



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



BUREAU OF WATER MANAGEMENT
PERMITTING, ENFORCEMENT & REMEDIATION DIVISION
FEDERAL REMEDIATION PROGRAM

February 27, 1998

Mr. Mark Evans
U.S. Department of the Navy
Northern Division, Naval Facilities Engineering Command, Code 1823
10 Industrial Way, Mail Stop 82
Lester, PA 19113-2090

Re: Request for Approval of Calculated CTDEP Remediation Standards
Lower Subbase Remedial Investigation
Naval Submarine Base New London, Groton, Connecticut

Dear Mr. Evans:

The Department has reviewed a letter dated December 23, 1997 requesting approval of calculated soil criteria for additional polluting substances for the planned Lower Base Remedial Investigation at the Naval Submarine Base New London, Groton, Connecticut. Mr. Corey A. Rich, P.E., of Brown & Root Environmental submitted the request on behalf of the Navy.

The Navy's letter requests approval of calculated direct exposure, pollutant mobility, and ground water protection criteria for a number of substances for which criteria are not specified in the Remediation Standard Regulations. Section 22a-133k-2(b)(4) of the Regulations allows the Commissioner to approve direct exposure criteria for additional polluting substances after consultation with the Commissioner of Public Health. Accordingly, the Navy's proposal was forwarded on December 31, 1997 to Dr. Gary Ginsberg of the Department of Public Health for comment on the proposed direct exposure criteria. Dr. Ginsberg's comments are attached for your reference.

The attached table lists the criteria proposed by the Navy for each additional polluting substance, and the status of the request for each substance. The column labeled "Approval Status" denotes whether the proposed criteria for a given substance can be approved by the Commissioner, or whether additional information will be required to evaluate the request. The term "Approved" in the Approval Status column for a pollutant indicates that the proposed criteria for that substance meet all requirements under the Regulations. A letter approving these criteria will be forwarded to the Navy under separate cover. The term "Revision Required" in the Approval Status column indicates that additional information or revision will be required before the Department can evaluate the request (the request is incomplete).

In general the proposed criteria were calculated in accordance with the relevant sections of the Regulations, including Section 22a-133k-2(b)(4) for the direct exposure criteria, Section 22a-133k-

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Lower Subbase Request Approval of Additional Soil Criteria

February 27, 1998

Page 2 of 4

2(c)(5) for the pollutant mobility criteria, and Section 22a-133k-3(h) for the ground water protection criteria. However, several of the proposed criteria were not calculated in accordance with the Regulations. The Department's questions and comments are listed below.

Surrogate Chemicals Used to Supply Toxicity Values

When published Cancer Slope Factor (CSF) or Reference Dose (RfD) values were not available, the Navy used other chemicals as surrogates to represent the toxicity of those chemicals for which published values were unavailable. While this approach is acceptable, it is important that appropriate chemical surrogates be selected. In several cases, the surrogates selected by the Navy were not appropriate. In these cases, the ground water protection and direct exposure criteria calculated using these surrogates are not correct. The pollutant mobility criteria calculated from the ground water protection criteria are therefore also not correct.

The Navy has used naphthalene as a surrogate to represent the toxicity of benzo(g,h,i)perylene. As noted in Dr. Ginsberg's memorandum, pyrene (RfD 0.03 mg/kg/d) is a more appropriate surrogate. The RfD for naphthalene has been withdrawn from IRIS. Please recalculate the direct exposure, pollutant mobility, and ground water protection criteria for benzo(g,h,i)perylene using this approach. This approach is appropriate for a screening level risk assessment. However, the uncertainties involved with this approach should be acknowledged if these two chemicals are found to be major risk drivers at the site.

It is unclear why the Navy calculated criteria for phenanthrene since the regulations list direct exposure, pollutant mobility, and groundwater protection criteria for this compound. Please use the criteria listed in the Regulations for this compound. The Navy should either withdraw their request for approval of criteria for phenanthrene, or, if the Navy is requesting approval of alternative criteria for this compound under the Regulations, the Navy should so state.

Bromodichloromethane should be used as a surrogate for bromochloromethane. Please use the criteria calculated for bromodichloromethane in place of those calculated using chloromethane as a surrogate.

The Navy's proposal to use 3-methylphenol as a surrogate for 4-chloro-3-methylphenol is not appropriate, due to structural differences between the two compounds. The use of a qualitative risk assessment would be acceptable assuming that concentrations of this chemical do not exceed the low part-per-billion range. Please see Dr. Ginsberg's comments for additional details.

