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Phase I Final Rule and Technical Development Document of Uniform National Discharge Standards (UNDS)

Section 4: Discharge Evaluation Methodolgy

April 1999

4. DISCHARGE EVALUATION METHODOLOGY

4.1 Introduction

The information collected during Phase I from surveys, consultations, and from discharge sampling and analysis was used collectively to evaluate the discharges and to make Phase I decisions according to the seven factors listed in section 1.3. This chapter explains how Phase I decisions were made for the 39 discharge types listed in Table 3-1 (i.e., which discharges need to be controlled by MPCDs and which do not). Section 4.2 describes how the environmental effects screening of the discharges was conducted. Section 4.3 describes the Nature of Discharge (NOD) analysis and the contents of the NOD reports contained in Appendix A. Section 4.4 describes the MPCD practicability, operational feasibility, and cost analysis and the contents of the MPCD reports - also contained in Appendix A. Section 4.5 lists the chapter 4 references.

4.2 Environmental Effects Determination

EPA and DoD assessed the potential environmental effects of the discharges using a screening approach characterized by the following questions concerning their chemical, physical, and biological characteristics:

- **Chemical Constituents**. Does the discharge contain constituents in concentrations that exceed State aquatic water quality criteria or Federal aquatic water quality criteria (as promulgated by EPA in the National Toxics Rule (NTR)[1]) and have the potential to be released into the environment in significant amounts, resulting in a potential adverse impact on the environment?
- **Thermal Pollution**. Does the discharge pose the potential to exceed State thermal water quality criteria in the receiving waters beyond a mixing zone, and to a degree sufficient to have an adverse impact on the environment?
- **Bioaccumulative Chemicals of Concern**. Does the discharge have the potential to contain bioaccumulative chemicals of concern in amounts sufficient to have an adverse impact on the environment?
- **Nonindigenous Species**. Does the discharge have the potential to introduce viable nonindigenous aquatic species to new locations?

If the answer to any of the above questions was “yes,” EPA and DoD determined that the discharge had a potential for adverse environmental effect. Each of these factors is discussed below.

4.2.1 Chemical Constituents

EPA and DoD used sampling results or process knowledge to identify the potential presence and concentrations of constituents in the discharge. Constituent concentrations in the discharge were compared to Federal aquatic water quality criteria promulgated by EPA in the National Toxic Rule (NTR)[1] and State aquatic water quality numeric criteria for the ten States

with the most significant presence of Armed Forces vessels.[2-11] These ten States are California, Connecticut, Florida, Georgia, Hawaii, Mississippi, New Jersey, Texas, Virginia, and Washington. Constituent concentrations in the discharge were compared against the most stringent of the Federal and ten States' criteria for that constituent. For almost all constituents, the State aquatic water quality criteria are more stringent than the Federal NTR aquatic water quality criteria. EPA and DoD used aquatic water quality criteria in this assessment because they are a measure of the level of water quality that provides for the protection and propagation of aquatic life.

EPA and DoD used saltwater aquatic life criteria for screening the discharges because most Armed Forces vessels operate in the brackish water of estuaries or bays, or in the marine environment off the coast or in open ocean, where the biology of the waterbody is dominated by saltwater aquatic life. In addition, aquatic life criteria were used instead of human health criteria, which are related to consumption of fish and shellfish, because recreational activities such as fishing and swimming generally do not occur in the immediate vicinity of Armed Forces vessels.

Depending on the nature of the discharge, EPA and DoD compared discharge concentrations to either the acute or chronic aquatic water quality criteria values. Where discharges are intermittent or occasional in nature, of relatively short duration (a few seconds to a few hours), and dissipate rapidly in the environment, constituent concentrations were compared to acute aquatic water quality criteria. Where discharges are of a longer duration or continuous and likely to result in concentrations in the environment that approach a steady-state condition, the constituent concentrations were compared to chronic aquatic water quality criteria. Table 4-1 is a list of the most stringent saltwater-based aquatic water quality criteria for the constituents that were either detected in UNDS discharge samples or thought to be present based on engineering knowledge. It contains aquatic water quality criteria for both short-term (acute) and long-term (chronic) exposure published in Federal and State regulations.

