

OPERATIONAL REQUIREMENTS DOCUMENT (ORD)
For
Auxiliary Cargo and Ammunition Ship (T-AKE)
Pre ACAT
Prepared for Milestone C

1. General Description of Operational Capability.

The purpose of the Auxiliary Cargo and Ammunition Ship (T-AKE) is to replace the current capability of the T-AE 26 Class (Ammunition Ship), T-AFS 1/8 Class (Combat Stores Ship) and, when operating in concert with a T-AO Class ship (Oiler), the AOE 1 Class (Fast Combat Support Ship). A detailed description of the Operational Capabilities of the T-AKE is provided in Attachment A.

a. Applicability of Joint Capstone Requirements Documents (CRD) to the T-AKE

The T-AKE will have information technology and communications systems installed that fall under the umbrella of the Global Combat Support System (GCSS) CRD, the Combat Identification (CID) CRD, and the Information Dissemination Management (IDM) CRD. An analysis of the applicability of Joint Capstone Requirements Documents to the T-AKE is provided in Attachment G. Details of the Command, Control, Computers and Communications systems are addressed in Attachment D.

2. Threat.

The primary threat will be from aircraft, ships, and submarines, coastal defense units armed with antiship cruise missiles (ASCMs), and air-, ship-, and submarine-launched mines. Secondary but significant threats will also come from submarine-launched torpedoes; fighter-launched tactical air-to-surface missiles (ASMs); other ordnance carried by sea- and land-based aircraft (fixed- and rotary-wing); and chemical, biological and nuclear weapons. While operating in the littoral regions, additional threats from coastal defense sites (artillery, missile, multiple rocket launchers, and possibly torpedoes) and theater ballistic missiles (TBMs) may be encountered. A third tier threat will include preemptive attacks or covert action from special operations forces and/or combat divers. Command, Control and Communications (C³) electronic attack and electronic support systems may support the weapons threats.

The Navy's dependence on information systems also provides potential vulnerabilities for adversaries to exploit. Potential adversaries are knowledgeable about Naval command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities and will attempt to disrupt information systems through electronic attack (EA), false data insertion, and malicious computer code insertion. Specific threats to Naval C4ISR systems are detailed in "Naval Command, Control, Communications, Computers, Navigation, and IFF Systems", ONI-TA-009-00, dated April 2000, "Naval Electronic Warfare Systems", ONI-TA-014-00, dated October 2000, and "Threats to Network Centric Warfare", ONI-1573-001-00, dated October 1999.

The threats against the T-AKE are detailed in the “Auxiliary Dry Cargo Carrier System Threat Assessment Report”, ONI-TA-055-00. Additional background information is provided in Attachment B.

3. Shortcomings of Existing Systems.

The current Combat Logistics Force (CLF) capability has been shrinking since 1992 when the five-ship AE 21/23 Class began to be decommissioned. The five ship AO 177 Class was decommissioned by FY 1999. The T-AE, T-AFS and the aging AOE 1 Classes will be retired/decommissioned at the end of their service life, extended to 35-40 years. Although the size of the entire fleet has been decreasing, unscheduled deployments and operational tempo have remained constant and without T-AKE there will not be enough ships to meet the projected need. T-AKE is needed to provide projected CLF capability requirements.

4. Capabilities Required.

a. System Performance

Recommended Key Performance Parameters (KPPs) and Key Mobility Factors (KMFs) are contained in the following tables.

KEY PERFORMANCE PARAMETERS (KPPs)

PARAMETER	THRESHOLD	OBJECTIVE
Intership Cargo Handling Interoperability	Intership cargo handling capability must provide all replenishment systems and equipment required for seamless interface with existing and planned U.S. ships.	T=O
C ⁴ I Interoperability	100% of top-level and Navy IERs designated critical will be satisfied.	100% of top-level and Navy IERs will be satisfied.
Survivability	The ship will survive flooding caused by damage to the shell at any location except the transverse bulkheads bounding an aft machinery space. The final damaged heel angle will not exceed 25 degrees.	The ship will survive flooding caused by damage to the shell at any location. The final damaged heel angle will not exceed 15 degrees and the margin line will not be submerged.
Endurance	The ship will be capable of 14,000 NM endurance at the sustained speed* of 20 knots.	T=O
Sustained Speed	The ship will be capable of a sustained speed* of 20 knots.	The ship will be capable of a sustained speed* of greater than 20 knots.

PARAMETER	THRESHOLD	OBJECTIVE
Cargo Transfer Rate (Sea State 2) (Sea States are defined in Standing NATO Agreement (STANAG) No. 4194.)	The ship will be capable of continuous transfer of palletized ordnance at a total rate equal to or greater than 149 metric tons per hour to an Aircraft Carrier (CV) using three CONREP stations and VERTREP with two military cargo logistics helicopters or two equivalent commercial variants simultaneously. The ship will also be capable of continuous transfer of palletized ordnance at a total rate equal to 138 metric tons per hour to a CV and Cruiser (CG) simultaneously using a total of five CONREP stations.	The ship will be capable of continuous transfer of palletized ordnance at a total rate greater than 274 metric tons per hour to an Aircraft Carrier (CV) using three CONREP stations and VERTREP with two military cargo logistics helicopters or two equivalent commercial variants simultaneously. The ship will also be capable of continuous transfer of palletized ordnance at a total rate greater than 220 metric tons per hour to a CV and Cruiser (CG) simultaneously using a total of five CONREP stations.

* Notes: Sustained speed is measured at full load (Condition D), calm water (no current, wind or waves), clean bottom and propeller(s) using no more than 80% of the propulsion engine maximum continuous rating (MCR). Trials will be conducted in accordance with the Society of Naval Architects and Marine Engineers Technical and Research (SNAME T&R) Bulletin No. 3-47. Trials that occur in conditions other than calm water will be adjusted back to calm water results. The adjustment to calm water conditions shall be accomplished analytically using the methodology referenced in SNAME T&R Bulletin No. 3-47.

KEY MOBILITY FACTORS (KMFs)

FACTOR	THRESHOLD	OBJECTIVE																
Maximum Size																		
LOA	210 meters	Less than 210 meters																
Beam	32.3 meters	Less than 32.3 meters																
Navigational Draft (Full Load)	9.5 meters	Less than 9.5 meters																
Air Draft (Max height above waterline)	41 meters above water line in light operating condition.	Less than 41 meters																
Sustained Speed*	20 knots	Greater than 20 knots																
Range	14,000 nm at sustained speed*	T=O																
Endurance Days	<table border="1"> <thead> <tr> <th>STORES</th> <th>DAYS</th> </tr> </thead> <tbody> <tr> <td>Dry</td> <td>90</td> </tr> <tr> <td>Freeze</td> <td>90</td> </tr> <tr> <td>Chill</td> <td>45</td> </tr> <tr> <td>Repair</td> <td>90</td> </tr> <tr> <td>Ship's Store</td> <td>90</td> </tr> <tr> <td>GSM</td> <td>90</td> </tr> <tr> <td>Medical</td> <td>90</td> </tr> </tbody> </table>	STORES	DAYS	Dry	90	Freeze	90	Chill	45	Repair	90	Ship's Store	90	GSM	90	Medical	90	T=O
STORES	DAYS																	
Dry	90																	
Freeze	90																	
Chill	45																	
Repair	90																	
Ship's Store	90																	
GSM	90																	
Medical	90																	
Seakeeping	Safely perform CONREP from a total of three stations to two receiving ships and VERTREP through Sea State 5, headings within 30° of head and following seas, day or night. Survival of ship, cargo, equipment and personnel in Sea State 9, all headings, zero speed. Sea States are defined in Standing NATO Agreement (STANAG) No. 4194.	T=O																

FACTOR	THRESHOLD	OBJECTIVE
Maneuverability	Perform CONREP at all speeds between 12 and 16 knots, with precise speed and course control, while ships are replenished on both sides simultaneously.	T=O
Ice Strengthening	ABS Class C0.	T=O

* Notes: Sustained speed is measured at full load (Condition D), calm water (no current, wind or waves), clean bottom and propellers using no more than 80% of the propulsion engine maximum continuous rating (MCR). Trials will be conducted in accordance with SNAME T&R Bulletin No. 3-47. Trials that occur in conditions other than calm water will be adjusted back to calm water results. The adjustment to calm water conditions shall be accomplished analytically using the methodology referenced in SNAME T&R Bulletin No. 3-47.

Other System Characteristics and Capabilities are provided in Attachment C.

b. Information Exchange Requirements

The high-level operational graphic (OV-1), system interface description (SV-1), and top-level Information Exchange Requirements (IERS) Matrix, are provided in Attachment F.

5. Program Support.

a. Maintenance Planning

The T-AKE will maintain ABS classification through regular inspections and surveys. Levels of maintenance and time phasing of availabilities will be in accordance with commercial practice.

b. Support Equipment

Support equipment normally required by MSC, ABS, USCG and other regulatory bodies for U.S. flag commercial ships will be carried.

c. Human Systems Integration.

Human engineering principles and design standards shall be applied to the design of all compartments, spaces, systems, individual equipment, workstations and facilities in which there is a human interface. Where specific design criteria are required, they shall conform to Standard Practices for Human Engineering Design for Marine Systems, Equipment and Facilities (ASTM F1166).

d. Computer Resources.

T-AKE will include fiber-optic cable necessary to support two local area networks (LANs) of desk top micro-computers, one unclassified and one with security classification up to SECRET level.

e. Other Logistics Considerations.

Logistics support may include the use of the Navy supply system as well as commercial distribution networks to reduce life cycle costs.

f. Command, Control, Communications, Computers, and Intelligence (C⁴I).

C⁴I will primarily consist of a standard commercial communications capability and standard Navy communication systems. Systems required to operate and maintain the ship and interface with forces afloat and ashore, including capabilities across the full spectrum of battle group communications, will be provided.

g. Transportation and Basing.

The ship will operate independently worldwide. It will require normal large commercial ship pier and/or mooring and fueling facilities. There are no additional dedicated training facilities required.

h. Standardization, Interoperability, and Commonality.

Every effort should be made to provide equipment commonality among all ships of the class. This should include, as far as practicable but not be limited to, the main propulsion drivers and gears, main and auxiliary equipment, and major cargo handling equipment.

i. Geospatial Information and Services.

No special mapping, charting or geodesy support will be required beyond that provided normally for ships with combat logistics force missions.

j. Environmental, Safety, and Health Compliance.

