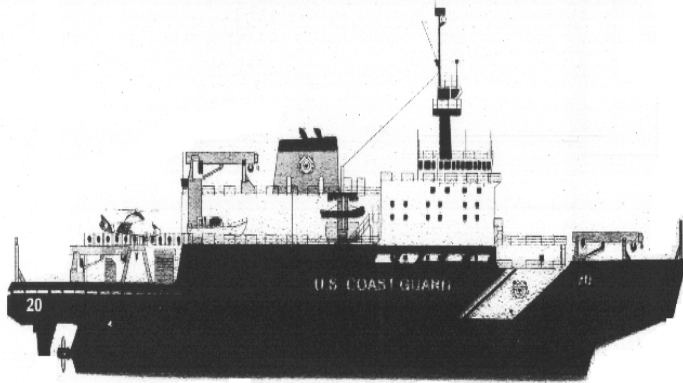


# APPENDIX IV

## USCGC HEALY ICE TRIALS

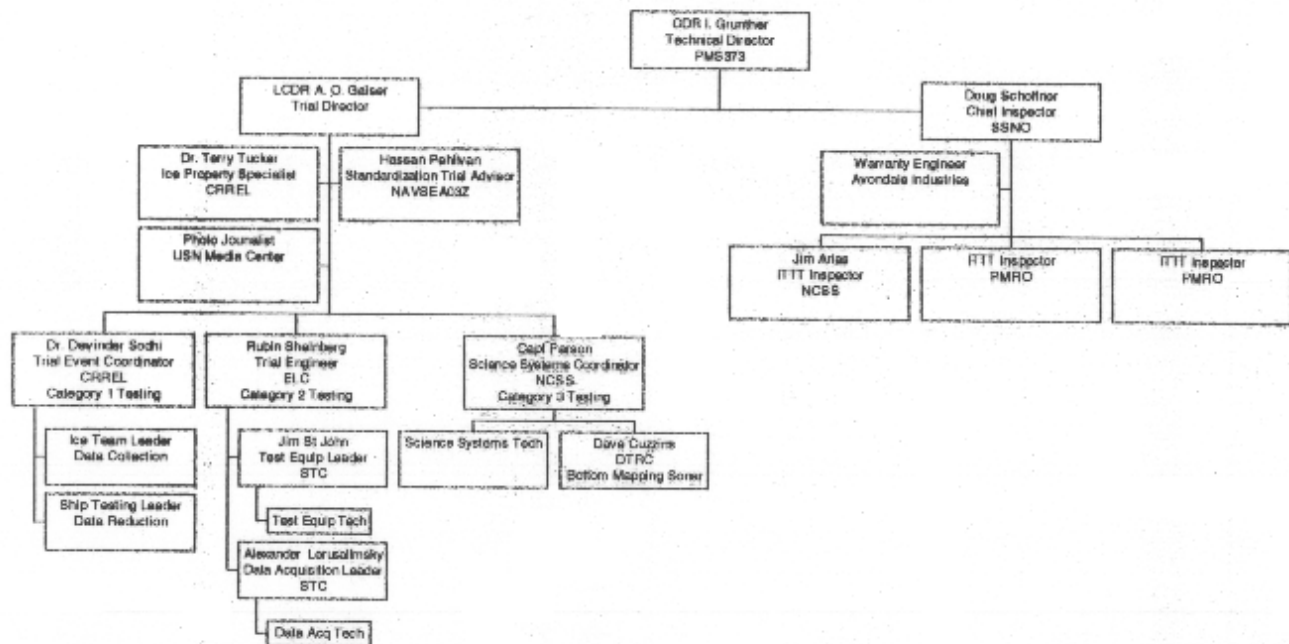


LCDR A. O. Gaiser, PMS373TE  
Test & Trial Director

# Performance Standardization and Ice Trial Meeting

22 April 1997  
New Orleans, LA

# Ice Trial Organization



## USCGC HEALY ICE TRIALS

### SOR Requirements

- Design Criteria
  - Continuous: The cutter shall be capable of breaking no less than 4.5 feet of level 100 psi ice at a continuous speed of 3 knots.
  - Ramming: The cutter shall be capable of breaking no less than 8 ft of level ice through backing and ramming. The cutter shall achieve penetration of no less than 1/2 of its overall length, in 100 psi ice at an impact velocity of 6 knots.
- Contractual Requirement
  - In any case the required shaft horsepower for continuous and ramming icebreaking shall not exceed 30,000 SHP.



