

PROGRAMMATIC ENVIRONMENTAL, SAFETY, AND HEALTH EVALUATION FOR THE T-AKE CLASS

22 November 2000



**NAVAL SEA SYSTEMS COMMAND
Department of the Navy
Arlington, VA**

**Program Executive Office Expeditionary Warfare
Support Ships, Boats & Craft {PEO EXW/PMS 325}**

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T-AKE PESHE Revision 2.0, 22 Nov 00

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EXECUTIVE SUMMARY

The streamlined Acquisition Strategy for the ACAT 1D T-AKE Program details a single acquisition milestone based upon a government developed system specification, industry derived ship specification, and ship detail design. The first phase of the two-phase program concentrated on intraship cargo stowage, handling, and management system design. Phase II consists of detail ship design and construction. The first of the planned twelve (12) ships of the class is scheduled for Initial Operating Capability (IOC) in 2005.

The Department of Defense (DoD) has mandated that all major acquisition programs must ensure that environmental, safety, and health concerns are identified throughout the acquisition process. This Programmatic Environmental Safety and Health Evaluation (PESHE) addresses the requirements associated with Environmental Protection to include National Environmental Policy Act (NEPA), Pollution Prevention (P2), Hazardous Material Management, and Environmental Compliance, as well as Occupational Safety and Health (OSH) and System Safety. This PESHE summarizes the T-AKE Program Manager's (PM) strategy for meeting Environmental, Safety, and Health (ESH) requirements, establishes responsibilities, and identifies how progress will be tracked.



Notional T-AKE

Table of Contents

Revision Record.....	iii
1.0 Introduction	1
2.0 Strategy for Meeting Environmental, Safety, and Health Requirements	1
3.0 Roles and Responsibilities.....	3
4.0 DOD 5000.2R Requirements	4
4.1 National Environmental Policy Act	4
4.1.1 Current Status.....	4
4.1.2 Phase II Objectives.....	5
4.2 Environmental Compliance	6
4.2.1 Current Status.....	6
4.2.2 Phase II Objectives	7
4.3 System Safety and Health	8
4.3.1 Current Status.....	8
4.3.2 Phase II Objectives	8
4.4 Hazardous Materials	9
4.4.1 Current Status.....	9
4.4.2 Phase II Objectives	10
4.5 Pollution Prevention	11
4.5.1 Current Status.....	11
4.5.2 Phase II Objectives	12
5.0 Conclusions.....	13
6.0 List of Program-Related ESH Documents.....	16
APPENDIX – LIST OF ACRONYMS.....	18

REVISION RECORD

Version 0; 31 May 2000

Initial document.

Version 1.0; 11 September 2000

- Document amended to reflect Distribution Statement A, Approval for unrestricted public release.
- Amended to include POA&M for NEPA documentation development.
- Include discussion on Programmatic ESH Risk.

Version 2.0; 22 November 2000

- Incorporate name change from T-ADC(X) to LEWIS and CLARK Class (T-AKE).
- Incorporation of the T-AKE Integrated ESH Program discussion.
- Incorporation of Prohibited and Government Controlled Substances List
- Incorporation of LCC Discussion and Legacy Ship Waste Stream Comparison

1.0 Introduction

DoD Regulation 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs, requires that all major acquisition programs must include a Programmatic, Environmental, Safety, and Health Evaluation (PESHE). The PESHE describes the Program Manager's (PM) strategy for meeting Environmental, Safety, and Health requirements, establishes responsibilities, and identifies how progress will be tracked. This PESHE is a derivative of the *Environmental, Safety, and Health Strategy and Management Plan (ESHSMP) for the T-AKE Class*, an environmental management plan that addresses the strategy for meeting Environmental, Safety and Health (ESH) requirements associated with the National Environmental Policy Act (NEPA), compliance with Environmental Regulations and Statutes, System Safety and Occupational Safety and Health, Hazardous Materials, Pollution Prevention, and Navy policy. This PESHE is a working document and will be maintained and updated throughout the life cycle of the ACAT 1D T-AKE Program.

2.0 Strategy for Meeting Environmental, Safety, and Health Requirements

The T-AKE Program Manager (PM) is committed to ensuring that the T-AKE Class of ships and their associated systems and equipment are designed and built to meet or exceed all applicable ESH regulations and policy requirements at delivery and goal of ten years into the future. The PM has established the ESHSMP to serve as the Environmental Management System and to ensure that ESH requirements are identified and integrated into the Acquisition Program. The ESHSMP identifies the ESH strategy and approach for satisfying ESH policy, objectives, targets, and goals. The T-AKE Program office has worked closely with Military Sealift Command (MSC) and cognizant Naval Sea Systems Command (NAVSEA) codes and followed NAVSEA ESH Integration Guide for Program Managers of February 2000 recommendations while developing the T-AKE ESH program.

As reflected in the Acquisition Strategy, the T-AKE will be designed to commercial standards based on a government generated performance System Specification. The overall ESH strategy is based upon gaining an appreciation for existing requirements, projecting probable changes to these requirements, and incorporating performance and administrative requirements into contractual documents to manage risk. Source Selection will be based, in part, on ESH criteria. Post contract award incentive fees will be based primarily on effectiveness of efforts to minimize life cycle cost, of which ESH criteria are included. Continuous dialog between the Shipbuilder, program office and MSC will minimize the risk of ESH performance.

Programmatic risk (cost, schedule, performance, and political) associated with ESH issues will be managed through the T-AKE Program Risk Management Plan and Risk Management Team. ESH Risks, whether identified by the government or shipbuilder, will be managed through the program risk management process. This process ensures that ESH Risks will be afforded equal visibility and reduction efforts with all other risk elements identified in the T-AKE Risk Register.