Because metals may be present in the discharges in both dissolved and solid forms, the Federal criteria and many States' criteria distinguish between dissolved and "total recoverable" forms. As issued by EPA or a particular State, an aquatic water quality criterion for the dissolved form of a metal is always less than or equal to the criterion for the "total recoverable" form. However, not all States issue criteria for both forms of metal. For metal constituents, the following method was used to compare concentrations in the discharge to aquatic water quality criteria:

- When the form of the metal was known (i.e., either "total recoverable" or "dissolved") as in the nine discharges that were sampled, as well as some of the non-sampled discharges, the measurement of "total recoverable" metal in the discharge was compared to "total recoverable" criteria, and the measurement of "dissolved" metal in the discharge was compared to "dissolved" criteria.

- When the form of the metal was unknown, the metal concentration was compared to the most stringent criteria, whether for "total recoverable" or "dissolved."

Table 4-1. Aquatic Life Water Quality Criteria

Constituent Name	Most Stringent Acute Aquatic Life Water Quality Criterion	Source of Most Stringent Acute Criterion	Most Stringent Chronic Aquatic Life Water Quality Criterion	Source of Most Stringent Chronic Criterion
PRIORITY POLLUTANTS*	**(µg/L)**		**(µg/L)**	
Acenaphthene	320	HI	--------	
Acenaphthylene	0.031 a	FL	0.031 a	FL
Acrolein, 2-Propenal	18	HI	780	GA
Anthracene	110,000	GA	110,000	GA
Antimony	4,300	FL	4,300	FL
Arsenic (Dissolved)	69	EPA, CA, HI, CT	36	EPA, CA, HI, CT
Arsenic (Total)	36	GA, FL	36	GA, FL, WA, MS
Benzene	71.28	FL, GA	71.28	FL, GA
Benzidine	0.000535	GA	0.000535	GA
Benzo(a)anthracene	0.031 a	FL	0.031 a	FL
Benzo(a)pyrene	0.031 a	FL	0.031 a	FL
Benzo(b)fluoranthene	0.031 a	FL	0.031 a	FL
Benzo(g,h,i)perylene	0.031 a	FL	0.031 a	FL
Benzo(k)fluoranthene	0.031 a	FL	0.031 a	FL
Beryllium	0.13	FL	0.13	FL
BHC, alpha- **	0.0131	GA	0.0131	GA
BHC, beta- **	0.046	GA, FL	0.046	GA, FL
BHC, gamma- \ Lindane **	0.0625	GA	0.01	VA
Bis(2-ethylhexyl) phthalate	5.92	GA	5.92	GA
Cadmium (Dissolved)	42	EPA, CA, CT	9.3	EPA, CA, HI, VA, CT, MS
Cadmium (Total)	9.3	GA, FL	8	WA
Chromium (Dissolved)	1,100	EPA & 6 STATES	50	EPA & 6 STATES
Chromium (Total)	50	GA, FL	50	WA, GA, FL
Chrysene	0.031 a	FL	0.031 a	FL
Copper (Dissolved)	2.4	EPA, CT, MS	2.4	EPA, CT, MS
Copper (Total)	2.9	WA	2.9	GA. FL
Cyanide	1	EPA & 9 STATES	1	EPA & 9 STATES
Dibenzo(a,h)anthracene	0.031	FL	0.031	FL
Diethyl phthalate	120,000	GA	120,000	GA
Dimethyl phthalate	2,900,000	GA	2,900,000	GA
Ethylbenzene	140	HI	28,718	GA
Fluoranthene	13	HI	370	GA
Fluorene	14,000	GA	14,000	GA
Heptachlor	0.00021	FL	0.00021	FL
Heptachlor epoxide	0.00011	GA	0.00011	GA
Indeno(1,2,3-cd)pyrene	0.031 a	FL	0.031 a	FL
Lead (Dissolved)	140	HI, TX	5.6	TX
Lead (Total)	5.6	GA, FL	5.6	GA, FL
Mercury ** (Dissolved)	1.8	EPA, CA, CT, MS	0.025	VA
Mercury ** (Total)	0.025	GA, FL	0.025	EPA, WA, GA, CT, MS, FL

Table 4-1. Aquatic Water Quality Criteria (contd.)

