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A Comparison of Existing Water Quality Criteria and Standards with Living Resources Habitat Requirements

Chesapeake Bay Program

A Comparison of Existing Water Quality Criteria and Standards with Living Resources Habitat Requirements

A report prepared by the
Criteria and Standards Workgroup
of the Chesapeake Bay Program's
Living Resources Subcommittee

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CONTENTS

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CHARGE TO THE WORKGROUP

The workgroup was charged with comparing existing water quality criteria and standards with the water quality requirements found in the Chesapeake Bay Program document, Habitat Requirements For The Chesapeake Bay Living Resources. Based on this comparison, recommendations for the possible improvement of existing criteria and standards were to be made as were any recommendations for the periodic updating of the Habitat Requirements document.

WORKGROUP ACTIVITIES

The workgroup met on November 13, 1987 and on January 15, 1988. At the first meeting, Mr. Frank Gostomski, Chief of EPA's Criteria and Standards Branch, explained EPA's criteria development program. Attachment A includes a table of the existing EPA water quality criteria along with a listing of the advisories and criteria EPA proposes for development in the near future. As required by the Clean Water Act, the jurisdictions must review and revised as appropriate their water quality standards every three years. Attachment B presents the schedule for these triennial reviews for each of the Bay jurisdictions.

Prior to the second meeting, a series of worksheets were developed which presented each of the water quality parameters discussed in the Habitat Requirements document (Attachment C). Each worksheet contains the relevant criteria and standards of each jurisdiction along with the habitat requirements of individual species. These worksheets were discussed and a variety of issues were raised.

For some parameters, the EPA criteria is either missing or insufficient to protect the target species of the Habitat Requirement document. One reason for this is that EPA has certain minimum data requirements which must be met before criteria are developed and for some parameters, the required data may not be available. Another reason as stated in, Quality Criteria for Water, EPA 440/5-86-001, is that: "Water quality criteria are not intended to offer the same degree of strategy for survival and propagation at all times to all organisms". Therefore, the most sensitive organisms may not be protected by some EPA criteria. In such cases, the EPA recommends that special standards be considered based on the presence of sensitive species.

For many other parameters, the existing EPA criteria, as well as the water quality standards adopted by the jurisdictions are more stringent than the numbers in the Habitat

Requirements document. This is due primarily to the differences in the approaches used in developing the criteria versus the habitat requirements. The EPA criteria are based upon data derived from a large number of species which may include species more sensitive to the chemical than the species targeted in the Habitat Requirements document.

GENERAL RECOMMENDATIONS

Examination of the existing standards and criteria in conjunction with the Habitat Requirements document yielded several general recommendations:

1. Information about existing water quality criteria and standards should be incorporated into future revisions of the Habitat Requirements document. The appropriate criteria or standards can either be incorporated into the matrices of individual species or listed in an appendix to allow users of the document easy reference to this information.

2. The Habitat Requirements document should be used to assist the jurisdictions in assessing whether regional water quality standards should be adopted. The document should not be used as the sole rationale for changing water quality standards.

3. More specific references should be included in the Habitat Requirements document for each toxic parameter value listed in the Habitat matrices. In the present document, it is difficult to determine the sources of some of the toxicity information.

4. Parameters should be examined to determine the need for and feasibility of varying habitat requirements based on salinity. The toxicity of several metals varies based on the ambient salinity.

5. Participating agencies in the Chesapeake Bay Monitoring Program should reassess the adequacy of their present monitoring programs with reference to the parameters listed in the Habitat Requirements document and existing criteria and standards.

6. Any product ban or restriction on the use of a toxic material should be mentioned. This would alert users of the document regarding the potential for the introduction of that pollutant into the environment.

SPECIFIC RECOMMENDATIONS BY PARAMETERS

There are specific recommendations that can be made about individual parameters. For practicality and ease of discussion, the individual parameters are divided into four groups: conventional parameters, metals, biocides, and other organic chemicals. Each of these groups presents different situations concerning the feasibility of developing useful water quality objectives, criteria or standards. The remainder of the report contains brief summaries of the workgroup's findings about specific parameters along with recommendations based upon these findings.

CONVENTIONAL PARAMETERS

1. Temperature

EPA has a complicated process for the development of Temperature criteria. All jurisdictions have adopted simplified criteria that are probably sufficient to protect the target species. Pennsylvania has a new standard under development that is more ecologically realistic than most existing standards. This standard takes into account various life stages of fish species as well as seasonal changes in ambient temperatures. It is recognized that this approach may be difficult to implement and enforce.

Recommendation: Other jurisdictions should examine the approach Pennsylvania is considering.

2. Light Related Parameters (Turbidity, Secchi depth, light intensity, light extinction coefficient (kd), suspended solids)

These parameters are important water quality indicators. Research has shown that many of the ecological problems in the Bay are related to declining light quality. Presently, there is some consideration given to these parameters in management programs through the following means:

1. BMP's are targeted to areas with highly erodible land.

2. Many jurisdictions have local ordinances which govern erosion and sediment control practices.

3. There are suspended solids and color limits in many NPDES permits.

4. Water quality planners are generally aware of the importance of these parameters.

However, at the present time, there is little focus on using these parameters as criteria or standards. Developing meaningful or implementable standards may be a difficult task. These parameters are often a function of natural causes and can be highly variable in both time and space. Furthermore, they are largely related with non-point source dominated problems and criteria and standards programs are traditionally more useful in dealing with point source problems.

Recommendation: Further consideration needs to be given to whether these parameters can be used by management agencies as standards, criteria, or "guidelines". Improvements in the understanding and usefulness of these parameters would allow agencies to focus BMP's in areas where impacts on water clarity has been demonstrated rather than on the potential for pollution (i.e. areas with highly erodible land). Also, improve information would be valuable to water quality planners.

3. Chlorophyll

There are presently no chlorophyll criteria/standards though it is widely recognized as an important water quality variable. It is a highly variable biological parameter and deleterious levels are very site specific. For these reasons, it may be difficult to develop as a standard. However, it is still valuable as an "indicator" of areas with potential water quality problems. Virginia has used chlorophyll as the primary basis for

for designating "nutrient enriched waters" in its proposed water quality standard. The designation of "nutrient enriched waters" is then used as justification for the implementation of management strategies.

Recommendation: Research should focus on approaches that may be used to determine deleterious levels of chlorophyll under estuarine conditions at varied salinities.

4. Dissolved Inorganic Nitrogen, Dissolved Inorganic Phosphorus

These parameters are also good "indicators" of areas with potential water quality problems. There are currently no criteria or standards for these parameters. It would be very difficult to develop any because of the high natural variability and the very confounding influences of biological cycling. Most jurisdiction are presently attempting to control nitrogen and phosphorus without the use of criteria and standards (through phosphate bans, NPDES permits, BMPs). Pennsylvania uses mathematical modeling and a "trophic index" for determining allowable phosphorus loadings to freshwater systems.

Recommendation: Applied research should focus on linking excessive levels of Dissolved Inorganic Nitrogen and Dissolved Inorganic Phosphorus to the decline of submerged aquatic vegetation and as causal factors in the shift in planktonic community structures from diatoms toward less desirable smaller sized dinoflagellates and cyanobacteria.

5. Dissolved Oxygen, Ph, Salinity

The current criteria and standards for these parameters are sufficient to protect the target species. EPA has recently revised the dissolved oxygen criteria.

Recommendations: The jurisdictions should consider the revised water quality criteria for dissolved oxygen during their next triennial reviews.

6. Alkalinity

Only Pennsylvania has adopted criteria for alkalinity.

Recommendation: Virginia, Maryland and the District of Columbia should examine the need for adoption of alkalinity standards.

7. Total Hardness

No criteria or standards for hardness have been adopted by EPA or any of the jurisdictions.

