

NAVIGATOR CLASS SCORE SHEET
ROVs in Extreme Environments: Science and Industry in the Arctic
SCIENCE UNDER THE ICE
SUBSEA PIPELINE INSPECTION AND REPAIR

SCHOOL NAME and # AS IT APPEARS ON THE OFFICIAL LIST: _____

Company CEO: _____ **Product demonstration attempt #:** _____

Product demonstration station officials: _____

<p>Safety Check and Set-Up (up to 10 points total)</p> <ul style="list-style-type: none"> <input type="checkbox"/> 5 points – Company presents signed safety inspection sheet. <input type="checkbox"/> 5 points – Vehicle and control system present no safety hazards. <p>Examples:</p> <ul style="list-style-type: none"> ○ All power cords, power bars, pressurized cylinders, etc. are secured. ○ No hazardous materials are leaking onto the pool deck. ○ Vehicle is hand-launched by team members in a safe manner. <p>Product demonstration official's notes: _____</p> <p>Company is cleared for demonstration: _____ (official's initials) _____ total points (out of 10)</p> <p><i>Note: An official's decision to disqualify a company due to safety concerns is final. If there is a safety concern, please contact the lead safety inspector or competition coordinator.</i></p>
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<p>Organizational and Operational Effectiveness (up to 10 points total)</p> <ul style="list-style-type: none"> • Up to 2 points – Organization <ul style="list-style-type: none"> ○ Chain of command evident 1 ○ Roles clear and executed well 1 • Up to 3 points – Task Plan <ul style="list-style-type: none"> ○ Task plan is well thought out to maximize score 1 ○ Alternate plans available 1 ○ All team members are aware of the plan 1 • Up to 2 points –Time Management <ul style="list-style-type: none"> ○ Awareness of time 1 ○ Adjusting timeline to adapt to situations 1 • Up to 3 points – Team Cooperation <ul style="list-style-type: none"> ○ Composure under pressure 1 ○ Supportive of each other 1 ○ Team communicates well with each other 1 <p style="text-align: right;">Total points (out of 10)</p>	<p>✓</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
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Judges' Notes:

Penalty Points

Tether pulling: Issue a warning for the first infraction. Begin deducting points AFTER the first infraction.

Illegal communication: Company members at the side of the pool may not communicate visual evidence of the ROV status (location, need to turn, etc.).

Diver assistance: Companies will be penalized for diver assistance during a product demonstration run. Diver assistance will be provided ONLY AFTER a company requests it. During a product demonstration run, the clock will not stop for diver assistance. Companies WILL NOT be penalized for diver assistance once the product demonstration time has ended. At this time the divers will assist the ROV to the surface as part of the company's 5-minute demobilization period.

Debris: Companies that leave debris (e.g. parts of their ROV, including weights and flotation) in the pool such that a diver must retrieve the debris will also receive penalty points. Product demonstration props are NOT considered debris. A collection basket constructed by the company is considered debris.

Fuses

If a vehicle blows the MATE power supply in-line fuse, the company is allowed two spares. If the vehicle blows the third MATE fuse, the product demonstration performance period is over. The company will receive points for the product demonstration tasks that they have completed up to that point but will not receive a time bonus score.

NAVIGATOR Product Demonstration Task Scoring Breakdown:

Task #1: Science Under the Ice (up to 100 points)

Task #2: Subsea Pipeline Inspection and Repair (up to 100 points)