Incorrect or Unsupported Potency Values

Several of the CSFs or RfDs used by the Navy appeared to be incorrect, based on a comparison to the values listed in the EPA Region III Risk Based Concentrations table, IRIS, or HEAST. Please

Lower Subbase Request Approval of Additional Soil Criteria

February 27, 1998

Page 3 of 4

recalculate the direct exposure, pollutant mobility, and ground water protection criteria using correct values for total 1,2-dichloroethene. Please assume that this value pertains to the mixture of *cis* and *trans* isomers. The RfD for the mixture should be $9E-3$ mg/kg/d.

The Department was unable to verify the potency factors listed by the Navy for several chemicals. Please either provide references to support the listed potency factors, or derive criteria using acceptable surrogates for the following compounds: chloroethane, 4,6-dinitro-2-methylphenol, 2-hexanone, and 2-methylnaphthalene. Please note that naphthalene is not an appropriate surrogate for 2-methylnaphthalene as the RfD for naphthalene has been withdrawn from IRIS. Please refer to Dr. Ginsberg's memo for additional guidance.

The Department was unable to verify the RfD listed by the Navy for 4-nitrophenol ($8.00E-3$ mg/kg/d). Please either provide a reference for the listed value, or use the default RfD currently listed in the RBC tables ($6.2E-2$ mg/kg/d).

Pollutant Mobility Criteria for Metals

The ground water protection criterion for cobalt was calculated correctly by the Navy. However, the approach used by the Navy in calculating pollutant mobility criteria for cobalt is unacceptable. Rather than using the calculated ground water protection criterion (420 $\mu\text{g/l}$) to establish a pollutant mobility criterion for cobalt, the Navy used the EPA Region III Risk Based Criteria for tap water ($2,200$ $\mu\text{g/L}$) as the GAA/GA pollutant mobility criterion. This approach is less conservative than using the calculated ground water protection criterion. The correct pollutant mobility criteria for cobalt, based on the groundwater protection criteria calculated by the Navy, are 420 $\mu\text{g/L}$ for a GAA/GA area, and $4,200$ $\mu\text{g/L}$ for a GB area (measurement by TCLP or SPLP).

The ground water protection criterion for manganese was calculated correctly by the Navy. Rather than using the calculated ground water protection criterion (160 $\mu\text{g/l}$) to establish a pollutant mobility criterion for manganese, the Navy used the EPA Secondary MCL for drinking water (50 $\mu\text{g/L}$) as the GAA/GA pollutant mobility criterion. This approach is acceptable as it is more conservative than using the calculated ground water protection criterion.

GB Pollutant Mobility Criteria for Dimethylphthalate

The GB pollutant mobility criteria listed for dimethylphthalate ($1,400$ mg/kg) in the Navy's Table 2 appears to be a typo. The correct value should be listed as $14,000$ mg/kg.

Bis(-chloroethoxy)methane

The Navy proposes a qualitative risk assessment for this compound. This approach is acceptable provided that the compound is not present at concentrations above the low part-per-billion range.

Lower Subbase Request Approval of Additional Soil Criteria

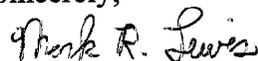
February 27, 1998

Page 4 of 4

As noted by Dr. Ginsberg, if it is present above this range, a more quantitative risk assessment may be required.

If you have any questions regarding this letter, please contact me at (860) 424-3768.

Sincerely,



Mark R. Lewis
Senior Environmental Analyst
Federal Remediation Program
Permitting, Enforcement & Remediation Division
Bureau of Water Management

Enclosures: 1) Memorandum dated 2/4/98
2) Table Summarizing Calculated Cleanup Criteria

cc: Kymberlee Keckler, US EPA New England, Federal Facilities Section
Jeff Sullivan, NSBNL Environmental Department
Corey Rich, P. E., Brown and Root Environmental
Gary Ginsberg, Dept. of Public Health

MEMORANDUM

TO: ELSIE PATTON, CTDEP/WATER BUREAU
THRU: MARY LOU FLEISSNER, DPH/EEOH *mlt*
FROM: GARY GINSBERG, DPH/EEOH *GG*
DATE: 2/4/98

re: NAVY PROPOSAL for ADDITIONAL CLEANUP CRITERIA

In response to your memo dated 12/31/97, we have reviewed the Navy's proposed list of direct exposure criteria (DECs) and groundwater protection criteria for additional polluting substances for the lower subbase area at the Naval Submarine Base in New London/Groton. The list covers cleanup criteria for a large number of analytes present at this particular site but not in the Remediation Standards Regulations. In most cases, we concur that the proposed criteria for these additional substances are appropriate and health protective. However, in the cases discussed below, the proposed criteria require adjustment or further justification. Please note that we have not evaluated the proposed Pollutant Mobility standards since our department was not involved in this area of the Remediation Standards Regulations. Please contact us at 509-7742 if you need additional information.

