

**OPTIMUM RISK TANKER (ORT) DESIGN REPORT  
 MINIMUM RISK ALTERNATIVE**

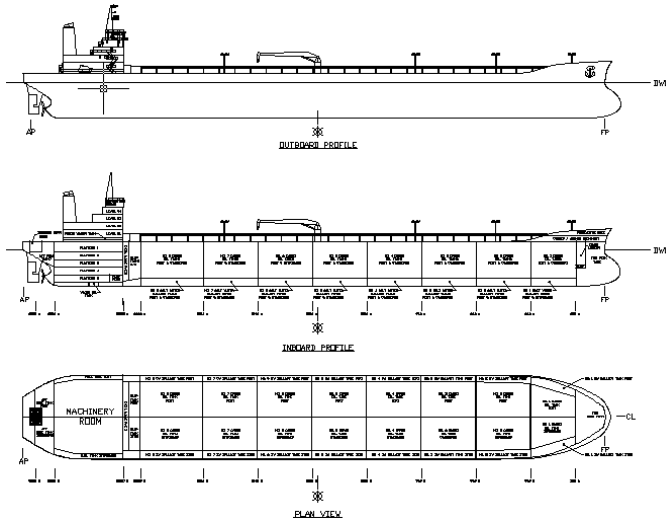
**A Systematic Approach to TAPS Tanker Design**

**AOE 4065/4066 Ocean Design  
 Fall 1999 – Spring 2000**

**Team Two**

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## Executive Summary



Characteristic	Value
Length on Waterline	308.61m
Depth	23.53m
Draft	18.9m
Beam	44.41m
Lightship Weight	47066 MT
Block Coefficient, CB	0.825
Prismatic Coefficient, CP	0.829
Max Sustained Speed	15.78 kts
Range at 15 kts	10000 nm
Propulsion Plant	MANB&W 7-cylinder slow-speed diesel
BHP	34580 hp
Propeller Type	B-series 5-blade CPP
Cargo Tankage	8x2 plus 2% slop tanks
Cargo Volume	161740m <sup>3</sup>
Double Bottom height	4m
Double Side width	4m
Crew	28
Risk	0.033m <sup>3</sup>
BCC	176.3 Million Dollars
TOC	294.5 Million Dollars

The goal of the Optimal Risk Tanker Design Project is to design a 140,000 DWT crude oil tanker for the Trans-Alaskan Pipeline System (TAPS) trade between Valdez, Alaska and the west coast of the continental United States. The tanker is to meet requirements defined by perspective future owners. To this end, a systematic exploration of the design space was conducted for ship designs that both meet the owners' requirements and are optimized for cost and risk of oil outflow. A Pareto-Genetic algorithm was used to develop a non-dominated frontier of concept designs satisfying the goals of the concept exploration. These ship designs constitute the vessels with the lowest risk for a given cost, and were defined by select design parameters used in the optimization process. Select designs of interest were highlighted and investigated further in a feasibility study.

The ship design with minimum risk on the non-dominated frontier was one such ship. During the feasibility study, the design parameters from the optimization were explored and developed in detail. The result is the Minimum Risk Tanker. The Minimum Risk Tanker satisfies all owners' requirements and provides safe, reliable transport of crude oil through environmentally sensitive regions with extremely low risk of oil spillage and damage to those areas. With an estimated lifetime mean oil outflow of only 0.033 cubic meters and a combination of sound design and proven technology, the Minimum Risk Tanker is the safest tanker design currently available to owners and operators in the TAPS trade. The ship is well worth the price when considering the alternative risk and cost of oil spills in the modern era of unrestricted liability.