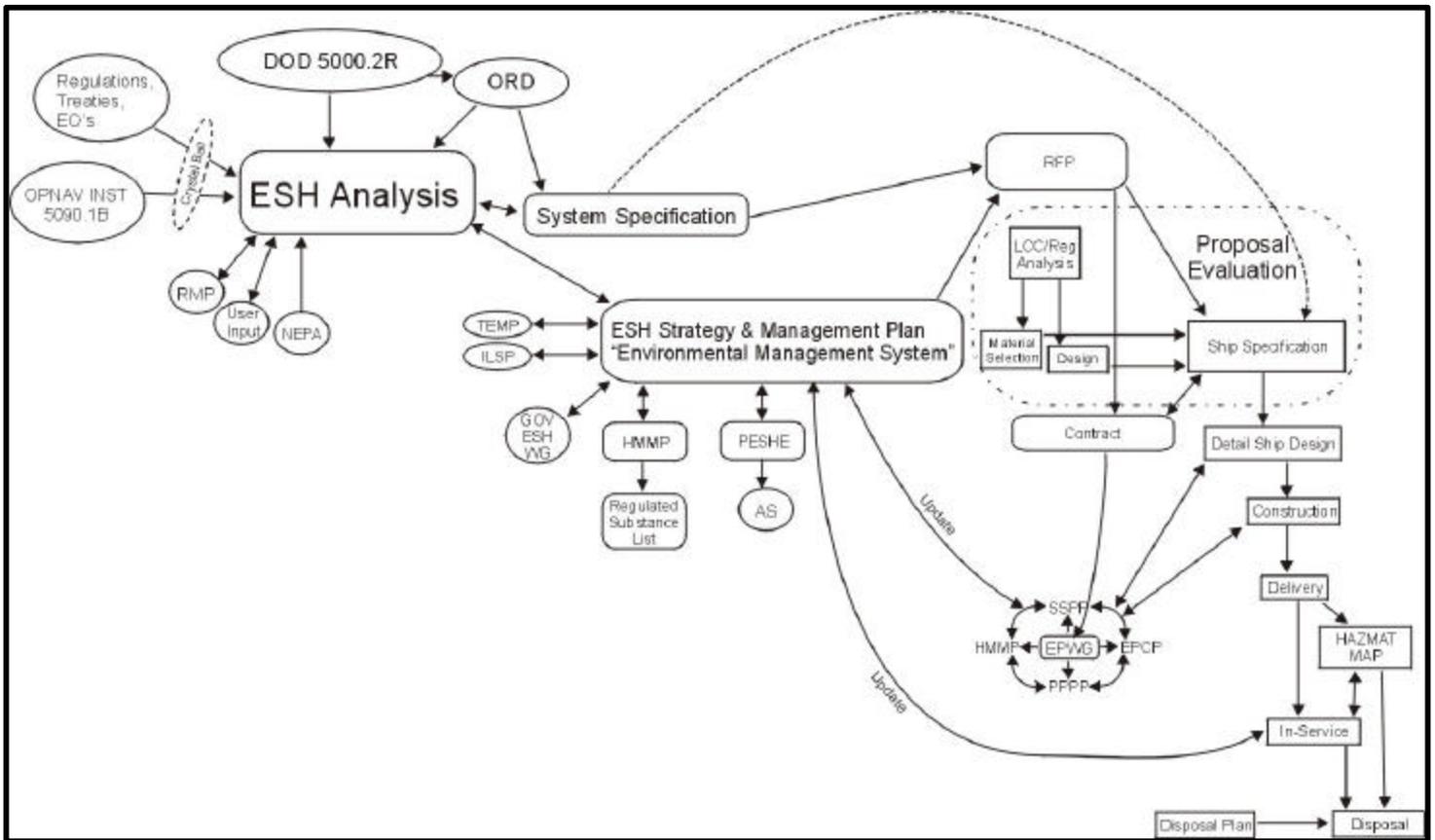


Figure 1: T-AKE Integrated ESH Program

The T-AKE Team has developed and implemented an innovative approach to ensuring that ESH considerations are incorporated into every aspect of the Program. The requirements of DoD 5000.1 and 5000.2-R are reflected in the ship performance requirements of the System Specification, in the contracting strategy and basis for award, and in plans for Phase II. Figure 1 provides an overview of the T-AKE approach to ESH integration.

The basis for establishing and measuring T-AKE ESH performance is the ESH Analysis (ESHA). The ESHA contains the regulatory review performed, informed projections for 10 years into the future, establishes T-AKE ship performance standards to meet these projected requirements, performed a waste streams baseline assessment of the 15 ships from the four classes T-AKE will replace, and provided a life cycle cost comparison between them. The ESHA integrates requirements from the ORD, DoD 5000 documents, regulations/treaties/executive orders, OPNAVINST 5090.1B, and the end-user into discrete system performance requirements of the System Specification, identifies risks reflected in the Risk Management Plan (RMP), and establishes NEPA compliance requirements. The ESHA is a living document, updated as the Program evolves, consistent with the ESHSMP.

The ESHSMP is the heart of the T-AKE ESH Strategy. This document is the interface with other documents such as the TEMP, Integrated Logistics Support Plan (ILSP), Program Hazardous

Material Management Program (HMMP), Programmatic ESH Evaluation (PESHE) and Acquisition Strategy (AS). The ESHSMP details strategy for incorporating environmental considerations into the Phase II RFP and source selection process as key drivers of life cycle cost, and establishes the post contract award government/Shipbuilder relationship for the EPWG, and Shipbuilder crafted and implemented: HMMP, Pollution Prevention Program (PPPP), and Environmental Protection Compliance Program (EPCP).

3.0 Roles and Responsibilities

The T-AKE PM must manage the schedule, cost, and performance risk associated with development of the T-AKE including ESH requirements and subsequent ESH programmatic risk. Therefore, with respect to the development and implementation of ESH requirements, the PM requires expert assistance in complying with all existing and emerging legal requirements while concentrating on acquiring the system that will meet the traditional military and logistic support missions specified in the Operational Requirements Document (ORD). As part of the approach to satisfy ESH requirements, the PM has assigned a T-AKE ESH Manager (EM) to ensure that all ESH requirements are integrated into the T-AKE Program and established an Environmental Program Working Group (EPWG) to support the EM in carrying out his responsibilities. However, it is the responsibility of each member of the T-AKE Program Team to minimize ESH risk and ensure ESH performance.

The EM's responsibilities include incorporating all relevant ESH-related policies, directives, laws, regulations, goals, and Navy policy (i.e. as reflected in OPNAVINST 5090.1B and COMSCINST 5090.1B) into the T-AKE design and acquisition program. The EM will ensure that ESH requirements are incorporated in the System Specification, Statement of Work and other contractual documents and subsequently verify the required system performance. The EM will ensure that environmental management system requirements are established, implemented, and maintained, and procedures are established for the identification, maintenance, and disposition of environmental records. The EM has developed a Hazardous Material Management Program and has required the Shipbuilder to implement a Hazardous Material Management Program, Pollution Prevention Program, Environmental Protection Compliance Program, and System Safety Program.