Recommendation: Virginia, Maryland, Pennsylvania, the District of Columbia and EPA should examine the need for the development of criteria/standards for total hardness.

8. Chlorine

The criteria and standards that exist are probably sufficient. Pennsylvania is the only jurisdiction with no criteria although new advanced treatment candidates are required to

provide facilities for dechlorination. In Pennsylvania, a chlorine criteria is also imposed in specific situations where it has been determined that chlorine is impacting designated stream uses.

Recommendation: Pennsylvania should reexamine the need to adopt standards for chlorine.

METALS

1. Cadmium

The existing criteria/standards may not be protective of striped bass. This is acknowledged in EPA's criteria.

Recommendation: Jurisdictions should examine the need for adoption of special cadmium standards for striped bass spawning areas.

2. Zinc

All jurisdictions except Maryland have adopted criteria or standards. The present criteria/standards, though lower than EPA criteria, are close to the levels that would harm hard clams. Zinc anodes on boats may be a significant source of zinc.

Recommendation: Research should focus on examination of the possible impact of zinc in hard clam grounds. Maryland should examine the need to adopt Zinc standards.

3. Aluminum

Pennsylvania is the only jurisdiction with any standard. Aluminum is of concern in striped bass spawning areas. EPA has a draft document in preparation.

Recommendation: Jurisdictions should consider the adoption of standards when EPA criteria are available.

4. Nickel

All jurisdiction except Maryland have criteria or standards. These criteria and standards may not protect white perch.

Recommendation: Further examination of the information on the toxicity of nickel should be conducted. Jurisdictions should consider the need to adopt special nickel criteria for white perch habitats.

5. Manganese

Pennsylvania and Virginia have sufficient standards.

Recommendation: Maryland and the District of Columbia should examine the need for adoption of manganese standards.

6. Silver, Mercury, Copper, and Lead

EPA criteria and sufficient state standards exist for all these parameters in Pennsylvania, Virginia, and the District of Columbia.

Recommendation: Maryland should examine the need for adoption of state standards for silver, mercury, copper and lead.

BIOCIDES

Herbicides and pesticides present difficulties for the setting of meaningful and enforceable criteria and standards. Monitoring for these compounds is difficult because of the non-point source nature of the input and the episodic timing of the input. Some of these compounds are already banned or their use restricted.

1. Aldrin, Toxaphene, and Dieldrin

Sufficient criteria exist for these compounds.

2. Endrin

Sufficient criteria exist for these compounds.

Recommendation: Information concerning the banning or restricted use of any of these compounds should be incorporated into the Habitat Requirements document.

3. Atrazine

Pennsylvania is the only jurisdiction with standards. However, the Pennsylvania criteria may not be protective of the SAV.

Recommendation: Jurisdictions should consider the need for setting special standards for atrazine to protect SAV habitats.

4. Paraquat and Diquat

Pennsylvania is the only jurisdiction with criteria.

Recommendation: Virginia, Maryland, and the District of Columbia should examine the need for adoption of standards for Paraquat and Diquat.

5. Chlordane

Pennsylvania, Virginia, and the District of Columbia have sufficient standards.

Recommendation: Maryland should examine the need for Chlordane standards.

6. Malathion

Only Virginia and Pennsylvania have adopted criteria/standards for this compound.

Recommendation: Maryland and District of Columbia should examine the need for adoption of criteria/standards for Malathion.

7. Dichlorophenoxy Acetic Acid

Pennsylvania is the only jurisdiction with standards.

Recommendation: Virginia, Maryland, and District of Columbia should examine the need for adoption of standards.

8. Trichlorophenoxy Acetic Acid

This compound effects striped bass and there are no criteria and standards adopted.

Recommendation: All jurisdictions should examine the need for the adoption of criteria and standards for this compound.

9. DDT

All jurisdictions have sufficient criteria.

10. TBT

Pennsylvania has a chronic standard. The other jurisdictions are in the process of developing standards.

Recommendation: Maryland, Virginia, and the District of Columbia should continue their standard development process.

OTHER ORGANIC CHEMICALS

The input of these compounds is largely from point sources. Therefore, the adoption of criteria and standards would aid in setting NPDES permit limits.

1. Phenol

Only Virginia and District of Columbia have criteria.

Recommendation: Maryland and Pennsylvania should examine the need to adopt criteria and standards. All jurisdictions should examine the expression and intent of their criteria.

2. Orthodichlorobenzene, Trichlorobenzene

Only Pennsylvania has criteria.

Recommendation: Virginia, Maryland, and District of Columbia should examine the need to adopt criteria and standards. The LC5O for this compound is very high. Monitoring data should be examined to see if environmental levels are high enough to consider adoption of standards.

ATTACHMENT A

WATER QUALITY CRITERIA SUMMARY

Note: This chart is for general information; please use criteria documents or detailed summaries in "E.P.A. Quality Criteria for Water - 1986" for regulatory purposes.

January 2, 1987

			CONCENTRATIONS IN ug/L						UNITS PER LITER		
	Priority Pollutant	Carcin-ogen	Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Con-sumption Only	Drinking Water M.C.L.	Date/ Reference	# of States with Aquatic Life Standard
ACENAPTHENE	Y	N	*1,700.	*520.	*970.	*710.				1980FR	1
ACROLEIN	Y	N	*68.	*21.	*55.		320.ug	780.ug		1980FR	1
ACRYLONITRILE	Y	Y	*7,550.	2,600.			0.058ug	0.65ug**		1980FR	
ALDRIN	Y	Y	3.0		1.3		0.074ng**	0.079ng**		1980FR	16
ALKALINITY	N	N		20,000.						1976RB	
AMMONIA	N	N	CRITERIA ARE pH AND TEMPERATURE DEPENDENT - SEE DOCUMENT							1985FR	24
ANTIMONY	Y	N	*9,000.	*1,600.			146.ug	45,000.ug		1980FR	1
ARSENIC	Y	Y					2.2ng**	17.5ng**	0.05mg	1980FR	21
ARSENIC (PENT)	Y	Y	*850.	*48.	*2,319.	*13.				1985FR	21
ARSENIC (TRI)	Y	Y	360.	190.	69.	36.				1985FR	21
ASBESTOS	Y	Y					30kf/L**			1980FR	
BACTERIA	N	N	FOR PRIMARY RECREATION AND SHELLFISH USES - SEE DOCUMENT						<1/100ml	1986FR	56
BARIUM	N	N					1.mg		1.0mg	1976RB	8
BENZENE	Y	Y	*5,300.		*5,100.	*700.	0.66ug**	40.ug**		1980FR	1
BENZIDINE	Y	Y	*2,500.				0.12ng**	0.53ng**		1980FR	6
BERYLLIUM	Y	Y	*130.	*5.3			6.8ng**	117.ng**		1980FR	8
BHC	Y	N	*100.		*0.34					1980FR	
CADMIUM	Y	N	3.9+	1.1+	43.	9.3	10.ug		0.010ug	1985FR	21
CARBON TETRA-CHLORIDE	Y	Y	*35,200.		*50,000.		0.4ug**	6.94ug**		1980FR	1
CHLORDANE	Y	Y	2.4	0.0043	0.09	0.004	0.46ng**	0.48ng**		1980FR	12
CHLORINATED BENZENES	Y	Y	*250.	*50.	*160.	*129.	488.ug			1980FR	1

