

# CCDOTT

## Program Element 2

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### Alternative Fueled High Speed Sealift

### Program Summary

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# Agenda

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- ⊕ **Program Goals and Objectives**
- ⊕ **Analysis Approach**
- ⊕ **Study Assumptions**
- ⊕ **Current Status**
  - ✓ Ship Systems
  - ✓ Economic Analysis
- ⊕ **Challenges**
- ⊕ **Summary**

# Program Goals and Objectives

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## **Evaluate Economic and Technical Feasibility of Alternatively Fueled Commercial High Speed Sealift**

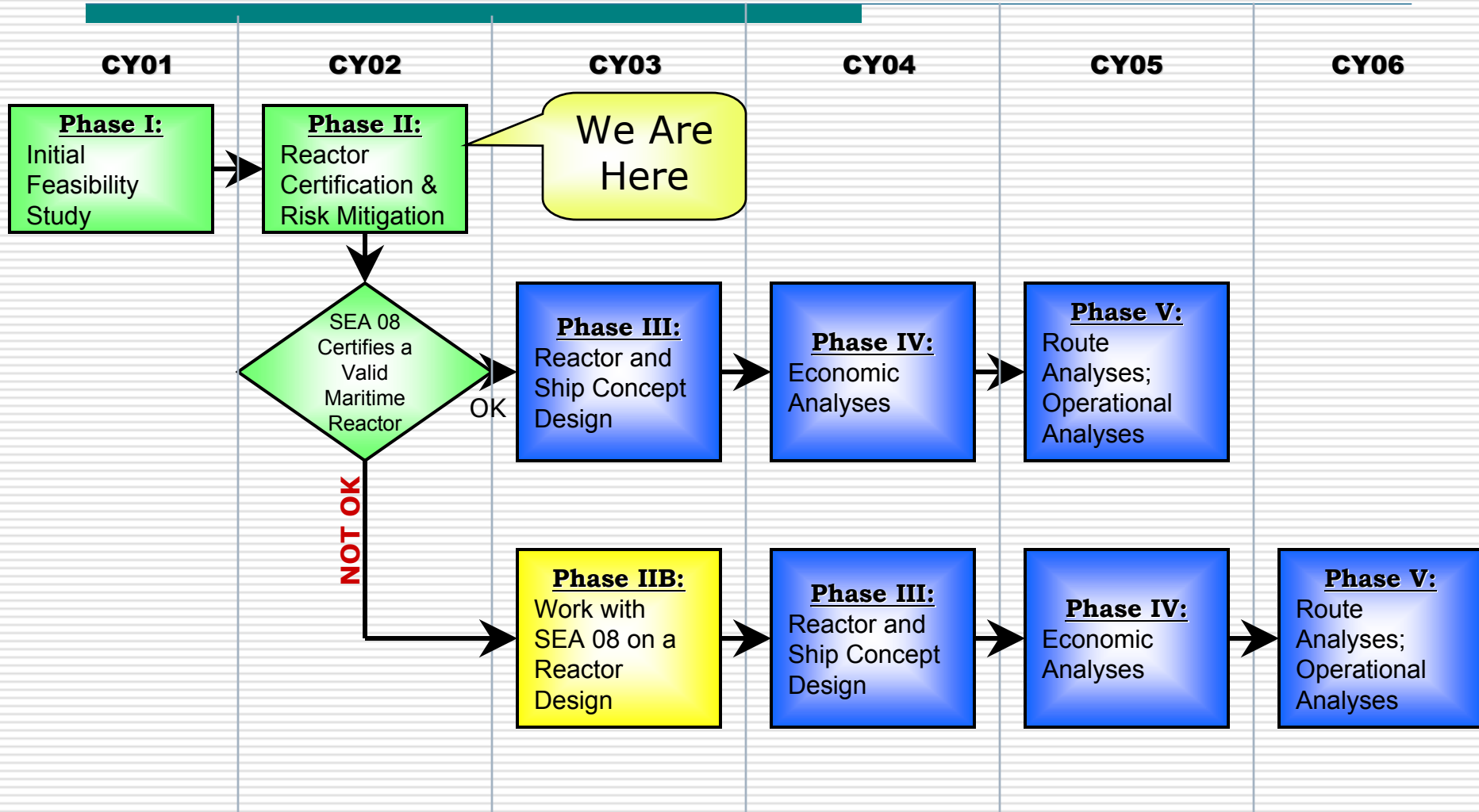
### **⊕ Economics**

- ✓ Time Critical Cargo
- ✓ Option to Air Freight

### **⊕ Technical Feasibility**

- ✓ Next Generation Reactor Designs
- ✓ High Power Densities Conventional Systems