Constituent Name	Most Stringent Acute Aquatic Life Water Quality Criterion	Source of Most Stringent Acute Criterion	Most Stringent Chronic Aquatic Life Water Quality Criterion	Source of Most Stringent Chronic Criterion
Naphthalene	780	HI	--------	
Nickel (Dissolved)	74	EPA, CA, CT	8.2	EPA, CA, CT
Nickel (Total)	8.3	GA, FL	7.9	WA
Nitrophenol, 4-	1,600	HI	--------	
Phenanthrene	0.031 a	FL	0.031 a	FL
Phenol	170	HI	58	MS
Pyrene	11,000	GA	11,000	GA
Selenium (Dissolved)	290	EPA, CA, CT	71	EPA, CA, HI, VA, CT, MS
Selenium (Total)	71	GA, FL	71	WA, GA, FL
Silver (Dissolved)	1.9	EPA, CA, MS	--------	
Silver (Total)	1.2	WA	1.2	WA
Thallium	6.3	FL	6.3	FL
Toluene	2,100	HI	200,000	GA
Trichloroethane, 1,1,1-	10,400	HI	--------	
Zinc (Dissolved)	90	EPA, CA, CT, MS	81	EPA, CA, MS
Zinc (Total)	84.6	WA	76.6	WA
NON-PRIORITY POLLUTANTS				
Chlorine (Chlorine Produced Oxidants)	10	FL	7.5	HI, WA, VA, CT, MS, NJ
Oil & Grease	5,000	FL	5,000	FL
Aluminum	1,500	FL	1,500	FL
Ammonia as NH3***	6	HI	6	HI
Bromine	100	FL	100	FL
Chloride	10% > ambient	FL	10% > ambient	FL
Iron	300	FL	300	FL
Nitrate/Nitrite***	8	HI	8	HI
Phosphorus***	25	HI	25	HI
Total Nitrogen***	200	HI	200	HI,
Tributyltin	0.001	VA	0.001	VA

Notes:

* from 40 CFR 136.36

** Denotes bioaccumulative chemicals of concern (40 FR 15366, Table 6A)

*** Nutrient criteria are not specified as either acute or chronic and are, therefore, listed in both columns.

a: Total of acenaphthylene benzo(a)anthrancene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, and phenanthrene.

The initial screening process involved comparing the constituent concentrations in the undiluted discharge to the aquatic water quality criteria. For those discharges, such as cathodic protection, where the constituents diffuse from the exterior of a vessel or vessel component, EPA and DoD generally computed a concentration within a small mixing zone (a few inches to a few feet).

EPA and DoD further assessed those discharges that had constituents exceeding aquatic water quality criteria. EPA and DoD considered mass loadings, flow rates, the geographic location of the discharge, the manner in which the discharge occurs (e.g., continuous or intermittent), and in some cases, the effect of the dilution within a small mixing zone. The purpose of this further assessment was to determine whether the constituents are discharged with such a low frequency or in such small amounts that the resulting constituent mass loading has the potential to produce only minor or undetectable environmental effects, or whether the constituents are released in such a manner that dilution in a small mixing zone quickly results in concentrations below aquatic water quality criteria. If so, EPA and DoD considered the chemical constituents of the discharge not to have the potential to adversely affect the environment.

4.2.2 Thermal Pollution

In addition to chemical constituents, EPA and DoD assessed whether the discharges exceeded State thermal water quality criteria for the five States with the most significant presence of Armed Forces vessels (California, Florida, Hawaii, Virginia, and Washington). A screening study was performed on these discharges to quantify these potential effects.[12] Many discharges did not need a detailed assessment because they are discharged at ambient or only slightly elevated temperatures, or the volume or discharge rate is very low. EPA and DoD determined that six discharges are released at sufficiently high temperatures and volumes that further assessment was warranted to determine whether the discharge had the potential to cause an adverse thermal effect. These discharges are:

- Boiler Blowdown;
- Catapult Water Brake Tank and Post-Launch Retraction Exhaust;
- Catapult Wet Accumulator Discharge;
- Distillation And Reverse Osmosis Brine;
- Seawater Cooling Overboard Discharge; and
- Steam Condensate.

