T-AKE to AS(R) Submarine Tender (Modified Repeat)

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Current fleet submarine tender assets include USS Emory S. Land (AS-39) (commissioned 1979) and USS Frank Cable (AS-40) (commissioned 1980). These ships are nearly 30 years old and close to the end of their useful service lives. The propulsion plants lack the reliability needed to execute frequent upkeeps and provide continuous utility services to tended submarines at geographically disparate and distant locations. Further, they are manpower-intensive and fuel-inefficient to operate. Lack of modular design and increasing difficulty of obtaining parts make maintenance expensive and time consuming. These deficiencies are inherent to the ships' design and could not be improved much by overhaul. Accordingly, a new class of submarine tender is needed to provide improved capability to repair submarine battle damage, provide in-theater maintenance support for forward-deployed units in peacetime and provide mobile remote-site logistics support.

This design study evaluated using the ongoing T-AKE 1 class production line as a basis for a modified repeat or minimum-modification / minimum cost ship configured for the submarine tender role. The study focused on using current T-AKE data, arrangements, weights, and drawings as a starting point. From there several design variants were analyzed and the most capable and cost effective model was chosen. Using this data, modifications were made as necessary to the arrangements, structure, and weights of the original T-AKE to transform her into the chosen AS(R) variant. The variant was put through a series of structural and stability analyses along with various seakeeping scenarios to determine the AS(R)'s sea worthiness and mission effectiveness. A simplified cost analysis based on SWBS weight groups was also performed comparing the costs of the AS(R) to those of the baseline T-AKE.

The outcomes from this study verify that using the T-AKE as a basis for a new submarine tender is a feasible solution from both an economic and capability perspective. The results demonstrate that the T-AKE can perform the mission of a submarine tender with minimal modifications and design alterations.

SHIP CHARACTERISTICS	
Displacement, Full Load	38,139 LT
Length Between Perpendiculars (LBP)	659.1 ft
Length Overall (LOA)	688.6 ft
Beam	105.6 ft
Draft, Full Load	28.9 ft
Sustained Speed	20 kts
Range (18+ kts)	13,061 NM
Service Life	40 years
Accommodations	1849
MISSION CAPABILITIES	
Repair Shop Area	50,000 ft^2 +
Submarine Ordnance Stowage	360 Stows
Repair Stock Stowage	2000 LT
1 – 35 LT Heavy Lift Crane (150 ft Boom)	
2 – 12 LT Side Repair Cranes (80 ft Booms)	
4 Hotel Service Booms (85 ft)	
1600 Amps at 450 VAC to 6 Tended Units	
COST	
Acquisition (% over base ship)	18%
Life Cycle (% over base ship)	12%