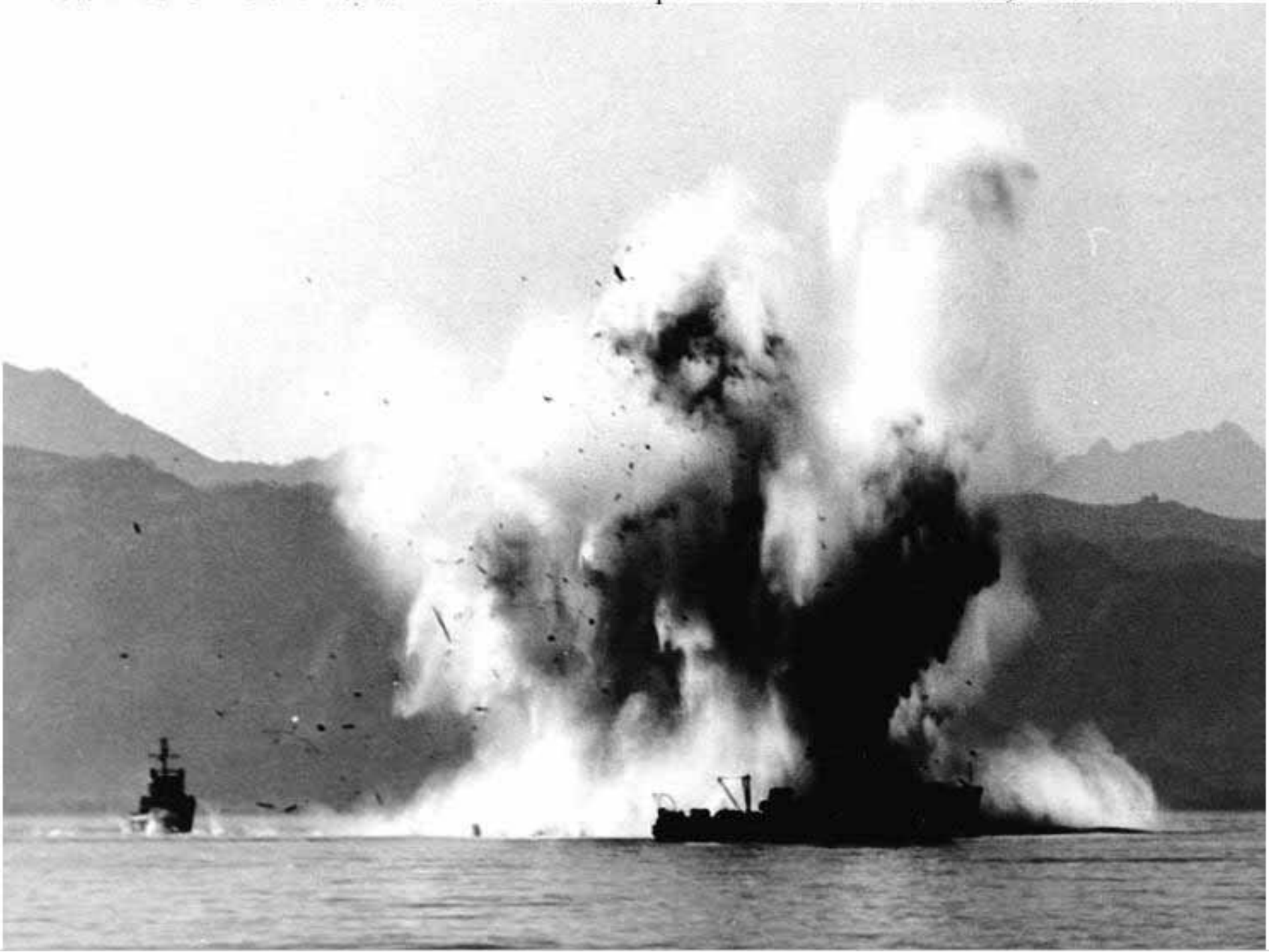


The Score Card

Number of Attacks

16
14
12
10
8
6
4
2

PIRATE

PRINCETON

STARK

LIBERTY

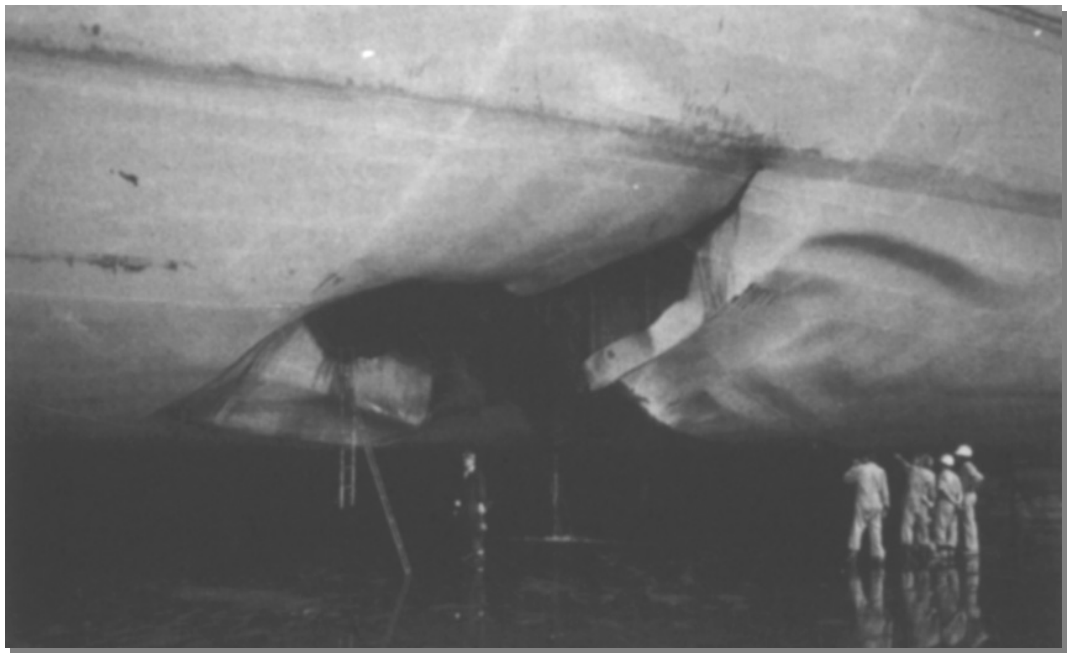
MINE	MISSILE	TORPEDO	AIRCRAFT	SMALL BOAT
PRINCETON	STARK	LIBERTY	HIGBEE	COLE
TRIPOLI			LIBERTY	
S.B. ROBERTS				
WARRINGTON				
WESTCHESTER COUNTY				
BARTON				
E.G. SMALL				
WALKE				
MANSFIELD				
BRUSH				
SARSI				
PARTRIDGE				
PLEDGE				
PIRATE				
MAGPIE				

Terrorist	2000
Iraq	1991
Iran	1987-1988
Israel	1967
Vietnam	1969-1973
Korea	1950-1952

Since the end of WW II mines have damaged or sunk four times more US Navy ships than all other means of attack!

Mines and IEDs in US Waterways

Emerging Naval Warfare: Mines and UWIEDs in US Ports and Waterways



Scott C. Truver, PhD
Gryphon Technologies
www.GryphonLC.com
April-May 2008

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Why Attack US Ports and Waterways?

