U.S. Navy Mine Countermeasures

National Defense Industrial Association
13th Expeditionary Warfare Conference
October 2008
Agenda

• Mine Threat
• The Transition Challenge
• MCM Mission Package Program Overview
• OMCM Challenges
• Summary
The real goal of a minefield is Sea Denial, NOT the damage or destruction of a specific ship.

Navy goal is Assured Access to defeat the minefield, NOT counter every mine.

- Over 300 Mine Types
- Over 50 Countries Possess
- Low Cost
- Simple to Deploy
The Organic Transition Challenge

MCM Assets Over Time

- FY17-25: Projected MCM Decom
- POM-12: Projected decision year for MCM Decom

FY17-25: Projected MH-53E Sundown
Coverage Complete

- Minefield Detection and Neutralization
- Laser (Hunt)
- Airborne Laser Mine Detection System
- Super-cavitating Projectiles (Kill)
- EOD Mobile Unit ONE
- Rapid Airborne Mine Clearance System
- Unmanned Underwater Vehicle and Low Frequency Broadband
- Unmanned Surface Vehicle / Organic Airborne and Surface Influence Sweep
- Assault Breaching System
- Remote Minehunting System & MH-60S AN/AQS20A
- Airborne Mine Neutralization System
- Magnetic Acoustic Influence Sweep
- Buried Mine Detection
- Sonar (Hunt)
- Propelled explosive charges (Kill)

Surf Zone & CLZ
0' - 10'

Very Shallow Water
10' - 40'

Shallow Water
40' - 200'

Deep Water
Over 200'

Obstacles
Anti-Invasion
Bottom
Moored
Floating

Promising Potential
with Low Frequency Broad Band

Unmanned Surface Vehicle / Organic Airborne and Surface Influence Sweep
Shallow Water to Beach Zone

Assault Breaching System
- MK-84
- JDAM & CMS
- COBRA

EOD Mobile Unit One
- H-60s or 1 H-60
- 3 VTUAVs
- EOD Mobile Unit (One)

LCS MCM Mission Package
- LCS Water Jet Propulsion
- LCS (LM) 13 ft Draft
- 2 H-60s or 1 H-60 and 3 VTUAVs
- RAMICS
- US3
- ALMDS
- RMS

BEACH
SURF
VSW
SW
## LCS MIW Mission Package: System Coverage

<table>
<thead>
<tr>
<th></th>
<th>Detect</th>
<th>Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Battlespace Preparation</strong></td>
<td><strong>Minehunting</strong> (Detect/Classify/Identify)</td>
<td><strong>Neutralize</strong></td>
</tr>
<tr>
<td>Beach Surf Zone</td>
<td>VTUAV+ COBRA</td>
<td>VTUAV+ COBRA</td>
</tr>
<tr>
<td>Near surface &amp; floating</td>
<td>ALMDS</td>
<td></td>
</tr>
<tr>
<td>Volume and bottom mines</td>
<td>AQS-20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMCM UUV LFBB</td>
<td></td>
</tr>
<tr>
<td>Buried</td>
<td>AQS-20</td>
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<td></td>
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</tbody>
</table>

*NOTE: Depth Coverages Vary with System and Mine Type*

**UNCLASSIFIED**
## MCM Package Sensor Status

<table>
<thead>
<tr>
<th>MCM Package Program</th>
<th>ACAT</th>
<th>Programmatic Status</th>
<th>Testing Details</th>
<th>Contractor</th>
<th>IOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS</td>
<td>1C</td>
<td>In Low Rate Initial Production</td>
<td>✓ TECHEVAL completed on DDG-96 Mar 07 ▪ Op Assess on USS BAINBRIDGE 14 Sep 08</td>
<td>Lockheed Martin</td>
<td>2009</td>
</tr>
<tr>
<td>AQS-20A</td>
<td>2</td>
<td>In Low Rate Initial Production</td>
<td>✓ TECHEVAL on MH-60S completed ▪ OPEVAL w/ MH-60S Aug 09 – Oct 09</td>
<td>Raytheon</td>
<td>2010</td>
</tr>
<tr>
<td>AMNS</td>
<td>2</td>
<td>In Low Rate Initial Production</td>
<td>✓ MS C Approval Jan 08 ▪ DT Live Fire Ground Testing Jul 09</td>
<td>Raytheon</td>
<td>2010</td>
</tr>
<tr>
<td>ALMDS</td>
<td>2</td>
<td>In Low Rate Initial Production</td>
<td>✓ Commenced WSIT CT on MH-60S Apr 08 ▪ Commence TECHEVAL 2nd Qtr FY09</td>
<td>Northrop Grumman</td>
<td>2010</td>
</tr>
<tr>
<td>OASIS</td>
<td>2</td>
<td>Milestone C: 3QFY10</td>
<td>✓ Re-design PDR 12 Jun 08 ▪ MH-53E OA Sep 09</td>
<td>ITT Corp</td>
<td>2011</td>
</tr>
<tr>
<td>COBRA</td>
<td>3</td>
<td>Milestone C: Jan 09</td>
<td>✓ Started Performance Validation (MH-53E) ▪ Integration flight tests on VTUAV Oct 09</td>
<td>Northrop Grumman</td>
<td>2010</td>
</tr>
<tr>
<td>CMS</td>
<td>3</td>
<td>Milestone C: FY14</td>
<td>✓ SD&amp;D Contract awarded 24 Jul 08 ▪ System Requirements Review 1st Qtr FY09</td>
<td>Boeing</td>
<td>2015</td>
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<tr>
<td>UUV LFBB</td>
<td>TBD</td>
<td>Milestone B: 2QFY09</td>
<td>▪ CDD in Navy Staffing</td>
<td>TBD</td>
<td>2015</td>
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</tbody>
</table>
# MCM Mission Package Evolution