Protecting the marine environment and the safety and health of shipboard personnel is essential. The T-AKE will conduct operations, in port and at sea, in such a manner as to minimize adverse impact on the marine environment and human health.

Additional T-AKE Program Support requirements are provided in Attachment D.

6. Force Structure.

The T-AKE end force structure will be such that it meets fleet peacetime requirements and satisfies the majority of wartime requirements. As determined by the T-ADC(X) Analysis of Alternatives (AoA), 12 T-AKE Class ships are needed for fleet peacetime operations. Wartime operations will require augmentation by additional shuttle ships (such as Modular Cargo Delivery System (MCDS) equipped ships currently in the Ready Reserve Force (RRF)).

The Joint Potential Designator of T-AKE is "Joint Interest".

7. Schedule and Cost.

Initial procurement will commence in FY 2000. Achieving Initial Operational Capability (IOC) in FY 2005 is desired and will occur after lead ship Post Shakedown Availability (PSA). At that time, the ship should have completed Post Delivery Tests and Trials and deficiencies, including warranty items, should have been corrected. Full operational capability will occur upon delivery of last ship of class.

An average cost threshold and objective for all 12 ships has been established as shown in the table below:

	THRESHOLD	OBJECTIVE
Average Unit Procurement Cost (12 ships, constant year FY-00\$)	Business Sensitive	Business Sensitive

- Attachments:**
- A Operational Capabilities
 - B Threat
 - C Other System Characteristics and Capabilities
 - D Program Support
 - E Survivability Features
 - F OV-1, SV-1 and Information Exchange Requirements
 - G ORD Supporting Analysis and CRD Crosswalk
 - H Glossary of Acronyms

Attachment A

OPERATIONAL CAPABILITIES

1. Background

On 15 October 1992, the Joint Requirements Oversight Council (JROC) reviewed and validated the Navy sponsored Mission Need Statement (MNS) for an Auxiliary Dry Cargo Carrier capability. On 27 February 1995, in preparation for a Milestone 0 Defense Acquisition Board (DAB) for T-ADC(X), the JROC Secretariat re-examined the MNS and determined that the requirement was still valid. Requirements were defined through the Analysis of Alternatives (AoA) conducted by the Center for Naval Analyses (CNA). A detailed discussion of the methodology used to define the requirements is provided in CNA Research Memorandum 98-69/May 1998 "Transitioning the Combat Logistics Force into the 21st Century" by John F. Ince and Burnham C. McCaffree, RADM, USN (Ret.).

a. Mission

T-AKE will provide logistic lift from sources of supply such as friendly ports, or at sea from specially equipped merchant ships by consolidation, and will transfer this cargo (ammunition; food; limited quantities of fuel; repair parts; ship store items and expendable supplies and material) at sea to station ships and other naval warfare forces.

As a secondary mission, T-AKE may be required to operate in concert with a T-AO Class ship as a substitute station ship to provide direct logistics support to the ships within a battle group. The T-AO Class ship, which carries liquid cargo, and the T-AKE Class ship, which carries dry cargo, when operating together in lieu of a station ship will provide the Battle Group with the product lift equivalent to an AOE 1/6 Class ship.

As an auxiliary support ship, T-AKE will directly contribute to the ability of the Navy to maintain a forward presence.

b. Capabilities

The T-AKE will have the capability to effectively and efficiently provide U.S. and North Atlantic Treaty Organization (NATO) ships with ordnance, stores and spare parts through both connected replenishment (CONREP) and vertical replenishment (VERTREP). Additionally, T-AKE will have the capability to transfer a limited quantity of fuel by means of CONREP or Astern Refueling.

Organic helicopter operations to conduct VERTREP require T-AKE to support two military cargo logistics helicopters or two equivalent commercial variants and associated aviation personnel. Specific capabilities of T-AKE are detailed in Attachment C, Section 1.

c. .Command, Control, Communications, Computers, and Intelligence (C⁴I)

Command, Control, Communications, Computers, and Intelligence (C⁴I) systems will be provided to support independent worldwide naval communications and navigation. The system architecture and equipment will consist of a Navy standard communications suite with additional commercial-off-the-shelf (COTS) marine communications equipment. More detailed discussions of C⁴I requirements are contained in Attachment D, Section 5.

d. Survivability

The T-AKE will be built to commercial standards to the extent practicable while still meeting Level 1 survivability criteria specified in OPNAVINST 9070.1 with the exception that electromagnetic pulse (EMP) hardening will not be required. The T-AKE is intended to operate independently underway. In transit, escorting combatants will provide defense. The protective umbrella of the Battle Group will provide defense while operating in its substitute station ship role. A table of survivability features is provided in Attachment E.

e. Mobility

T-AKE will be designed to operate independently for extended periods at sea while providing replenishment services to U.S. and NATO ships. A table of mobility requirements is provided in Section 4 of the basic document.

f. Personnel

The crew will be U.S. Merchant Marine or Military Sealift Command (MSC) civilian mariners (CIVMARS) and the crew levels will be in accordance with U.S. Coast Guard (USCG) minimum requirements for U.S. flag vessels, augmented as applicable by mission requirements. Either a Military Detachment or a Ship's Department will support the communications and cargo management/ inventory functions. Surge berthing of at least 25 berths will be provided.

Attachment B

THREAT

Most countries' naval forces will remain in their littoral waters. A small number of regional powers possess forces that could support a limited blue-water confrontation. T-AKE may face challenges ranging from none to a broad-based technologically robust threat ranging from low-cost conventional to sophisticated non-conventional weapons. Foreign forces will gain more effective and sophisticated weapon platforms through 2019 by means of indigenous and cooperative industrial development, technology transfers, and outright arms purchases. Some nations are currently upgrading the size and/or quality of their military forces and many have relatively modern weapons. The weapons technology available to these nations is increasing and they are receiving front-line equipment quicker than in the past.

Surveillance and targeting technology is becoming more complex and capable with space borne surveillance systems expected to gradually assume a larger role in reconnaissance and target updating. In many cases, improvements in littoral surveillance will be driven primarily by the need for nations to patrol Exclusive Economic Zones and enforce their sovereignty.

Further details are contained in "Major Surface Ship Threat Assessment", ONI-TA-018-98, July 1998; the Land Attack Destroyer (DD 21) Threat Assessment Report, ONI-TA-045-99, May 1999.

Attachment C

Other System Characteristics and Capabilities

1. System Performance

The primary goal of the T-AKE acquisition program is to provide effective fleet underway replenishment capability at the lowest life cycle cost (LCC). This goal can be met by commercially designed and constructed ships, classed to American Bureau of Shipping (ABS) Standards, certificated by the U.S. Coast Guard and in compliance with other commercial regulatory body rules and regulations. The ships will be U.S. flagged, operated by U.S. Merchant Marine or MSC CIVMAR crews, with a minimum of military systems and specifications. Propulsion controls will be automated, permitting unattended engine room operation. The shipbuilding program will be non-developmental in nature, however, industry innovation will be sought to minimize Life Cycle Cost (LCC) and provide expeditious replenishment of U.S. and North Atlantic Treaty Organization (NATO) ships at sea. Projected service life will be 40 years from completion of Post Shakedown Availability (PSA).

Intership cargo handling capability must provide all replenishment systems and equipment required for seamless interface with existing and planned U.S. and NATO ships. Accordingly, Navy Standard Underway Replenishment (UNREP) Equipment will be used. The ships will employ the connected underway replenishment (CONREP) and Astern Refueling methods as well as vertical replenishment (VERTREP) for transfer of stores, fuel and ordnance.

Since T-AKE will be expected to operate in company with other naval forces when in theater, its defense will be provided by escorting combatants, or the protective umbrella of the Battle Group. Required survivability features are contained in Attachment E.

Provisions will be included for the ability to expand transfer and self-defense capabilities in future modifications. Increased capacity kingposts will be included to allow next generation underway replenishment equipment to be installed to support future Battle Group and Naval Warfare Forces. Space and weight reservations will be included in the design to allow future installations of self-defense systems as required.

a. Cargo Capacity

In the dual cargo configuration the ship will have the cargo cube capacity of at least 63% of the T-AE 26 Class ammunition load and 63% of the T-AFS 1 Class stores load, including 100% of the T-AFS 1 Class refrigeration/frozen stores capacity. For a single cargo configuration, the T-AKE should, at a minimum, carry 100% of either the T-AE 26 Class ammo load or the T-AFS 1 Class stores load. The majority of the cargo holds will be "multi-use" holds that can be easily converted from storing either ammunition or dry stores. Design of the convertible spaces that carry ordnance will be in full compliance with Ordnance Pamphlet 4 (OP-4) standards for ammunition stowage. The cargo stowage and handling capability will be based on notional load lists derived from Non Nuclear Ordnance Requirements (NNOR) PR-99 data. The notional load lists will capture the extremes on the range and depth of naval ordnance and stores. Stores capacity will be

sufficient to satisfy battle group demand during the same period. Cargo stowage will allow configuration of a loadout that includes a compatible mix of ammunition and dry cargo. Separate dedicated cargo stowage will be provided for:

- White Phosphorous
- Pyrotechnics
- Fuses, Primers, Detonators
- Medical Supply
- Plywood and Lumber
- Plate and Sheet Metal
- Pipe and Bar Stock
- US Mail
- Hazardous Cargo and Medical Waste
- Oxidizing Agents
- Thermite
- Explosive Ordnance Disposal (EOD) and Special Warfare Items

In addition to the notional loads and dedicated spaces, the ship will have sufficient cargo staging areas and a minimum of 50 m² of stowage area (with a minimum 3 meters clear headroom) for the stowage of outsized cargo. This area will not block cargo handling routes, the ship's self loading areas or interfere with CONREP or VERTREP operations. Vehicle Lashing Assemblies (VLAs) and flush deck sockets will be provided for securing outsized cargo. This stowage area may be located in the weather.

The ship will have the capability to carry approximately 2900 m³ (18,241 barrels) of cargo fuel. This fuel will be carried in a minimum of two tanks (1700 m³ and 1200 m³). All cargo fuel equipment and tanks will have the capability to convert between F76 or F44 fuels. The ship will have the capability of transferring this fuel at the rate per hose specified in Naval Warfare Publication 4-01.1 (NWP 4-01.4) by alongside CONREP and Astern Refueling methods.

Space for retrograde material is required, including battle group plastic and hazardous material (HAZMAT) waste. This may be space that is utilized for other cargo loads when the ship is fully loaded. However, the designated space should be appropriate for the expected quantity and type of material.

Separate space for stowage of flammable liquids, spare parts and ship's store items is required.