The EM will coordinate environmental issues, participate in design and program reviews, identify and project the resources required to implement the ESHSMP, and chair the EPWG. The EM will work closely with other government participating managers (PARMs) to identify and resolve ESH issues in systems, equipment, and components to be integrated into the T-AKE. The EM will establish and maintain procedures for internal communication among various levels and functions of the program and will be responsible for receiving, documenting, and responding to relevant communication from external interested parties. The EM will also provide ESH Awareness training to all key acquisition and design participants.

The EPWG will advise the contractor and program office on environmental protection requirement implementation for the T-AKE Program and monitor contractor environmental performance as reflected in the Hazardous Material Management Plan (HMMP), Pollution

Prevention Program Plan (PPPP), System Safety Program Plan (SSPP) and Environmental Protection Compliance Plan (EPCP). The EPWG will meet at each Quarterly Progress Review (QPR) and periodically, timed to coincide with the Initial Critical Design Review (ICDR), Final Critical Design Review (FCDR), and scheduled design reviews at eight week intervals. The EPWG will be comprised of six government representatives and a minimum of one Shipbuilder representative expert in the area of marine environmental protection. In addition to the EM, the government EPWG members will be from: NAVSEA 00T, NAVSEA 05, NSWCCD Code 63, MSC, and the Program Manager Representative (PMR). The Shipbuilder representative shall be knowledgeable of the contractor's ship design, construction and test processes. The EM will identify individual roles and responsibilities of each EPWG member.

The Shipbuilder is responsible for obtaining the level of system performance required in the Contract. System performance requirements are found in the System Specification (Attachment J-1 of the RFP/Contract). Unique program requirements are found in Section C of the RFP/Contract and require the shipbuilder to: develop and implement the HMMP, PPPP, SSPP, and EPCP consistent with the requirements of the System Specification. The Shipbuilder will provide status reports for each of these program plans at each EPWG meeting.

4.0 DoD 5000.2R Requirements

The philosophy and guidance of DoD 5000.2R for integrating ESH requirements into T-AKE Program documentation have been fully implemented as discussed in the following sections (4.1 through 4.5).

4.1 National Environmental Policy Act (NEPA) and Executive Order (EO) 12114

4.1.1 Current Status

Program activities and actions have been identified that may require National Environmental Policy Act (NEPA) review and analysis of Executive Order (EO) 12114, "Environmental Effects Abroad of Major Federal Actions." Any analyses' required under either NEPA or EO 12114 are tied to proposed, program-specific actions and will be prepared in accordance with Navy and DoD regulations and guidance when required by such actions.

The following activities have been considered as potentially requiring NEPA review:

Testing: The testing activities include Developmental Testing (DT), Technical Evaluation (TECHEVAL), Operational Evaluation (OPEVAL), and Live Fire Testing and Evaluation (LFT&E). DT, TECHEVAL and OPEVAL should not invoke NEPA documentation requirements because the testing will not differ from normal Combat Logistics Force (CLF) operations. Test evolutions and procedures will be of the kind typically performed by existing ships, conducted in areas where the Navy traditionally operates. The probability of shock trials for T-AKE is extremely low and, therefore no NEPA documentation for LFT&E is anticipated. LFT&E requirements will be satisfied through a land based surrogate test program using existing

facilities that perform identical testing analysis. Completion of the Live Fire Management Plan will trigger compilation of NEPA documentation.

Homeporting: The T-AKE will replace existing fleet assets on a one-for-one basis. As each T-AKE ship is brought on line either an AOE-1, T-AFS or T-AE Class of ship will be retired. Although nearly twice the displacement of T-AFS and T-AE ships, the T-AKE manning level will be similar, making impact on local communities and infrastructure minimal. When compared to T-AKE manning will be a fraction of AOE-1. Port access (to include no required dredging particular to T-AKE) and pier services required to support T-AKE will be similar to existing CLF ships. Analysis of the government generated ship Point Design indicates that no improvements are required in Norfolk or San Diego, the most likely CONUS homeports for the T-AKE. The T-AKE will release a fraction of the pollutants now released by the legacy ships that it is replacing such that the local communities will not face increases in pollutants associated with the homeporting of these vessels. Therefore, T-AKE homeporting will not result in significant impacts to the environment.

Navy NEPA Categorical Exclusions (CATEX): Pursuant OPNAVINST 5090.1 Series (paragraph 2-5.2.c), there is a categorical exclusion that is applicable to the homeporting of the T-AKE. This CATEX relates to “routine movement of mobile assets, such as ships and aircraft, in home port reassignments (when no new support facilities are required) to perform as operational groups, and/or for repair and overhaul.”

4.1.2 Phase II Objectives

The EM will continue to evaluate all program actions for potential NEPA review, Table I provides the timetable for accomplishing the appropriate NEPA documentation. Testing during Phase II may have impacts on the human environment and these will be analyzed and documented as the Program matures. Based upon past experience from similar situations, the T-AKE Program does not envision significant impacts from these actions and therefore it is anticipated that NEPA documentation in the form of Environmental Assessments (EA) or Categorical Exclusions (CATEX) will most likely be developed during Phase II. Once completed, NEPA documents will become part of the *Environmental, Safety and Health Analysis for the T-AKE Class*.

The EM will review all contract change proposals submitted by the shipbuilder to determine if there are any environmental impacts associated with the change. Homeport issues for T-AKE will be further investigated after contract award. Representatives from the program office will travel to San Diego, Norfolk, and Japan to meet with local officials to discuss homeport issues. These investigations will include an analysis of sea trial procedures to ensure that the effect of the sea trials on the marine environment has been minimized and that no significant dredging will occur. Mitigation action will be taken as required, and if necessary NEPA/EO 12114 documentation will be prepared to document decisions and actions associated with this program when such actions have the potential to impact the environment.