## MCM MM Delivery

### MCM MP 1
**Spiral Alpha Modules**
- USV w/USSS (x1) (EDM)
- RMMV (x1) (EDM)
- ANNS (x1) (EDM)
- ALMDS (x1) (LRIP)
- AN/AQS-20A (x2) (LRIP)
- UUV (x2) (EDM)
- Support Equipment

**FY 07 Delivered**

### MCM MP 2
**Spiral Alpha Modules**
- USV w/USSS (x1) (EDM)
- RMMV (x2) (LRIP)
- AMNS (x1) (LRIP)
- ALMDS (x1) (LRIP)
- AN/AQS-20A (x3) (LRIP)
- Support Equipment

**FY 09**

### MCM MP 3-4
**Spiral Alpha Modules**
- USV w/USSS (x1) (LRIP)
- RMMV (x2) (Production)
- OASIS (x1) (LRIP)
- AMNS (x1) (LRIP)
- ALMDS (x1) (LRIP)
- AN/AQS-20A (x3) (Production)
- COBRA (x1) (LRIP)
- Support Equipment

**FY 11**

### MCM MP 5
**Alpha Module Baseline**
-...
-...
-...

**FY 12**

### MP X
**Spiral Bravo Modules**
- Systems x,y,z
- Support Equipment

**Future**

## Mission Package

## Mission Module

### Legend
- **Systems Added/Matured**
- **Delivered**
OMCM Challenges

Our most mature programs face many challenges (RMS, AQS-20A & ALMDS in or near Operational testing)

• **Sensor False Alarms**
  – SONAR – (HFWB, LFBB)
  – LIDAR – (ALMDS, RAMICS, COBRA)
    • New Data type; New viewers; Learning curve
    • High False Alarms mean longer PMA & higher False classification by PMA Operator
  – CAD/CAC – improvements needed
    • Real time algorithms in Common Console?
    • Post mission via OPMA?

• **Reliability (Ao, MTBOMF)**
  – Sensor Reliability needs to meet ORD or CPD
  – Support Equipment Reliability (CSTRS, Common Tow Cable) needs improvement

• **WorkLoad / Crew Limitations**
  – Streaming and Recovery of towed systems (high workload)
  – PMA takes long time (Fatigue adds to problem)
  – Learning Curve with new data types
Summary

• The Mine threat is real and not getting easier

• The transition to Organic MCM will have its challenges; therefore, the Navy needs Industry’s help in meeting Organic IOC and preservation of current forces
  ✓ MCM upgrades
  ✓ MH-53 Flex

• MCM Mission Package program making progress

• We must make smart investments to reduce false alarms as they drive the Detect to Neutralize timeline
Questions?
BackUp
False Alarms Lengthen Kill Chain

Develop Search Mission Plan
- MEDAL
- MPS

MH-60S - ALMDS
- RMS
- AQS-20A
- UUV LFBB
- COBRA

Sortie Data Collection

Post Mission Analysis

Contact List

False Alarms

False Classification

False Calls

Develop Neutralization Mission Plan

MH-60S - AMNS
- RAMICS
- ABS

False Calls in Mission Plan

NMLOs

Neutralization

Sweep

MH-60S - OASIS
- USV Sweep
Reliability

\[ Ao = \frac{Uptime}{Uptime + Downtime} = \frac{MTBF}{MTBF + (MTTR + MLDT)} \]

Mean Time to Repair & Mean Logistics Delay Time:
Number of systems on LCS and O to D level maintenance philosophy

Hardware failures typically characterized by a bath tub curve

All MCO timelines are driven by required MTBF, so we must improve upon reliability to meet the requirements and increase useful life!