EPA and DoD modeled these discharges to determine the size of the mixing zone that would be needed for receiving waters to meet State thermal water quality criteria and compared this zone to State thermal mixing zone allowances. Small boat engine wet exhaust, firemain systems, portable damage control drain pump wet exhaust, and submarine emergency diesel engine wet exhaust discharges also have elevated temperatures above ambient when released. These discharges generally have minimal temperature differences between the influent and effluent streams, are released in small volumes, and generally occur only while the vessel is moving, which distributes the heat load over a wide area. Submarine emergency diesel engine wet exhaust is released into the air as a mist and cools before contacting the water. The overall

thermal impact from these discharges is minimal; thus, they were not included in the thermal effects study.

Two screening protocols were used to evaluate thermal discharges. For discharges that can be continuous such as steam condensate, seawater cooling overboard discharge, and distillation and reverse osmosis brine, the Cornell Mixing Zone Expert System (CORMIX, Version 3.2) was used to estimate the plume size and temperature gradients in the receiving waterbody for comparison to mixing zone requirements for States with major naval ports. CORMIX is a software model used to analyze and predict aqueous pollutant discharges into water bodies. The output from CORMIX provides the shape and size of the thermal plume along with temperature contours that can then be compared to various thermal criteria. However, CORMIX has several limitations when modeling this discharge, including modeling the effect of tidal action and turbulent mixing beyond the plunge zone (i.e., area of initial mixing from a discharge above the waterline) on the discharge plume. Therefore, additional modeling was performed using a hydrodynamic transport model, CH3D, to evaluate steam condensate because CH3D simulates the mixing of the buoyant plume with ambient and tidal flows by advection and turbulent mixing both horizontally and vertically in the water column.[13]

For discharges that can be intermittent, short-duration, or batch (boiler blowdown, catapult water brake tank and post-launch retraction exhaust, and catapult wet accumulator blowdown), thermodynamic equations were used to estimate the temperature effects because CORMIX and CH3D were designed primarily for continuous, steady-state discharges. Batch discharges of high-temperature water require a different screening approach than continuous discharges because these discharges are not steady-state and are generally small. The steps used to estimate the maximum size of the impact zone for a given acceptable plume temperature included:

- calculating the total heat and water mass released;
- calculating the volume of water needed to dilute this mass of water such that the acceptable mixed temperature is obtained; and
- determining the region around the release point assuming complete vertical mixing that will provide the required volume.

4.2.3 Bioaccumulative Chemicals of Concern

EPA and DoD reviewed each discharge to determine whether it contained bioaccumulative chemicals of concern, as identified in the Final Water Quality Guidance for the Great Lakes System.[14] This guidance contains a list of bioaccumulative chemicals of concern identified after scientific study, in a process subjected to public notice and comment, designed to support a regionally uniform set of standards applicable to the waters of the Great Lakes. Table 4-2 lists these bioaccumulative chemicals of concern. In every case where the presence of a bioaccumulative chemical of concern was confirmed in a discharge, EPA and DoD had already

determined based on other information that it was reasonable and practicable to require control of that discharge.

4.2.4 Nonindigenous Species

EPA and DoD also assessed each discharge for its potential to transport viable living aquatic organisms between naturally isolated water bodies. Preventing the introduction of invasive nonindigenous aquatic species has been recognized as important in maintaining

Table 4-2. List of Bioaccumulative Chemicals of Concern[14]

- BHC, alpha-
- BHC, beta-
- BHC, delta-
- BHC, gamma- \Lindane
- Chlordane
- DDD
- DDE
- DDT
- Dieldrin
- Hexachlorobenzene
- Hexachlorobutadiene
- Mercury
- Mirex/Dechlorane
- PCB-1016
- PCB-1221
- PCB-1232
- PCB-1242
- PCB-1248
- PCB-1254
- PCB-1260
- Pentachlorobenzene
- 1,2,4,5-Tetrachlorobenzene
- 2,3,7,8-Tetrachlorodibenzo-p-dioxin
- Toxaphene

Notes:
BHCs are chlorinated cyclohexanes
DDT is dichlorodiphenyl trichloroethane
DDD and DDE are metabolites of DDT
PCBs are polychlorinated biphenyls

biodiversity, water quality, and the designated uses of water bodies. If the available data indicate that a discharge has a potential for transporting and then subsequently discharging viable aquatic organisms into waters of the U.S., then EPA and DoD considered the discharge to present a potential for causing adverse environmental effects from nonindigenous species.