Task #1: Science Under the Ice	Scoring – up to 100 points
Judges' Notes: Companies may complete the steps of Task #1 in any order and may alternate between this and the other tasks.	
1.1 5 points each (10 points total) – removing two samples of algae	_____
1.2 5 points each (10 points total) – returning two samples of algae to the surface	_____
1.3 5 points – removing a sea urchin from the seafloor	_____
1.4 5 points – returning a sea urchin to the surface	_____
1.5 up to 10 points – using a handbook to identify and count species of sea stars	_____
<ul style="list-style-type: none"> ○ 10 points – all sea star species properly identified and counted ○ 5 points – at least three sea star species properly identified and counted ○ 0 points – less than three sea star species properly identified and counted 	
1.6 10 points – deploying a passive acoustic sensor in a designated area	_____
1.7 10 points – surveying the iceberg at four points around its perimeter	_____
1.8 up to 10 points – measuring the keel depth of the iceberg	_____
<ul style="list-style-type: none"> ○ 10 points - \leq 10 cm off true depth ○ 0 points - $>$ 10 cm off true depth 	
1.9 up to 10 points – measuring the diameter of the iceberg	_____
<ul style="list-style-type: none"> ○ 10 points - \leq 10 cm off true length ○ 0 points - $>$ 10 cm off true length 	
1.10 10 points – using the dimensions to calculate its volume within 10%	_____
1.11 10 points – using the coordinates to map the location of the iceberg	_____
TOTAL POINTS FOR TASK #1 _____	

Task #2: Subsea Pipeline Inspection and Repair**Scoring – up to 100 points**

Judges' Notes: Companies may complete the steps of Task #2 in any order and may alternate between this and the other tasks.

2.1 10 points – conducting a CVI of an oil pipeline to locate the corroded section _____

2.2 20 points – turning a valve to stop the flow of oil through the pipeline _____

2.3 10 points – examining a gauge to determine that the pipeline oil pressure is zero _____

2.4 up to 20 points – measuring the section of corroded pipeline _____

- **20 points** - ≤ 5 cm off true length
- **10 points** – 5.01 cm to 10 cm off true length
- **0 points** - > 10 cm off true length

2.5 10 points – attaching a lift line to the corroded section _____

2.6 10 points each, 20 points total – pulling two pins to simulate cutting the pipeline _____

2.7 10 points – removing the section of corroded pipeline and returning it to the surface _____

TOTAL POINTS FOR TASK #2 _____

SCORING SUMMARY WORKSHEET

The purpose of this sheet is to allow you to verify and tally scores from the previous pages.

SAFETY CHECK & SET-UP			
Signed safety inspection sheet	0	5	
Vehicle and control system present no hazards	0	5	
ORGANIZATION			
Company is effectively organized to undertake the product demonstration	0	1	2 3 4 5
	6	7	8 9 10
Safety check, set-up, and organization point total:			
Task #1: Shipwrecks (up to 100 points)			
Removing two samples of algae from the underside of the ice sheet	0	5	10
Returning two samples of algae to the surface	0	5	10
Removing a sea urchin from the sea floor	0		5
Returning the sea urchin to the surface	0		5
Using a species identification handbook to identify and count sea stars	0	5	10
Deploying a passive acoustic sensor in a designated area	0		10
Surveying the iceberg at four points around its perimeter	0		10
Measuring the keel depth of the iceberg	0		10
Measuring the diameter of the iceberg	0		10
Calculating the volume of the iceberg within 10% of its true volume	0		10
Using the coordinates to map the location of the iceberg	0		10
Task #1 point total:			
Task #2: Science (up to 100 points)			
Conducting a CVI of an oil pipeline to locate the corroded section	0		10
Turning a valve to stop the flow of oil through the pipeline	0		20
Examining the dial to determine the pressure is at zero	0		10
Measuring the corroded section of pipeline	0	10	20
Attaching a lift line to the corroded section of pipeline	0		10
Pulling two pins to simulate cutting the section of corroded pipeline	0	10	20
Removing the section of corroded pipeline and returning it to the surface	0		10
Task #2 point total:			

PENALTY POINT DEDUCTIONS		
*Illegally pulling tether _____ infractions X - 5		
*Illegal communication _____ infractions X - 5		
**Diver assistance _____ infractions X - 5		
*** Leaving debris in the pool _____ infractions X - 5		
Exceeded 5-minute demobilization period _____ minutes X - 1 =		

TIME BONUS	
1 point for every minute and 0.01 point for every second under 15 minutes	
Duration of Product Demonstration: _____	
Minutes under 15 remaining: _____ X 1 point = _____	
Seconds remaining: _____ X 0.01 point = _____	
Time bonus	
TOTAL PRODUCT DEMONSTRATION SCORE	

Official's initials: _____

Company CEO's initials: _____