Table I: T-AKE NEPA/EO 12114 Plan of Action and Milestones

Action Proponent	Program Decision	Decision Date	NEPA Planning Start	NEPA Planning Completion Date	Analysis & Documentation Anticipated
PM T-AKE	Developmental Test (DT II)	2 nd QTR FY 01	4 th QTR FY 00	1 st QTR FY 01	CATEX & Record of CATEX
PM T-AKE	Technical Evaluation (TECHEVAL)	2 nd QTR FY 05	2 nd QTR FY 04	4 th QTR FY 04	CATEX & Record of CATEX
PM T-AKE	Operational Evaluation (OPEVAL)	4 th QTR FY 05	4 th QTR FY 04	2 nd QTR FY 05	CATEX & Record of CATEX
PM T-AKE	Live Fire Testing & Evaluation (LFT&E)	2 nd QTR FY 01	4 th QTR FY 00	1 st QTR FY 01	EA & FONSI
Fleet	Homeporting	4 th QTR FY 04	4 th QTR FY 03	2 nd QTR FY 04	CATEX & Record of CATEX
Applicable Public Shipyard	Overhaul/Repair Yard (s)	1 st QTR FY 07 (First Event)	1 st QTR FY 06	3 rd QTR FY 06	CATEX or EA & FONSI
MSC	Ship Disposal	FY 2043	FY 2042	FY 2044	EA & FONSI

4.2 Environmental Compliance

4.2.1 Current Status

The EM has identified and integrated all applicable environmental laws, regulations, policies, EOs, and treaties into the T-AKE acquisition program. These include: MARPOL 73/78 including Annexes I through VI, OPNAVINST 5090.1B Change 2, COMSCINST 5090.1B Change 1, Act to Prevent Pollution From Ships, Clean Water Act (CWA), Marine Mammal Protection Act, Clean Air Act, Endangered Species Act, Hazardous Material Transportation Act, Occupational Safety and Health Act, Resource Conservation and Recovery Act, and Toxic Substances Control Act.

As discussed in the CLF Pollution Baseline found in the *Environmental, Safety and Health Analysis for the T-AKE Class*, an analysis and program risk assessment due to pending twenty-five (25) ship discharges to be regulated via the Uniform National Discharge Standards (UNDS) (CWA Section 312) was performed. Of these discharges, sixteen (16) were determined to be applicable to the expected T-AKE design, of which technological Marine Pollution Control Devices (MPCD's) were specified in the System Specification via performance based language for Graywater, Surface Ship Bilgewater/OWS Discharge, Deck Runoff, Clean Ballast, and Chain Locker Effluent. It is anticipated that the remaining eleven (11) discharges will be regulated via management based MPCD's for T-AKE.

Section 3.5.8 of the System Specification provides the T-AKE Pollution Control requirements in excess of current regulatory requirements. These features include: a solid waste handling system capable of operating in compliance with applicable regulations associated with Annex V of MARPOL 73/78, requirements for ship diesel engines with a power output exceeding 130 kW (excluding emergency use) to meet emission standards prescribed in Annex VI of MARPOL 73/78, and a sewage and graywater system capable of operating in compliance with MARPOL 73/78 Annex IV, and its subsequent amendments, in any location worldwide. In addition, a space and weight reservation for the Navy developed post oil water separator membrane polisher has been made that will ensure all system overboard discharges of oily waste contain less than fifteen (15) parts per million oil as determined by EPA Standard Method 1664. The decision to reserve space and weight for installation during the Post Shakedown Availability (PSA) was based upon the infancy of the polisher design, and expected economies of scale should the polisher be selected as an UNDS bilgewater MPCD. The ship will also contain a stowage locker convenient to locations of likely spill events and sized for the ship's allowance of Oil and Hazardous Substance (OHS) spill response materials. Section 2.1.2, 2.1.3, and 2.2 of the System Specification identifies the specifications, standards, and publications referenced in the formulation of the System Specification.

4.2.2 Phase II Objectives

The EM will keep abreast of changing national, state, local, and international ESH laws, regulations, and policies and document their potential impacts on the system acquisition program in terms of cost, schedule, and performance. The EM will also ensure that equipment, systems, and practices will meet or exceed all applicable environmental regulations.

As part of the Phase II contract execution, the Shipbuilder will develop and implement an Environmental Protection Compliance Program and Environmental Protection Compliance Plan (EPCP) consistent with the requirements in the System Specification. Approved by the government, the EPCP will be a derivative of the Requirements Verification program as described in Section C.2.4 of the RFP/Contract. The EPCP will describe all applicable international, national, state, and local regulatory requirements (or system specifications) and will define the Shipbuilder's strategy, organization, and controls to ensure compliance with all applicable regulations. The EPCP will describe the pollution prevention and pollution control measures incorporated into the ship design (to enable compliance with environmental protection specifications and legal requirements) and will include life cycle cost information used in the selection process of pollution control measures. The EPCP will also identify which shipbuilding activities, shipboard systems, and resulting ship operations, maintenance, and disposal requirements will be affected by the regulations.

The shipbuilder will describe their approach in conducting Life Cycle Cost (LCC) reduction analyses and will convey results of the trade-off studies related to the LCC of the T-AKE. The shipbuilder will describe the impact of the analysis and trade-off on life cycle cost reduction initiatives. The shipbuilder will also document how they addressed the cost reduction for compliance with applicable laws & regulations, and minimization of adverse environmental impacts over the life cycle of T-AKE. This documentation will indicate how the shipbuilder

analyzed environmental compliance requirements and selection of proposed pollution control solutions, incorporated pollution prevention, addressed the reduction of disposal costs of ship systems of the ship class, and reduced hazardous material use over the life cycle through elimination, minimization, and/or substitution. The program office recognizes the difficulties in performing LCC analysis of environmental compliance alternatives, but will use this information in programmatic decision making to the maximum extent practicable.

The Shipbuilder will present an updated, detailed summary of all activities completed under the EPCP no later than 20 days prior to each scheduled design review. The EPWG will review the EPCP status reports and provide comments that shall be incorporated into the EPCP prior to the next scheduled design review.

The *Environmental, Safety and Health Analysis for the T-AKE Class* will be revised to incorporate features of the detail ship design to reflect as-designed/as-built T-AKE environmental compliance features to refine the total pollutant mass loading analysis.

4.3 System Safety and Health

4.3.1 Current Status

The EM has addressed ESH concerns to eliminate potential adverse impacts on the environment, Navy personnel, and the general public, minimize those impacts that cannot be eliminated, and resolve any residual adverse impacts that may occur. The EM has reviewed the system safety requirements documented in DoD Regulation 5000.2-R for acquisition programs and has determined that a System Safety Program developed and implemented by the Shipbuilder based upon MIL-STD-882D is satisfactory. Frequent monitoring of Shipbuilder performance by personnel from NAVSEA 05L5, Navy Technical Authority for System Safety, of the System Safety Program Plan and periodic Progress Reports will minimize performance risk due to system safety issues.