ATTACHMENT A

CONCENTRATIONS IN ug/L — UNITS PER LITER

	Priority Pollutant	Carcin-ogen	Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Con-sumption Only	Drinking Water M.C.L.	Date/ Reference	# of States with Aquatic Life Standard
CHLORINATED NAPHTHALENES	Y	N	*1,600.		*7.5					1980FR	1
CHLORINE	N	N	19.	11.	13.	7.5				1985FR	21
CHLOROALKYL ETHERS	Y	N	*238,000.							1980FR	1
CHLOROETHYL ETHER (BIS-2)	Y	Y					0.03ug**	1.36ug**		1980FR	
CHLOROFORM	Y	Y	*28,900.	*1,240			0.19ug**	15.7ug**		1980FR	1
CHLOROISOPROPYL ETHER (BIS-2)	Y	N					34.7ug	4.36mg		1980FR	
CHLOROMETHYL ETHER (BIS)	Y	N					0.00000376ng**	0.00184ug**		1980FR	
CHLOROPHENOL 2	Y	N	*4,380.	*2,000.						1980FR	1
CHLOROPHENOL 4	N	N			*29,700.					1980FR	1
CHLOROPHENOXY HERBICIDES (2,4,5,-TP)	N	N					10.ug			1980FR	
CHLOROPHENOXY HERBICIDES (2,4-D)	N	N					100.ug			1976RB	7
CHLORPYRIFOS	N	N	0.083	0.041	0.011	0.0056				1986FR	
CHLORO-4 METHYL-3 PHENOL	N	N	*30							1980FR	
CHROMIUM (HEX)	Y	N	16.	11.	1,100.	50.	50.ug		0.05mg	1985FR	24
CHROMIUM (TRI)	N	N	1,700.+	210.+	*10,300.		170.mg	3,433.mg	0.05mg	1985FR	24
COLOR	N	N	NARRATIVE STATEMENT - SEE DOCUMENT							1976RB	
COPPER	Y	N	18.+	12.+	2.9	2.9				1985FR	20
CYANIDE	Y	N	22.	5.2	1.	1.	200.ug			1985FR	23
DDT	Y	Y	1.1	0.001	0.13	0.001	0.024ng**	0.024ng**		1980FR	16
DDT METABOLITE (DDE)	Y	Y	*1,050.		*14.					1980FR	
DDT METABOLITE (TDE)	Y	Y	*0.06		*3.6					1980FR	
DEMETON	Y	N		0.1		0.1				1976RB	
DIBUTYLPHTHALATE	Y	N					35.mg	154.mg		1980FR	
DICHLOROBENZENES	Y	N	*1,120.	*763.	*1,970.		400.ug	2.6mg		1980FR	1

ATTACHMENT A

	Priority Pollutant	Carcin-ogen	Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Con-sumption Only	Drinking Water M.C.L.	Date/ Reference	# of States with Aquatic Life Standard
			CONCENTRATIONS IN ug/L					UNITS PER LITER			
DICHLOROBENZIDINE	Y	Y					0.01ug**	0.020ug**		1980FR	1
DICHLOROETHANE 1,2	Y	Y	*118,000.	*20,000.	*113,000.		0.94ug**	243.ug**		1980FR	1
DICHLOROETHYLENES	Y	Y	*11,600.		*224,000.		0.033ug**	1.85ug**		1980FR	1
DICHLOROPHENOL 2,4	N	N	*2,020.	*365.			3.09mg			1980FR	1
DICHLOROPROPANE	Y	N	*23,000.	*5,700.	*10,300.	*3,040.				1980FR	1
DICHLOROPROPENE	Y	N	*6,060.	*244.	*790.		87.ug	14.1mg		1980FR	1
DIELDRIN	Y	Y	2.5	0.0019	0.71	.0019	0.071ng**	0.076ng**		1980FR	16
DIETHYLPHTHALATE	Y	N					350.mg	1.8g		1980FR	
DIMETHYLPHENOL 2,4	Y	N	*2,120.							1980FR	
DIMETHYLPHTHALATE	Y	N					313.mg	2.9g		1980FR	
DINITROTOLUENE 2,4	N	Y					0.11ug**	9.1ug**		1980FR	
DINITROPHENOLS	Y	N					70.ug	14.3mg		1980FR	
DINITROTOLUENE	N	Y	*330.	*230.	*590.	*370.				1980FR	1
DINITRO-O-CRESOL 2,4	Y	N					13.4ug	765.ug		1980FR	
DIOXIN (2,3,7,8-TCDD)	Y	Y	*0.01	*0.00001			0.000013ng**	0.000014ng**		1984FR	1
DIPHENYLHYDRAZINE	Y	N					42.ng**	0.56ug**		1980FR	1
DIPHENYLHYDRAZINE 1,2	Y	N	*270							1980FR	
DI-2-ETHYLHEXYL PHTHALATE	Y	N					15.mg	50.mg		1980FR	
ENDOSULFAN	Y	N	0.22	0.056	0.034	0.0087	74.ug	159.ug		1980FR	10
ENDRIN	Y	N	0.18	0.0023	0.037	0.0023	1.ug		0.0002mg	1980FR	18
ETHYLBENZENE	Y	N	*32,00		*430		1.4mg	3.28mg		1980FR	
FLUORANTHENE	Y	N	*3,980.		*40.	*16.	42.ug	54.ug		1980FR	1
GASSES, TOTAL DIS-SOLVED	N	N	NARRATIVE STATEMENT - SEE DOCUMENT							1976RB	
GUTHION	N	N		0.01		0.01				1976RB	8

ATTACHMENT A

CONCENTRATIONS IN ug/L — UNITS PER LITER

	Priority Pollutant	Carcin-ogen	Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Con-sumption Only	Drinking Water M.C.L.	Date/ Reference	# of States with Aquatic Life Standard
HALOETHERS	Y	N	*360	*122						1980FR	
HALOMETHANES	Y	Y	*11,000.		*12,000	*6,400.	0.19ug**	15.7ug**		1980FR	
HEPTACHLOR	Y	Y	0.52	0.0038	0.053	0.0036	0.28ng**	0.29ng**		1980FR	12
HEXACHLOROETHANE	N	Y	*980.	*540.	*940.		1.9ug	8.74ug		1980FR	1
HEXACHLOROBENZENE	Y	N					0.72ng**	0.74ng**		1980FR	
HEXACHLOROBUTADIENE	Y	Y	*90.	*9.3	*32.		0.45ug**	50.ug**		1980FR	2
HEXACHLOROCYCLO-HEXANE (LINDANE)	Y	Y	2.0	0.08	0.16				0.004mg	1980FR	12
HEXACHLOROCYCLO-HEXANE - ALPHA	Y	Y					9.2ng**	31.ng**		1980FR	
HEXACHLOROCYCLO-HEXANE - BETA	Y	Y					16.3ng**	54.7ng**		1980FR	
HEXACHLOROCYCLO-HEXANE - GAMMA	Y	Y					18.6ng**	62.5ng**		1980FR	
HEXACHLOROCYCLO-HEXANE - TECHNICAL	Y	Y					12.3ng**	41.4ng**		1980FR	
HEXACHLOROCYCLO-PENTADIENE	Y	N	*7.	*5.2	*7.		206.ug			1980FR	3
IRON	N	N		1,000.			0.3mg			1976RB	15
ISOPHORONE	Y	N	*117,000.		*12,900.		5.2mg	520.mg		1980FR	
LEAD	Y	N	82.+	3.2.+	140.	5.6	50.ug		0.05mg	1985FR	20
MALATHION	N	N		0.1		0.1				1976RB	7
MANGANESE	N	N					50.ug	100.ug		1976RB	7
MERCURY	Y	N	2.4	0.012	2.1	0.025	144.ng	146.ng	0.002mg	1985FR	17
METHOXYCHLOR	N	N		0.03		0.03	100.ug		0.1mg	1976RB	12
MIREX	N	N		0.001		0.001				1976RB	7
MONOCHLOROBENZENE	Y	N					488.ug			1980FR	
NAPHTHALENE	Y	N	*2,300.	*620.	*2,350.					1980FR	1
NICKEL	Y	N	1,400.+	160.+	75.	8.3	13.4ug	100.ug		1986FR	10
NITRATES	N	N					10.mg		10.mg	1976RB	5