# Analysis Approach



# Study Assumptions

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## ⊕ **Commercial Time Sensitive Market**

- ✓ Shipping Premium for Time Critical Cargoes
- ✓ Fast Mono-Hull Design
  - Analogous to FastShip Atlantic
- ✓ Point to Point Cargo Route
  - Singapore to West Coast
  - No Change in Routing

## ⊕ **Next Generation Reactor**

- ✓ General Atomic GT-MHR
  - Compact
  - Significantly Improved Safety

# Current Status

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## ⊕ **Phase I Completed**

- ✓ Identified baseline Ship Design
- ✓ Refined Reactor Design
  - Marinization added significant weight
  - Identified 11 Critical Technical Issues

## ⊕ **Prior to Additional Work:**

- ✓ TRANSCOM Initiated Re-Programming
  - Overall Concern with Program
  - Significant Concern with SEA 08 Certification of the Reactor
- ✓ Nominally 12 Month Funding Award Delay

## ⊕ **Phase II Awarded in Late August '02**

- ✓ Slow Start due to Award Delay
- ✓ Focus is Technical Issues, Economics Analysis, and Reactor Certification Approach

# Ship Summary

## Characteristics

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### Principle Characteristics

	<u>METRIC</u>	<u>ENGLISH</u>
Length, Overall	268.0 m	879 ft
Length, Waterline	232.0 m	761 ft
Draft, FL	11.2 m	37 ft
Depth, Main Deck	32.0 m	105 ft
Displacement, Full Load	35,320 Tonnes	34,760 LT
Cargo Payload	11,000 Tonnes	10,800 LT
Sustained Speed	37+ kts	
Endurance	10,000nm	

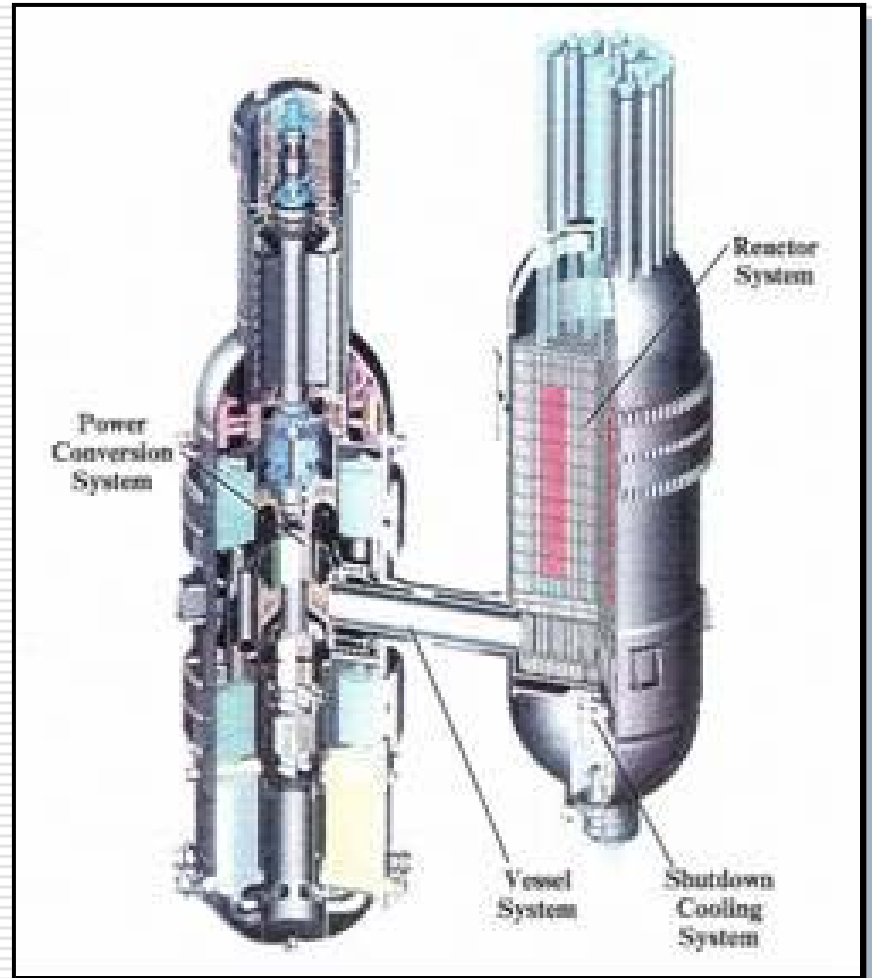
### Main Machinery Characteristics

# Ship Summary

## Propulsion System

- ⊕ **GT-MHR has Two Main Elements**
  - ✓ Gas Turbine Power Conversion System (GT)
  - ✓ Modular Helium cooled Reactor (MHR)