The ship will have the capability to carry and transfer via CONREP 200 MT of cargo fresh water.

b. *Connected Replenishment (CONREP) Stations*

The following CONREP stations will be provided:

- (1) Replenishment at Sea (RAS): 5 cargo Standard Tensioned Replenishment Alongside Method (STREAM) delivery stations (3 Port (P) / 2 Starboard (S)).
- (2) RAS: 1 sliding padeye receiving station (1S).
- (3) Fueling at Sea (FAS): 1 liquid cargo STREAM double hose delivery station with auxiliary hose capability (1P).
- (4) FAS: 1 liquid cargo STREAM single hose delivery station with auxiliary hose capability (1S).
- (5) FAS: 2 double probe receiving stations (2S).
- (6) FAS: Astern refueling capability via 65 mm (2 ½ inch) hose.

c. *Vertical Replenishment (VERTREP)*

The ship is to be capable of landing, fueling and maintaining the H-46D, CH-60 and commercial logistics helicopters, with a hangar large enough to accommodate two such aircraft. In addition, the flight deck will be capable of day and night landing of the H-53E and V-22 in accordance with Air Capable Ship Aviation Facilities Bulletin Number 1. Additionally, a prestaging area to accommodate cargo and ordnance to be transferred by VERTREP will be provided.

d. *Cargo Handling*

The ship will be capable of simultaneous operation of five stations. This will be five CONREP stations or three CONREP stations plus VERTREP using two helicopters.

Cargo handling systems will be designed to operate safely and reliably while minimizing life cycle cost.

The design of intraship (strikeup/striekedown) cargo handling and stowage in combination with the quantity of prestaging area will ensure continuous UNREP at the transfer rate of the CONREP and VERTREP stations. The transfer rate for fueling-at-sea will be at least 1360 m³/hour (360,000 gallons/hour) for the double hose station.

The cargo handling system will permit the safe and expeditious selective issue of various types and quantities of cargo from stowage to prestaging or directly to any CONREP or VERTREP station for transfer at sea. Additionally, the ship must meet OP-4 requirements for the stowage, movement, handling and transfer of cargo ordnance underway.

Provisions shall be made to maintain the temperature of freeze and chill cargo prior to transfer.

Temperature and humidity control for the cargo stowage spaces will be provided. Dehumidified stowage will be provided for perishable items. All chill and freeze cargo holds will be capable of stowing either freeze or chill cargo.

Segregation of cargo will be provided to comply with Navy and regulatory body requirements.

The capability to load/unload cargo to/from a pier or lighterage with ship's own equipment will be provided. This includes the capability to conduct cargo onload/offload operations from austere commercial port facilities.

The ship will have the capability to move forklift trucks between cargo holds, staging areas and transfer stations while at sea.

Deck heights on the T-AKE will be designed to safely and efficiently handle cargo.

The T-AKE will be provided with sufficient organic material handling equipment (MHE) to enable efficient loading and offloading of the ship in port or at sea.

e. Stores Handling

Facilities will be provided for shipboard handling of stores and provisions which are carried onboard for ships own use. Handling equipment will be provided to facilitate strikedown of stores and provisions from replenishment stations to stowage in the ship's own storerooms.

f. Mission Profile

The T-AKE will be available for fleet support operations based on a Military Sealift Command (MSC) notional operational cycle that includes a maintenance availability scheduled every 12 to 15 months. For these maintenance periods, a midterm availability (MTA) of 21 to 30 days duration alternates with a Regular Overhaul (ROH) of 30 to 45 days duration. An ROH could extend up to 60 days if a dry-docking is required. During operating quarters that do not have either an MTA or an ROH, a 2-week period in port for voyage repairs (VR) is scheduled.

- (1) The notional peacetime shuttle ship profile is a 90-day employment of a T-AKE in a shuttle mission scenario. It assumes the ship will service two Carrier Battle Groups (CVBGs) prior to return to port for resupply. The table below was developed from this narrative.

<u>Description</u>	<u>Total Days</u>	<u>%</u>
In-port Time (load, refuel, cargo ops, etc.)	21	23
Transit	17	19
Underway Replenishment	38	42
Voyage repair period (in port)	14	16
Total	90	100

- (2) This notional profile is a 26 day continuous wartime deployment period of an T-AKE in a shuttle mission scenario using the “next closest” resupply point.

<u>Description</u>	<u>Total Days</u>	<u>%</u>
In-port Time (load, refuel, cargo ops, etc.)	8	31
Transit	10	38
Underway Replenishment	8	31
Total	26	100

- (3) The notional peacetime profile is a 180-day employment of a T-AKE in a substitute station ship mission scenario.

<u>Description</u>	<u>Total Days</u>	<u>%</u>
In-port Time (load, refuel, cargo ops, etc.)	29	16
CONSOL (load, refuel, cargo ops, etc.)	29	16
Battle Group Port Calls	24	13
Transit (CONUS and In-Theater)	56	31
Underway Replenishment to Battle Group	32	18
Voyage repair period (in port)	10	6
Total	180	100

- (4) This notional profile is a 90day continuous wartime deployment period of a T-AKE in a substitute station ship mission scenario.

<u>Description</u>	<u>Total Days</u>	<u>%</u>
In-port Time (load, refuel, cargo ops, etc.)	12	13
Transit	16	18
Underway Replenishment	62	69
Total	90	100

g. Environment

This ship and all its systems will be capable of operating without performance limitations, except those stated in this document, in the following environmental range:

	<u>Maximum</u>	<u>Minimum</u>
Outside Dry Bulb	40 °C (104 °F)	-18 °C (0 °F)
For Topside Equipment	48.9 °C (120 °F)	-28.9 °C (-20 °F)
Outside Wet Bulb	30 °C (86 °F)	--
Seawater	35 °C (95 °F)	-2 °C (28.4 °F)
Seakeeping	Sea State 5	Sea State 0

All systems shall retain full capability through a relative humidity range of 0 to 95% and be capable of operating through a relative humidity range of 0 to 100%.

The ship will be capable of operating in all ocean environments other than high latitudes and close sea ice.

Electromagnetic Environmental Effects (E³) Control: The ship and all its systems shall be capable of operation in the extreme electromagnetic (EM) environments associated with own ship and battle group operations without suffering degradation below established key performance, mobility and survivability thresholds, due to E³. In addition, T-AKE systems shall not degrade the performance of other equipment/systems in expected operational environments.

2. Logistics and Readiness.

The primary requirement for logistics and readiness is to maintain operational availability for completing the T-AKE mission profile. The T-AKE Class ships are to be built to commercial standards and shall comply with all applicable laws and regulations of the United States and the requirements of the American Bureau of Shipping (ABS), the United States Coast Guard (USCG) and other regulatory body rules and regulations.

a. Reliability, Maintainability and Availability (RMA)

The design of the T-AKE Class ships will be based on proven conventional commercial criteria and built to the best commercial practices using current state-of-the-art technology. The shipbuilder will be required to perform and employ acceptable commercial practices as delineated in the performance specification. The shipbuilder will also be required to select and install standard commercial-off-the-shelf (COTS) non-developmental systems, modified as necessary for shipboard use, and equipment having a reliable operational history, and approved by ABS and/or the USCG wherever applicable.

Designs will provide for equipment and system redundancy, arrangements that suit ready maintenance and repair, reliability based on proven engineering principles and commercial reliability standards that are based upon successful past performance. The shipbuilder will also employ a comprehensive test and trials program that will ensure that construction and system integration meets the highest commercial standards. Commercial Organizations that will dictate the shipbuilder's level of performance include ABS, USCG, International Organization for Standardization (ISO), American Society for Testing and Materials (ASTM), Institute of Electrical and Electronics Engineers (IEEE) and the Society of Naval Architects and Marine Engineers (SNAME). Regulatory body and government oversight throughout the design, construction, testing, and trials phases will confirm that these standards are achieved.

Mission and safety critical systems are required to have an increased level of redundancy over ABS and USCG standards. The ship will have a minimum of two propulsion engines or redundant windings in the case of electric propulsion motors.

Auxiliary service systems supporting the propulsion plant will be redundant. A Failure Mode Effect Analysis is required to verify the integrity of the propulsion systems, steering systems and auxiliary services systems. The ship will have backup units for ship service generators, firepumps, cargo refrigeration, and fresh water production units. Redundant seawater supplies will be provided for firefighting in cargo holds. A dual redundant data bus with redundant interface units will be provided to interconnect control and data signals within the integrated bridge system. Two routes of cargo movement will be provided from stowage spaces to each CONREP or VERTREP locations so that any single point failure of the cargo handling system will not stop cargo flow from a cargo hold.

The cargo transfer and inventory management systems will meet the operational availabilities (A_o) in the table below:

SYSTEM	THRESHOLD	OBJECTIVE
Cargo Transfer Systems (Replenishment at Sea (RAS) and Fueling at Sea (FAS))	0.80	0.98
Cargo Inventory Management System	0.98	0.99

The T-AKE shall be capable of operating throughout the full realm of peacetime and wartime scenarios with minimum time out of service for emergent repairs. The objective for maximum time out of service (i.e., time not available to carry out an existing mission) should be less than 2.5 days per year. This time is exclusive of mandatory (regulatory) drydockings that are normally limited to no more than one 21-day period every 4.5 years for MSC ships and regularly scheduled maintenance availabilities. Maintenance practice shall follow MSC's practice, which entails regular repair and maintenance work conducted by the crew during the ship's regular at sea and inport operating cycle.

b. Repair Capability

Repair capability will include damage control repair with damage control lockers. The equipment will be organic to the ship and the crew will be capable of effecting repairs and controlling the spread of damage. See Attachment E.

3. Other System Characteristics.

A capability to tow and to be towed will be provided.

The ship will have a service life allowance of 5% weight and 0.15 meters KG based on the full load departure condition when delivered.

Accommodations will be to Military Sealift Command standards. The design will facilitate assignment of separate accommodations for male and female personnel, both crew and Military Detachment and surge/transient personnel.

The ship will be equipped with an ABS and USCG approved commercial integrated bridge system, including an Electronic Chart Display and Information System (ECDIS), certified for NIMA digital nautical charts (DNC®).

The ship will not be required to perform its primary mission in a Nuclear, Biological, and Chemical Contamination (NBCC) environment, however, it must have the capability to survive and reach a non-contaminated area.

The T-AKE shall be electromagnetically compatible within itself in its operational environment. The operational performance should not be degraded by electromagnetic environmental effects.