ATTACHMENT A

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			CONCENTRATIONS IN ug/L					UNITS PER LITER			
NITROBENZENE	Y	N	*27,000.		*6,680.		19.8mg			1980FR	1
NITROPHENOLS	Y	N	*230.	*150.	*4,850.					1980FR	1
NITROSAMINES	Y	Y	*5,850		*3,300,000		0.8ng**	1240.ng**		1980FR	1
NITROSODIBUTYL-AMINE N	Y	Y					6.4ng**	587.ng**		1980FR	
NITROSODIETHYL-AMINE N	Y	Y					0.8ng**	1,240.ng**		1980FR	
NITROSODIMETHYL-AMINE N	Y	Y					1.4ng**	16,000.ng**		1980FR	
NITROSODIPHENYL-AMINE N	Y	Y					4,900.ng**	16,100.ng**		1980FR	
NITROSOPYRROLIDINE N	Y	Y					16.ng**	91,900.ng**		1980FR	
OIL AND GREASE	N	N	NARRATIVE STATEMENT - SEE DOCUMENT							1976RB	56
OXYGEN DISSOLVED	N	N	WARMWATER AND COLD WATER CRITERIA MATRIX - SEE DOCUMENT							1986FR	56
PARATHION	N	N	0.065	0.013						1986FR	8
PCB's	Y	Y	2.0	0.014	10.	0.03	0.079ng**	0.079ng**		1980FR	16
PENTACHLORINATED ETHANES	N	N	*7,240.	*1,100.	*390.	*281.				1980FR	1
PENTACHLOROBENZENE	N	N					74.ug	85.ug		1980FR	
PENTACHLOROPHENOL	Y	N	***20.	***13.	13.	*7.9	1.01mg			1986FR	2
pH	N	N		6.5-9.0		6.5-8.5				1976RB	56
PHENOL	Y	N	*10,200.	*2,560.	*5,800.		3.5mg			1980FR	23
PHOSPHORUS ELEMENTAL	N	N				0.1				1976RB	
PHTHALATE ESTERS	Y	N	*940.	*3.	*2,944.	*3.4				1980FR	6
POLYNUCLEAR AROMATIC HYDROCARBONS	Y	Y			*300.		2.8ng**	31.1ng**		1980FR	1
SELENIUM	Y	N	260.	35.	410.	54.	10.ug		0.01mg	1980FR	15

ATTACHMENT A

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			CONCENTRATIONS IN ug/L					UNITS PER LITER			
SILVER	Y	N	4.1+	0.12	2.3		50.ug		0.05mg	1980FR	14
SOLIDS DISSOLVED AND SALINITY	N	N					250.mg			1976RB	56
SOLIDS SUSPENDED AND TURBIDITY	N	N	NARRATIVE STATEMENT - SEE DOCUMENT							1976RB	44
SULFIDE-HYDROGEN SULFIDE	N	N		2.		2.				1976RB	
TEMPERATURE	N	N	SPECIES DEPENDENT CRITERIA - SEE DOCUMENT							1976RB	56
TETRACHLORINATED ETHANES	Y	N	*9,320.							1980FR	
TETRACHLOROBEN-ZENE 1,2,4,5	Y	N					38.ug	48.ug		1980FR	
TETRACHLOROETHANE 1,1,2,2	Y	Y		*2,400.	*9,020.		0.17ug**	10.7ug**		1980FR	1
TETRACHLOROETHANES	Y	N	*9,320.							1980FR	1
TETRACHLOROETHYLENE	Y	Y	*5,280.	*840.	*10,200.	*450.	0.8ug**	8.85ug**		1980FR	1
TETRACHLOROPHENOL 2,3,5,6	Y	N				*440.				1980FR	
THALLIUM	Y	N	*1,400.	*40.	*2,130.		13.ug	48.ug		1980FR	2
TOLUENE	Y	N	*17,500.		*6,300.	*5,000.	14.3mg	424.mg		1980FR	1
TOXAPHENE	Y	Y	0.73	0.0002	0.21	0.0002	0.71ng**	0.73ng**	0.005mg	1986FR	17
TRICHLORINATED ETHANES	Y	Y	*18,000.							1980FR	
TRICHLOROETHANE 1,1,1	Y	N			*31,200.		18.4mg	1.03g		1980FR	1
TRICHLOROETHANE 1,1,2	Y	Y		*9,400.			0.6ug**	41.8ug**		1980FR	1
TRICHLOROETHYLENE	Y	Y	*45,000.	*21,900.	*2,000.		2.7ug**	80.7ug**		1980FR	1
TRICHLOROPHENOL 2,4,5	N	N					2,600.ug			1980FR	
TRICHLOROPHENOL 2,4,6	Y	Y		*970.			1.2ug**	3.6ug**		1980FR	
VINYL CHLORIDE	Y	Y					2.ug**	525.ug**		1980FR	
ZINC	Y	N	120.+	110.+	95.	86.				1987FR	19

ATTACHMENT A

NOTES

g = grams
mg = milligrams
μg = micrograms
ng = nanograms
f = fibers

Y = YES
N = NO

+ = Hardness Dependent Criteria (100mg/L used)

* = Insufficient Data to Develop Criteria.
Value Presented is the L.O.E.L. - Lowest Observed Effect Level

** = Human Health Criteria For Carciogens Reported For Three Risk Levels. Value Presented is the 10^{-6} Risk Level

*** = pH Dependent Criteria (7.8 pH used)

FR = FEDERAL REGISTER
RB = QUALITY CRITERIA FOR WATER, 1976 (REDBOOK)

M.C.L. = MAXIMUM CONTAMINANT LEVEL

ATTACHMENT A

CRITERIA PROPOSED BY EPA FOR DEVELOPMENT IN THE NEAR FUTURE

Criteria

Acrolein (no saltwater criteria)

Acrylonitrile (no saltwater criteria)

Aluminum (draft criteria dated 2/18/86 rec'd)

Analine (no saltwater criteria)

Antimony III

Chloroform (no saltwater criteria)

Diethylhexyphthalate

Dimethylphenol

Hexachlorobenzene

Hexachlorobutadiene (no saltwater criteria)

Organotins

Phenanthrene

Phenol (no saltwater criteria)

Silver (no saltwater criteria)

Tetrachloroethylene (no saltwater criteria)

Thallium (no saltwater criteria)

Toluene (no freshwater criteria)

Tributyltin (advisory [9/14/87] rec'd) - criterion expected in FY'90

1,2,4, Trichlorobenzene

2,4,5, Trichlorophenol

ADVISORIES/CRITERIA PROPOSED BY EPA FOR DEVELOPMENT IN THE NEAR FUTURE

Advisories

Bis-2 chloroethyoxymethane

Carbazole

Chlorides (freshwater only)

Chlorinated Styrenes

Cobalt

Diaminotoluene

Dibenzofurans

Dimethylsulfoxide

1,3,-Dinitrobenzene

Dioxins (other than 2,3,7,8-TCPP)

Microbiological

Nitroaniline

Nitrogen

p-dioxane

Phosphates

Polychlorinated diphenyl ethers

Styrene

Tetramethyl lead

Xylene

ATTACHMENT B

SCHEDULE FOR TRIENNIAL REVIEWS OF WATER QUALITY STANDARDS

MARYLAND

Triennial review of all water quality standards in 1988.

PENNSYLVANIA

Triennial review of all water quality standards in 1988. Proposed rulemaking presented to Water Quality Board in January. Public hearings to be scheduled in near future.

VIRGINIA

Triennial review completed in 1987. Initiate process for the next triennial review during the next fiscal year. Water Control Board has directed staff to initiate process to incorporate EPA toxics criteria into standards when national guidance received from EPA.

WASHINGTON, D.C.

Plans to review and revise water quality standards by December 1988.