Access to the NAVSEA Safety Technical Authority to Phase I contractors and Phase II potential offerors has been afforded. This access provides lessons learned information to the shipbuilders for consideration in ship design maturation.

4.3.2 Phase II Objectives

The EM will identify, evaluate, and report safety and health hazards associated with the development, use, and disposal of all T-AKE shipboard systems and equipment. The EM will ensure the Shipbuilder is developing a System Safety Program, identifying all health hazards, assessing the severity and probability of the mishap risk associated with each hazard, and identifying potential mishap risk mitigation alternatives and its effectiveness. The EM will also review the Shipbuilder's list of identified hazards, verify the Shipbuilder is reducing mishap risk through an acceptable mitigation approach, and ensure the Shipbuilder is maintaining a tracking system throughout the life cycle of the program.

The Shipbuilder will develop, for government approval, a System Safety Program (SSP) and System Safety Program Plan (SSPP) in accordance with MIL-STD 882D. The SSPP will identify, evaluate, and report safety and health requirements necessary to provide adequate protection of workers, ship's force, and the general public. The SSPP will describe how ship safety design requirements have been satisfied and how health hazards associated with the ship development, operation, maintenance, support, and disposal have been reduced or eliminated. The SSPP will also include a recommended list for preliminary hazard analyses of shipboard areas; shipboard equipment, subsystems, and system interfaces; and conditions capable of resulting in a Category I, II, or III Hazard.

The Shipbuilder will present an updated target list identifying all potential hazards for T-AKE and a detailed summary of all activities completed under the SSPP. The target list and status report will be completed no later than 20 days prior to each scheduled design review. The EPWG will review the SSPP status reports and provide comments that shall be incorporated into the SSPP prior to the next scheduled design review.

4.4 Hazardous Materials

The T-AKE PM has established the following program definition for Hazardous Materials: "Anything that due to its chemical, physical, or biological nature causes safety, public health, or environmental concerns that results in an elevated level to manage it."

4.4.1 Current Status

The EM has established an aggressive Hazardous Material Management Program to ensure appropriate consideration is given to eliminate and reduce the use of hazardous materials in the acquisition program, construction, service life, and disposal. The EM has identified those actions required for T-AKE to satisfy current Hazardous Material/Hazardous Waste-related policies, directives, regulations, goals, and objectives.

As a requirement for the Hazardous Material Management Program, the EM has developed a Hazardous Material List that identifies hazardous or otherwise regulated materials that should be prohibited or subject to restricted use on T-AKE. This Hazardous Material List was used to generate a Prioritized Hazardous Material List that ranks materials according to the potential environmental regulatory impact that each material may have on T-AKE life cycle phases. A computer algorithm, developed by Naval Surface Warfare Center Carderock Division (NSWCCD), to determine the environmental regulatory impact of hazardous or otherwise regulated materials on the life cycle of the Virginia Class Submarine was used as the basis for the development of a similar computer algorithm tailored to the anticipated life cycle operations of T-AKE. The algorithm assigned point values to data elements associated with each applicable environmental regulation and health and safety standard, calculated a total point score for each hazardous substance on the T-AKE list, then ranked the substances from greatest environmental regulatory impact to least to formulate a Prioritized Hazardous Materials List. The Prioritized Hazardous Material List was further broken down to identify those twenty-eight (28) materials which shall not be used (Prohibited Substances List – Table XV of the System Specification) in

the design, construction, operation, and maintenance of T-AKE and those sixty-eight (68) materials which may only be used if a waiver request is granted to the Shipbuilder (Government Controlled Substances List – Table XVI of the System Specification). A summary of T-AKE Program regulated materials is given as Table 2.

Table 2: T-AKE Program Regulated Hazardous Materials

Prohibited Substance List		
Asbestos	Mercury	Benzene
Tri-N-Butyl Tin Hydride (TBT)	Carbon Tetrachloride	Toluene
Polychlorinated Biphenyl (PCBs)	Methyl Ethyl Ketone	Xylenes
Methylene Chloride		
Government Controlled Substance List*		
N-Nitrosodimethylamine	4-Nitrobiphenyl	Trichloroethylene
4-Dimethylaminoazo-benzene	3-3' Dichlorobenzidine	Vinyl Chloride
Benzidine	Chromic Acid	Beryllium
Cyanide	Methyl Isobutyl Ketone	Chromium
Tetrachloroethylene	Nickel	Cadmium
Lead	Beta-Naphthylamine	Trichloromethane/Chloroform
4-Aminodiphenyl	Ethyleneimine	Carbon Disulfide
Ethylene Dichloride	Styrene	

*Note: The government may authorize use once the Shipbuilder demonstrates that no suitable alternative exists and documents its use, quantity and location.

4.4.2 Phase II Objectives

The EM will ensure the Shipbuilder pursues and develops a HMMP and a Ship Hazardous Material List (SHML). The EM will work with NAVSEA ship arrangements, pollution prevention engineers, and appropriate Logistic Element Managers (LEMs) to ensure HM is minimized, properly segregated, adequate storage space and location is provided, and sufficient resources are available to support management and control of shipboard HM. The EM will also ensure that pollution prevention systems and equipment are required to maintain health and safety standards while complying with regulatory requirements.

The EM will review and revise the specifications of all HM required to support T-AKE systems/equipment in order to eliminate or reduce the use of targeted materials. The EM will work with the EPWG to review and revise all T-AKE technical documents to ensure that only SHML items and least hazardous materials are cited for maintenance and repair. The EM and the EPWG will evaluate and manage the Shipbuilder's selection, use, and disposal of hazardous materials so that the Navy incurs the lowest cost required to protect human health and environment over the system's life cycle, consistent with the program's cost, schedule, and performance requirements. The EM will also ensure that all hazardous or regulatory materials are documented with Material Safety Data Sheets (MSDSs) and entered into the Hazardous Material Inventory System (HMIS) and available to all T-AKE personnel.

The Shipbuilder will develop and implement a Hazardous Material Management Program and Hazardous Material Management Plan (HMMP) in accordance with National Aerospace Standard (NAS) 411 and consistent with the requirements in the System Specification. The HMMP will define the Shipbuilder's strategy, organization, and controls established to ensure the use of hazardous or otherwise regulated materials are eliminated or reduced in the construction and service life of the ship. The HMMP will include the Shipbuilder's approach on how selection, use, and disposal of hazardous or otherwise regulated materials will be evaluated and managed. The list of prohibited and government controlled substances listed in section 3.4.10 of the System Specification shall be also included in the Shipbuilder's HMMP. The Shipbuilder's HMMP will be approved by the government.