# USCGC HEALY ICE TRIALS

## Ice Trial Objectives

- Icebreaking Capability
- Hull Performance
- Machinery Performance
- Science Equipment Performance



# USCGC HEALY ICE TRIALS

## Icebreaking Capability

- Level Ice Performance

- Quantify the ship's icebreaking capability in terms of continuous speed, ice thickness and ice flexural strength.
- Quantify the ship's icebreaking capability by backing and ramming in terms of ice penetration, ice thickness and ice flexural strength.
- Quantify the level ice resistance of the ship in terms of speed, ice thickness and ice flexural strength. Resistance data required for near-zero speed of icebreaking.
- Evaluate ship's maneuvering capability in terms of speed, ice thickness and ice flexural strength.



# USCGC HEALY ICE TRIALS

## Icebreaking Capability *(Continued)*

- Broken Ice Channel Resistance
  - Determine the resistance of the ship in a broken ice channel.
  
- Pressure Ridge Performance
  - Determine the pressure ridge transiting ability of the ship for a range of sail heights and impact speeds.

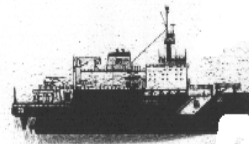


# USCGC HEALY ICE TRIALS

## Hull Performance

- Icebelt Hull Performance

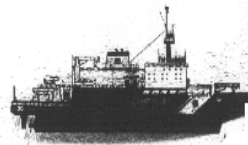
- Measure the ice impact loads on the icebelt structural members in order to validate the load criteria used for the ship's design.
- Establish operational limiting conditions based on ice impact loading.



# USCGC HEALY ICE TRIALS

## Machinery Performance

- Propulsion System Controls
  - Evaluate the control system for the main propulsion plant for all configurations of machinery as a function of ice conditions and establish limiting conditions.
- Steering Gear and Rudder Loading
  - Evaluate the loads on the steering gear and rudders as function of ice conditions and establish limiting conditions for the system.



# USCGC HEALY ICE TRIALS

## Science Equipment Performance

- Science Equipment OPTEST & EVAL
  - Evaluate the performance of the science equipment in an operating environment. Video all OPTEST and EVALS for future training of crew and scientists.





# USCGC HEALY ICE TRIALS

## Approximate Date & Time for Ice Trials

- Based on a Fall 1998 delivery, expect ice trials to occur in the early spring of 1999.
- Expect Ice trials to last three months at the test site.



### 3. Broken Ice Channel Resistance

Test	Priority
Determine the resistance of the ship in a broken ice channel.	2

## Category 2

### Hull & Machinery Performance

#### 1. Icebelt Hull Performance

Test	Priority
Measure the ice impact loads on the icebelt frames in the bow (fwd sta 5), midbody (fwd sta 16 aft sta 5), and stern (aft sta 16) and use obtained data to extrapolate ship operating limiting conditions.	3

#### 2. Propulsion system controls

Test	Priority
Evaluate the control system for the main propulsion plant for all configurations of machinery as a function of ice conditions and extrapolate its limits.	2

#### 3. Steering gear and rudder loading

Test	Priority
Evaluate the loads on the steering gear and rudders as a function of ice conditions and extrapolate its limits.	2

## Category 3

### Science Equipment

#### 1. Science Data Network

Test	Priority
Evaluate the operational capabilities of the SDN during Ice Trials based on ability to obtain useful Ice Trial specific ship testing data and other scientific data required by embarked scientists.	2

## 2. Oceanographic winches

Test	Priority
Evaluate the operation of the oceanographic winches, both stand alone and in conjunction with embarked scientist expedition of opportunity usage. Film and document operation for future crew training.	2

## 3. CTD system

Test	Priority
Evaluate the operation of the CTD system, both stand alone and in conjunction with embarked scientist expedition of opportunity usage.	3

## 4. Coring equipment

Test	Priority
Evaluate the operation of the coring equipment, both stand alone and in conjunction with embarked scientist expedition of opportunity usage. Film and document operation for future crew training.	2

IV. **Specific Tasking:** Each of the three categories listed above will be assigned to a separate command. Each of the three categories will require a test matrix with appropriate test plans to be developed. Due to the inter-relationships between the three categories, each command must work with the other in order to successfully execute the Ice Trials. All will be expected to follow the Team HEALY guiding principles.

a. **CRREL Tasking:** Be responsible for the development and execution of category 1 testing. A draft test matrix must be completed by June 1997. The final test matrix must be flexible enough to be incorporated with the other category test matrices with little difficulty. Minor changes to the final matrix can be allowed to incorporate flexibility in testing, but should be as complete as practicable. Request cost estimates for accomplishing the above task with the following conditions:

1. **Personnel Limitations:** During Ice Trials, berthing space will be at a premium. For development of the cost estimate, assume that the Ice Trials will be three months maximum in length in the Western Arctic. Request the services of one Trial Coordinator for the duration of Ice Trials who will have the dual responsibility of: (i) assist the NAVSEA Trial Director execute the Ice Trials by coordinating ship testing; and (ii) insure accomplishment of all category 1 testing including the development of test results. Additionally, request the services of one ice property specialist to accompany ship during Ice Trials, who will work with ship's crew to obtain the necessary data from the ice. The

specialist must be able to not only evaluate ice properties along a test track, but be able to help locate appropriate test sights.

