value[3]
Acenaphthene	83329	SVOC		X	
Acenaphthylene	208968	SVOC	X		
Anthracene	120127	SVOC	X		
Acetone	67641	VOC	X		
Aldrin	309002	PEST		X	
Aluminum	7429905	INORG	[4]	[4]	[4]
Antimony	7440360	INORG	X		
Arsenic	7440382	INORG	X		
Barium	7440393	INORG	X		
Benzene	71432	VOC	X		
Benz(a)anthracene	56553	SVOC	X		
Benzo(b)fluoranthene	205992	SVOC	X		
Benzo(k)fluoranthene	207089	SVOC	X		
Benzo(g,h,i)perylene	191242	SVOC			X (naphthalene)
Benzo(a)pyrene	50328	SVOC	X		
Beryllium	7440417	INORG	X		
BCH (alpha-)	319846	PEST		X	
BCH (beta-)	319857	PEST		X	
BCH (delta-)	319868	PEST			X (alpha-BHC)
BCH (gamma-; Lindane)	58899	PEST	X		
Bis(2-chloroethoxy)methane	111911	SVOC	[5]	[5]	[5]
Bis(2-chloroethyl)ether	111444	SVOC	X		
Bis(2-ethylhexyl)phthalate	117817	SVOC	X		
Bromochloromethane	74975	VOC			X (chloromethane)
Bromodichloromethane	75274	VOC		X	
Bromoform	75252	VOC	X		
Bromomethane	74839	VOC		X	
4-Bromophenyl-phenylether	101553	SVOC		X	
2-Butanone	78933	VOC	X		
Butylbenzylphthalate	85687	SVOC	X		
Cadmium	7440439	INORG	X		
Calcium	7440702	INORG	[6]	[6]	[6]
Carbazole	86748	SVOC		X	
Carbon disulfide	75150	VOC		X	
Carbon tetrachloride	56235	VOC	X		
Chlordane (alpha-)	57749	PEST	X[7]		
Chlordane (gamma-)	57749	PEST	X[7]		
4-Chloroaniline	106478	SVOC		X	
Chlorobenzene	108907	VOC	X		
Chlorodibromomethane	124481	VOC	X		
Chloroethane	75003	VOC		X	
Chloroform	67663	VOC	X		
Chloromethane	74873	VOC		X	

TABLE 1

SOURCE OF CONNECTICUT REMEDIATION STANDARDS
CTO 260 LOWER SUBASE RI
NEW LONDON, GROTON, CONNECTICUT

Chemical	CAS Number	Chemical Fraction	Basis of Value to be Used in RI Report		
			Promulgated Value[1]	Calculated Value[2]	Surrogate Calculated Value[3]
4-Chloro-3-methylphenol	59507	SVOC			X (3-methylphenol)
2-Chloronaphthalene	91587	SVOC		X	
2-Chlorophenol	95578	SVOC	X		
4-Chlorophenyl-phenylether	7005723	SVOC			X (4-Bromophenyl-phenylether)
Chromium (total)		INORG	X[8]		
Chrysene	218019	SVOC		X	
Cobalt	7440484	INORG		X	
Copper	7440508	INORG	[4]	[4]	[4]
4,4'-DDD	72548	PEST		X	
4,4'-DDE	72559	PEST		X	
4,4'-DDT	50293	PEST		X	
Dibenzofuran	132649	SVOC		X	
Dibenz(a,h)anthracene	53703	SVOC		X	
1,2-Dibromo-3-chloropropane	96128	VOC		X	
1,2-Dibromoethane	106934	VOC		X	
1,2-Dichlorobenzene	95501	VOC/SVOC	X		
1,3-Dichlorobenzene	541731	VOC/SVOC	X		
1,4-Dichlorobenzene	106467	VOC/SVOC	X		
3,3'-Dichlorobenzidine	91941	SVOC		X	
1,1-Dichloroethane	75343	VOC	X		
1,2-Dichloroethane	107062	VOC	X		
1,1-Dichloroethene	75354	VOC	X		
1,2-Dichloroethene (cis-)	156592	VOC	X		
1,2-Dichloroethene (trans-)	156605	VOC	X		
1,2-Dichloroethene (total)	156605	VOC		X	
2,4-Dichlorophenol	120832	SVOC	X		
1,2-Dichloropropane	78875	VOC	X		
1,3-Dichloropropene (cis-)	542756	VOC	X		
1,3-Dichloropropene (trans-)	542756	VOC	X		
Dieldrin	60571	PEST	X		
Diethyl phthalate	84662	SVOC		X	
2,4-Dimethylphenol	105679	SVOC		X	
Dimethylphthalate	131113	SVOC		X	
Di-n-butylphthalate	84742	SVOC	X		
Di-n-octylphthalate	117840	SVOC	X		
4,6-Dinitro-2-methylphenol	534521	SVOC		X	
2,4-Dinitrophenol	51285	SVOC		X	
2,4-Dinitrotoluene	121142	SVOC		X	
2,6-Dinitrotoluene	606202	SVOC		X	
Endosulfan I	115297	PEST		X[9]	
Endosulfan II	115297	PEST		X[9]	
Endosulfan sulfate	1031078	PEST			X (endosulfan)