All hazardous, or otherwise regulated materials selected for use in the construction, operation, and maintenance of T-AKE will be summarized by the Shipbuilder in the Ship Hazardous Material List (SHML). The government will approve the SHML. The SHML will identify where all selected materials are used by system, why the materials were selected, the potential hazards/impacts associated with the materials, the regulations governing the distribution in commerce, transportation, use, and ultimate disposal of the materials and associated wastes, and the quantity and distribution of the materials on board ship. The materials identified in the SHML will be documented in an overlay as part of the 3D Computer Aided Design (CAD) product model of the ship to produce a T-AKE Hazardous Materials Map (HMM). The HMM will identify the quantity and location of all hazardous or otherwise regulated materials listed in the SHML.

The Shipbuilder will present an updated, detailed summary of all activities completed under the HMMP no later than 20 days prior to each scheduled design review. The summary will include the Shipbuilder's strategy to eliminate and reduce the use of hazardous or otherwise regulated materials, an updated version of the SHML, and an evaluation of the impact of selected materials on the program's cost, schedule, and performance. The EPWG will review the HMMP status reports and waiver requests submitted by the Shipbuilder to use materials identified on the government controlled substance list. The EPWG will provide comments to the Shipbuilder that shall be incorporated into the HMMP prior to the next scheduled design review.

4.5 Pollution Prevention

The EM has invoked top-level design objectives in section 3.4.3 of the System Specification. Paragraph 3.4.3.e provides: "Environmental protection. – The T-AKE shall be capable of being operated in such a manner to minimize adverse impact on the marine environment. Equipment, systems and practices shall prevent pollution, reduce risk, protect health, and meet or exceed performance, durability, safety of operation, and efficiency requirements."

4.5.1 Current Status

The EM has addressed pollution prevention concerns by emphasizing source reduction of waste generating materials, minimizing adverse impacts on the marine environment, and emphasizing the reuse, recycling, and disposal of waste in an environmentally acceptable manner. The EM has

also drafted a Ship Disposal Plan for T-AKE that identifies those actions required to properly demilitarize and dispose of the T-AKE class of ships. Several means of ultimate disposal include scrapping, Sinking Exercise (SINKEX), Transfer, Donation, Foreign Military Sale (FMS) or Foreign Military Lease (FML). Since the expected size of the ship class is twelve, a mixture of these disposal options is expected for the T-AKE Class.

The CLF Pollution Baseline found in the *Environmental, Safety and Health Analysis for the T-AKE Class*, provides a quantitative and qualitative means to show T-AKE Class ESH performance improvement. The study, based on T-AFS, T-AE, and AOE-1 Class ships, documents the types and amounts of regulated materials used on existing CLF ships, identifies the waste/emissions generated and released by the ships, reports current ESH-related problems, documents associated risks to the environment and ship personnel, and identifies existing methods for minimizing waste/emissions and eliminating or reducing potential risks. In addition to complying with existing and anticipated regulations, several pollution prevention features will be incorporated in the ship design by government specification. These pollution prevention features, found in section 3.5.8.a of the System Specification, include: the minimization of risk of overboard discharge of oily weather deck runoff, dry machinery bilge spaces, prevention of the introduction of synthetic oils into the ship's bilge water or Oil Pollution Abatement System, a safe and efficient mid-ocean sequential ballast water exchange, minimization of potential transport of non-indigenous water borne species and sediment collection, and a seawater anchor chain washing system, cargo fuel double hull and vapor emission control system, and prohibition of Class I and Class II Ozone Depleting Substances (ODS) in all shipboard systems, equipment, and for use as solvents.

4.5.2 Phase II Objectives

The EM will perform continuous pollution prevention analysis to identify the impacts of proposed systems on the environment, the general public, and T-AKE personnel. System designers and engineers will be incentivized to develop design alternatives or apply new technologies to eliminate negative impacts and identify source reduction and recycling opportunities.

The Shipbuilder will develop and implement a Pollution Prevention Program and Pollution Prevention Program Plan (PPPP) consistent with the System Specification. The PPPP will address the requirements for elimination and reduction of all forms of pollution to minimize the impacts and life cycle costs associated with environmental compliance. The PPPP will present the Shipbuilder's plan for pollution prevention through source reduction, material reuse, treatment and recycling. The PPPP will also define the contractor's strategy to identify, eliminate, minimize, and control the impacts of the shipbuilding process, proposed ship's systems, and resulting ship operations, maintenance, and disposal requirements on the environment, general public, and T-AKE personnel. The PPPP will guide the Shipbuilder in minimizing the environmental impacts and the life cycle costs associated with environmental compliance through an aggressive source reduction program. The Shipbuilder derived PPPP will be approved by the government.

The Shipbuilder will present an updated, detailed summary of all activities completed under the PPPP no later than 20 days prior to each scheduled design review. The summary will include the

impacts of the shipbuilding process, proposed ship's systems, and resulting ship operations, maintenance, and disposal requirements on the environment, wastes released to the environment, environmental risks associated with using new technologies, and other information needed to identify source reduction and recycling opportunities. The EPWG will review the PPPP status reports and provide comments that shall be incorporated into the PPPP prior to the next scheduled design review.

The anticipated Phase II contract incentive fee strategy will be based upon Shipbuilder efforts to minimize life cycle costs. Pollution prevention and pollution control initiatives form a fundamental part of this equation.

In addition to compliance with MARPOL 73/78 Annex VI marine diesel engine emissions requirements, Section C.1.3.7 of the Contract requires engine testing for gaseous (NO_x, CO, CO₂, HC, and O₂), particulate and smoke emissions. Similar testing is required for gas turbine engines, if they are selected. This testing will establish a baseline for T-AKE engine related emissions.

The *Environmental, Safety and Health Analysis for the T-AKE Class* will be revised to incorporate features of the detail ship design to reflect as-designed/as-built T-AKE pollution prevention features to refine the total pollutant mass loading analysis.