4.2.5 Discharge Evaluation

In some cases, EPA and DoD determined it was reasonable and practicable to require MPCDs to control a discharge even though available information indicates that the discharge has a low potential for adversely affecting the environment. For the Chain Locker Effluent and Sonar Dome discharges, at least one class of Armed Forces vessel has a management practice or control technology already in place to control the environmental effects of the discharge. EPA and DoD considered the existence of a currently applied management practice or control technology to be sufficient indication that it was reasonable and practicable to require a MPCD. In other cases (Non-Oily Machinery Wastewater and Photographic Laboratory Drains), analysis

of whether the discharge had a potential to adversely affect the environment was inconclusive. However, EPA and DoD determined that it was reasonable and practicable to require a MPCD to mitigate possible adverse environmental effects from the discharge.

For each discharge that was determined to have the potential to adversely affect the environment, EPA and DoD conducted an initial evaluation of the practicability, operational impact, and economic cost of using a MPCD to control each discharge. EPA and DoD first determined whether a control technology or management practice is currently in place to control the discharge for environmental protection on any vessel type. The use of existing controls on a vessel was considered sufficient demonstration that at least one reasonable and practicable control is available for at least one vessel type. The Phase I UNDS rule does not address whether existing control technologies or management practices are adequate to mitigate potential adverse impacts. In Phase II of UNDS, EPA and DoD will promulgate MPCD performance standards for the discharges requiring control. For discharges without any existing pollution controls, EPA and DoD analyzed potential pollution control options to determine whether it is reasonable and practicable to require the use of MPCDs. For every discharge that was found to have a potential to cause adverse environmental effects, EPA and DoD determined that it is reasonable and practicable to require a MPCD for at least one vessel type. The results of the MPCD assessments are presented in Appendix A.

4.3 Nature of Discharge Analysis

The nature of the discharge was analyzed for each of the 39 discharges incidental to the operations of Armed Forces vessels (Table 3-1), and based on this analysis, a NOD report was prepared that describes the discharge in detail, including the system that produces the discharge, the equipment involved, the constituents released to the environment, and the current practice, if any, to prevent or minimize environmental effects. The NOD report summarizes the results of additional sampling or other data gathered on the discharge. Based on this information, the NOD report describes how the estimated constituent concentrations and mass loadings in the environment were determined. The constituent concentrations are compared to applicable Federal and State water quality criteria. In addition to comparing discharge concentrations to Federal and State water quality criteria, other U.S. laws and international standards were also evaluated, including the standards for oil established by the International Convention for the Prevention of Pollution from Ships (MARPOL) (73/78) as implemented by the Act to Prevent Pollution from Ships, and the oil spill regulations at 40 CFR Part 110. Where Federal law and international standards were relevant to a discharge, the law and standards are discussed in the NOD reports contained in Appendix A.

In addition, known bioaccumulative chemicals of concern are identified, possible thermal effects are discussed (if applicable) and the potential for introducing nonindigenous aquatic species is assessed. The NOD report also discusses the potential for the discharge to cause adverse environmental effects.

4.3.1 Nature of Discharge Report Contents

NOD reports are divided into six sections, the outline of which is presented below:

Section 1.0 -- Introduction
Provides a brief description of the basic objectives of the NOD analysis. This section is identical for each of the reports.