ATTACHMENT C

WORKSHEETS FOR THE COMPARISON OF WATER QUALITY CRITERIA AND STANDARDS WITH CHESAPEAKE BAY HABITAT REQUIREMENTS

The enclosed worksheets were developed to compare Water Quality Criteria and Standards of EPA and the Bay jurisdictions with the Chesapeake Bay habitat requirements. The following references were used:

- Habitat Requirements For Chesapeake Bay Living Resources; A report from the Chesapeake Bay Living Resources Task Force, U.S. EPA, 1987.
- Quality Criteria For Water - 1986, EPA 440/5-86-001.
- Water Quality Standards documents from Virginia, Maryland, Pennsylvania, and the District of Columbia.

The parameters examined are as follows:

CONVENTIONALS	METALS	BIOCIDES
Temperature	Cadmium	Aldrin
Turbidity	Zinc	Toxaphene
Secchi Depth	Aluminum	Dieldrin
Light Intensity	Nickel	Endrin
Light Extinction Coeff.	Manganese	Atrazine
Suspended Solids	Silver	Paraquat/Diquat
Chlorophyll	Mercury	Chlordane
DIN	Copper	Malathion
DIP	Lead	Dichlorophenoxy Acetic Acid
Dissolved Oxygen		Trichlorophenoxy Acetic Acid
pH		DDT
Salinity		TBT
Alkalinity		
Total Hardness		
Chlorine		

OTHER ORGANIC CHEMICALS

Phenol
Orthodichlorobenzene
Trichlorobenzene

NOTES ABOUT JURISDICTIONAL POLICIES

Virginia:

Virginia has both criteria and standards. Unless otherwise footnoted as being State standards, all values are criteria only. One basic distinction differentiates water quality criteria from water quality standards. The standards are always mandatory while the criteria are not. Criteria shall be utilized as mandatory requirements when in judgement of the Board they are necessary to ensure the protection of the beneficial uses of the water body. The agency will employ the criteria values or any others it deems appropriate in establishing effluent limitations or other limitations necessary to protect the beneficial uses. The Board may consider modifications to these criteria, on a case-by-case basis, dependent upon a site-specific determination performed by the permittee which demonstrates that alternate criteria are sufficient to ensure protection of water quality.

Maryland:

Maryland has only water quality standards. In cases where there are no established State standards, MDE has a staff level working policy of using EPA's water quality criteria in their NPDES permit program in the following manner. In most cases where they find industries with toxics, they start with EPA's effluent guideline numbers. A mass balance is calculated and compared to the Criteria to determine if the Criteria number is met. When it isn't, the permit number will be made more stringent. On occasion, the effluent guidelines might not include a number for a particular chemical in the effluent. They may include it as a permit parameter based on Criteria numbers or some other basis.

District of Columbia:

The District of Columbia utilizes only standards. For those toxics where the District has no numerical standard, a guideline value for Class C waters is 10 percent of the 96 hour LC50 for affected biota for short-term exposure. Class C waters are those waters protected for aquatic life, waterfowl, shorebirds, and water-oriented wildlife.

Pennsylvania:

Pennsylvania has both criteria and standards. Water quality standards are defined as a combination of water uses to be protected and the criteria necessary to protect those uses. Water quality criteria are defined as the levels of parameters that must be maintained or attained to prevent or eliminate pollution. All of Pennsylvania's waters are protected for fish and aquatic life, human health, and recreational activities; therefore, the most stringent criteria necessary to protect any of these uses would be applicable. All criteria are thus included in the "Fresh" row.

EPA CRITERIA: TEMPERATURE

Freshwater Aquatic Life

For any time of year, there are two upper limiting temperatures for a location (based on the important sensitive species found there at that time):

1. One limit consists of a maximum temperature for short exposures that is time dependent and is given by the species-specific equation:

$$\text{Temperature } (^{o}C) = (1/b)\,(\log_{10}[\text{time}_{min}] - a) - 2^{o}\,C$$

where: $\log_{10}$ = logarithm to base 10 (common logarithm)

a = intercept on the "y" or logarithmic axis of the line fitted to experimental data and which is available for some species from Appendix II-C, National Academy of Sciences 1974 document.

b = slope of the line fitted to experimental data and available for some species from Appendix II-C, National Academy of Sciences document.

2. The second value is a limit on the weekly average temperature that:

a. In the cooler months (mid-October to mid-April in the north and December to February in the south) will protect against mortality of important species if the elevated plume temperature is suddenly dropped to the ambient temperature, with the limit being the acclimation temperature minus 2Pt^{o} C when the lower lethal threshold temperature equals the ambient water temperature (in some regions this limitation may also be applicable in summer).

or

b. In the warmer months (April through October in the north and March through November in the south) is determined by adding to the physiological optimum temperature (usually for growth) a factor calculated as one-third of the difference between the ultimate upper incipient lethal temperature and the optimum temperature for the most sensitive important species (and appropriate life state) that normally is found at that location and time.

or

c. During reproductive seasons (generally April through June and September through October in the north and March through May and October through November in the south) the limit is that temperature that meets site-specific requirements for successful migration, spawning, egg incubation, fry rearing, and other reproductive functions of important species. These local requirements should supersede all other requirements when they are applicable.

or

d. There is a site-specific limit that is found necessary to preserve normal diversity or prevent appearance of nuisance organisms.

Marine Aquatic Life

In order to assure protection of the characteristic indigenous marine community of a water body segment from adverse thermal effects:

a. The maximum acceptable increase in the weekly average temperature resulting from artificial sources is 1° C (1.8° F) during all seasons of the year, providing the summer maxima are not exceeded;

and

b. Daily temperature cycles characteristic of the water body segment should not be altered in either amplitude or frequency.

Summer thermal maxima, which define the upper thermal limits for the communities of the discharge area, should be established on a site specific basis. Existing studies suggest the following regional limits:

	Short-term Maximum	Maximum True Daily Mean*
Subtropical regions (south of Cape Canaveral and Tampa Bay, Florida, and Hawaii)	32.2° C (90° F)	29.4° C (85° F)
Cape Hatteras, N.C. to Cape Canaveral, Fla.	32.2° C (90° F)	29.4° C (85° F)
Long Island (south shore) to Cape Hatteras, N.C.	30.6° C (87° F)	27.8° C (82° F)

(* True Daily Mean = average of 24 hourly temperature readings.)

Baseline thermal conditions should be measured at a site where there is no unnatural thermal addition from any source, which is in reasonable proximity to the thermal discharge (within 5 miles) and which has similar hydrography to that of the receiving waters at the discharge.

VIRGINIA WATER CONTROL BOARD: SITE-SPECIFIC TEMPERATURE REQUIREMENTS

A. Criteria for Developing Site-Specific Temperature Standards

For any specified time of year there shall be two upper limiting temperatures for a location based on temperature requirements of important sensitive species found at the location at that time. These limiting temperatures are:

1. A maximum weekly average temperature that:

   a. In the warmer months is determined by adding to the physiological optimum temperature (usually the optimum for growth) for the most sensitive important species (and appropriate life stage) that normally is found at that location and time; a factor calculated as one-third of the difference between the ultimate upper incipient lethal temperature and the optimum temperature for that species;

   b. In cooler months is an elevated temperature that would still ensure that important species would survive if the temperature suddenly dropped to the normal ambient temperature;

   c. During those seasons of reproduction meets specific site requirements for successful migration, spawning, egg incubation, fry rearing, and other reproductive functions of important species;

   d. At a specific site is found necessary to preserve normal species diversity or prevent undesirable growths of nuisance organisms.

2. A time-dependent maximum temperature for short exposures.

Baseline thermal conditions shall be measured at a site where there is no unnatural thermal addition from any source, which site is in reasonable proximity to the thermal discharge (within 5 miles), and which has similar hydrography to that of the receiving waters at the point of discharge.

Standards development should be in accordance with Water Quality Criteria 1972: A Report of the Committee on Water Quality Criteria and Quality Criteria for Water, U.S. EPA.

