Ocean Class AGOR
Dakota Creek Industries
Guido Perla & Associates

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.
Phase II: Detailed Design & Construction

Contract award (AGOR 27) – 14 October 2011

Scheduled contract events

- Post award conference: 7 & 8 November 2011
- First design review: 13 & 14 December 2011
- Logistics Guidance Conference: TBD January 2012
- Start of Construction: Spring/Summer 2012
- Option for AGOR 28: TBD Spring/Summer 2012

Deliveries:

- Early FY 2015, Mid FY 2015
## Ocean Class AGOR

### Acquisition Schedule

**SIO Phase II Proposal: $2.7M**

<table>
<thead>
<tr>
<th>FY 07</th>
<th>FY 08</th>
<th>FY 09</th>
<th>FY 10</th>
<th>FY11</th>
<th>FY 12</th>
<th>FY 13</th>
<th>FY 14</th>
<th>FY 15</th>
<th>FY 16</th>
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**Key:**
- **Blue**: Planned Event
- **Black**: Completed Event
- **Gray**: Duration TBD

- **ACAT**: Acquisition Category
- **ASR**: Acquisition Strategy Report
- **AT**: Acceptance Trials
- **BT**: Builder’s Trials
- **CDD**: Capability Development Document
- **DPST**: Dynamic Positioning Sea Trials
- **FCT**: Final Contract Trials
- **FOC**: Full Operational Capability
- **IOC**: Initial Operational Capability
- **MT**: Mission Trials
- **OF**: Outfitting
- **PD**: Post Delivery
- **PRR**: Production Readiness review
- **RFP**: Request for Proposal
- **SOC**: Start of Construction

**Legend:**
- **KL**: Launch
- **FCT**: IOC
- **MT**: Phase III
- **BT**: Second Ship Option Award

**Events:**
- **ACAT Designation**
- **CDD Signature**
- **ASR Approved**
- **RFP Release (combined phase I & II)**
- **Phase I Award (Preliminary/Contract Design)**
- **Phase II Bid Preparation**
- **Phase II Source Selection**
- **Phase II Downselect (Detail Design & Lead Ship Construction)**
- **SOC**
- **Launch**
- **Delivery**
- **IOC**
- **FCT**

**Planned Events:**
- **SOC**
- **Launch**
- **Delivery**
- **IOC**
- **FCT**

**Completed Events:**
- **SOC**
- **Launch**
- **Delivery**
- **IOC**
- **FCT**

**Duration TBD:**
- **SOC**
- **Launch**
- **Delivery**
- **IOC**
- **FCT**
Vessel Requirements
Based on input from scientists: science mission requirements (SMRs)

Contractual
• Mission Equipment Specification
• System Specification

Regulatory
• ABS Under 90 meter rules (A1, Circle E, AMS, ACCU, NIBS, Ice Class D0, UWILD)
• 46 CFR Subchapter U (Oceanographic Vessels)
• MARPOL
• SOLAS
## SMR/Design Comparison

<table>
<thead>
<tr>
<th>SMR Parameter</th>
<th>Capability or Characteristic</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodations</td>
<td>• 20 to 25 science berths (original SMR)</td>
<td>• Meets: 24 in 12 doubles</td>
</tr>
<tr>
<td></td>
<td>• Target all single berths for crew</td>
<td>• Meets target: 20 singles</td>
</tr>
<tr>
<td>Working deck area</td>
<td>• 1,500 – 1,800 sq ft aft of deckhouse</td>
<td>• Exceeds: 1,873 sq ft</td>
</tr>
<tr>
<td></td>
<td>• 2,000 – 2,600 sq ft total clear stern working area</td>
<td>• Meets: 2,557 sq ft</td>
</tr>
<tr>
<td></td>
<td>• 80 ft clear deck area on one side</td>
<td>• Meets: 80 ft</td>
</tr>
<tr>
<td>Laboratory Area</td>
<td>• Main lab 900 - 1,000 sq ft</td>
<td>• Exceeds: 1,023 sq ft</td>
</tr>
<tr>
<td></td>
<td>• Wet lab 350 - 400 sq ft</td>
<td>• Meets: 398 sq ft</td>
</tr>
<tr>
<td></td>
<td>• Computer lab 250 - 300 sq ft</td>
<td>• Exceeds: 311 sq ft</td>
</tr>
<tr>
<td></td>
<td>• Staging Bay 250 – 300 sq ft</td>
<td>• Exceeds: 303 sq ft</td>
</tr>
<tr>
<td>Science Storage</td>
<td>4,000 to 5,000 cu ft</td>
<td>Exceeds: 5,017 cu ft</td>
</tr>
<tr>
<td>Science payload</td>
<td>150 to 250 LT</td>
<td>Meets target: 250 LT</td>
</tr>
</tbody>
</table>
# SMR/Design Comparison

<table>
<thead>
<tr>
<th>SMR Parameter</th>
<th>Capability or Characteristic</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vans</td>
<td>Two 8 ft by 20 ft deck vans with target of capability to carry additional vans</td>
<td>Meets target: 3 vans</td>
</tr>
</tbody>
</table>
| Towing              | • 10,000 lbs at 6 knots  
• 25,000 lbs at 4 knots                                           | • Meets                                    |
| Sustained Speed     | 10 to 11 knots through SS4  
12 to 12.5 kts at 80% MCR calm seas                                     | Meets: 12 kts at 80% MCR in calm seas       |
| Endurance           | 40 to 45 days                                                                               | Meets: 40 days                              |
| Range               | Up to 10,800 nm at optimal transit speeds                                                 | Exceeds: 11,500 nm at sustained speed       |
| Seakeeping          | Maximize ability to work in SS5 and higher                                                  | Meets: 86% (arrival load) and 88% (full load) in SS5 |
## SMR/Design Comparison