- **Spectacular effects**
  - Sink ships...kill people...
- **Economic/Political effects**
  - Damage US economy...90+% US trade transits US ports
  - Direct and indirect impacts... 2002 West Coast “strike” cost $Billions
- **Military effects**
  - Frustrate/delay naval ops during crises and conflicts
- **The GWOT includes home waters, too**

Mines and IEDs in US Waterways

Port Closure (days) Scenario 1

- 100% Closure for Given Period – Decreasing 50%, 25%, Normal
- Seattle: 14% US Total — 30.0 Day Closure
- Full day equivalent until Recovery — 52.5 Days
- San Francisco: 25% US Total — 45.0 Day Closure
- Full day equivalent until Recovery — 75.0 Days
- LA/Long Beach: 25% US Total — 45.0 Day Closure
- Full day equivalent until Recovery — 75.0 Days
- Gulf Coast Ports: 18% US Total — 45.0 Day Closure
- Full day equivalent until Recovery — 67.5 Days
- All Other Seaports: 2.7% Total — 10.0 Day Closure

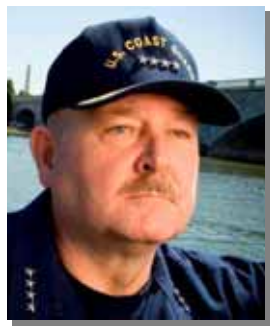
Scenario 1
Economic Results

- Personal consumption — Down 3.7 percent,
- Nonresidential construction — Down 4.4 percent,
- Equipment investment — Down 4.1 percent
- Residential construction — Down 5.0 percent.
- Export volume — Down 7.8 percent
- Import volume — Down 8.3 percent
- Real Disposable Income — Down 4.4 percent
- Gross Domestic Product (GDP) — Down 3.1 percent

- 3.1 percent reduction of GDP from baseline forecast implies a major recession for the economy.

Why Mines and U-IEDs?

- Are cheap, easy to acquire or build: "Baggy Mine"
- Can be deployed by submarines, surface ships, small craft, commercial vessels, pleasure boats, aircraft, helicopters, swimmers, trucks…
- Range from a few pounds to several tons H.E.
- Have a variety of firing mechanisms: remote control/command, contact, magnetic, acoustic, seismic, pressure or combinations…
- Are very difficult to detect, identify and counter once in the water
- Are the ultimate "asymmetric" weapons



What keeps me awake at night? The threat of water-born IEDs.

Admiral Thad Allen, USCG
Commandant, August 2007

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Mines and IEDs in US Waterways

Terrorist Use of Mines…

Those who cannot remember the past are condemned to repeat it.

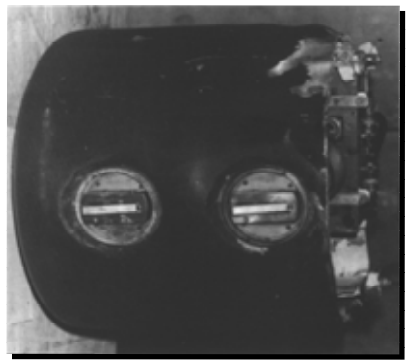
George Santayana
1906

- Mines also used in numerous "peacetime" crises, from October 1946 when two RN warships struck Russian mines in Corfu Channel…Contras mining Corinto harbor in 1984…to Persian Gulf "Tanker War"…to Tamil Tigers attacking Sri Lankan ships…to…

- The "Patriotic SCUBA Diver" crisis, January 1980
  - Phone call from "Patriotic SCUBA Diver" claimed to have placed a mine in the Sacramento River
  - "Terrorist" threat stopped all shipping
  - Required four days of mine hunting by USS *Gallant* (MSO-489) to determine the channel was safe: *Hoax!*
  - Economic impact of just merchant vessel "lay-days" estimated in the hundreds of thousands of dollars