Attachment D

PROGRAM SUPPORT

1. Maintenance Planning.

The ship will meet USCG/ABS extended drydocking rules.

The maintenance philosophy for all systems will be based on commercial practice and MSC policy, which uses the requirements for USCG certification, ABS classification and the recommendations of equipment manufacturers as the basis for formulating a maintenance plan.

The T-AKE will utilize an integrated maintenance planning approach for accomplishing normal and corrective maintenance. The levels of maintenance and time phasing will mirror commercial practice, which entails regular repair and maintenance conducted by the crew or industrial assistance as required.

The T-AKE will have an automated system to schedule, document, track, and report shipboard maintenance activity. The automated system will produce monthly reports that will be used to monitor the maintainability, reliability and availability of major systems throughout the ship.

The T-AKE will incorporate mechanical and electronic diagnostic technology that is commercially proven, nondevelopmental, and cost effective. Embedded diagnostics will be designed into the main propulsion, mission essential cargo handling, major auxiliary, military and ship control systems.

2. Human Systems Integration.

a. Human Engineering

A Training Planning Process Methodology (TRPPM) analysis will be conducted to determine final Navy Military Detachment (MILDET) manpower and personnel required for fleet introduction. The evaluation should include all officer and enlisted requirements that may be required by the T-AKE. As a threshold, manning should not be increased over similarly MSC manned auxiliary ships. As an objective, a decrease in the military manning requirement will be sought to minimize life cycle cost.

The TRPPM analysis will examine training approaches, including both dedicated pipeline training and on-the-job training as well as training delivery methods. Contractor furnished computer-based-training and/or embedded training should be investigated as an enhancement and/or alternative to adding to existing formal Navy training courses. Operator and maintainer training requirements will be reflected in a Navy Training System Plan (NTSP).

b. Safety and Health

Ship arrangements and ship system operations, maintenance and support will not injure, kill or create an adverse health environment for onboard personnel. Ship

arrangements and ship system operation, maintenance and support will not interfere with, damage or destroy any ship system component. Safety considerations will accommodate full joint/allied interoperability including joint munitions, fuels and aircraft.

Environmental management procedures shall include the preclusion of potential electromagnetic (EM) hazards to personnel, ordnance and volatile fuels from intra-platform or inter-platform emissions.

3. Computer Resources.

T-AKE will include fiber-optic cable necessary to support two local area networks (LANs) of desk top micro-computers, one unclassified and one with security classification up to SECRET level. Shipboard computer resources include commercial navigational and ship control systems, communications systems and an automated cargo load planning and inventory management control system. The automated cargo load planning and inventory management control system will incorporate current and emerging technology suitable to a shipboard environment. All associated software will interface seamlessly with Navy cargo and ordnance inventory management systems aboard T-AKE, at activities ashore, and resident in customer ships.

4. Other Logistics Considerations.

Engineering drawings, commercial technical manuals and technical support data shall be provided in accordance with MSC criteria/instructions. Onboard repair parts will be provided to support corrective and preventive maintenance of equipment in accordance with MSC maintenance philosophy and operating instructions. Crew familiarization will be provided.

5. Command, Control, Communications, Computers, and Intelligence (C⁴I).

Command, Control, Communications, Computers, and Intelligence (C⁴I) systems will be provided to support independent worldwide naval communications and navigation. The system architecture and equipment will consist of a Navy standard (government off the shelf (GOTS)) communications suite, and additional commercial-off-the-shelf (COTS) communications equipment. The ship will be equipped with two independent local area networks (LANs) for administrative purposes, intra and inter-ship communications and maintenance. One LAN will be for unclassified use and one with a security classification up to SECRET. Both the LANs will exchange data with the Navy communications system for processing information of the appropriate classification, but will not directly communicate with each other. Additionally, the ship will be equipped with a commercial navigation and ship control system, propulsion control system and automated cargo load planning and inventory management control system that may exchange data with, but not be part of the LANs. Appropriate security precautions will be provided to prevent the unauthorized disclosure of information. Information with a security classification higher than SECRET will be processed manually and not on the shipboard computer networks outside the Communications Center.

The T-AKE will be equipped with standard Navy Supply / Logistics / Ordnance management information technology systems to provide a seamless interface with Navy systems ashore and on customer ships.

The ship will comply with the requirements for Safety of Life at Sea (SOLAS) as prescribed by regulations of the International Maritime Organization (IMO), the International Telecommunications Union (ITU) and the Federal Communications Commission (FCC). This will include a capability to utilize the International Maritime Satellite (INMARSAT) system and the Global Maritime Distress and Safety System (GMDSS).

The ship will have the capability to integrate a Secure Telephone Unit (STU) III/Secure Terminal Equipment (STE) secure communications system with its organic communications capability. Military precise positioning service (PPS) with Selective Availability Anti-Spoofing Modules (SAASM) will be provided.

A capability for friendly forces to identify the T-AKE will be provided. This ORD will be in compliance with the applicable air to surface and surface to surface requirements, KPPs, and IERs specified in the CID CRD dated 19 March 2001.

All T-AKE commercial C⁴I systems shall demonstrate immunity to expected operational electromagnetic (EM) environment levels. Spectrum approval of all C⁴ systems aboard military platforms will be verified to be in compliance with National and International spectrum management policies and regulations, particularly with respect to coordination agreements with host nations.

All T-AKE ships will be equipped with a robust C4I suite that provides sufficient capabilities to perform the T-AKE mission, as well as be interoperable with other U. S. military services and, as deemed necessary, with allies and coalition partners. The C4I suite will (a) be an integration of commercial-off-the-shelf (COTS), government-off-the-shelf (GOTS), and non-development items (NDI), (b) incorporate the Defense Information Infrastructure (DII) Common Operating Environment (COE), Level 5 (Threshold) and Level 8 (Objective) compliance for ships delivered in the 2005 to 2010 timeframe. Ships will be upgraded with Level 6 (Threshold) and Level 8 (Objective) compliant software as it becomes available for Fleet installation. The T-AKE will use Information Technology for the 21st Century (IT21) compliant hardware to support C4I and to comply with applicable information technology standards contained in the US DOD Joint Technical Architecture (JTA).

The requirements of this sub-paragraph apply to all new data base systems, which are installed in T-AKE and can be accessed from outside T-AKE or transfer information outside T-AKE. Such systems shall comply with applicable information technology standards which are specified in the DoD Joint Technical Architecture (JTA), ensuring all data that will be exchanged outside T-AKE or has the potential to be exchanged outside T-AKE, will be tagged IAW the current JTA standard for tagged data items (XML) DISA Registry COE Level 6 (Threshold) and Level 8 (Objective) (XML: Extensible Markup Language). Systems will maintain the integrity of delivered information 99.99% of the time (Threshold) and 99.999% (Objective). Information Integrity is defined as the condition that exists when information is unchanged from its source and has not been accidentally or maliciously modified, altered or destroyed. Systems that can be accessed from outside T-AKE will ensure information user (outside T-AKE) will be able to acquire needed information through search queries. Successful searches must yield 85% of

available needed information, with no more than 20% of the total received being waste, (Threshold) and successful searches must yield 95% of available needed information with no more than 10% of the total received being waste (Objective).

The T-AKE will comply with Navy Information Security requirements as defined in SECNAVINST 5239.3, Naval Information Assurance Program Publications and National Security Telecommunications and Information Systems Security Instructions (NSTISSI) requirements.

Further information is provided in the OV-1 diagram, SV-1 diagram, Information Exchange Requirements (IER) matrix (Attachment F), and Attachment G.

6. Standardization, Interoperability, and Commonality.

Ship support service requirements, i.e., fuel, water and electrical are similar to normal U.S. flag commercial ship requirements. Ship's machinery will be capable of continuous operation using diesel fuel in accordance with ASTM D975, grade 2-D; ISO 8217, Fuel-Distillate Marine Type A (F-DMA); and NATO F-76; and will be capable of operation for 1,000 nm at 20 knots on NATO F-44. Based on the requirement to maintain the existing system interface with both US and NATO fleets, the lack of any equivalent commercial system, the cost to industry to redesign existing Navy equipment and the life cycle cost to the Navy to support non-standard equipment, U.S. Navy Standard Underway Replenishment Equipment, except for astern refueling, will be utilized as government specified equipment.

All T-AKE C⁴I computers, Local Area Network (LAN) systems and sub-systems used in mission systems or by the Military Detachment will be DII COE compliant and shall be compatible and interoperable with existing and planned U.S. and Allied nations' functionally related C⁴I systems and equipment. Additionally, C⁴I systems will comply with the DOD Joint Technical Architecture (JTA) standards and Defense Information Infrastructure (DII) Common Operating Environment (COE), Level 5 (Threshold) and Level 8 (Objective) compliance for ships delivered in the 2005 to 2010 timeframe. Ships will be upgraded with Level 6 (Threshold) and Level 8 (Objective) compliant software as it becomes available for Fleet installation.

The T-AKE will undergo C⁴I interoperability testing and the test results will be certified by Defense Information System Agency (Joint Interoperability Test Command) (DISA (JITC)) as required by CJCSI 6212.01B, 8 May 2000, "Interoperability and Supportability of National Security Systems, and Information Technology Systems". Testing will be performed in conjunction with other testing (Developmental Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E) and will support the JITC/DISA interoperability certification recommendation to the Director, Joint Staff (J-6) in time to support Initial Operational Capability (IOC).

7. Geospatial Information and Services.

8. The T-AKE will be equipped with a commercial navigation and ship control system capable of displaying and accessing Geospatial Information and Services obtained from the National Imagery and Mapping Agency (NIMA). These products and services include Digital Nautical Charts (DNC), World Vector Shoreline Plus, and

essential navigation products in Vector Product Format (VPF) and other standard NIMA gridded formats. Latitude and Longitude coordinates will be referenced to the World Geodetic System 1984 (WGS 84). Natural Environmental Support.

Meteorology and Oceanography (METOC) conditions affecting ship and aircraft safety of operations and cargo handling efficiency will be provided as standard products from a joint or service METOC forecast activity.

9. Environmental, Safety, and Health Compliance.

The ship will be compliant with all applicable environmental and occupational safety and health regulations, Navy policies, international agreements, and industry standards.

All equipment, systems, and practices designed to protect health, reduce risk, and prevent pollution will meet or exceed current applicable Navy and industry standard of performance, durability, safety of operation, and efficiency.