B. 316 (a) Determinations

A successful demonstration concerning thermal discharge limits carried out under Section 316(a) of the Clean Water Act shall constitute compliance with the temperature requirements of these standards. A successful demonstration must assure the protection and propagation of a balanced indigenous population of aquatic species and wildlife in or on the water into which the discharge is made. When making a determination concerning thermal discharge limits under Section 316(a) of the Clean Water Act, the Board shall provide notice and opportunity for a public hearing.

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Temperature
UNITS: Degrees Centigrade

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA[x]	DISTRICT OF COLUMBIA
FRESH	#	<20[n]; <21[r]; <31 (mtn. zone) <32 (coastal zone); also see marine	<20[n], <23.9[r] <32[a]	2.3 increase above ambient 1 increase per hr. No increase if ambient temp ≥30.5	32.2 max. 2.8 anthropogenic increase
MARINE	1 anthropogenic increase, No alteration of daily cycle	3 anthropogenic increase, 2 anthropogenic increase/hr.	<32	None	Same as fresh
OTHER	#	#			

Species	Habitat Requirements
Snowy Egret	3-31
Spot	6.3-32.5
Eelgrass	8-30
Yellow Perch	10-19[t]
Menhaden	10-30
White Perch	11-30[t]; 12-20[o]
Alewife	12.7-26.7[f]; 16-24[g]
Blueback Herring	12.7-26.7[f]; 16-24[g]
Bay Anchovy	15-30
Sago Pondweed	15-35
Redhead Grass	15-35
American Shad	15.5-26.6
Hickory Shad	15.5-26.6
Striped Bass	16-19[i]
Wild Celery	18-35[i]
Hard Clam	18-30
Soft Shell Clam	19.4-21.9[j]; 19.6-13.9[k]
Widgeon Grass	20-26
Blue Crab	<33

Notes

a - All natural waters
f - Eggs
g - Larvae
i - Larval/juvenile stage
j - Mean temp. during spring larval set
k - Mean temp. during fall larval set
n - Natural trout waters
o - Optimum
r - Recreational trout waters
t - Tolerate
x - Under Revision
- Species/season specific, see attachment

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Turbidity

UNITS: NTU

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	<10% Anthropogenic Increase	None	50 Avg./Month 150 Max	None	<20% Anthropogenic Increase
MARINE	<10% Anthropogenic Increase	None	Same as Fresh	None	Same as Fresh
OTHER					

Species	Habitat Requirements	Notes
Eelgrass	<15	
Wild Celery	<20	
Sago Pondweed	<20	
Redhead Grass	<20	
Widgeon Grass	<20	
White Perch	<50	
Yellow Perch	<50	
Alewife	<50	
Blueback Herring	<50	
American Shad	<50	
Hickory Shad	<50	
Spot	<50	

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Secchi Depth

UNITS: Meters

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	<10% Anthropogenic decrease	None	None	None	None
MARINE	Same as Fresh	None	None	None	None
OTHER					

Species	Habitat Requirements	Notes
Great Blue Heron	0.5	
Black Duck	1	
Wild Celery	1	
Sago Pondweed	1	
Redhead Grass	1	
Widgeon Grass	1	
Eelgrass	1.25	
Redhead Duck	2	

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Light Intensity

UNITS: $uE/M^2/Sec$

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	<10% Anthropogenic decrease.	None	None	None	None
MARINE	<10% Anthropengic decrease	None	None	None	None
OTHER					

Species	Habitat Requirements	Notes
Wild Celery	100	
Eelgrass	220	
Redhead	230	
Widgeon grass	236	
Sago Pondweed	350	

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Kd (Light Extinction Coefficient)

UNITS: M - L

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	<10% Anthropogenic decrease	None	None	None	None
MARINE	Same as fresh	None	None	None	None

OTHER

Species	Habitat Requirements	Notes
Sago Pondweed	1.7-2.0	
Redhead Grass	1.7-2.0	
Widgeon Grass	1.7-2.0	

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Suspended Solids

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	None	None
MARINE	None	None	None	None	None
OTHER					

Species	Habitat Requirements	Notes
American Oyster	< 35000	
Blueback Herring	< 50000	
American Shad	< 50000	
Hickory Shad	< 50000	
Alewife	50000	
Spot	< 70000	
White Perch	< 70000	
Yellow Perch	5000000	(Reduced Larval Survival)

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Chlorophyll

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	p	None	None	None
MARINE	None	p	None	None	None
OTHER					

Species	Habitat Requirements
Eelgrass	<10
Sago Pondweed	<15
Wild Celery	<15
Redhead Grass	<15
Widgeon Grass	<15

Notes

p - Standard for designation of 'Nutrient waters' based on Chlorophyll levels has been proposed.

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: DIN (Dissolved Inorganic Nitrogen)

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	None	None
MARINE	None	None	None	None	None
OTHER					

Species	Habitat Requirements	Notes
Wild Celery	< 700-14000	
Sago Pondweed	< 140	
Redhead Grass	< 140	
Widgeon Grass	< 140	

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: DIP (Dissolved Inorganic Phosphorus)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	None	None
MARINE	None	None	None	None	None
OTHER					

Species	Habitat Requirements	Notes
Wild Celery	< 10	
Sago Pondweed	< 10	
Redhead Grass	< 10	
Widgeon Grass	< 10	

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Dissolved Oxygen
UNITS: mg/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	3.0[u] min. 4.0[u] weekly avg. min. 5.0[e] min.	4.0[s] min. 5.0[s] daily avg. min.	5.0 min	4.0 min. 5.0 daily avg. min.	4.0 min. 5.0 daily avg. min.
MARINE	Same as fresh	Same as fresh	Same as fresh	None	Same as fresh
OTHER	8.0[c,e] min. 4.0[c,u] min.	5.0[s,x] min. 6.0[s,x] daily avg. 6.0[s,n] min. 7.0[s,n] daily avg.	5.0[n] min. 6.0[n] daily avg. min.		

Species	Habitat Requirements
Blue Crab	> 2
Hard Clam	> 2.4
American Oyster	> 2.4[f]
Soft Shell Clam	> 5
Snowy Egret	> 5[q]
Striped Bass	4.5 - 20[t] 6 - 12[o]
White Perch	> 5
Yellow Perch	> 5
Alewife	> 5
Blueback Herring	> 5
American Shad	> 5
Hickory Shad	> 5
Spot	> 5
Menhanden	> 5

Notes

e - Early life stages
f - Will be higher if Temp. > 25 C°
n - Natural trout waters
o - Optimum
s - State standard
t - Tolerate
u - Other than early life stages
q - Protects prey species
c - Cold water species present (e.g. trout)
x - Put and take trout waters

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: pH

UNITS: Standard Units

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	6.5-9[c]	6-9[s]	6.5-8.5	6-9	6.0-8.5
MARINE	6.5-8.5[c] 0.2 change from Amb.	Same as fresh	Same as fresh	None	Same as fresh
OTHER					

Species	Habitat Requirements
Striped Bass	7.5-8.5 (Optimum)
Soft Shell Clam	6.5-8.0
Hard Clam	6.8-8.5
American Oyster	6.8-8.5
Blue Crab	6.0-8.0
Alewife	6.5-8.5
Blueback Herring	6.5-8.5
American Shad	6.5-8.5
Hickory Shad	6.5-8.5
Spot	6.5-8.5
Menhaden	6.5-8.5
Wild Celery	6.0-9.0
Sago Pondweed	6.0-9.0
Redhead Grass	6.0-9.0
Widgeon Grass	6.0-9.0
Eelgrass	6.0-9.0

Notes

c - Chronic
s - State Standard

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Salinity
UNITS: mg/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	None	None
MARINE	1-4% Anthropogenic variation	None	None	None	None