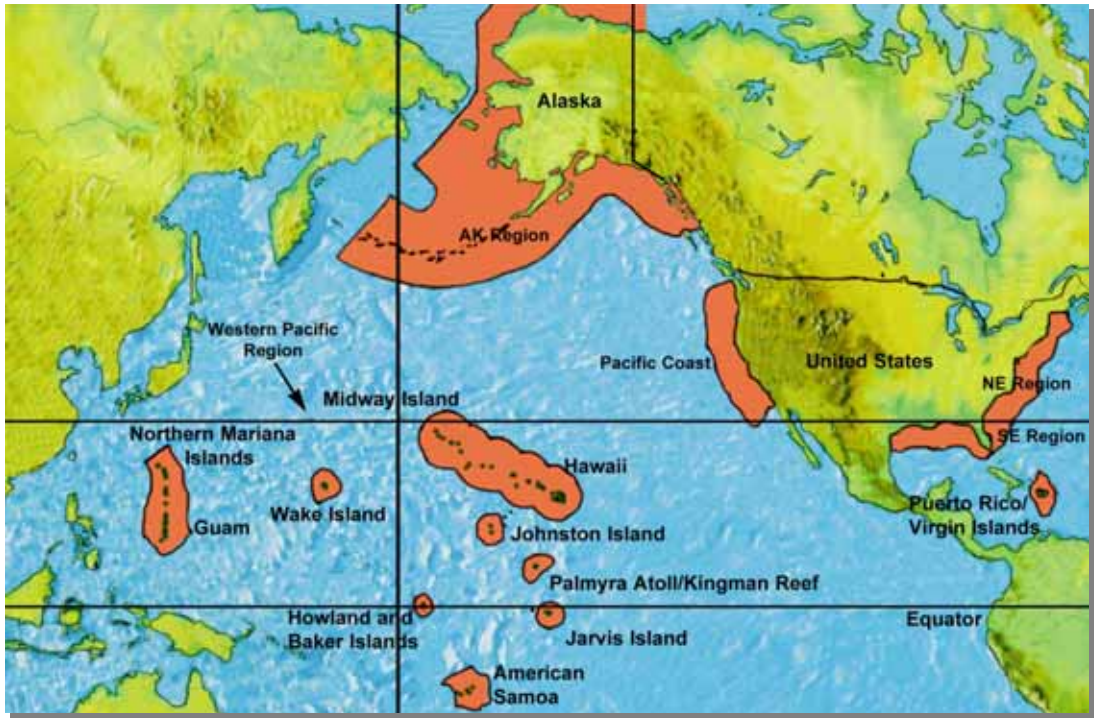
Two More to Consider...

- **"Mines of August" 1984**
  - Libyan naval personnel used the ferry *Ghat* to roll off "99501" mines in the Red Sea and Gulf of Suez
  - More than 19 ships reported damage from underwater explosions, which generated an intense multinational MCM response
  - Only one new mine recovered and rendered-safe by Royal Navy divers – a Soviet design unknown in the West: *Surprise!*



- **Floating IED in Lake Ponchartrain, 21 April 2004**
  - Tugboat operator spotted suspicious floating bag
  - USCG called and CG contacted Jefferson Parish bomb squad, which fished bag out of the water
  - IED with explosives in plastic pipes and timer wrapped in trash bags...possibly targeting presidential hopeful Senator John Kerry
  - Bomb squad neutralized IED with water cannon

“Tyranny” of US Geography



- 95,000 miles of coastline
- 3.5 million nmi^2 territorial seas and EEZs
- Inland waterways and Great Lakes
- Thousands of merchant and fishing vessels... millions of recreational craft...
- 361 ports of interest
  - 15-20 with strategic military/economic value
  - No two ports are alike, vary by geography, channels, navigation markers, bathymetry, winds, tides, currents, bottom sediment, turbidity, “infrastructure” – cables, pipelines, piers...
- Who’s in charge and can deal with threat?
  - USN...USCG?
  - Local bomb squads?
  - Department of Natural Resources police?
  - Police/fire department divers?