- ⊕ **Installed Systems**
  - ✓ (2) 125MW GT-MHR Reactor
  - ✓ (5) Electric Motors
  - ✓ (5) KaMeWa Waterjets



# Operations Summary

## Route and Cargo Operations

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### ⊕ **Route**

- ✓ San Francisco or Equal
- ✓ Singapore or Equal

### ⊕ **Commercial Crew**

- ✓ Augmentation for Reactor Staffing

### ⊕ **Refueling Rates**

- ✓ Every 5<sup>th</sup> Year

### ⊕ **15 Year Life**

### ⊕ **28 Transits Per Year**

- ✓ Full Load into US
- ✓ Partial Load From US

### ⊕ **Rates of \$1/#**

- ✓ Lower than Air Rates
- ✓ Competitive
- ✓ Cargo Movement Need Significantly Growing

# Economics Summary

## Non-Recurring Costs

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### ⊕ Design

- ✓ Ship Design \$77M
  - Mature the Design to Support Production
  - Currently Design is Early Level Feasibility
- ✓ Reactor Design & Certification \$1,100M
  - Significant Reactor Design Effort Required
  - Certification Program
    - NRC
    - INRC

# Economics Summary

## Non-Recurring and Production Costs

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### ⊕ Production

- ✓ Leadship \$845M
  - Commercial Equivalent Standards for Ship and Non Reactor Systems
  - Military and NRC/INRC Compliant Reactor System and Services
- ✓ Follow-ships \$725M
  - Assumes Lead Ship Was Fully Built and Tested Prior to Production of Follow Units

# Economics Summary

## Operational Costs

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### ⊕ Per Ship/Year

- ✓ Cargo Rates \$210M
  - Full Cargo Loads
  - \$1/# Cargo Rate
  - 14 Round Trip Transits Per Year
- ✓ Operational Costs \$56M
  - Crewing Based on Com'l Rules
  - Significant Increase to Engine Room Crewing Envisioned
  - Maintenance of the Reactor
  - Recurring Reactor Certification, Training, Inspections
  - Refueling every 5<sup>th</sup> Year

# Economics Summary

## Costs Summary

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### ⊕ For Three Ship Class

✓ Design	(\$1,177M)
✓ Production	(\$2,295M)
✓ Operations	15,900M
✓ Disposal	(\$150M)

### ⊕ Analysis

✓ Net Present Value	\$600M
□ 10% Discounting	
□ No Financing Assumptions Included	
✓ IRR	13%

# Technical Challenges

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## ⊕ Reactor Design Issues

✓ 11 Items Identified

### □ Marinization

- Effects of Flooding
- Effects of Ship Motions and Loads
- Shielding

### □ Marine Operations

- Shielding and Impacts on Near Port Operations
- Power Level/Requirement Changes
  - Maneuverings
  - Port Operations

### □ Technical Risk

- Fuel Element Failure History
  - Turbine Blade Accident, Chamber Integrity
  - Refueling Rates and Fuel Quality
  - Auxiliary Systems Characteristics
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# Technical Challenges

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## ⊕ **Speed**

- ✓ We are in the high 30 kt area
- ✓ Market requirements indicate mid 40's is best

## ⊕ **Regulatory Requirements/Technical Requirements**

- ✓ No existing commercial marine US Rules
- ✓ Significant Number of Stakeholders

# Operational Challenges

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## ⊕ **Near Port Operations**

- ✓ Model Timing assumes no delay for near port shut-down and maneuvering
- ✓ Routing to Mitigate Socio-Political Issues

## ⊕ **Cargo Operations**

- ✓ Homeland Defense Could Help – or Hurt

## ⊕ **Port Operations**

- ✓ In Port Infrastructure Requirements Not Defined
  - FastShip Type Cargo Loading would speed turnaround times
  - Dedicated Port Facilities Might be Required to Mitigate Reactor concerns

# Socio/Political Challenges

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## ⊕ **Far East Operations**

- ✓ Stability of some Nation States
- ✓ Environmental and Economic Impact and Risk
  - Fisheries is a Primary Industry
  - Heavy Cargo Routes

## ⊕ **Port Operations**

- ✓ Access Rights and Certification
  - ✓ Certification Efforts Magnified by Number of Nation-States Involved
    - Plus International Bodies such as INRC
  - ✓ Security Requirements
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# Summary

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## ⊕ **Execute Phase II**

- ✓ Complete Phase II Tasks
  - Shift in focus areas away from technical to a more in-depth economic and socio-political analysis
    - Address the Key Question of Why Bother?
- ✓ Gain Additional Program Support