

Writing US Naval Operational History 1980-2010

US Navy Mine Countermeasures in Terror and War

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Naval History and Heritage Command Speakers Series
Needs and Opportunities in US Naval History

31 August 2016

[USN MCM in Terror and War: An Historiography](#)

When Dr. Michael Crawford, Senior Historian, NHHHC, invited me to prepare a paper on the “needs and opportunities in U.S. Naval History in the post-World War II” period, my first thought was: “Doesn’t he know that I’m NOT an historian?”

Of course I took several history courses at college.

But I wondered about the relevance of “REN and REF” — “Renaissance and Reformation” — I was thinking about becoming a Lutheran pastor — to what Mike proposed, which was:

Very broad!

I was to address the historiography of the Navy’s security roles and operations throughout virtually the entire world since 1980, and the Navy’s role in counter-piracy since the 1820s.

So we met, and he assured me that all would be good.

However, we agreed to rethink the discussion of counter-piracy since the 1820s and refocus on the 1980 to 2010 period.

The goal was to provide a perspective of the “Post-Vietnam War, Post-Cold War, Post-9/11” Navy and assess how U.S. Navy operations have been addressed in the English-language historical literature to carry out the tasks shown here.

Nevertheless, I remained concerned by the use of “everything of significance” about USN global ops.

To bound the problem, I did a preliminary search of NHHHC/ Navy Library holdings, resources at the Naval War College and Naval Postgraduate School libraries, the Center for Naval Analyses library, the Library of Congress and JSTOR, and Google Scholar, Google Chrome and Bing.

I focused only on *operations* — I did not include the much more numerous *exercises* — but still came up with 158 named operations from 1980 to 2010, shown here sorted by decade, types of operations, frequency, and regions.

Initial Tasking

➤ **Operations:** Address the historiography of the Navy's security roles in reference to China and Southeast Asia, Africa, South America, and Europe, particularly since 1980, and the Navy's role in *counter-piracy since the 1820s*.

- Identify what has been published on the subject of *Navy operations from 1980 to 2010*, including counter-piracy ops
- Explain the broader historical context and the subject's historical significance
- Map out the scholarly landscape by *reviewing everything of significance* published on the subject, and
- Identify needs and opportunities to help *set the agenda for the research and writing of the history of US Navy operations for the next 20 years*

I gave up on counter-piracy ops from 1820 to 1980.

A quick-and-dirty assessment of time to complete my task was about 1,200 hours.

I again met with Michael: how can we cut this down and still meet the NHHC's goals?

Because of my interest in naval mine warfare, I suggested, and he agreed, to focus on two USN mine countermeasures operations in the post-1980 era.

The first was the 1984 "Mines of August" state-sponsored terrorist mine-crisis in the Red Sea and the Navy's **Operation Intense Look** response.

The second was the Desert Shield/Storm **Operation Candid Hammer** in the Arabian Gulf 1990-1991.

Michael reminded me that the focus of the project was on the *historiography of these two operations not the operations, themselves*.

So, my revised tasking was now as shown here.

The actual, official name of the 1990-1991 Desert Shield/Desert Storm MCM operations proved difficult to determine, with "Candid Hammer," "Desert

Sweep," "Desert Clean Up," and "Arabian/Persian Gulf MCM Ops" used by various sources.

Some characterized Candid Hammer as an "exercise" while others used "operation."

An informal survey of an Internet MIW "community of interest" that included Navy personnel who took part in the Desert Shield/Storm MCM ops revealed that none had even heard of "Candid Hammer."

Dates were uncertain, too, although an "early-August 1990-to-early-October 1991" period for the overall U.S. Navy MCM/EOD operations seems reasonable.

These ambiguities complicated the Desert Shield/Desert Storm MCM bibliographical searches.

So, why should we care?

Sea mines and the need to counter them have been constants for America since Bushnell's *Turtle* in 1776. Mine warfare figured prominently in the Civil War, Spanish-American War, both World Wars, Korea, Vietnam, several Cold War crises (including at least one hoax), and in Operations Earnest Will, Desert Shield/Storm and Iraqi Freedom.