Mines and IEDs in US Waterways

MCM in US Ports and Waterways

- **The best MCM is preventing weapons from getting into the water in first place...or knowing where they might be: Maritime Domain Awareness!**
- **What we know...don't know...**
  - **Intelligence on terrorists and weapons is key**
  - **Port/Waterway surveys and change detection: Refrigerators *do* look like and *could be* mines**
- **Other federal, regional, state, local and tribal authorities and agencies: "Who's on First?"**
  - **Who "owns" the limpet on the commercial vessel or pier?**
  - **Is it Homeland Security or Navy or both ?**

Mine and UIED Conscious... "Beginning Last Week!"

"Torpedoes [mines] are not so agreeable when used by both sides; therefore, I have reluctantly brought myself to it. I have always deemed it unworthy of a chivalrous nation, but it does not do to give your enemy such a decided superiority over you."

RADM David G. Farragut
March 1864

"…when you can't go where you want to, when you want to, you haven't got command of the sea. And command of the sea is a rock-bottom foundation for all our war plans. We've been plenty submarine-conscious and air-conscious. Now we're going to start getting mine-conscious – beginning last week."

ADM Forrest Sherman
October 1950

"…I believe there are some fundamentals about mine warfare that we should not forget. Once mines are laid, they are quite difficult to get rid of. That is not likely to change. It is probably going to get worse, because mines are going to become more sophisticated."

ADM Frank B. Kelso, II
October 1991

Port U-IED Capability Study: Methods and Techniques for the Defeat of Underwater Improvised Devices in Port and Harbor Environments and Implications for NMAWC

Study Approach & Methodology

National Defense Industrial Association
Undersea Warfare Division
M/U-IED Steering/Workging Group Leads
20 March 2008

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UIED Study Objectives

- Conduct a study of the application of conventional and unconventional MCM assets and technologies to provide a cost-effective counter-U-IED capability for US ports, harbors and waterways. Focus expanded beyond "just" U-IEDs to include conventional mines, too.
- Three-phase effort:
  - Assessment of current capabilities––including multi-agency strategy, policy and command-and-control relationships––against projected terrorist threat
  - Exploration of alternative applications of technology
  - Conclusions and recommendations
- Answer the question: What in-service, programmed and alternative technologies, systems, platforms, ConOps and TTPs can help NMAWC defeat the threat of mines and U-IEDs in US ports, harbors and waterways?

Define Important TOR Terms

- ***Defeat the threat:*** **all counter-M/U-IED strategies, capabilities, ConOps/TTPs to protect US ports and waterways from terrorist threat**
- ***Conventional assets and technologies:*** **Existing and programmed USN MCM assets and systems––Intel, AMCM, SMCM, UWMCM**
- ***Conventional applications:*** **Current USN MCM ConOps and TTPs**
- ***Alternative assets and technologies:*** **MCM technologies, systems and platforms not in current USN MCM service or programmed**
- ***Unconventional assets and technologies:*** **Technologies, systems and platforms in service, planned or under development for non-MCM applications, e.g., ROVs to inspect offshore oil platform legs or pipelines**
- ***Unconventional applications:*** **New ConOps/TTPs for conventional, alternative and unconventional assets and technologies**
- **Address US *and* international resources**

U-IED Study Management

- **Study Leader**
  - **Scott Truver**
    Gryphon Technologies LC
- **Steering Committee**
  - **Eric Holmes**
    Lockheed Martin
  - **Bill Key**
    WK Technical Group LLC
  - **George Pollitt**
    APL/JHU
  - **Tom Casey**
    Lockheed Martin
- **SOPA (Senior Oversight, Programs and Advisory) Committee**
  - **Senior Leaders**

U-IED Study Structure

- **Working Group One**
  - **Strategy, Policy & Agency Context**
  - **Capt Mike Kynett, NORTHCOM**
- **Working Group Two**
  - **Threat & Domestic M/U-IED Requirements**
  - **Lee Hunt, MIW Consultant**
- **Working Group Three**
  - **Current Capabilities & Gaps**
  - **RAdm Rick Williams, USNPGS**
- **Working Group Four**
  - **Assess Alternative Counter-M/U-IED Concepts**
  - **Chuck Fralick, SAIC Arlington**
- **Working Group Five**
  - **Implications for NMAWC**
  - **Steering Committee, SOPA Committee, WG Chairs**