TABLE 1

SOURCE OF CONNECTICUT REMEDIATION STANDARDS
CTO 260 LOWER SUBASE RI
NEW LONDON, GROTON, CONNECTICUT

Chemical	CAS Number	Chemical Fraction	Basis of Value to be Used in RI Report		
			Promulgated Value[1]	Calculated Value[2]	Surrogate Calculated Value[3]
Endrin	72208	PEST	X		
Endrin aldehyde	7421363	PEST			X (endrin)
Endrin ketone	53494705	PEST			X (endrin)
Ethylbenzene	100414	VOC	X		
Fluoranthene	206440	SVOC	X		
Fluorene	86737	SVOC	X		
Heptachlor	76448	PEST	X		
Heptachlor epoxide	1024573	PEST	X		
Hexachlorobenzene	118741	SVOC	X		
Hexachlorobutadiene	87683	SVOC		X	
Hexachlorocyclopentadiene	77474	SVOC		X	
Hexachloroethane	67721	SVOC	X		
2-Hexanone	73663715	VOC		X	
Indeno(1,2,3-cd)pyrene	193395	SVOC		X	
Iron	7439896	INORG	(4)	(4)	(4)
Isophorone	78591	SVOC		X	
Lead	7439291	INORG	X		
Magnesium	7439954	INORG	(6)	(6)	(6)
Manganese	7439965	INORG		X	
Mercury	7439976	INORG	X		
Methoxychlor	72435	PEST	X		
Methylene chloride	75092	VOC	X		
2-Methylnaphthalene	91576	SVOC		X	
4-Methyl-2-pentanone	108101	VOC	X		
2-Methylphenol	95487	SVOC		X	
4-Methylphenol	106445	SVOC		X	
Naphthalene	91203	SVOC	X		
Nickel	7440020	INORG	X		
2-Nitroaniline	88744	SVOC		X	
3-Nitroaniline	99092	SVOC		X	
4-Nitroaniline	100016	SVOC		X	
Nitrobenzene	98953	SVOC		X	
2-Nitrophenol	88755	SVOC			X (4-nitrophenol)
4-Nitrophenol	100027	SVOC		X	
N-Nitrosodiphenylamine	86306	SVOC		X	
N-Nitrosodi-n-propylamine	621647	SVOC		X	
2,2'-Oxybis(1-chloropropane)	108601	SVOC	(5)	(5)	(5)
Pentachlorophenol	87865	SVOC	X		
Phenanthrene	85018	SVOC			X (naphthalene)
Phenol	108952	SVOC	X		
Potassium	7440097	INORG	(6)	(6)	(6)
Pyrene	129000	SVOC	X		