Bounding the Problem: 158 Ops

Operations by Decade:

1980-1989: 49
1990-1999: 85
2000-2010: 24

Types of Operations by Intensity:

Peace operations/forward presence: 15
Humanitarian assistance/disaster relief: 15
Freedom of navigation: 3
Maritime interception: 3
Counter piracy: 3
Non-combatant evacuation: 26
Show of force: 49
Contingent positioning: 20
Combat: 24

Frequency of Operations:

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Maritime interception: 3
Freedom of navigation: 3

Operations by World Region:

Mediterranean: 51
Arabian Gulf: 32
Africa: 27
Western Hemisphere: 18
Pacific: 14
Indian Ocean: 6
Southwest Asia: 4
United States: 3
Europe: 2
Red Sea: 1

The 1990-1999 period was the busiest, 54% of the total ops. Show of Force ops were the most frequent, 31%. And, the Mediterranean/Arabian Gulf accounted for 53% of the ops across all ten regions.

Revised Tasking

- **Operation Intense Look “Mines of August” mine-crisis in Red Sea, July-October 1984**
- **Operation Candid Hammer/Gulf War MCM, August 1990-October 1991**
 - Identify what has been published on *Operations Intense Look* and *Candid Hammer* (and other Arabian Gulf MCM ops in Desert Shield/Storm 1990-1991)
 - Explain the broader *historical context* and Navy mine warfare’s *historical significance*
 - Map out the scholarly landscape by reviewing *everything of significance* published on *Operations Intense Look* and *Candid Hammer*
 - Identify needs and opportunities to help *set the agenda* for the research and writing of the *history of U.S. Navy mine warfare*, generally, but with a *specific focus on mine countermeasures*

The Navy increasingly worries about anti-access/area-denial challenges. These “weapons that wait” are the quintessential A2/AD threats. They can be put in place by virtually any platform — aircraft, surface ships and craft, submarines... you name it — and their low cost belies their effectiveness.

Navy data indicate as many as a million sea mines of more than 300 types are in the inventories of more than 50 navies world wide, not counting underwater improvised explosive devices.

More than 30 countries produce and more than 20 countries export mines. Even highly sophisticated weapons are available in the international arms trade.

And, the Navy’s experience attests to the seriousness of the mine threat: Since the end of World War II, mines have severely damaged or sunk four times more U.S. Navy ships than all other means of attack.

OK: four of these 15 mine-victims were minesweepers clearing the way for U.N. naval forces during the Korean War, but that underscores the dangers from mines.

Beginning on 9 July and continuing through 20 September, several commercial vessels reported “underwater explosions” in the Red Sea.

At least 16 — and perhaps as many as 19 — ships transiting the Gulf of Suez

and as far south as the Bab el Mandeb claimed they had been mined.

Various extremist groups claimed responsibility for planting weapons, with Islamic Jihad boasting it had laid “190 mines to punish the imperialists.”

U.S. Navy MCM and EOD teams joined a loose international MCM coalition comprising Egypt, France, Italy, Great Britain, The Netherlands, and the Soviet Union.

The U.S. involvement in theater was from 13 August to 1 October 1984, but the Navy detected no mines.

Other-navy MCM forces swept several mines, including ordnance that dated to before World War II.

The British detected, rendered safe and exploited a recently deployed weapon — the absence of sea growth indicating it had not been in the water long — an advanced Soviet multiple-influence mine of a design that had never been seen in the West.

It was later determined that the mines were deployed from the Libyan commercial ferry, *Ghat*. Manned by a Libyan navy crew and the head of the Libyan mine-laying division, she entered the Red Sea southbound from the Suez Canal on 6 July, having declared “general cargo,” and she returned northbound, with no cargo declared, at the Canal on 23 July.

Historical Context: Why Do We Care?