1. Surrogate chemicals used to supply toxicity values: The use of naphthalene as a surrogate to represent the toxicity of benzo(g,h,i)perylene and phenanthrene is inappropriate given the structural differences (naphthalene 2 cyclic rings, phenanthrene 3 rings, benzo(g,h,i)perylene 6 rings) and the fact that the naphthalene RfD has been withdrawn from the HEAST database. A better surrogate for these PAHs is pyrene (4 rings; RfD of 0.03 mg/kg/d⁻¹). While the pyrene surrogate could be used in a screening level risk assessment, the uncertainties associated with this approach should be discussed if benzo(g,h,i)perylene and/or phenanthrene are among the major PAHs found on-site.

The use of 3-methylphenol as a surrogate to represent the toxicity of 4-chloro-3-methylphenol is inappropriate based upon structural differences. Further, a quick literature search found references to chronic/oncogenicity data and developmental data in rats that could form the basis for an interim RfD for this compound. However, de novo RfD development would not be necessary if 4-chloro-3-methylphenol concentrations are uniformly very low (i.e., low ppb range) on-site. In this case, a qualitative assessment could be used to describe the risks, drawing upon what is known about other cresols (2- or 3- or 4-methylphenol and substituted cresols) and from the available 4-chloro-3-methylphenol database.

The use of chloromethane as a surrogate to represent the toxicity of bromochloromethane is one possible approach; however, this surrogate is less highly

halogenated than the analyte of interest, and the chlorine substituent generally confers less molecular reactivity than the bromine constituent. Therefore, the preferred approach would be to use bromodichloromethane as surrogate instead of chloromethane. Since this approach may be somewhat conservative, if bromochloromethane turns out to be a risk driver, a sensitivity analysis could be conducted with the cancer potency allowed to vary between chloromethane's and bromodichloromethane's (a 5 fold spread).

2. Bis(2-chloroethoxy)methane: the proposal is for a purely qualitative assessment. This evaluation should include a literature search and analysis to describe the chemical's toxic potential. If it is present at greater than trace levels (low ppb range) such that it could potentially be a risk driver, then consideration should be given to making the assessment more quantitative (e.g., comparison of daily exposure doses against literature NOAELs/LOAELs), as possible.
3. Incorrect or unsupported potency values: Several of the toxicity potency values listed in the Navy submission appeared to be incorrect or couldn't be verified from an examination of the Region III RBC Table, IRIS, or HEAST. The toxicity values [RfDs in mg/kg/d or cancer slope factors in (mg/kg/d⁻¹)] in question are as follows:

RfD for 1,2-dichloroethene (total) - assume this pertains to the mixture of cis and trans isomers - value should be 9E-03 instead of 2E-02 (RBC Table).

Cancer slope factor for chloroethane listed as 2.9E-03; however, no record of this slope factor in above sources.

RfD for 4,6-dinitro-2-methylphenol listed as 1E-04; however, no record of this RfD in above sources.

RfD for 2-hexanone listed as 4E-02; however, no record of this RfD in above sources.

RfD for 2-methylnaphthalene listed as 4E-02; however, no record of this in above sources and naphthalene RfD withdrawn; ATSDR Toxicological Profile for naphthalene should be consulted for pertinent data on this class of chemicals.

RfD for 4-nitrophenol listed as 8E-03; however, the RBC Table lists a value of 6.2E-02 with no values available on IRIS or HEAST.

cc: Mark Lewis, DEP/Water Bur.

Naval Submarine Base New London- Lower Base RI
Summary of Calculated Cleanup Criteria Proposed by US Navy for Additional Polluting Substances
February 27, 1998