Species	Habitat Requirements
Striped Bass	0-5
Wild Celery	0-5
White Perch	0-1.5[t]
	0-8[o]
Yellow Perch	0.5[t]
	16-19[o]
Alewife	0-5
Blueback Herring	0-5
American Shad	7.5-15[e]
	0-5[g]
Hickory Shad	7.5-15[e]
	0-5[g]
Spot	0-5[o]
	0-32[t]
Bay Anchovy	0-7
Sago Pondweed	0-12
Menhaden	0-15[o]
	0-34.0[t]
Snowy Egret	1-34[q]
Redhead Grass	2-19
Blue Crab	2-21
American Oyster	5-35
Eelgrass	5-35
Widgeon Grass	5-60
Soft Shell Clam	>10.5
Hard Clam	>17.5

Notes

e - Eggs at 12 - 17°C
g - Larvae
o - Optimum
q - Salinity tolerance of prey species
t - Can tolerate

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Alkalinity

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	20000 min.	None	None	20000 min.	None
MARINE	None	None	None	None	None
OTHER					

Species	Habitat Requirements	Notes
Soft Shell Clam	>20000	
Hard Clam	>20000	
Striped Bass	>20000	

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Total Hardness

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	None	None
MARINE	None	None	None	None	None
OTHER					

Species	Habitat Requirements	Notes
Striped Bass	200000-250000	

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Total Residual Chlorine (TRC)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	11.0[c] 19.0[a]	11.0[d,s] 19.0[e,s]	2.0[n]	None	10.0
MARINE	7.5[c] 13.0[a]	7.5[f] 13.0[g]	None	None	Same as fresh
OTHER		z	q		

Species	Habitat Requirements
Soft Shell Clam	50.0[i]
White Perch	150.0[j]
Striped Bass	150.0-430.0[k]
Blueback Herring	200.0

Notes

a - Acute
c - Chronic
d - Average Daily
e - One Hour Average
f - Average Daily Chlorine Produced Oxidants
g - One Hour Average Chlorine Produced Oxidants
i - LCO
j - LC5
k - Sublethal
n - Trout waters only, no standard for others
q - Dechlorination required for all users except power plants. No chlorine can be used by dischargers to natural trout waters.
s - State Standard
z - Chlorine may not be used by dischargers of >.02 mgd if such discharge is to natural trout waters or waters containing endangered species.

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Cadmium (Total Recoverable)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	1.1[c,h] 3.9[a,h]	1.0[c,h]	None	1.0[c,h] 3.9[a,h]	1.0[h]
MARINE	43.0[a] 9.3[c]	9.3[c]	None	None	Same as Fresh
OTHER	10.0[w] 10.0[d]	10.0[p]			10.0p

Species	Habitat Requirements
Striped Bass	1.0[e]
Soft Shell Clam	150.0[l]

Notes

a - Acute
c - Chronic
d - Drinking water M.C.L. (Maximum Contaminant Level)
e - LCO
h - Hardness dependent, 100mg/l used
l - 168hr, LC50
p - Public water supply standard
w - Fish and water ingestion waters

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Zinc (Total Recoverable)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	110.0[c,h] 120.0[a,h]	47.0[c]	None	36.0[c,h,r]	50.0
MARINE	86.0[c] 95.0[a]	58.0[c]	None	None	Same as Fresh
OTHER		5000[p]			5000[p]

Species	Habitat Requirements
Hard Clam	68.0[d]
Striped Bass	100.0[e]
Soft Shell Clam	100.0[f]

Notes

a - Acute
b - Total recoverable
c - Chronic
d - Zinc chloride LC5
e - Zinc chloride LC0
f - 168hr. LC50
p - Standard for public water supply
h - Hardness dependent (100 mg/l used)
r - Under revision

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Aluminum (Total)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	500[c,h]	z
MARINE	None	None	None	None	z
OTHER					

Species	Habitat Requirements
Striped Bass	Dissolved Aluminum is "Of Concern"

Notes

c - Chronic
h - Hardness, pH dependent
z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure.

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Nickel (Total Recoverable)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	160.0[c] 1400.0[a,h]	160.0[c,h]	None	109,0[c,h,r]	100.0
MARINE	8.3[c] 75.0[a]	7.1[c]	None	None	
OTHER	13.0[w] 100.0[f]				13.0[p]

Species	Habitat Requirements
White Perch	37.0[d]
Hard Clam	1110.0[d]
Striped Bass	6200.0[x]
Soft Shell Clam	50000.0[b]

Notes

a - Acute
b - 168hr. LC50
c - Chronic
d - Nickel chloride, LC5
f - Fish ingestion waters
h - Hardness dependent, 100 mg/l used
w - Water and fish ingestion waters
p - Standard for public water supply
r - Under revision
x - 96hr. LC50, Appendix A, "Habitat Req. ..."

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Managanese

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	1000[e]	z
MARINE	None	100 (Total)	None	None	z
OTHER	50.0[w] 100[f]	50.0[p] (Soluble)			

Species	Habitat Requirements
Soft Shell Clam	3000[l]

Notes

e - Aesthetics
f - Fish ingestion waters
l - 168hr. LC50
p - Public water supply standard
w - Water and fish ingestion waters
z - Guideline is 10% of the 96HR. LC50 for effected biota for short term exposure.

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Silver (Total Recoverable)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	4.1[a,h] 0.12[c,h]	0.041[c,h]	None	4.1[a,h] 0.12[c]	1.0(dissolved)
MARINE	2.3[a]	0.023[c]	None	None	Same as fresh
OTHER	50.0[w] 50.0[d]	50.0[p]			

Species	Habitat Requirements
White Perch	17.0b
Hard Clam	21.0b

Notes

a - Acute
b - Silver Nitrate, LC5
c - Chronic
d - Drinking water M.C.L. (maximum contaminant level)
h - Hardnes dependent, 100 mg/l used
p - Public water supply standard
w - water and fish ingestion waters

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Mercury (Total Recoverable)

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	2.4[a] 0.12[c,h]	0.05[s]	None	0.012[c] 0.12[c]	0.012
MARINE	2.1[a]	0.1[c] (total)	None	None	Same as fresh
OTHER	0.144[w] 0.146[f] 2.0[d]			0.144[x]	0.1[p]

Species	Habitat Requirements
White Perch	4.0[l]

Notes

a - Acute
c - Chronic
d - Drinking water M.C.L.
f - Fish ingestion waters
p - Public water supply
m - Methyl mercury
l - Mercuric chloride LC5
s - State standard
x - Human health
w - Water and fish ingestion waters

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Copper (Total Recoverable)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	18.0[a,h] 12.0[c,h]	11.0[c,h]	None	13.0[c,r,h] 0.12[c]	11.0[h]
MARINE	2.9[a]	2.9[c]	None	None	Same as fresh
OTHER		1000[p]			1.0[p]

Species	Habitat Requirements
Striped Bass	100.0[l] 100.0[m]
White Perch	23.0[n]
Soft Shell Clam	35.0[o]

Notes

a - Acute
c - Chronic
h - Hardness dependent (100 mg/l used)
l - Copper sulfate, LC0
m - Cupric chloride, LC0
n - Cupric chloride, LC5
o - 168hr., LC50
p - Public water supply standard
r - Under revision

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Lead (Total Recoverable)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	82.0[a,h] 3.2[c,h]	3.2[c,h]	None	39.0[c,r,h]	3.2[h]
MARINE	140.0[a] 5.6[c]	5.6[c]	None	None	Same as fresh
OTHER	50.0[w] 5.0[d]	50.0[p]			1.0[p]

Species	Habitat Requirements
Soft Shell Clam	8800[l]

Notes

a - Acute
b - Total recoverable
c - Chronic
d - Drinking water M.C.L. (maximum contaminant level)
h - Hardness dependent (100 mg/l used)
l - 168hr. LC50
p - Public water supply standards
w - Fish and water ingestion waters
r - Under revision