Section 2.0 – Discharge Description

2.1 Equipment Description and Operation – *this section describes the equipment and ship operations that generate the discharge. It includes any pertinent figures and schematics that assist in explaining the origin of the discharge.*

2.2 Releases to the Environment *– this section describes the actual discharge released to the environment. The section also describes how the discharge is released, such as whether the flow is a stream, a mist, or results from direct contact with surrounding waters.*

2.3 Vessels Producing the Discharge *– this section describes which Armed Forces vessels produce the discharge.*

Section 3.0 -- Discharge Characteristics

3.1 Locality *– this section describes whether the discharge occurs within 12 n.m. from shore.*

3.2 Rate *– this section presents the estimated flow rate of the discharge. This rate can be a distinct flow in the case of liquid discharges, or a release rate in the case of constituents that corrode, erode, or dissolve into the environment.*

3.3 Constituents *– this section identifies the constituents in the discharge, including thermal pollution, when applicable. Included in this section is an identification of those pollutants known to be particularly detrimental to environmental quality. Section 3.3 includes the following:*

- *a list of all constituents identified in the discharge;*
- *identification of priority pollutants; and*
- *identification of bioaccumulative chemicals of concern.*

3.4 Concentrations *– this section presents the concentrations of the constituents in the discharge. When possible, this is estimated from an analysis of the existing data or alternatively, from process knowledge of the system that produces the discharge. When sampling was conducted, results of the sample analyses are presented.*

Section 4.0 - Nature of Discharge Analysis

4.1 Mass Loadings *-- in this section, the flow rate and the concentrations presented in section 3.0 are used to calculate an estimated annual mass loading on a fleet-wide basis.*

4.2 Environmental Concentrations *– this section varies with each analysis, but includes a comparison of the concentrations (from section 3.4) with the Federal aquatic water quality criteria and aquatic water quality criteria for selected States. Where appropriate, this section presents estimates of the concentrations after dilution in the environment. Any mixing zone calculations are clearly explained and assumptions are*

listed. Pertinent figures from any analysis are included to support statements regarding the results of the analysis.

***4.3 Potential for Introducing Nonindigenous Species** – this section describes an evaluation of the potential for the discharge to transport and introduce nonindigenous aquatic species.*

Section 5.0 -- Conclusion
Provides a summary of the assessment of the potential for the discharge to cause an adverse environmental effect based on information presented in the report.

Section 6.0 -- Data Sources and References
This section contains a table that indicates the type and source of information presented in each section of the analysis. The section also lists the references cited in the report.

4.3.2 Peer Review

Peer review is a documented critical review of a scientific and technical work product. It is an in-depth assessment that is used to ensure that the final work product is technically sound. Peer reviews are conducted by qualified individuals who are independent of those who prepared the work product. For the Phase I rule, reviewers were selected because of their technical expertise in assessing pollutant behavior in coastal and estuarine ecosystems, modeling pollutant concentrations, and predicting the effects of pollutant loadings on ambient water quality, sediments, and biota.

NOD reports for five discharges were selected for peer review. For each of these discharges, EPA and DoD determined that it is not reasonable and practicable to require the use of MPCDs because they exhibit a low potential for causing adverse impacts on the marine environment. Peer reviewers were asked whether the data and process information presented in the NOD reports are sufficient to characterize the discharges; whether the analyses are appropriate for the discharges; and whether the conclusions regarding the discharges' potential for causing adverse environmental impacts are supported by the information presented in the NOD reports. Peer review comments are compiled in a separate report.[15]

EPA and DoD reviewed the peer review comments and determined that the comments did not indicate any fundamental flaws in the methodology used to assess a discharge's potential to cause adverse impacts on the marine environment. EPA and DoD resolution of peer review comments are compiled in *Uniform National Discharge Standards For Vessels Of The Armed Forces Peer Review Comment Response.* [16]

4.4 MPCD Practicability, Operational Feasibility, and Cost Analysis

If a discharge was determined to have a potential to cause an adverse environmental impact in the absence of pollution controls, EPA and DoD evaluated the practicability, operational impact, and economic cost of using a MPCD to control the discharge. First, EPA and DoD determined whether a control technology or management practice is currently in place to control the discharge for environmental protection on any vessel type. The use of existing controls was considered sufficient demonstration that at least one practicable control is available. The Phase I UNDS rule does not address whether existing control technologies or management practices are adequate to mitigate potential adverse impacts. In Phase II of UNDS, EPA and DoD will promulgate MPCD performance standards for the discharges requiring control. For discharges without any existing pollution controls but having the potential to cause an adverse environmental impact, EPA and DoD analyzed potential pollution control options to determine whether it is reasonable and practicable to require the use of MPCDs. Practicability analyses were prepared for the following four discharges (these analyses are contained in Appendix A):

- Distillation and Reverse Osmosis Brine;
- Hull Coating Leachate;
- Small Boat Engine Wet Exhaust; and
- Underwater Ship Husbandry.