Pollutant	Reference Dose mg/kg/d	Cancer Slope Factor (oral) kg/day/mg	Soil (mg/kg)				Groundwater (µg/l)	Approval Status
			Residential DEC	Industrial/ Commercial DEC	GAA/GA PMC	GB PMC	Groundwater Protection Criteria	
acenaphthene	6.00E-2	NA	1000	2500	8.4	84	420	Approved 2/27/98
aldrin	3.00E-5	1.70E+1	0.036	0.34	0.000041	0.00041	0.0021	Approved 2/27/98
benzo(g,h,i)perylene (1)	NA	NA	1000	2500	5.6	56	280	Revision required
BCH(alpha-)	NA	6.3E 0	0.097	0.91	0.00011	0.0011	0.0056	Approved 2/27/98
BCH(beta-)	NA	1.8E 0	0.34	3.2	0.00039	0.0039	0.0194	Approved 2/27/98
BCH(delta) (2)	NA	NA	0.097	0.91	0.00011	0.0011	0.0056	Approved 2/27/98
bromochloromethane (3)	NA	NA	47	440	0.054	0.54	2.7	Revision required
bromodichloromethane	2.00E-2	6.20E-2	9.9	92	0.011	0.11	0.56	Approved 2/27/98
bromomethane	1.40E-3	NA	95	1000	0.2	2	9.8	Approved 2/27/98
4-bromophenyl-phenylether	5.80E-2	NA	500	1000	8.2	82	410	Approved 2/27/98
carbazole	NA	2.00E-2	31	290	0.036	0.36	1.8	Approved 2/27/98
carbon disulfide	1.00E-1	NA	500	1000	14	140	700	Approved 2/27/98
4-chloroaniline	4.00E-3	NA	270	2500	0.56	5.6	28	Approved 2/27/98
chloroethane (4)	4.00E-1	2.90E-3	210	1000	0.24	2.4	12	Revision required
chloromethane	NA	1.30E-2	47	440	0.054	0.54	2.7	Approved 2/27/98

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			Residential DEC	Industrial/ Commercial DEC	GAA/GA PMC	GB PMC	Groundwater Protection Criteria	
4-chloro-3methylphenol (5)	NA	NA	1000	2500	7	70	350	Revision requi
2-chloronaphthalene	8.00E-2	NA	1000	2500	11	110	560	Approved 2/27/98
4-chlorophenyl-phenyl ether (6)	NA	NA	500	1000	8.2	82	410	Approved 2/27/98
chrysene	NA	7.30E-3	84	780	0.096	0.96	4.8	Approved 2/27/98
cobalt (7)	6.00E-2	NA	1000	2500	2200 µg/L	22,000 µg/L	420	Revision required
4,4'-DDD	NA	2.40E-1	2.6	24	0.0029	0.029	0.15	Approved 2/27/98
4,4'-DDE	NA	3.40E-1	1.8	17	0.0021	0.021	0.1	Approved 2/27/98
4,4'-DDT	5.00E-4	3.40E-1	1.8	17	0.0021	0.021	0.1	Approved 2/27/98
dibenzofuran	4.00E-3	NA	270	2500	0.56	5.6	28	Approved 2/27/98
dibenz(a,h)anthracene	NA	7.30E 0	0.084	0.78	0.000096	0.00096	0.0048	Approved 2/27/98
1,2-dibromo-3-chloropropane	NA	1.40E 0	0.44	4.1	0.0005	0.005	0.025	Approved 2/27/98
1,2 dibromoethane	NA	8.50E+1	0.0072	0.067	0.0000082	0.000082	0.00041	Approved 2/27/98
3,3'-dichlorobenzidene	NA	4.50E-1	1.4	13	0.0016	0.016	0.078	Approved 2/27/98
1,2-dichloroethene (total) (8)	2.00E-2	NA	500	1000	2.8	28	140	Revision required
diethyl phthalate	8.00E-1	NA	1000	2500	110	1100	5600	Approved 2/27/98

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			Residential DEC	Industrial/ Commercial DEC	GAA/GA PMC	GB PMC	Groundwater Protection Criteria	
2,4-dimethylphenol	2.00E-2	NA	1000	2500	2.8	28	140	Approved 2/27/98
dimethylphthalate (9)	1.00E+1	NA	1000	2500	1400	1400	70,000	Revision required
4,6-dinitro-2methylphenol (10)	1.00E-4	NA	6.8	200	0.014	0.14	0.7	Approved 2/27/98
2,4-dinitrophenol	2.00E-3	NA	140	2500	0.28	2.8	14	Approved 2/27/98
2,4-dinitrotoluene	2.00E-3	NA	140	2500	0.28	2.8	14	Approved 2/27/98
2,6-dinitrotoluene	1.00E-3	NA	68	2000	0.14	1.4	7	Approved 2/27/98
endosulfan I	6.00E-3	NA	410	1200	0.84	8.4	42	Approved 2/27/98
endosulfan II	6.00E-3	NA	410	1200	0.84	8.4	42	Approved 2/27/98
endosulfan sulfate (11)	NA	NA	410	1200	0.84	8.4	42	Approved 2/27/98
endrin aldehyde (12)	NA	NA	20	610	NE	NE	NE	Approved 2/27/98
endrin ketone (13)	NA	NA	20	610	NE	NE	NE	Approved 2/27/98
hexachlorobutadiene	2.00E-4	7.80E-2	7.9	73	0.009	0.09	0.45	Approved 2/27/98
hexachlorocyclopentadiene	7.00E-3	NA	470	2500	0.98	9.8	49	Approved 2/27/98
2-hexanone (methylbutyl ketone)(10)	4.00E-2	NA	500	1000	5.6	56	280	Revision required
indeno(1,2,3-cd)pyrene	NA	7.30E-1	0.84	7.8	0.00096	0.0096	0.045	Approved 2/27/98