Attachment E

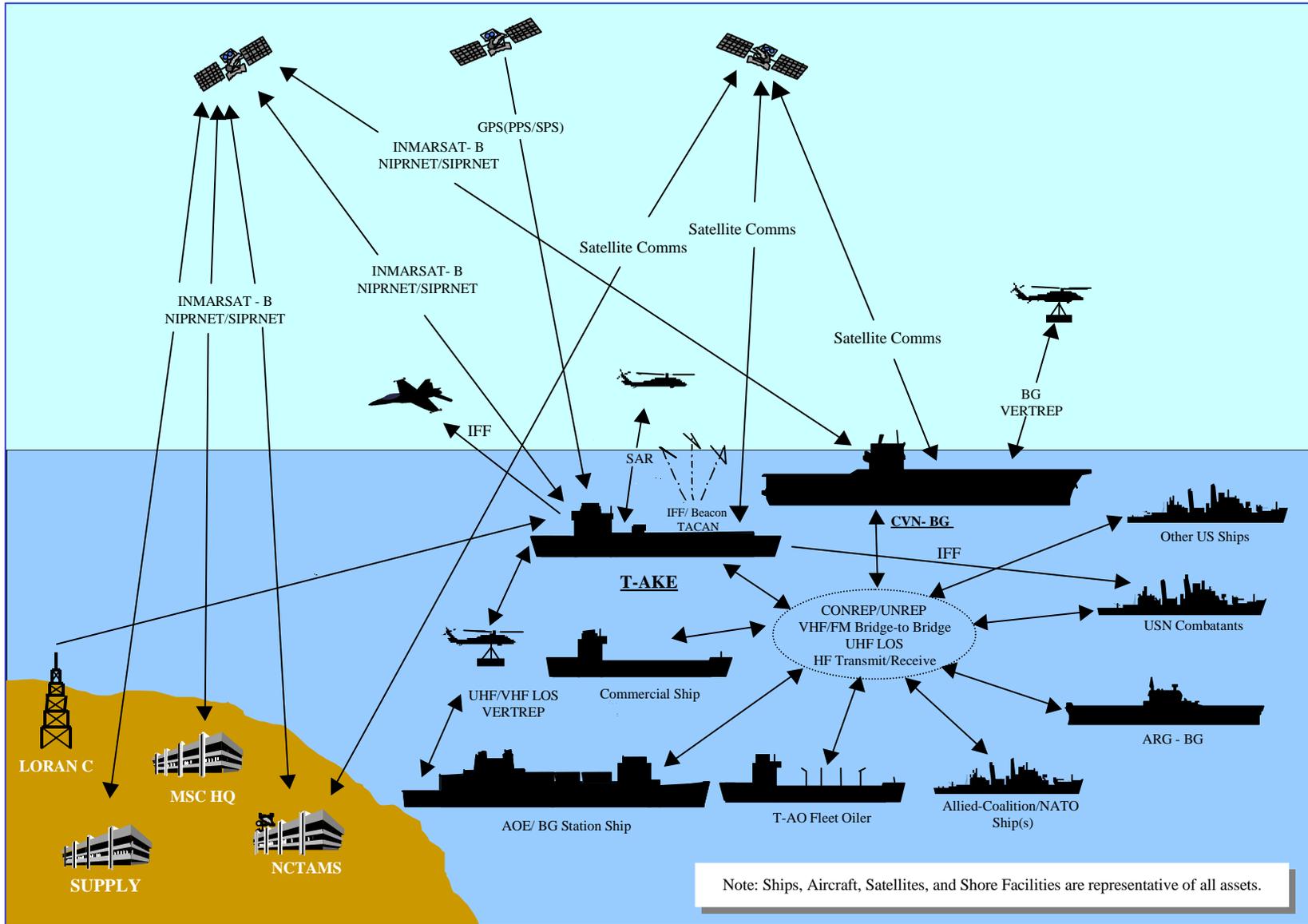
T-AKE SURVIVABILITY FEATURES

The T-AKE is civilian in character and does not carry self-defense weapon systems, however it is possible that the ship may encounter any or all of the threats present in the theater of operations. Its protection will be the responsibility of the U.S. and allied naval forces engaged in the operation. The following table lists the required survivability features:

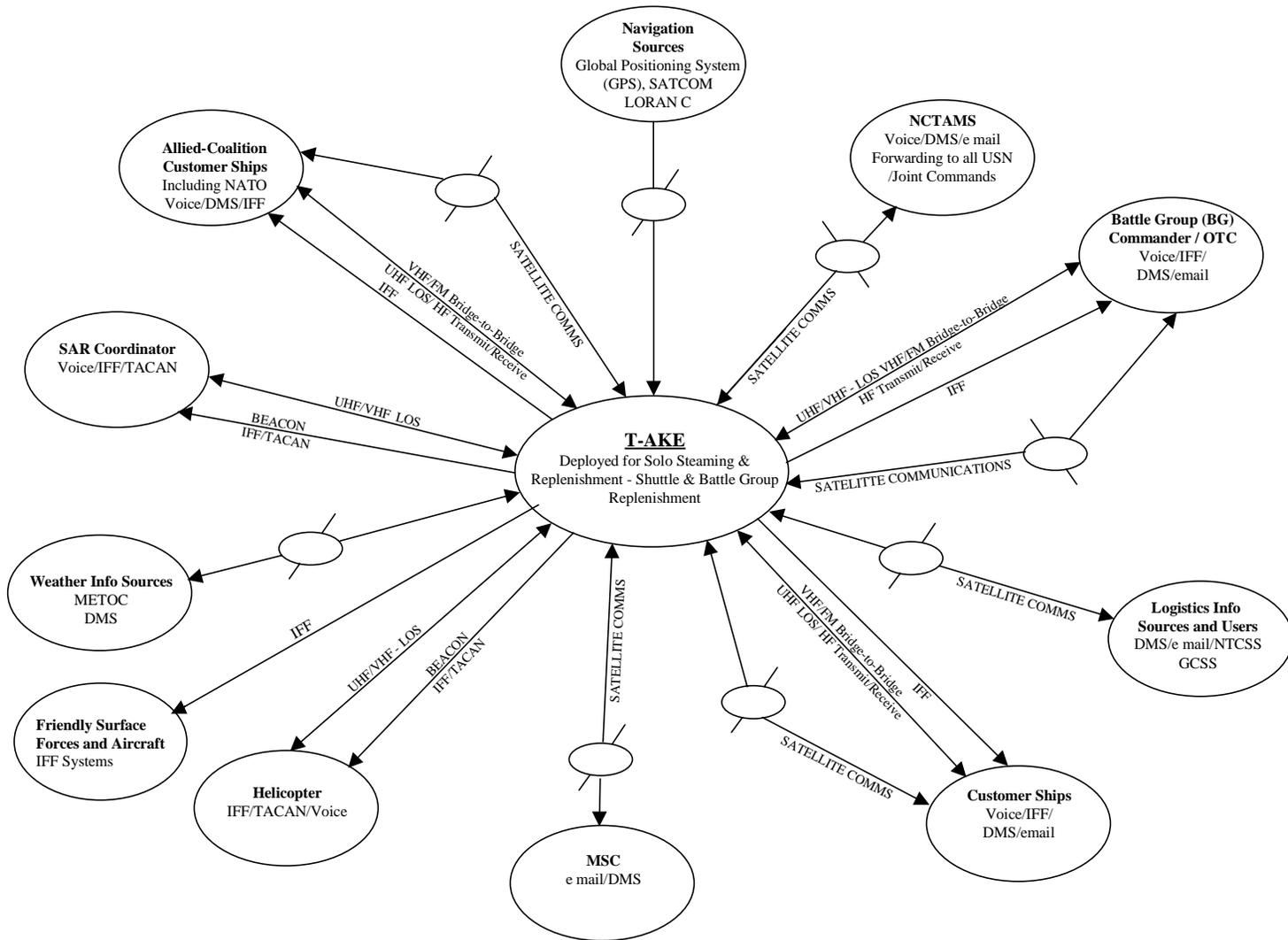
FEATURE	THRESHOLD	OBJECTIVE
Shock Resistance	Retain firefighting, communications and emergency lighting capability after underwater shock exposure.	T=O
Firefighting	<ul style="list-style-type: none"> • Built in redundancy so that a single equipment failure or loss will not degrade system capability. Redundant system functions will be provided and will be separated so as to avoid the possibility of total system loss due to a single casualty. • Low expansion fire fighting foam for the helicopter deck and hangar and machinery space bilges. • Watermist or other USCG approved total flooding system for machinery spaces. • Seawater sprinkling (wet firemain/dry sprinklers) for cargo ordnance holds. 	T=O
Damage Control	T-Ship DC Management System per MSC standards.	T=O
Damaged Stability	The ship will survive flooding caused by shell damage at any location except the transverse bulkheads bounding an aft machinery space. Final damaged heel angle will not exceed 25 degrees.	The ship will survive flooding caused by damage to the shell at any location. The final damaged heel angle will not exceed 15 degrees and the margin line will not be submerged.
Chemical, Biological and Radiological Detection (CBR-D) Capability	<ul style="list-style-type: none"> • Chemical Agent Point Detection System (CAPD) or equivalent state-of-the-art chemical and biological automatic detection system • Weather deck Washdown Capability • Personnel Decontamination in accordance with MSC standards. • Protective Clothing for every crew member. 	T=O

FEATURE	THRESHOLD	OBJECTIVE
Torpedo Countermeasures	NIXIE - AN/SLQ-25A or equivalent state-of-the-art countermeasures system.	T=O
Mine Countermeasures	Degaussed magnetic signature will conform to 25% of the level specified in OPNAVINST C8950.2 for Group B ships. Minimize Extra Low Frequency Electric (ELFE) signature.	T=O

ATTACHMENT F
OV-1, SV-1 AND INFORMATION EXCHANGE REQUIREMENT MATRIX



T-AKE High Level Operational Concept Graphic (OV-1)



T-AKE Inter-System Interface Diagram (SV-1)

Top Level Joint Information Exchange Requirements Matrix

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UJTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
1	TA 6.5	Own Ship Identification to Friendly Forces	Threat	T-AKE	Friendly Forces - Ships and Aircraft	N	Y	Data	Less than 5 sec	S	Purpose: Identification Systems: This functionality to be provided by an IFF system (Transmit only includes Mode 4) or future replacement. This information exchange will only occur after an interrogation by the friendly air or surface platform. This IER will meet the applicable CID CRD attribute standards to include data integrity Applicable UNTLs: NTA 6.1.1.3
2	TA 1.1 TA 4.2 TA 4.2.1 TA 4.2.2 TA 5.5	Underway Replenishment Coordination	Other, Scheduling	OTC	T-AKE & Receiving Ships	Y	Y	Data (USMTF), Voice	Less than 1 hour (Data) Real Time (Voice)	S	Purpose: Short Term Underway Replenishment, Scheduling and Coordination Systems: SATCOM or e mail Applicable UNTLs: NTA 1.1.2 NTA 4.2.1.1 NTA 4.6 NTA 4.6.3 NTA 4.6.5 NTA 5.4