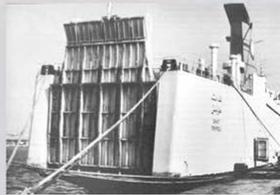
➤ A global A2/AD threat:

- Russian navy has about 250,000 mines
- Chinese navy has about 80,000 mines
- North Korean navy has about 50,000 mines
- Iranian navy has about 6,000 mines



Operation Intense Look 1984

- July-September 19 vessels reported “underwater explosions,” at least 16 were mine victims
- USN joined international MCM coalition, deployed 4 RH-53D AMCM helos; USS *Harkness*, *La Salle*, *Shreveport*; EOD dets
 - 13 August-1 October
- Royal Navy recovered sophisticated Soviet bottom mine: the “smoking gun”
- Libyan navy crew rolled mines off ferryboat *Ghat*



and types of 1,167 mines. Clearance operations involved Belgium, France, Germany, Great Britain, Italy, Japan, and the Netherlands, as well as the United States.

The last time the Navy confronted a similar mining event was off Wonsan, North Korea, in October 1950, when 3,000 Russian mines kept a United Nations amphibious task force at bay and prompted the task force commander Rear Admiral Allen Smith to lament:

“We have lost control of the seas to a nation without a Navy, using pre-World War I weapons, laid by vessels that were utilized at the time of the birth of Christ.”

With that as prelude, I began a focused search to build the bibliography

MCM deployment commenced immediately after Saddam Hussein invaded Kuwait on 2 August 1990. All elements of the “MCM Triad” — EOD divers, MCM surface vessels, and AMCM helicopters — turned to

of “everything of significance” about Intense Look and Candid Hammer.

I revisited the nine sources noted earlier.

The EOD contingent also included the Navy’s Marine Mammal Systems — MCM bottlenose dolphins that detect and neutralize buoyant, close-tethered, bottom and buried mines. The MCM dolphins also deployed in support of Earnest Will in 1988 and Iraqi Freedom in 2003.

The Library of Congress site was difficult to maneuver, and many hours with JSTOR produced little of value.

Remarkably, Google Scholar identified many useful “hits” and cross-referenced citations. But there was much “chaff” to winnow: a 14 May 2016 keyword search involving com-

On 18 February the USS *Tripoli*, which had embarked the Navy’s AMCM helicopters, and the guided-missile cruiser USS *Princeton* suffered mine-strikes.

Although *Princeton* restored some warfare capabilities within a couple of hours, she ultimately was a mission-kill and had to be towed to port and later heavy-lifted home: \$110 million to repair damage from a \$15 thousand weapon.

Despite a 16-by-20-foot gash below the waterline, *Tripoli* continued AMCM flight ops for another five days.

After hostilities ended, Iraq provided detailed charts showing the location

Operation Candid Hammer/Gulf MCM

- MCM deployment began 2 Aug 1990
 - Six MCM helos from HM-14 ready 4 Aug but strategic airlift priorities delayed to 4 Oct
 - EOD dets in theater mid-Aug, MCM ops began 12 Feb 91
 - Four MCM vessels heavy-lift to Bahrain 3 Oct, MCM ops began 16 Feb
- Two USN warships “mined” 18 Feb
 - USS *Tripoli*
 - USS *Princeton*
- Multinational MCM coalition accounted for 1,167 Iraqi mines
 - European MCM forces completed ops 20 July
 - USN and Japan MSDF completed early Oct
- “We have lost control of the seas...”



binations of “US Navy/mine warfare/ Operation Intense Look/Red Sea/1984” resulted in about 13,400 items to be reviewed.

A similar search on Operation Candid Hammer produced much fewer results — just three! — and only a handful more when the search was broadened to “Desert Shield/ Desert Storm Arabian/Persian Gulf War MCM operations 1990-1991.”

However, the “mother load” was the Mine Warfare Bibliography constructed and maintained by Greta Marlatt, Senior Research Librarian, Dudley Knox Library at the Naval Postgraduate School.

Likewise, Dr. Timothy O’Hara, Research Scientist at the Center for Naval Analyses, searched the CNA library and archives for this project.

General Articles

The search turned up 215 articles related to Operation Intense Look, published between 9 July and 21 October 1984, but only 13 articles for Operation Candid Hammer/Gulf War MCM operations that spanned more than a year.

Most Operation Intense Look articles were “today’s news,” reporting what had transpired in the previous 24 hours or so, and thus should not be considered “history.” However, they were secondary-sources for the more scholarly articles and publications.