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Aldrin

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	3.0[a]	0.03[c]	0.003	0.000074*	0.0004
MARINE	1.3[a]	0.003[c]	Same as fresh	None	Same as fresh
OTHER	0.000074[w] 0.000079[f]				0.00007[p]

Species	Habitat Requirements
Striped Bass (juvenile)	7.2[x]
Striped Bass (larvae)	10.0[x]
Hard Clam	41.0[l]

Notes

a - Acute
c - Chronic
f - Fish ingestion waters
l - LC0
w - Water and fish ingestion waters
p - Public water supply
x - 96hr. LC50, Appendix A, "Habitat Reg...."
* - Carcinogen @ 10^{-6} risk level

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Toxaphene

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	0.73[a] 0.0002[c]	0.013[c]	0.005	0.00071*	0.01
MARINE	0.21[a] 0.0002[c]	0.0007[c]	Same as fresh	None	Same as fresh
OTHER	0.00071[w,*] 0.00073[f,*] 5[d]	5[p]			0.0007[p,*]

Species	Habitat Requirements
Striped Bass (juvenile)	4.4[x]
Hard Clam	25[b]

Notes

a - Acute
b - LC50
c - Chronic
d - Drinking water M.C.L. (maximum contaminant levels)
f - Fish ingestion waters
p - Public water supply standard
w - Water and fish ingestion waters
* - Carcinogen @ 10^{-6} risk level
x - 96hr. LC50, Appendix A, "Habitat Req. ..."

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Dieldrin

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	2.5[a] 0.0019[c]	0.0019[c]	0.003	0.000071*	0.0019
MARINE	0.71[a] 0.0019[c]	Same as fresh	Same as fresh	None	Same as fresh
OTHER	0.00071[w,*] 0.00076[f,*]				0.0007[p,*]

Species	Habitat Requirements
Striped Bass (larvae)	1.0[x]
White Perch	10000[l]

Notes

a - Acute
c - Chronic
f - Fish ingestion waters
l - LC50
p - Public water supply
x - 96hr. LC50, Appendix A, "Habitat Req. ..."
w - Water and fish ingestion waters
* - Carcinogen @ 10^{-6} risk level

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Endrin

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	o.18[a] 0.0023[c]	0.0023[c]	0.004	0.18[a]	0.0023
MARINE	0.037[a] 0.0023[c]	Same as fresh	Same as fresh	None	Same as fresh
OTHER	1.0[w] 0.2[d]	0.2[p]			1.0[p]

Species	Habitat Requirements
Striped Bass (Juvenile)	.094[x]
Little Blue Heron	50-10000[b]
Great Egret	50-10000[b]
Great Heron	50-10000[b]
Great Blue Heron	50-10000[b]
Snowy Egret	50-10000[b]

Notes

a - Acute
b - Toxic to Prey Species
c - Chronic
d - Drinking water M.C.L. (maximum contaminant level)
p - Public water supply standard
w - Water and fish ingestion waters
x - 96hr. LC50, Appendix A, "Habitat Req. ..."

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Atrazine

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	560[c,e]	z
MARINE	None	None	None	None	z
OTHER					

Species	Habitat Requirements
Wild Celery	12[d]
Redhead Grass	50[b]
Eelgrass	100-1000

Notes

b - Levels above this reduce photosynthesis
c - Chronic
d - Mortality above this level
e - Human health
z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Paraquat/Diquat

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	60.0[c,e]	z
MARINE	None	None	None	None	z
OTHER					

Species	Habitat Requirements
Sago Pondweed	<250
Striped Bass	1000[x]

Notes

c - Chronic
e - Human health criteria
x - 96hr. LC50, Appendix A, "Habitat Req. ..."
z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Chlordane

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	2.4[a] 0.0043[c]	0.0043[c]	None	0.00046[*]	0.0043
MARINE	0.09[a] 0.004[c]	0.004[c]	None	None	0.0005
OTHER	0.00046[w,*] 0.00048[f]				

Species	Habitat Requirements
Striped Bass	<2.4

Notes

a - Acute
c - Chronic
f - Fish ingestion waters
w - Water and fish ingestion waters
* - Carcinogen @ 10^{-6} risk level

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Malathion

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	0.1[c]	0.1[c]	None	0.23[c,e]	z
MARINE	0.1[c]	0.1[c]	None	None	z
OTHER					

Species	Habitat Requirements
Striped Bass	<14

Notes

a - Acute
c - Chronic
e - Human health
z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: 2,4-D Dichlorophenoxyacetic Acid

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	Not Detectible+	z
MARINE	None	None	None	None	z
OTHER	100w	0.1p			

Species	Habitat Requirements
White Perch	55500l

Notes

l - LC50
p - Public water supply standard
w - Water and fish ingestion waters
z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure.
+ - Mutagen

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: 2,4,5 T (2,4,5 Trichlorophenoxyacetic Acid)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	None	z
MARINE	None	None	None	None	z
OTHER					

Species	Habitat Requirements
Striped Bass	<10

Notes

z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure.

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: DDT

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	1.1[a] 0.001[c]	0.001[c]	0.001	0.000024*	0.001
MARINE	0.13[a] 0.001[c]	Same as fresh	Same as fresh	None	Same as fresh
OTHER	0.000024[w,f,*]				

Species	Habitat Requirements
Striped Bass (juvenile)	0.53[x]
White Perch	8000[l]

Notes

a - Acute
c - Chronic
f - Fish ingestion waters
l - LC50
p - Public water supply
w - Water and fish ingestion waters
x - 96hr. LC50, Appendix A, "Habitat Req. ..."
* - Carcinogen @ 10^{-6} risk level

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: TBT

UNITS: ug/l

	STANDARD/CRITERIA				
	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None[d]	*	*	0.20[c]	z
MARINE	None[d]	*	*	None	z
OTHER					

Species	Habitat Requirements
Striped Bass	"Of Concern"

Notes

d - Advisory issued, .01 ug/l
c - Chronic
z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure
* - Use restricted, standard under development

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Phenol

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	2560.0[c,b] 10200.0[a,b]	1.0c	None	5.0 (as phenolics)	100.0
MARINE	5800.0[a,b]	1.0[c]	None	None	Same as fresh
OTHER	3500.0[w]	1.0[p]			300.0[p]

Species	Habitat Requirements
Hard Clam	5500.0[l]

Notes

a - Acute
b - Insufficient data available to determine criteria; value is lowest observable effect (L.O.E.L.). Criteria to be proposed.
c - Chronic
l - LC0
p - Public water supply standards
w - Water and fish ingestion waters

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Orthodichlorobenzene (1,2 - Dichlorobenzene)

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	None	None	None	763[c] 1120[a]	z
MARINE	None	None	None	None	z
OTHER					

Species	Habitat Requirements
Hard Clam	10000[l]

Notes

a - Acute
c - Chronic
l - LC0
z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure.

ATTACHMENT C

WATER QUALITY STANDARDS/CRITERIA COMPARISON WITH HABITAT REQUIREMENTS

PARAMETER: Trichlorobenzene

UNITS: ug/l

STANDARD/CRITERIA

	EPA (criteria)	VIRGINIA	MARYLAND	PENNSYLVANIA	DISTRICT OF COLUMBIA
FRESH	50c,p 250[a,p]	None	None	250[a,y]	z
MARINE	129[c,p] 160[a,p]	None	None	None	z
OTHER					

Species	Habitat Requirements
Hard Clam	1000[l]

Notes

a - Acute
c - Chronic
d - Draft criteria document to be proposed
l - LC0
p - Insufficient data available to determine criteria; value is lowest observable effect level (L.O.E.L.). This L.O.E.L. is for chlorinated benzenes. Criteria specific to 1,2,4 - tri-chlorinated benzene is to be proposed.
y - (1,2,4 -Trichlorobenzene)
z - Guideline is 10% of the 96hr. LC50 for effected biota for short term exposure.