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UJTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
											NTA 5.4.1
3	TA 4.2 TA 4.2.1 TA 4.2.2 TA 4.2.4 TA 5.2.1 TA 5.2.2	Underway Replenishment Execution	Other, Coordination	T-AKE	Receiving Ship	Y	Y	Voice	Real Time	S	Purpose: Underway Replenishment Execution, Maneuvering Systems: UHF, VHF Applicable UNTLs: NTA 1.1.2 NTA 4.2.1.1 NTA 4.6 NTA 4.6.3 NTA 5.4 NTA 5.4.1
4	TA 1.1 TA 1.1.1 TA 1.1.4 TA 4.2 TA 4.2.1 TA 4.2.2 TA4.2.3 TA4.2.4	Joint Asset Visibility (GCSS Requirement)	Logistics	T-AKE	NAVSUP / NAVPETOFF	N	Y	DATA	As required by established business processes Threshold: Batch Goal: Real Time	C	Purpose: Asset visibility of in-storage assets to authoritative source. System: This functionality to be provided by standard Navy Information Technology systems. Asset visibility systems installed in T-AKE will meet GCSS CRD requirements to the degree provided for in individual system ORDs. Applicable UNTLs: NTA 4.1 NTA 4.1.2 NTA 4.1.3 NTA 4.2 NTA 4.2.1.1

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UJTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
											NTA 4.2.2 NTA 4.3 NTA 4.3.3 NTA 4.3.3.1 NTA 4.3.3.2
5	TA 1.1 TA 1.1.1 TA 1.1.4 TA 4.2 TA 4.2.1 TA 4.2.2 TA 4.2.3 TA 4.2.4	Joint Asset Visibility (GCSS Requirement)	Logistics	T-AKE	GCSS / GCSS-M	N	Y	DATA	Real Time	S	Purpose: Obtain Logistics info for Battlegroup Commander/Joint Warfighter. System: This functionality to be provided by the GCSS System when operational. Asset visibility systems installed in T-AKE will meet GCSS CRD requirements to the degree provided for in individual system ORDs. Applicable UNTLs: NTA 4.1 NTA 4.1.2 NTA 4.1.3 NTA 4.2 NTA 4.2.1

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UJTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
											NTA 4.2.2 NTA 4.3 NTA 4.3.3 NTA 4.3.3.1 NTA 4.3.3.2
6	Not Used										
7	OP 2.2.3	Weather Reporting and Forecasts	Other - Weather	T-AKE	METOC	Y	Y	Data (USMTF)	Less than 1 hour	TS	Purpose: Weather Data Systems: SATCOM Applicable UNTLs: NTA 1.2.6
8	TA 6.2 TA 6.2.1	Distress	Other – Distress & Commercial Communications	T-AKE	Ships, Shore, and Aircraft	Y	Y	Data, Voice	Less than 5 minutes	U	Purpose: Emergency Communications System: Global Maritime Distress and Safety System (GMDSS) Applicable UNTLs: NTA 6.2.3
9	TA 6.2 TA 6.2.1	Distress	Other - Distress System	T-AKE	Other Ships and Aircraft	N	Y	Data (Homing Beacon)	Less than 5 minutes	U	Purpose: Emergency Communications Systems: EPIRBs Applicable UNTLs: NTA 6.2.3
10	OP 5.1	Incident Reporting	Other – Communi-	T-AKE	NCTAMS	Y	Y	Voice	Real Time	TS	Purpose: Incident Reporting

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UJTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
			cations								Systems: SATCOM, HF Applicable UNTLs: NTA 5 NTA 5.1 NTA 5.1.1
11	TA 5.2.1 TA 5.2.2 TA 5.5	TACOM	Situational Awareness	OTC	T-AKE	Y	Y	Voice	Real Time	U	Purpose: Fleet Tactical, Maneuvering Systems: UHF, HF Applicable UNTLs: NTA 5 NTA 5.1.1.1 NTA 5.1.1.2 NTA 5.4.1.2
12	TA 5.4	Operations Coordination	Situational Awareness	OTC	T-AKE	Y	Y	Voice	Real Time	S	Purpose: Battle Group Coordination Systems: NAVY SECURE Voice, UHF, HF Applicable UNTLs: NTA 5.3 NTA 5.1.1.1
13	TA 5.4	Mission Coordination	Situational Awareness	T-AKE	OTC	Y	N	Voice	Real Time	U	Purpose: Mission Coordination, Assigned Warfare C and R Systems: UHF/HF Applicable UNTLs: NTA 5.2.2 NTA 5.2.1.2
14	TA 1.1 TA 1.1.4 TA 1.2.3 TA 2.2	Determine Location and Time	Situational Awareness	Global Positioning System (GPS)	T-AKE	N	Y	Data (Positioning and Timing)	Real Time	S	Purpose: General Navigation Systems: Military GPS

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UJTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
	TA 4.2 TA 4.2.1. TA 4.2.2 TA 4.2.4 TA 5.1 TA 5.2 TA 5.3 TA 5.4 TA5.5 TA 6.2 TA 6.2.1 TA 6.6							Data -PPS)			Applicable UNTLs: NTA 1.2
15	TA 1.1 TA 1.1.4 TA 1.2.3 TA 2.2 TA 4.2 TA 4.2.1. TA 4.2.2 TA 4.2.4 TA 5.1 TA 5.2 TA 5.3 TA 5.4 TA5.5 TA 6.2 TA 6.2.1 TA 6.6	Determine Location	Situational Awareness	LORAN C	T-AKE	N	N	Data (LORAN)	Less than 10 minutes	U	Purpose: General Navigation Systems: LORAN C (or GLOMASS, RDF, other backup electronic navigation aid) Applicable UNTLs: NTA 1.1.2

U. S. Navy Information Exchange Requirements Matrix

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UNTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
16	NTA 4.6.5 NTA 6.2.3	Helicopter Operations	Other – Helicopter Navigation	T-AKE	Helicopters	N	Y	Data	Less than 60 sec	U	Purpose: Helicopter Navigation including VERTREP and SAR Systems: TACAN or future replacement
17	NTA 4.6.5 NTA 6.2.3	Helicopter Operations and Distress	Other - Distress	T-AKE	Other Ships and Aircraft	N	Y	Audio	Less than 60 sec	U	Purpose: Distress including VERTREP and SAR Operations Systems: Homing Beacon (KY 850) (or future replacement)-TACAN Backup
18	NTA 4.6.5 NTA 6.2.3 NTA 5.4.1.2	Helicopter Operations	Situational Awareness	T-AKE	Helicopters	Y	Y	Voice	Real Time	S	Purpose: Helicopter operations including VERTREP and SAR Systems: UHF/VHF
19	NTA 1.1.2 NTA 5.4	Ship Scheduling	Other, Scheduling	Fleet Commander	T-AKE	N	Y	Data (USMTF) (E-mail)	Less than 24 hours	TS	Purpose: Long Range Ship Scheduling Systems: SATCOM or e mail
20	NTA 1.1.2 NTA 5.4	Ship Scheduling	Other, Scheduling	Navy Task Force Commander	T-AKE	N	Y	Data (USMTF) (E-mail)	Less than 24 hours	TS	Purpose: Scheduling System: SATCOM or e mail
21	NTA 1.1.2 NTA 4.2.1.1 NTA 4.6 NTA 4.6.3 NTA 4.6.5 NTA 5.4.1	Underway Replenishment Scheduling	Other, Scheduling	OTC	T-AKE	N	Y	Data (USMTF) (E-mail)	Less than 24 hours	TS	Purpose: Scheduling System: SATCOM or e mail
22	NTA 4.3 NTA 4.4.3	Status/Location	Situational Awareness,	NCTAMS	T-AKE	Y	Y	Data (USMTF)	Less than 24 hours	TS	Purpose: General Service Message

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UNTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
	NTA 4.6.4 NTA 4.9.1 NTA 4.9.2 NTA 5.1.1.2 NTA 5.1.3.3	Reporting, Admin, Resource Management	Personnel, Other - Admin								Traffic including OPREP, Unit SITREP, DIP Clearance, Nav Info, SORTS, and CASREP Systems: SATCOM
23		COMSEC Update	Other - Information Security	NCTAMS	T-AKE	N	Y	Data (COMSEC)	Less than 10 minutes	TS	Purpose: COMSEC Update Systems: Over the Air Crypto (OTAT/OTAR), CUDIXS, STU III/STE, INMARSAT-B or future replacement Future System: Electronic Key Management System (EKMS)
24	NTA 5.1.1.1.1 NTA 5.1.3.1 NTA 6.1.1.3	Location of Friendly Forces	Situational Awareness	OTC	T-AKE	N	N	Data	Less than 5 minutes	TS	Purpose: Location of Friendly Forces System: SATCOM

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UNTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
25	NTA 4.3.3 NTA 4.3.3.1 NTA 4.3.3.2 NTA 4.6 NTA 4.6.1 NTA 4.6.2	Resupply (Own Ship) From U. S. Navy (only) source	U. S. Navy Logistics	T-AKE	NAVICP - Philadelphia	Y	Y	Data (E-mail)	Less than 24 hours	U	Purpose: Ships Logistics, Own Unit Supply Support System: SATCOM
26	NTA 4.6 NTA 4.5.1 NTA 4.5.3 NTA 4.6.2 NTA 4.3.3	Resupply (Cargo) from U. S. Navy (only) source	U. S. Navy Logistics	T-AKE	FISC	Y	Y	Data (E-mail, Database Files)	Less than 24 hours	U	Purpose: Cargo Resupply/ Requisition Status (HULL/FILL, Ships Store, Provisions) using U. S. Navy legacy system System: e-mail
27	NTA 4.1 NTA 4.1.2 NTA 4.1.3	Resupply (Ammo) from U. S. Navy (only) source	Logistics	T-AKE	NAVSUP (CAIMS)	Y	Y	Data (USMTF)	Less than 24 hours	TS	Purpose: Ammo Resupply/Status Systems: SATCOM or e mail
28	NTA 4.2 NTA 4.2.1.1 NTA 4.2.2	Resupply (Fuel) from U. S. Navy (only) source	Logistics	T-AKE	NAVPET-OFF, MSC HQ, NDFS	Y	Y	Data (USMTF)	Less than 24 hours	TS	Purpose: Resupply/Status of Fuel from U. S. Navy source. System: SATCOM or e mail