<table>
<thead>
<tr>
<th>SMR Parameter</th>
<th>Capability or Characteristic</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station keeping</td>
<td>35 knot wind, SS5, and 2 knot current</td>
<td>Meets: ± 5 meters in SS5</td>
</tr>
<tr>
<td>Track line following</td>
<td>± 5 meters of intended track with a crab angle of less than 45 degrees with 30 knot wind, up to SS5 and 2 knots current</td>
<td>Meets: ± 5 meters in SS5</td>
</tr>
<tr>
<td>Handling Systems</td>
<td>Main crane; portable crane; 2 hydro winches; stern frame; CTD handling system, starboard side handing system; traction winch with 2 drums</td>
<td>Meets equipment requirements and capabilities</td>
</tr>
<tr>
<td>Ice strengthening</td>
<td>Work near 1st year ice</td>
<td>Meets: Ice Class D0</td>
</tr>
</tbody>
</table>
Unique/Novel Features

• Hull form to divert bubbles from sonar area
• Controllable Pitch Propellers (CPP’s) with variable speed motors for improved efficiency over varying modes of operation
• Cranes, CTD Handling and Starboard Side Handling Systems reach to waterline for improved safety and load control
• Condition based monitoring system for main propulsion, major auxiliaries and ship control equipment
• Centralized fresh water cooling system
• HVAC variable air volume and regenerative heat
# General Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length overall</td>
<td>238'-0”</td>
</tr>
<tr>
<td>Waterline length</td>
<td>230'-0”</td>
</tr>
<tr>
<td>Maximum breadth (molded)</td>
<td>50'-0”</td>
</tr>
<tr>
<td>Depth to Main Deck</td>
<td>22'-0”</td>
</tr>
<tr>
<td>Draft</td>
<td>15'-0”</td>
</tr>
<tr>
<td>Sustained speed</td>
<td>12 knots</td>
</tr>
<tr>
<td>Max speed (estimated)</td>
<td>12.8 knots</td>
</tr>
<tr>
<td>Installed brake horsepower</td>
<td>2,324 hp</td>
</tr>
<tr>
<td>Installed total power</td>
<td>3,952 kw</td>
</tr>
</tbody>
</table>
### General Characteristics

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lightship weight (with 5.5% design and build margin)</td>
<td>2,058 LT</td>
</tr>
<tr>
<td>Full load displacement (with SLA)</td>
<td>3,024 LT</td>
</tr>
<tr>
<td>Range (at sustained speed)</td>
<td>11,500 nm</td>
</tr>
<tr>
<td>Endurance</td>
<td>40 days</td>
</tr>
<tr>
<td>Accommodations</td>
<td>20 single crew staterooms</td>
</tr>
<tr>
<td></td>
<td>12 scientist double staterooms</td>
</tr>
</tbody>
</table>
Power Plant and Propulsion

• Integrated diesel electric drive
• Four diesel gensets
• Two AC propulsion motors and drives
• Two CPP’s
• Bow thruster, azimuthing
• Stern tunnel thruster
Mission Systems

- Ship has been designed with space, weight and power reservations for the following sonar systems:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manufacturer 1</th>
<th>Model 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Water Multibeam Survey System</td>
<td>Kongsberg</td>
<td>EM-122</td>
</tr>
<tr>
<td>Mid Water Multibeam Survey System</td>
<td>Kongsberg</td>
<td>EM-710</td>
</tr>
<tr>
<td>Subbottom Profiler</td>
<td>Knudsen</td>
<td>Chirp 3260 with 16 Massa TR-1075 Array</td>
</tr>
<tr>
<td>Single Beam Survey System</td>
<td>Kongsberg</td>
<td>EA-600 (12, 38, 120, 200 kHz)</td>
</tr>
<tr>
<td>Acoustic Doppler Current Profiler</td>
<td>Teledyne RD Instruments</td>
<td>Ocean Surveyor 38 and 75 kHz Workhouse Mariner 300 kHz</td>
</tr>
<tr>
<td>Acoustic Navigation and Tracking System</td>
<td>-</td>
<td>Gantry</td>
</tr>
</tbody>
</table>

1 from Mission Equipment Specification
Performance:
Bubble Sweepdown and
Dynamic Positioning

Bubble Sweepdown
• Model tests have demonstrated favorable results.
  ➢ System Spec requirement: *Flow streamlines originating at the ship’s stem shall pass no closer than 2 meters, measured transversely, from the centerline of the Deep Water Multibeam Survey System sonar transducer receive array.*

Dynamic Positioning
• Analytical predictions meet requirements.
  ➢ System Spec station keeping requirement: *Hold position within ± 5 meters in 35 knot wind and 2 knot beam current with ship headed into collinear wind and SS5 waves.*
Performance:
Seakeeping and Maneuvering

Seakeeping
• Analytical predictions show 100% operability in SS4 and 86%/88% operability in SS5 for arrival load/full load, with roll stabilization tank.
  ➢ System Spec defines operability as:
    ✓ Roll < 3 degrees, pitch < 2 degrees
    ✓ Vertical acceleration < 0.15 g and lateral acceleration < 0.05 g at Main Deck amidships at deck edge

Maneuvering
• Model tests demonstrate meeting System Spec requirements.
  ➢ Directionally stable
  ➢ Turning diameter < 4 ship lengths
  ➢ Zig zag
Performance:
Noise

• Analytical predictions meet System Spec requirements:
  ➢ Airborne noise in all interior spaces and topside locations at sustained speed and during station keeping
  ➢ Sonar self-noise at sustained speed
  ➢ Radiated noise goal at 8 knots