For every discharge that showed a potential to cause adverse environmental effects, EPA and DoD determined that it is reasonable and practicable to require a MPCD.

4.4.1 MPCD Practicability, Operational Feasibility, and Cost Report Contents

Each MPCD report gives a brief description of the discharge, lists and describes the MPCD options, and reports the results of analyzing each MPCD option according to practicability, operational impact, cost, and environmental effectiveness. The contents of the MPCD reports are briefly described below:

Analysis of Practicability, Operational Impact, and Cost of Selected MPCD Options
This section describes the purpose of the MPCD analysis and discusses the factors that are considered when determining which discharges should be controlled by MPCDs.

1.0 MPCD Options
This section describes the discharge and how it is generated and lists each of the MPCD options considered.

2.0 MPCD Analysis Results
This section presents the results of the MPCD analysis including discussions on practicability, effect on operational and warfighting capabilities, cost, environmental effectiveness, and a determination for each MPCD option. It recommends one or more MPCD options for further consideration under Phase II of UNDS.

4.5 References

1. USEPA. "Water Quality Standards." 40 CFR Part 131.36. The following Federal Register notices addressed the National Toxic Rule that is promulgated at 40 CFR Part 131.36: "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants," 57 FR 60848, 22 December 1992, and "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance – Revision of Metals Criteria," 60 FR 22230, 4 May 1995.
2. State of Florida. "Florida Department of Environmental Protection. Surface Water Quality Standards," Chapter 62-302. Effective 26 December 1996.
3. State of Georgia. Georgia Final Regulations. "Water Quality Control," Chapter 391-3-6 as provided by The Bureau of National Affairs, Inc. 1996.
4. State of Connecticut. Connecticut Department of Environmental Protection. "Surface Water Quality Standards," Effective 8 April 1997.
5. State of Mississippi. Mississippi Department of Environmental Quality, Office of Pollution Control. "Water Quality Criteria for Intrastate, Interstate and Coastal Waters." Adopted 16 November 1995.
6. State of Texas. Texas Natural Resource Conservation Commission. "Texas Surface Water Quality Standards." 307.2 - 307.10. Effective 13 July 1995.
7. State of New Jersey. New Jersey Final Regulations. "Surface Water Quality Standards." Section 7:9B-1, as provided by The Bureau of National Affairs, Inc. 1996.
8. USEPA. "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California," Proposed Rule under 40 CFR Part 131, Federal Register, Vol. .62, Number 150. 5 August 1997.
9. State of Hawaii. "Water Quality Standards." Chapter 54, Section 11-54.
10. State of Washington. "Water Quality Standards for Surface Waters of the State of Washington." Chapter 173-201A. Washington Administrative Code.
11. State of Virginia. "Water Quality Standards." Chapter 260. Virginia Administrative Code VA 9; VAC 25-260.
12. NAVSEA. "Thermal Effects Screening of Discharges From Vessels of the Armed Forces." July 1997.
13. USNavy/USEPA. "Supplement to Thermal Effects Screening of Discharges from Vessels of the Armed Forces."
14. USEPA. Table 6A of the "Water Quality Guidance for the Great Lakes System." 60 FR 15365. 23 March 1995.
15. USEPA. "Peer Review Comments Document, Nature of Discharge Reports for Uniform National Discharge Standards." Contract No. 68-C7-0002, Work Assignment No. 1-50. 1 July 1998.
16. USNavy/USEPA. "Uniform National Discharge Standards For Vessels Of The Armed Forces Peer Review Comment Response." 1 March 1999.