TABLE 1

SOURCE OF CONNECTICUT REMEDIATION STANDARDS
CTO 260 LOWER SUBASE RI
NEW LONDON, GROTON, CONNECTICUT

Chemical	CAS Number	Chemical Fraction	Basis of Value to be Used in RI Report		
			Promulgated Value(1)	Calculated Value(2)	Surrogate Calculated Value(3)
Selenium	7782492	INORG	X		
Silver	7440224	INORG	X		
Sodium	7440235	INORG	(6)	(6)	(6)
Styrene	100425	VOC	X		
1,1,2,2-Tetrachloroethane	79345	VOC	X		
Tetrachloroethylene	127184	VOC	X		
Thallium	6533739	INORG	X		
Toluene	108883	VOC	X		
Toxaphene	8001352	PEST	X		
1,2,4-Trichlorobenzene	120821	SVOC		X	
1,1,1-Trichloroethane	71556	VOC	X		
1,1,2-Trichloroethane	79005	VOC	X		
Trichloroethylene	79016	VOC	X		
2,4,5-Trichlorophenol	95954	SVOC		X	
2,4,6-Trichlorophenol	88062	SVOC		X	
Vanadium	7440622	INORG	X		
Vinyl chloride	75014	VOC	X		
Xylene (total)	1330207	VOC	X		
Zinc	7440666	INORG	X		

INORG Inorganic
PEST Pesticide
SVOC Semivolatile organic compound
VOC Volatile organic compound

1 State of Connecticut Remediation Standard Regulations, Section 22a-133k (January 1996).
2 Published toxicity criteria is available. Toxicity criteria from the current USEPA Region III Risk-Based Concentration Table (October 22, 1997) will be used to calculate a value using the methodology presented in the State guidance (January 1996).
3 No toxicity criteria is available. Toxicity criteria for a similarly structured chemical (noted in parentheses) will be used to calculate a value.
4 Region I does not advocate a quantitative evaluation of this chemical. Exposure to this chemical will be addressed in a qualitative fashion.
5 No promulgated value or published toxicity criteria are available. A similarly structured chemical with published toxicity criteria could not be identified. Exposure to this chemical will be addressed in a qualitative fashion.
6 Chemical is an essential nutrient.
7 Value for chlordane is used.
8 Value for hexavalent chromium is used for conservative purposes.
9 Value for endosulfan is used.