5.0 Conclusions

ESH requirements have been analyzed and then integrated into all facets of the T-AKE Program. Based upon the *Environmental, Safety and Health Analysis for the T-AKE Class*, predictions for T-AKE system performance have been made and comparisons between legacy ships being replaced conducted. The *Environmental Safety and Health Strategy and Management Plan for the T-AKE Class* establishes the Environmental Management System for the life cycle of the T-AKE. ESH requirements have been incorporated into contractual documents and form a fundamental part of the proposal evaluation criteria and post-contract award incentive fee strategy.

The *Environmental, Safety and Health Analysis for the T-AKE Class* describes the process by which the total pollutant mass loading analysis was performed. Figure 2 provides a pictorial representation of this process. This method established a control boundary, then measured the waste that passed through the surface. Analysis included solid, liquid and gaseous waste streams. This study compares 15 legacy ships with T-AKE Class 12 ships based on government design requirements. A comparison of waste streams is given as Table 3, and a graphical representation of the 70% reduction in waste streams (5.74 million metric tons/year) is given in Figure 3.

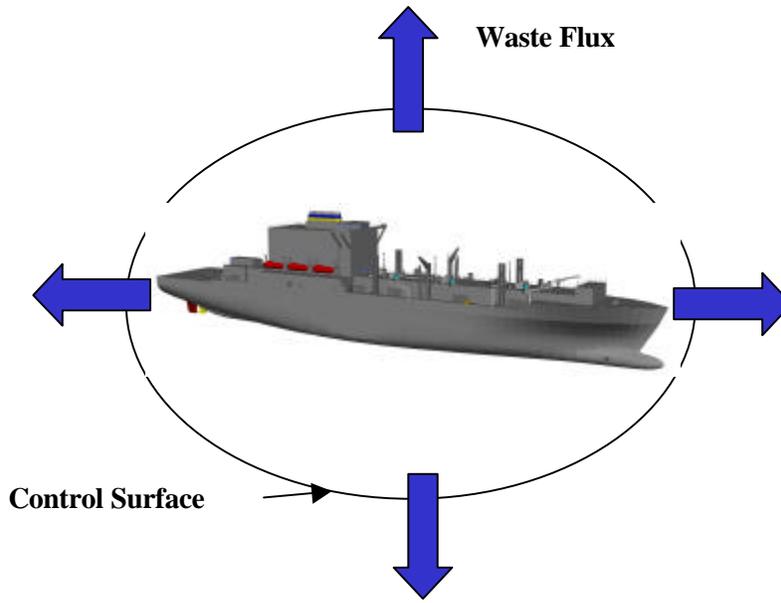


Figure 2: T-AKE Waste Streams Assessment Methodology

Table 3: Annual Waste Stream Comparison - Legacy vs. T-AKE Classes

Waste Stream	Units	Legacy	T-AKE	Delta	% Change
Sewage	Cubic Meters	123,906	7,526	-116,381	-93.9%
Graywater	Cubic Meters	247,704	138,455	-109,249	-44.1%
Bilgewater	Cubic Meters	204,656	19,619	-185,037	-90.4%
Evaporator Brine	Cubic Meters	6,463,327	1,888,191	-4,575,135	-70.8%
CFC's	Metric Tons	10	0	-10	-100.0%
Solid Waste	Metric Tons	2,201	2,781	580	26.3%
NO _x	Metric Tons	2,290	8,393	6,103	266.5%
SO _x	Metric Tons	2,729	78	-2,650	-97.1%
CO ₂	Metric Tons	1,165,045	406,560	-758,485	-65.1%
Time Underway	Days/year	1975	2640	665	33.7%
Time UNREPIg	Days/year	530	1840	1,310	247.2%
Manpower		4,405	2,064	-2,341	-53.1%
Number of Ships		15	12	-3	-20.0%

Of particular note, though the T-AKE Class will spend approximately 34% more time underway each year, total CO₂ emissions will be decreased by 53% (759 thousand metric tons/year). The increase in NO_x is due to transition to diesel propulsion from steam. A trade off was made between efficiency/reduction of CO₂ and an increase in short lived NO_x. Table 2 indicates an increase in solid waste generation. This can be attributed to the 250% rise in the number of days T-AKE will be UNREPIg. The estimate for solid waste generation is based upon the MSC standard of one metric ton of solid waste generated for each day of underway replenishment. These represent design requirements; it is likely that the T-AKE operating profile will correspond more closely to existing ships in practice, resulting in reduced solid waste generation. It is also expected that Shipbuilders will propose new innovative methods to reduce solid waste resulting

from UNREP operations, with significant reduction in the 1 metric ton/day of waste dunnage produced. In almost every category, substantial reductions from legacy ship waste generation rates have been documented.

When compared to regulatory requirements for full compliance on legacy and T-AKE classes, the *Environmental, Safety and Health Analysis for the T-AKE Class* shows an annual cost reduction in waste streams requiring ashore disposal of approximately \$5M, or \$200 million across the 40 year class service life.