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UNTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
29	NTA 4.6 NTA 4.6.2 NTA 4.3.3 NTA 4.2 NTA 4.2.1.1 NTA 4.2.2 NTA 4.5.3	Supply U. S. Navy (only) Customer Ships	Logistics	Customer Ships	T-AKE	Y	Y	Data (USMTF)	Less than 24 hours	TS	Purpose: U. S. Navy Customer Resupply (HULL/FILL, Ships Store, Provisions, Fuel), LOGREQ Systems: SATCOM or e mail
30	NTA 4.1 NTA 4.1.2 NTA 4.1.3	Supply U.S. Navy Customer Ships	Logistics	Customer Ships	T-AKE	Y	Y	Data (USMTF)	Less than 24 hours	TS	Purpose: U. S. Navy Customer Ammo Resupply, LOGREQ, MILSTRIP Systems: SATCOM or e mail
31	NTA 4.3 NTA 4.4.3 NTA 4.12	Admin, Personnel, and Resource Management	Personnel, Other – Admin	T-AKE	MSC	Y	N	Data	Less than 24 hours	U	Purpose: MSC Admin E-mail including Maintenance, Payroll, and Medical Data, MILDET Payroll NSIPS System: e mail
32	NTA 5.3	Operations Management – Navy/MSC Coordination	Personnel, Other – Operations/ Admin	T-AKE	DISA	Y	N	Data	Less than 24 hours	S	Purpose: Operations/Admin E-mail Systems: e mail

	1	2	3	4	5	5A	6	7	8	9	10
IER No.	Rationale UNTL #	Event	Info Char	Sending Node	Receiving Node	Bi-Dir	Crit	Format	Timeliness	Class	Remarks
33	NTA 4.3 NTA 4.4.3	Admin, Personnel, and Resource Management	Personnel, Other – Admin	T-AKE	Shore Facilities, Other Ships	Y	N		Voice	U	Purpose: Administrative System: e mail
34	NTA 5 NTA 5.1 NTA 5.1.1 NTA 5.1.1.2	Warfare Coordination	Other, Communications	T-AKE	OTC	Y	Y	Voice	Real Time	TS	Purpose: Warfare Coordination Systems: SATCOM (voice), HF
35	NTA 2.2.2 NTA 2.4.4.1 NTA 2.5	Intelligence	Other Intelligence	T-AKE	Theater JIC	Y	Y	Data (USMTF)	Less than 1 hour	TS	Purpose: Intelligence Reports System: SATCOM
36	NTA 5.1.1.1.1 NTA 5.1.1.2 NTA 5.1.1.1.2 NTA 5.1.1.1.3	Communications Coordination	Other - Communications Coordination	OTC	T-AKE	Y	Y	Data (TTY)	Real Time	S	Purpose: Communications Coordination Systems: UHF, HF, VHF

Attachment G

ORD SUPPORTING ANALYSIS AND CRD CROSSWALK

C4I systems to be installed in the Auxiliary Cargo and Ammunition ships (T-AKE) will be low-cost non-developmental applications of existing commercial off the shelf (COTS) and U. S. Navy government off the shelf (GOTS) technology. The T-AKE is intended primarily to support U.S. Navy forward presence by providing re-supply of dry cargo (including food, spare parts, consumables, etc.), ammunition, and limited fuel. The T-AKE has a secondary joint role in that it could be used to provide logistic support to allied naval forces, or U.S. Coast Guard forces; however, communications with these Joint forces will utilize standard U.S. Navy communications systems and require neither any additional equipment to be included on the T-AKE, nor any peculiar Joint interoperability or information exchange requirements.

To provide worldwide communications, T-AKE's C⁴I system architecture will include provisions for Radio Frequency (RF) communications from High Frequency (HF) through the Ultra High Frequency (UHF) spectrum, including UHF satellite communication (SATCOM) and INMARSAT B, command and control, SIPRNET/NIPRNET, and a Defense Messaging System (DMS). Integration with, or support to cryptographic, secure and non-secure Local Area Networks (LAN), navigation, weather and environment, logistics, administrative, and combat identification (IFF transponder only), portable/emergency communication, and air traffic control systems will be ensured. The remarks section of each T-AKE IER, either Joint or Navy, list the communications systems envisioned for communicating that information exchange. The OV-1 and SV-1 diagrams show the basic C⁴ISR architecture to be used for achieving the IER matrix exchanges.

Applicability to Global Command Support System (GCSS) CRD dated 5 June 2000

The T-AKE will have information technology systems installed that fall under the umbrella of the GCSS CRD. The T-AKE will be equipped with the standard Navy information technology systems for Supply / Logistics / Ordnance management and a standard Navy communications suite. The T-AKE program will comply with the GCSS CRD by installing or upgrading applications and systems that are GCSS CRD compliant as they become available. The degree of GCSS CRD compliance will be as specified in individual system/application ORDs.

The table below is a crosswalk for the GCSS CRD KPP / requirements to the T-AKE ORD.

CRD KPP or Requirement	Matching ORD Requirement	Notes
KPP 1. The GCSS FoS shall be developed in accordance with Joint Technical Architecture (JTA) and be compliant	Attachment D para 6: Additionally, C4I systems will comply with the DOD Joint Technical Architecture (JTA) standards and	When equipment becomes available to meet DII COE Level 6 requirements it will be incorporated in the T-AKE.

CRD KPP or Requirement	Matching ORD Requirement	Notes
with the Defense Information System Agency (DISA) DII COE. Threshold: Level 6 Goal: Level 8	Defense Information Infrastructure (DII) Common Operating Environment (COE), Level 5 (Threshold) and Level 8 (Objective) compliance for ships delivered in the 2005 to 2010 timeframe. Ships will be upgraded with Level 6 (Threshold) and Level 8 (Objective) compliant software as it becomes available for Fleet installation.	
KPP 2. Must provide security Management services. Provide for classified (GENSER), sensitive but unclassified, unclassified information IAW the minimum standards set forth in DoD 5200.28 STD	Attachment D, para. 5: The T-AKE will comply with Navy Information Security requirements as defined in SECNAVINST 5239.3, Naval Information Assurance Program Publications and National Security Telecommunications and Information Systems Security requirements.	SECNAVINST 5239.3 requires compliance with DoD 5200.28 STD.
KPP 3. Interoperability. Integrate corporate logistics data into a common operational logistics picture for the joint warfighter providing real-time logistics situational awareness.	Joint Asset Visibility IER. (See page 28, 29) Attachment D, para. 5: The T-AKE will be equipped with standard Navy Supply / Logistics / Ordnance management information technology systems to provide a seamless interface with Navy systems ashore and on customer ships.	In order to comply with the GCSS CRD requirement to provide visibility of assets, the T-AKE will communicate current logistics data via standard Navy Information Technology systems. The degree of GCSS CRD compliance will be as specified in individual system/application ORDs.
Relevancy/Currency: Provide current and accurate information from the authoritative source. Threshold: Once query is	Joint Asset Visibility IER (See Page 28, 29) Attachment D, para. 5: The T-AKE will be	T-AKE will provide asset visibility information to the Navy's authoritative source as determined by established business

CRD KPP or Requirement	Matching ORD Requirement	Notes
<p>complete, provide user with anticipated runtime; single / multiple queries must be accomplished in less than 60 seconds, 95% of the time Goal: Once query is complete provide user with anticipated run time; single / multiple queries must be accomplished in less than 30 sec, 95% of the time</p>	<p>equipped with standard Navy Supply / Logistics / Ordnance management information technology systems to provide a seamless interface with Navy systems ashore and on customer ships.</p>	<p>processes. The Navy's authoritative source for asset visibility will communicate with GCSS. Relevancy / Currency of asset visibility information will be complied with at the level of the Navy's authoritative source for asset visibility. It is possible that direct interface will be possible in the future as standard navy information technology systems become fully web enabled. At that time, T-AKE will comply with GCSS CRD requirements to the degree supported by individual applications/system ORDs.</p>
<p>Responsiveness (Asset Visibility): Provide asset visibility to the user in a responsive manner upon data/information queries Threshold: Once query is complete, provide user with anticipated run time; single / multiple queries must be accomplished in less than 60 sec, 95% of the time. Goal: Once query is complete provide user with estimated run time; single / multiple queries must be accomplished in less than 30 sec, 95% of the time.</p>	<p>Joint Asset Visibility IER (See page 28, 29)</p> <p>Attachment D para. 5: The T-AKE will be equipped with standard Navy Supply / Logistics / Ordnance management information technology systems to provide a seamless interface with Navy systems ashore and on customer ships.</p>	<p>T-AKE will provide asset visibility information to the Navy's authoritative source as determined by established business processes. The Navy's authoritative source for asset visibility will communicate with GCSS. Responsiveness of asset visibility information will be complied with at the level of the Navy's authoritative source for asset visibility. It is possible that direct interface will be possible in the future as standard navy information technology systems become fully web enabled. At that time, T-AKE will comply with GCSS CRD requirements to the degree</p>

CRD KPP or Requirement	Matching ORD Requirement	Notes
		supported by individual applications/system ORDs.
<p>Responsiveness (Joint Decision Support Tools): Provide collaborative planning course of action analysis / development providing actionable information Threshold: Once query is complete, provide user with anticipated run time; portray actionable information within 120 seconds, 95% of the time Goal: Once query is complete provide user with anticipated run time; portray actionable information within 30 seconds, 95% of the time</p>	NA	T-AKE has no applicability to this KPP
<p>Availability: Provide independent user workstation access and connectivity to any authorized user on any box (within security parameters) at any location Threshold: 95% down to the Joint Task Force Headquarters level; business process to determine tactical/forward deployed level, threshold to be identified in the CRD annual review. Goal: 99% down to the Joint Task Force Headquarters level; business processes to determine tactical/forward deployed level, objective to be identified in CRD annual</p>	NA	T-AKE will not directly impact on GCSS availability.

CRD KPP or Requirement	Matching ORD Requirement	Notes
review.		

Information Dissemination Management (IDM) CRD dated 22 January 2001

The T-AKE program fully supports the goals of the IDM CRD and the Clinger Cohen Act. In order to insure superior interoperability with both the U. S. Navy and allied – coalition customers, SPAWAR Charleston will provide the communications and information technology suite (LANs) separate from the shipbuilding contract. As improved technology becomes available in the military communications and information technology, it can be easily incorporated into the T-AKE without costly modification to the shipbuilding contract.