TABLE 2

CALCULATED AND SURROGATE CALCULATED VALUES
CTO 260 LOWER SUBASE RI
NEW LONDON, GROTON, CONNECTICUT

Chemical	Published Toxciological Criteria[1]		Calculated Remediation Standards[2]				
	RfD_{oral} (mg/kg/day)	CSF_{oral} (kg/day/mg)	Soil (mg/kg)				Groundwater (ug/L)
			RES DE[3]	I/C DE[3]	GA/GAA PM	GB PM	GA/GAA GP
Acenaphthene	6.00E-02	NA	1000[4]	2500[4]	8.4	84	420
Aldrin	3.00E-05	1.70E+01	0.036	0.34	0.000041	0.00041	0.0021
Benzo(g,h,i)perylene	NA	NA	1000[5]	2500[5]	5.6[5]	56[5]	280[5]
BCH (alpha-)	NA	6.30E+00	0.097	0.91	0.00011	0.0011	0.0056
BCH (beta-)	NA	1.80E+00	0.34	3.2	0.00039	0.0039	0.0194
BCH (delta-)	NA	NA	0.097[6]	0.91[6]	0.00011[6]	0.0011[6]	0.0056[6]
Bromochloromethane	NA	NA	47[7]	440[7]	0.054[7]	0.54[7]	2.7[7]
Bromodichloromethane	2.00E-02	6.20E-02	9.9	92	0.011	0.11	0.56
Bromomethane	1.40E-03	NA	95	1000[4]	0.2	2	9.8
4-Bromophenyl-phenylether	5.80E-02	NA	500[4]	1000[4]	8.2	82	410
Carbazole	NA	2.00E-02	31	290	0.036	0.36	1,8
Carbon disulfide	1.00E-01	NA	500[4]	1000[4]	14	140	700
4-Chloroaniline	4.00E-03	NA	270	2500[4]	0.56	5.6	28
Chloroethane	4.00E-01	2.90E-03	210	1000[4]	0.24	2.4	12
Chloromethane	NA	1.30E-02	47	440	0.054	0.54	2.7
4-Chloro-3-methylphenol	NA	NA	1000[8]	2500[8]	7[8]	70[8]	350[8]
2-Chloronaphthalene	8.00E-02	NA	1000[4]	2500[4]	11	110	560
4-Chlorophenyl-phenylether	NA	NA	500[9]	1000[9]	8.2[9]	82[9]	410[9]
Chrysene	NA	7.30E-03	84	780	0.096	0.96	4.8
Cobalt	6.00E-02	NA	1000[4]	2500[4]	2200[10][11]	22000[10][11]	420
4,4'-DDD	NA	2.40E-01	2.6	24	0.0029	0.029	0.15
4,4'-DDE	NA	3.40E-01	1.8	17	0.0021	0.021	0.1
4,4'-DDT	5.00E-04	3.40E-01	1.8	17	0.0021	0.021	0.1
Dibenzofuran	4.00E-03	NA	270	2500[4]	0.56	5.6	28
Dibenz(a,h)anthracene	NA	7.30E+00	0.084	0.78	0.000096	0.00096	0.0048
1,2-Dibromo-3-chloropropane	NA	1.40E+00	0.44	4.1	0.0005	0.005	0.025
1,2-Dibromoethane	NA	8.50E+01	0.0072	0.067	0.0000082	0.000082	0.00041
3,3'-Dichlorobenzidine	NA	4.50E-01	1.4	13	0.0016	0.016	0.078
1,2-Dichloroethene (total)	2.00E-02	NA	500[4]	1000[4]	2.8	28	140
Diethyl phthalate	8.00E-01	NA	1000[4]	2500[4]	110	1100	5600

TABLE 2

CALCULATED AND SURROGATE CALCULATED VALUES
CTO 260 LOWER SUBASE RI
NEW LONDON, GROTON, CONNECTICUT

Chemical	Published Toxciological Criteria[1]		Calculated Remediation Standards[2]				
	RfD_{oral} (mg/kg/day)	CSF_{oral} (kg/day/mg)	Soil (mg/kg)				Groundwater (ug/L)
			RES DE[3]	I/C DE[3]	GA/GAA PM	GB PM	GA/GAA GP
2,4-Dimethylphenol	2.00E-02	NA	1000[4]	2500[4]	2,8	28	140
Dimethylphthalate	1.00E+01	NA	1000[4]	2500[4]	1400	1400	70000
4,6-Dinitro-2-methylphenol	1.00E-04	NA	6.8	200	0.014	0.14	0.7
2,4-Dinitrophenol	2.00E-03	NA	140	2500[4]	0.28	2.8	14
2,4-Dinitrotoluene	2.00E-03	NA	140	2500[4]	0.28	2.8	14
2,6-Dinitrotoluene	1.00E-03	NA	68	2000	0.14	1.4	7
Endosulfan I	6.00E-03	NA	410	1200	0.84	8.4	42
Endosulfan II	6.00E-03	NA	410	1200	0.84	8.4	42
Endosulfan sulfate	NA	NA	410[12]	1200[12]	0.84[12]	8.4[12]	42[12]
Endrin aldehyde	NA	NA	20[13]	610[13]	NE[13]	NE[13]	NE[13]
Endrin ketone	NA	NA	20[13]	610[13]	NE[13]	NE[13]	NE[13]
Hexachlorobutadiene	2.00E-04	7.80E-02	7.9	73	0.009	0.09	0.45
Hexachlorocyclopentadiene	7.00E-03	NA	470	2500[4]	0.98	9.8	49
2-Hexanone	4.00E-02	NA	500[4]	1000[4]	5.6	56	280
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	0.84	7.8	0.00096	0.0096	0.045
Isophorone	2.00E-01	9.50E-04	640	2500[4]	0.74	7.4	37
Manganese	2.30E-02	NA	1600	47000	50[10][14]	500[10][14]	160
2-Methylnaphthalene	4.00E-02	NA	1000[4]	2500[4]	5.6	56	280
2-Methylphenol	5.00E-02	NA	1000[4]	2500[4]	7	70	350
4-Methylphenol	5.00E-03	NA	340	2500[4]	0.7	7	35
2-Nitroaniline	6.00E-05	NA	4.1	1200	0.0084	0.084	0.42
3-Nitroaniline	3.00E-03	NA	200	2500[4]	0.42	4.2	21
4-Nitroaniline	3.00E-03	NA	200	2500[4]	0.42	4.2	21
Nitrobenzene	5.00E-04	NA	34	1000	0.07	0.7	3.5
2-Nitrophenol	NA	NA	540[15]	2500[15]	1.1[15]	11[15]	56[15]
4-Nitrophenol	8.00E-03	NA	540	2500[4]	1.1	11	56
N-Nitrosodiphenylamine	NA	4.90E-03	130	1200	0.14	1.4	7.1
N-Nitrosodi-n-propylamine	NA	7.00E+00	0.088	0.82	0.0001	0.001	0.005
Phenanthrene	NA	NA	1000[5]	2500[5]	5.6[5]	56[5]	280[5]
1,2,4-Trichlorobenzene	1.00E-02	NA	680	2500[4]	1.4	14	70