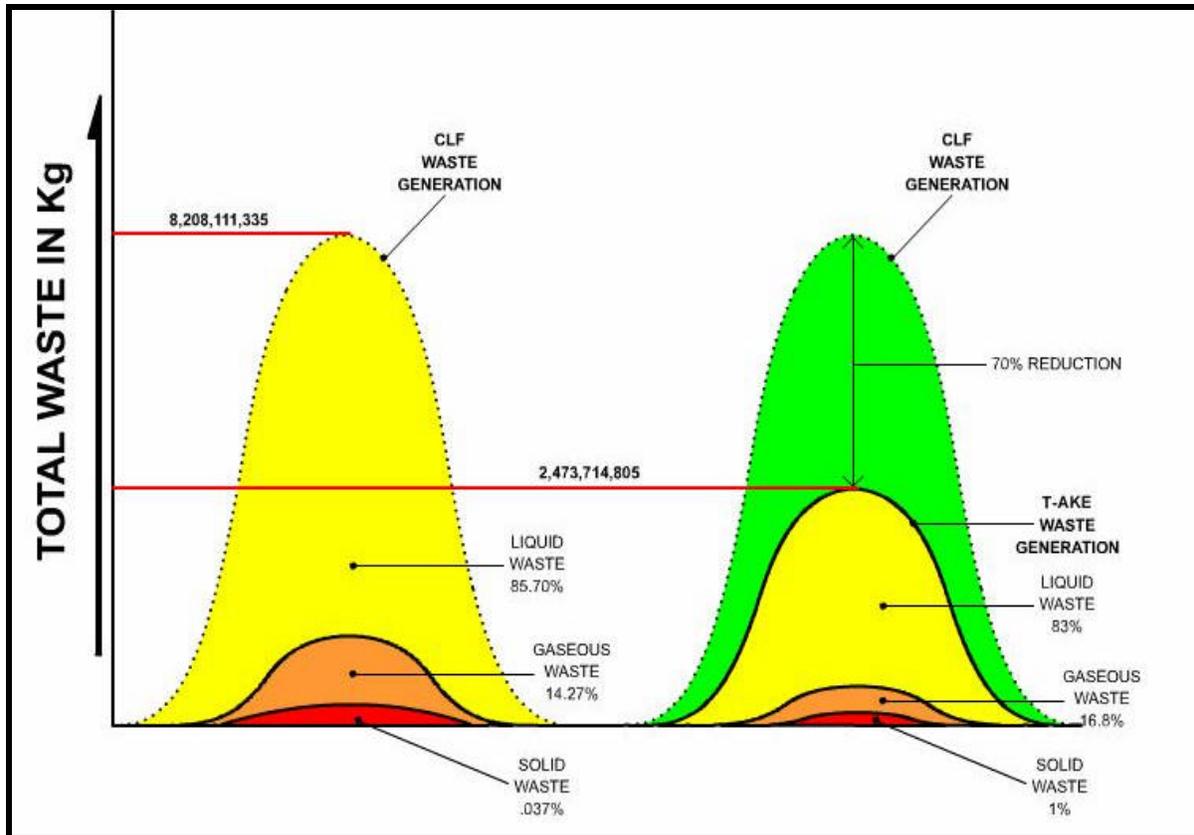


Figure 3: Waste Stream Comparison

6.0 List of Program-Related ESH Reference Documents

1. Act to Prevent Pollution from Ships, 33 USC 1901 et seq
2. Auxiliary Dry Cargo Carrier T-AKE Acquisition Strategy (AS)
3. Clean Air Act (CAA), 42 USC 7401 to 7671q
4. Code of Federal Regulations, 33 CFR 155, Navigation and Navigable Waters, Oil Pollution Prevention Regulations for Vessels
5. Code of Federal Regulations, 40 CFR, Chapter VII, Uniform National Discharge Standards (UNDS) for Vessels of the Armed Forces
6. Code of Federal Regulations, 40 CFR 82, Protection of Stratospheric Ozone
7. Code of Federal Regulation, 40 CFR 140, Protection of the Environment, Marine Sanitation Standard
8. COMSCINST 5090.1 Series
9. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601 to 9675
10. Defense Acquisition Deskbook (DAD)
11. DOD 5000.1, Defense Acquisition
12. DOD 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information Systems
13. DOD Directive 4210.15, Hazardous Material Pollution Prevention
14. DODI 4715.4, Pollution Prevention
15. Environmental Safety and Health Strategy and Management Plan for the T-AKE Class
16. Environmental, Safety and Health Analysis for the T-AKE Class
17. Executive Order 12114, “Environmental Effects Abroad of Major Federal Actions”
18. International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)
19. MIL-STD-882D, Standard Practice for System Safety
20. National Aerospace Standard (NAS 411), Hazardous Material Management Program
21. NAVSEA Program Manager’s Environmental Guide
22. Occupational Safety and Health Act (OSHA), 29 USC 651 et seq.
23. Occupational Safety and Health Administration (OSHA) Occupational Safety and Health Standards, 29 CFR 1910
24. Operational Requirements Document (ORD) for Auxiliary Dry Cargo Carrier (T-AKE)
25. OPNAVINST 4110.2 Series, Hazardous Material Control and Management
26. OPNAVINST 5090.1 Series, Environmental and Natural Resources Program Manual
27. Pollution Prevention Act (PPA), 42 USC 13101 to 13109
28. Resource Conservation and Recovery Act (RCRA), 42 USC 6901 to 6992k

29. SECNAVINST 5000.2B, Implementation of Mandatory Procedures for Major and Non-Major Defense Acquisition Programs and Major and Non-Major Information Technology Acquisition Programs
30. SECNAVINST 5090.6, Evaluation of Environmental Effects and Department of the Navy Actions
31. System Specification for the Auxiliary Dry Cargo Carrier, T-AKE
32. Toxic Substances Control Act (TSCA), 15 USC 2601 to 2692
33. United States Code, Title 33, Navigation and Navigable Waters; Chapter 26, Water Pollution Prevention and Control; Section 312, Federal Water Pollution Control Act

APPENDIX – LIST OF ACRONYMS

CAD	Computer Aided Design
CATEX	Categorical Exclusion
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLF	Combat Logistics Force
CWA	Clean Water Act
DOD	Department of Defense
EM	Environmental Manager
EO	Executive Order
EPCP	Environmental Protection Compliance Plan
EPWG	Environmental Program Working Group
ESH	Environmental, Safety, and Health
ESHSMF	Environmental, Safety, and Health Strategy and Management Plan
FCDR	Final Critical Design Review
HM	Hazardous Materials
HMIS	Hazardous Material Inventory System
HMMP	Hazardous Material Management Plan
HMM	Hazardous Material Map
ICDR	Initial Critical Design Review
IOC	Initial Operating Capability
LFT&E	Live Fire Test and Evaluation
MAIS	Major Automated Information System
MDAP	Major Defense Acquisition Program
MSC	Military Sealift Command
MSDS	Materials Safety Data Sheet
NAS	National Aerospace Standard
NAVSEA	Naval Sea Systems Command
NEPA	National Environmental Policy Act
NSWCCD	Naval Surface Warfare Center Carderock Division
ODS	Ozone Depleting Substance
OHS	Oil and Hazardous Substance
OPAS	Oil Pollution Abatement System
ORD	Operational Requirements Document
OSH	Occupational Safety and Health
P2	Pollution Prevention
PARM	Participating Manager
PESHE	Programmatic Environmental, Safety, and Health Evaluation
PM	Program Manager
PPPP	Pollution Prevention Program Plan
QPR	Quarterly Progress Review
RCRA	Resource Conservation and Recovery Act
SHML	Ship Hazardous Material List
SSP	System Safety Program
SSPP	System Safety Program Plan

T-AKE	Auxiliary Dry Cargo Ship
TOC	Total Ownership Cost
UNDS	Uniform National Discharge Standards