Working Group One Tasking
Strategy, Policy & Agency Context

- **Identify and explain responsibilities, roles, missions and tasks of key actors**
  - **DHS/USCG, DOD/NORTHCOM, DON/USN/NMAWC**
  - **Other Federal Stakeholders (e.g., DoJ/FBI)**
  - **Regional, state, tribal and local agencies and industry**
- **Evaluation of planning, command and control relationships and MoAs, e.g.:**
  - **2005 National Strategy for Maritime Security**
  - **MOTR**
  - **2005/2006 DoD/DHS MoAs, 2008 USCG/USN MoA**
- **Preliminary implications for NMAWC: Who's got the "CONN"?**
  - **Normal, pre-crisis interactions and activities**
  - **Crisis situations and response**
  - **Post-crisis remediation**

Working Group Two Tasking
Threat & Domestic M/U-IED Requirements

- Assessment of the terrorist threat, M/U-IED weapons, strategy and tactics
  - Conventional mines and unconventional devices
- Risk assessment of each CONUS port proposed as examples
  - Identify and describe port/waterway focus (descriptive/quantitative data for each) - Narrow, short fairway (Long Beach), Large natural harbor, long fairway (New York), Inland waterway, long fairway, multiple access points (Great Lakes Seaway)
  - Evaluate Potential for political, economic and military harm
- Describe port M/U-IED operational situation (similar/unique features)
  - Conventional MCM asset availability, Critical targets and target types
  - Physical and environmental conditions and operational constraints
- Notional Counter-M/U-IED operational requirements and tasks
  - Intel Preparation of the Environment…strategic…tactical…
  - Pre-incident operations: route surveys, MCM assets and logistics support
  - Priorities for ports and waterways during "event", Way is Clear Timelines

Working Group Three Tasking
Current Capabilities & Gaps

- **Using Results of WGs 1&2, Provide assessment of conventional/existing USN MCM capabilities and capacities**
  - **Focus on in-service and programmed technologies, systems, platforms and force structure and conventional ConOps/TTPs - Address general and specific threats, operational environments and top-level operational requirements for sample ports**
- **Identify capabilities gaps that must be addressed to meet top-level requirements suggested by WG 2 and NMAWC/USCG**
  - **Sufficiently describe gaps to permit future resolution of gaps**
- **Assess resolution of identified gaps through adaptation of:**
  - **In-service/programmed conventional capabilities**
  - **New ConOps and TTPs**
- **Identify, qualify and quantify capabilities gaps that remain**
  - **Provide listing of gaps with detailed discussion**
  - **Provide initial listing of unconventional MCM capabilities to address gaps**

Working Group Four Tasking
Assess Alternative Counter-M/U-IED Concepts

- **Incorporate results of WG 3, identify potential conventional and unconventional alternative M/U-IED technologies, systems and platforms…**
  - **Not included in USN program of record or MIW plans**
  - **From US and international sources**
- **Risk Assessment for each CONUS port**
  - **Narrow, short fairway port (Long Beach), Large multi-access harbor, long fairway (New York/New Jersey), Inland waterway, long fairway with multiple access points (Great Lakes Seaway)**
  - **Evaluate potential for political, economic and military harm and derive estimates of the level of harm to local, regional and national frameworks**
- **Assess Effectiveness of selected alternative and unconventional technologies, systems, platforms and ConOps/TTPs for:**
  - **Operational feasibility - Applicability in ports/harbors/waterways of interest**
  - **Effectiveness against threat - Precedent applications**
  - **Cost**
- **Provide findings and recommendations**