2. Deliverables: (1) Provide a minimum of three copies of a final test matrix. (2) Provide a minimum of three copies of the test data results. (3) Provide final test results in a format that meets the specified objectives. The results must be in a format that the ship's crew can use the obtained data to make important decisions regarding ship's capabilities in any given ice condition. Format to be submitted to PMS373 for final approval.

3. Travel: In addition to the above conditions, it is requested that CRREL provide an estimate for necessary travel prior to the Ice Trials. This is to include, in addition to the Ice Trials, site visits to the ship building site as well as any other necessary travel.

b. ELC Tasking: Be responsible for the development and execution of category 2 testing. A test matrix draft must be completed by June 1997. The final test matrix must be flexible enough to be incorporated with the other category test matrices with little difficulty. Minor changes to the final matrix can be allowed to incorporate flexibility in testing, but should be as complete as practicable. Request cost estimates for accomplishing the above task with the following conditions:

1. Personnel Limitations: During Ice Trials, berthing space will be at a premium. For development of the cost estimate, assume that the Ice Trials will be three months maximum in length in the Western Arctic. Request the services of one Ice Trial Chief Engineer for the duration of Ice Trials who will have the dual responsibility of: (i) assist NAVSEA Trial Director execute the Ice Trials; and (ii) insure accomplishment of all category 2 testing including the development of test results. Additionally, request the Ice Trial Chief Engineer determine the number of personnel needed to accomplish assigned responsibility areas, during Ice Trials, keeping in mind the total number of personnel allowed aboard for trials must be below 20. The personnel designated to assist must be able to accomplish multiple assignments.

2. Deliverables: (1) Provide a minimum of three copies of a final test matrix. (2) Provide a minimum of three copies of the test data results. (3) Provide final test results in a format that meets the specified objectives. The results must be in a format that the ship's crew can use the obtained data to make important decisions regarding ship's capabilities in any given ice condition. Format to be submitted to PMS373 for final approval.

3. Travel: In addition to the above conditions, it is requested that the ELC provide an estimate for necessary travel prior to the Ice Trials. This is to include in addition to the Ice Trials, site visits to the ship building site as well as any other necessary travel.

c. Naval Coastal Systems Station Tasking: Be responsible for the development and execution of category 3 testing. A test matrix draft must be completed by November 1997. The final test matrix must be flexible enough to be incorporated with the other category test matrices with little difficulty. Changes to the final matrix is to be expected since the tasking

requires incorporating embarked scientist testing. Flexibility in testing is a must for category 3 testing. In addition to the Ice Trial Testing, provide two Builder's Sea Trial and Preliminary Acceptance Trial riders to cover the areas of Damage Control and elevator/winch operation. These two trial riders will assist the PMRO accomplish testing as well as act as consultants for the Preliminary Acceptance Trial Board, which is made up of several Coast Guard Officers. Request cost estimates for accomplishing the above tasks with the following conditions:

1. **Personnel Limitations:** During Ice Trials, berthing space will be at a premium. For development of the cost estimate, assume that the Ice Trials will be three months maximum in length in the Western Arctic. Request the services of one Ice Trial Science Coordinator for the duration of Ice Trials who will have a three fold responsibility: (i) assist the NAVSEA Trial Director execute the Ice Trials; (ii) insure accomplishment of all category 3 testing including the development of test results; and (iii) maintain a liaison with the embarked scientists, ship's crew and other ice trial personnel. Additionally, request the services of one multi-purpose inspector during Ice Trials, who can evaluate a variety of systems and enter deficiencies into the DTS system.

2. **Deliverables:** (1) Provide a minimum of three copies of a final test matrix. (2) Provide a minimum of three copies of the test data results which includes all training videos. (3) Provide final test results in a format that meets the specified objectives. The results must be in a format that the ship's crew can use the obtained data to make important decisions regarding equipment capabilities in any given ice condition.

3. **Travel:** In addition to the above conditions, it is requested that the NCSS provide an estimate for necessary travel prior to the Ice Trials. This is to include in addition to the Ice Trials, site visits to the ship building site as well as any other necessary travel deemed necessary to accomplish tasking.

V. **Other Comments:** Request each command provide an estimate for category leaders to travel to Washington, D.C. for a kick-off / team building session in the spring of 1997. Actual dates of the kick-off meeting will be based on personnel availability and provided SEPCOR.