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			Residential DEC	Industrial/ Commercial DEC	GAA/GA PMC	GB PMC	Groundwater Protection Criteria	
isophorone	2.00E-1	9.50E-4	640	2500	0.74	7.4	37	Approved 2/27/98
manganese (14)	2.30E-2	NA	1600	47000	50 µg/L	500 µg/L	160	Approved 2/27/98
2-methylnaphthalene (10)	4.00E-2	NA	1000	2500	5.6	56	280	Revision required
2-methylphenol	5.00E-2	NA	1000	2500	7	70	350	Approved 2/27/98
4-methylphenol	5.00E-3	NA	340	2500	0.7	7	35	Approved 2/27/98
2-nitroaniline	6.00E-5	NA	4.1	1200	0.0084	0.084	0.42	Approved 2/27/98
3-nitroaniline	3.00E-3	NA	200	2500	0.42	4.2	21	Approved 2/27/98
4-nitroaniline	3.00E-3	NA	200	2500	0.42	4.2	21	Approved 2/27/98
nitrobenzene	5.00E-4	NA	34	1000	0.07	0.7	3.5	Approved 2/27/98
2-nitrophenol	NA	NA	540	2500	1.1	11	56	Approved 2/27/98
4-nitrophenol (15)	8.00E-3	NA	540	2500	1.1	11	56	Revision required
N-nitrosodiphenylamine	NA	4.90E-3	130	1200	0.14	1.4	7.1	Approved 2/27/98
N-nitrosodi-n-propylamine	NA	7.00E 0	0.088	0.82	0.0001	0.001	0.005	Approved 2/27/98
phenanthrene (16)	NA	NA	1000	2500	5.6	56	280	Revision required
1,2,4-trichlorobenzene	1.00E-2	NA	680	2500	1.4	14	70	Approved 2/27/98

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			Residential DEC	Industrial/ Commercial DEC	GAA/GA PMC	GB PMC	Groundwater Protection Criteria	
2,4,5-trichlorophenol	1.00E-1	NA	1000	2500	14	140	700	Approved 2/27/98
2,4,6-trichlorophenol	NA	1.10E-2	56	520	0.064	0.64	3.2	Approved 2/27/98

- Notes:
- 1) Naphthalene used inappropriately as surrogate for benzo(g,h,i)perylene. Pyrene should be used instead.
 - 2) BCH(alpha) used as surrogate for BCH (delta).
 - 3) Chloromethane used inappropriately as surrogate for bromochloromethane. Bromodichloromethane should be used instead.
 - 4) Criteria based on Cancer Slope Factor which could not be verified by DEP.
 - 5) 3-methylphenol used inappropriately as surrogate for 4-chloro-3methylphenol. A qualitative risk assessment would be acceptable.
 - 6) 4-bromophenyl-phenyl ether used as surrogate for 4-chlorophenyl-phenyl ether.
 - 7) Pollutant mobility criteria for cobalt based on EPA Region III RBC for tapwater (2200µg/l). This approach is unacceptable.
 - 8) Criteria for total 1,2 dichloroethene based RfD for trans isomer (2.00E-2 mg/kg/day). RfD for mixture of trans and cis isomers (9.00 E-3 mg/kg/day) should be used.
 - 9) Navy lists GB pollutant mobility criteria for dimethylphthalate as 1,400 mg/kg. Correct value is 14,000 mg/kg.
 - 10) Criteria based on Reference Dose which could not be verified by DEP.
 - 11) Endosulfan used as surrogate for endosulfan sulfate.
 - 12) Endrin used as surrogate for endrin aldehyde.
 - 13) Endrin used as surrogate for endrin ketone.
 - 14) Pollutant mobility criteria for manganese based on EPA Secondary MCL (50 µg/L). This approach is acceptable. GA/GAA pollutant mobility criteria based on calculated ground water protection criteria would be 160 µg/L, GB pollutant mobility criteria would be 1,600 µg/L.
 - 15) Criteria for 4-nitrophenol based on incorrect RfD. Correct RfD of 6.2E-2 mg/kg/day should be used, or reference should be provided for listed RfD.
 - 16) Naphthalene used inappropriately as surrogate for phenanthrene. Criteria listed in Regulations must be used instead of calculated values.