TABLE 2

CALCULATED AND SURROGATE CALCULATED VALUES
CTO 260 LOWER SUBASE RI
NEW LONDON, GROTON, CONNECTICUT

Chemical	Published Toxciological Criteria[1]		Calculated Remediation Standards[2]				
	RfD_{oral} (mg/kg/day)	CSF_{oral} (kg/day/mg)	Soil (mg/kg)				Groundwater (ug/L)
			RES DE[3]	I/C DE[3]	GA/GAA PM	GB PM	GA/GAA GP
2,4,5-Trichlorophenol	1.00E-01	NA	1000[4]	2500[4]	14	140	700
2,4,6-Trichlorophenol	NA	1.10E-02	56	520	0.064	0.64	3.2

RfD	Reference dose
CSF	Cancer slope factor
RES DE	Direct exposure criteria for residential land use
I/C DE	Direct exposure criteria for industrial/commercial land use.
GA/GAA PM	Pollutant mobility criteria for a GA/GAA classified area
GB PM	Pollutant mobility criteria for a GB classified area
GA/GAA GP	Groundwater protection criteria for a GA/GAA classified area
NA	Not available
NE	None established by Connecticut DEP (January 1996)

1 Values obtained from current USEPA Region III Risk-Based Concentration Table (October 22, 1997)
2 Calculated using methodologies presented in State guidance (January 1996).
3 Calculated value for direct exposure for volatile and semivolatile organics is replaced with the appropriate ceiling limit if the calculated value exceeds the ceiling limit. Ceiling limit for volatiles is 500 mg/kg for residential exposure and 1000 mg/kg for industrial/commercial exposure. Ceiling limit for semivolatiles is 1000 mg/kg for residential exposure and 2500 mg/kg for industrial/commercial exposure.
4 Ceiling limit. Calculated value exceeds the ceiling limit.
5 Value for naphthalene is used.
6 Value for alpha-BHC is used.
7 Value for chloromethane is used.
8 Value for 3-methylphenol is used.
9 Value for 4-bromophenyl-phenylether is used.
10 Value is for aqueous units (ug/L) and is based on SPLP or TCLP analytical results.
11 Value is based on the Region III RBC for tap water (2200 ug/L).
12 Value for endosulfan is used.
13 Value for endrin is used.
14 Value is based on the secondary Federal MCL for drinking water (50 ug/L).
15 Value for 4-nitrophenol is used.