CRD KPP or Requirement	Matching ORD Requirement	Notes
All data that will be exchanged or has the potential to be exchanged will be tagged IAW the current JTA standard for tagged data items (Extensible Markup Language – XML) DII COE Level 6 (threshold) / Level 8 (Objective)	Attachment D para 5: The requirements of this sub-paragraph apply to all new data base systems, which are installed in T-AKE and can be accessed from outside T-AKE or transfer information outside T-AKE. Such systems shall comply with applicable information technology standards which are specified in the DoD Joint Technical Architecture (JTA), ensuring all data that will be exchanged outside T-AKE or has the potential to be exchanged outside T-AKE, will be tagged IAW the current JTA standard for tagged data items (XML) DISA Registry COE Level 6 (Threshold) and Level 8 (Objective) (XML: Extensible Markup Language). Attachment D para 6: Additionally, C4I systems will comply with the DOD	When equipment becomes available to meet DII COE Level 6 requirements it will be incorporated in the T-AKE.

CRD KPP or Requirement	Matching ORD Requirement	Notes
	Joint Technical Architecture (JTA) standards and Defense Information Infrastructure (DII) Common Operating Environment (COE), Level 5 (Threshold) and Level 8 (Objective) compliance for ships delivered in the 2005 to 2010 timeframe. Ships will be upgraded with Level 6 (Threshold) and Level 8 (Objective) compliant software as it becomes available for Fleet installation.	
Survival Information Dissemination. IDM will support and enable the dissemination of survival information in “n” seconds (TBD) or less 95% of the time (threshold) and within “n” seconds (TBD) 95% of the time (Goal)	NA	The T-AKE is not a Combatant platform and has no offensive or defensive weapons. Therefore, the T-AKE will not process Survival Information.
Information Integrity. IDM will maintain the integrity of delivered information 99.99% of the time (threshold) and 99.999% of the time (goal).	Attachment D para 5: Systems will maintain the integrity of delivered information 99.99% of the time (Threshold) and 99.999% (Objective). Information Integrity is defined as the condition that exists when information is unchanged from its source and has not been accidentally or maliciously modified, altered or destroyed.	
Search Driven Information. IDM will enable users to acquire needed information by search queries	Attachment D para 5: Systems that can be accessed from outside T-AKE will ensure	

CRD KPP or Requirement	Matching ORD Requirement	Notes
(threshold). Successful searches will yield 85% of available needed information, with no more than 20% of the received being irrelevant/unusable (waste) or failed searches (threshold). Successful searches will yield 95% of available needed information, with no more than 10% of the total received being irrelevant/unusable (waste) or failed searches (objective).	information user (outside T-AKE) will be able to acquire needed information through search queries. Successful searches must yield 85% of available needed information, with no more than 20% of the total received being waste, (Threshold) and successful searches must yield 95% of available needed information with no more than 10% of the total received being waste (Objective).	

Combat Identification (CID) CRD dated 19 March 2001

The T-AKE is not a combatant platform and has no weapons systems either offensive or for self-defense. For defense the T-AKE relies on other Naval Forces. To prevent fratricide, T-AKE needs to be identified as a friendly unit by friendly air and surface forces. This is accomplished through the first Joint IER (own ship identification to friendly forces) and the requirement in Attachment D paragraph 5 that "A capability for friendly forces to identify the T-AKE will be provided." It is envisioned the T-AKE will have an Identification Friend or Foe (IFF) transponder (or future replacement). This ORD will be in compliance with the applicable air to surface and surface to surface requirements, KPPs, and IERs specified in the CID CRD dated 19 March 2001.

APPENDIX H

GLOSSARY OF ACRONYMS

A _o	Operational Availability
ABS	American Bureau of Shipping
ACAT	Acquisition Category
AE	Ammunition Ship (1 product) – Navy manned
AO	Oiler (1 product) – Navy manned
AoA	Analysis of Alternatives (formerly the Cost and Operational Effectiveness Analysis (COEA))
AOE	Fast Combat Support Ship (3 products) – Navy manned
ASCM	Anti-Ship Cruise Missile
ASM	Air-to-Surface Missile
ASTM	American Society for Testing and Materials
BEST	Bandwidth Efficient Satellite Transport
BG	Battlegroup
°C	Degrees Centigrade
C ³	Command, Control and Communications
C ⁴ I	Command, Control, Communications, Computers and Intelligence
C4ISR	Command, Control, Communications, Computers and Intelligence Surveillance and Reconnaissance
CAIMS	Consolidated Ammunition Inventory Management System
CAPD	Chemical Agent Point Detection System
CBR-D	Chemical, Biological and Radiological Decontamination
CAS	Collaboration At Sea
CG	Cruiser
CID	Combat Identification
CIVMAR	Civilian Mariner (Military Sealift Command)
CLF	Combat Logistics Force
CNA	Center for Naval Analyses
COE	Common Operating Environment
COMSEC	Communications Security
CONREP	Connected Underway Replenishment
CONSOL	Consolidation
CONUS	Continental United States
COTS	Commercial-off-the-shelf
CRD	Capstone Requirements Document
CUDIXS	Common User Digital Interface Exchange System
CV	Aircraft Carrier
CVBG	Carrier Battle Group

CVN	Aircraft Carrier (nuclear powered)
DAB	Defense Acquisition Board
DC	Damage Control
DD-21	Surface Combatant for the 21 st Century (under development)
DII	Defense Information Infrastructure
DISA	Defense Information System Agency
DMS	Defense Message System
E ³	Electromagnetic Environmental Effects
EKMS	Electronic Key Management System
ELFE	Extra Low Frequency Electric
EM	Electromagnetic
EMP	Electromagnetic Pulse
EOD	Explosive Ordnance Disposal
EPIRBS	Emergency Positioning Indication Radio Beacon
°F	Degrees Fahrenheit
F44	Jet Propulsion 5 (JP-5) Fuel
F76	Diesel Fuel Marine (DFM)
FAS	Fueling at Sea
FCC	Federal Communications Commission
F-DMA	Fuel-Distillate Marine Type A
FISC	Fleet Industrial Supply Center
FY	Fiscal Year (1 October – 30 September)
GCSS	Global Combat Support System
GLOMASS	Global Maritime Navigation Receiver System
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
GTN	Global Transportation Network
HAZMAT	Hazardous Material
HF	High Frequency
HICOM	High Command
IDM	Information Dissemination Management
IEEE	Institute of Electrical and Electronics Engineers
IER	Information Exchange Requirement
IFF	Identification Friend or Foe
IMO	International Maritime Organization
INMARSAT	International Maritime Satellite

INST	Instruction
IOC	Initial Operational Capability
ISO	International Organization for Standardization
IT-21	Information Technology to the Twenty First Century
ITU	International Telecommunications Union
JIC	Theater Joint Intelligence Center
JROC	Joint Requirements Oversight Council
JTA	Joint Technical Architecture
JTAV	Joint Total Asset Visibility
KG	Center of Gravity from the Keel
KPP	Key Performance Parameter
LAN	Local Area Network
LCC	Life Cycle Cost
LOA	Length Overall
LOGREQ	Logistic Requisition
LOS	Line of Sight
M	Million
m ²	Meters Squared (Square Meters)
m ³	Meters Cubed (Cubic Meters)
MCDS	Modular Cargo Delivery System
MCR	Maximum Continuous Rating
METOC	Meteorology and Oceanography
MHE	Material Handling Equipment
MILDET	Military Detachment
MNS	Mission Need Statement
MSC	Military Sealift Command
MT	Metric Tons
MTA	Mid-term Availability
NATO	North Atlantic Treaty Organization
NAVPETOFF	Navy Petroleum Office
NAVSEA	Naval Sea Systems Command
NAVSUP	Naval Supply Systems Command
NAVTEX	National Weather Facsimile Network
NBCC	Nuclear, Biological and Chemical Contamination
NCTAMS	Navy Computers and Telecommunications Area Master Station
NIMA	National Imagery and Mapping Agency
NIPRNET	Unclassified Internet Protocol Router Network

NM	Nautical Miles
NNOR	Non Nuclear Ordnance Requirements
NOW	Navy Order Wire
NTSP	Navy Training System Plan
NWP	Naval Warfare Publication
ONI	Office of Naval Intelligence
OP	Ordnance Pamphlet
OPNAV	Office of the Chief of Naval Operations
OPNAVINST	Office of the Chief of Naval Operations Instruction
OPREP	Operational Report
OPS	Operations
ORD	Operational Requirements Document
OTAT/OTAR	Over The Air Crypto
OTC	Officer in Tactical Command
OTCIXS	Officer in Tactical Command Information Exchange System
P	Port
PPS	Precise Positioning Service
PR	Program Review
PSA	Post Shakedown Availability
RADM	Rear Admiral
RAS	Replenishment at Sea
Ret.	Retired
ROH	Regular Overhaul
ROLMS	Retail Ordnance Logistics Management System
RRF	Ready Reserve Force
S	Starboard
SAR	Sea-Air Rescue
SATCOM	Satellite Communication
SATHICOM	Satellite High Command
SIPRNET	Secret Internet Protocol Router Network
SITREP	Situational Reports
SNAME	Society of Naval Architects and Marine Engineers
SOLAS	Safety of Life at Sea
SORTS	Status of Resources and Training
SPS	Standard Positioning Service
SPAWAR	Space and Naval Warfare Command
STANAG	Standing NATO Agreement
STE	Secure Terminal Equipment
STREAM	Standard Tensioned Replenishment Alongside Method

STU	Secure Telephone Unit
SUADPS	Shipboard Uniform Automated Data Processing System
T-AKE	Auxiliary Cargo and Ammunition Ship (under development) (1 or 2 products - convertible) – CIVMAR manned
T-AE	Ammunition Ship (1 product) – CIVMAR manned
T-AFS	Combat Stores Ship (1 product) – CIVMAR manned
T-AO	Oiler (1 product) – CIVMAR manned
T&R	Technical and Research
TA	Threat Assessment
TACAN	Tactical Air Navigation
TBM	Theater Ballistic Missile
TRPPM	Training Planning Process Methodology
UNREP	Underway Replenishment
U.S.	United States
USCG	United States Coast Guard
USN	United States Navy
UHF	Ultra High Frequency
VERTREP	Vertical Replenishment
VHF	Very High Frequency
VLA	Vehicle Lashing Assemblies
VR	Voyage Repairs