Three articles on the “mines of August” have served as unofficial histories and have been referenced numerous times:

- My USNI *Proceedings* “Mines of August: An International Whodunit” (May 1985);
- Jan Breemer’s “Intense Look: U.S. Minehunting Experience in the Red Sea” (*Navy International* August 1985); and
- Retired Royal Navy Captain John Moore’s overview, “Red Sea Mines a Mystery No Longer” (*Jane’s Naval Review* 1985).

Among what must be tens of thousands of publications related to Operations Desert Shield/Desert Storm, generally, the 13 articles specifically addressing mine countermeasures topics in Desert Shield/ Storm/Candid Hammer provided varying historical perspectives, mostly lessons re-learned, for example:

- Captain J. M. Martin focused sharply on lessons “We Still Haven’t Learned” in the July 1991 USNI *Proceedings*.
- Lieutenant Ernest Fortin addressed the nature of the mine threat — “Those Damn Mines” in the February 1992 *Proceedings* — and how to counter it.
- In the October 1992 USNI *Proceedings*, Commander Rick Nagle outlined the difficult challenges that the Navy’s EOD forces confronted in the Gulf.

And, writing in the Summer/Fall 1992 *Amphibious Review*, Carle White discussed how the Navy’s MCM assets addressed the shallow-water threat.

As noted, there was an important international component to the Desert Shield/Storm/Candid Hammer MCM operations:

- David Foxwell had four articles in the *International Defense Review* (one with David Brown) — “The Gulf War in Review: Report from the Front” (5/1991); “MCM and the Threat Beneath the Surface” (7/1991); “Mine Warfare in an Uncertain World” (5/1992); and “Naval Mine Warfare: Underfunded and Underappreciated” (2/1993) — that addressed the challenges from our allies’ perspectives.
- Similarly, Anthony Preston’s “Allied MCM in the Gulf” (*Naval Forces* 4/1991) and Vice Admiral Josef De Wilde’s “Mine Warfare in the Gulf” (*NATO’s Sixteen Nations* 1/1992) remind that the global aspects of the threat demand collaboration and cooperation among friends.

“Everything of Significance”

- General articles ✓
- Books ✓
- Center for Naval Analyses reports ✓
- Command histories ✓
- US Government publications ✓
- Academic pubs ✓



Books

I could find no book-length, history specific to either Operation Intense Look or Operation Candid Hammer/Gulf War MCM —along the lines, for example, of Edward Marolda's history of mine-sweeping operations in North Vietnam, Operation End Sweep, published by the Naval Historical Center in 1993. Instead, several significant discussions were "embedded" in publications taking the broader focus.

For Operation Intense Look

David Crist's *Twilight War: The Secret History of America's Thirty-Year Conflict with Iran* (2013) in Chapter 13 weaves an eloquent story that begins in "...the morning of July 6, 1984, the small cargo ship *Ghat* left Libya on its way to the Eritrean Port of Assab...."

Greg Hartmann and I collaborated on the 1991 update of Hartmann's original 1979 edition of *Weapons that Wait: Mine Warfare in the U.S. Navy*. The discussion of Operation Intense Look relies heavily on "Mines of August" but was updated to take advantage of information not available in 1985.

Howard S. Levie's *Mine Warfare at Sea* (1992) devotes just three pages to Intense Look and provides little that was new.

Tam Moser Melia's *Damn the Torpedoes* (1991) provides good operational information but in only two pages.

Turning to Operation Candid Hammer/Gulf War MCM

- Anthony Cordesman and Abraham Wagner allocated eight pages in their 1,000-page *The Lessons of Modern War, Volume IV: The Gulf War* (1996), but they provided excellent treatment of the MCM ops.
- Marvin Pokrant's *Desert Storm at Sea: What the Navy Really Did* (1999) devotes Chapter 9 to mine countermeasures, a good deal of Chapter 12 to post-hostilities mine clearance, and all of Chapter 15 to "Observations on Mine Countermeasures."
- Ed Marolda and Robert Schneller's *Shield and Sword* (1998) provides significant discussion of the Iraqi mine threat, the U.S. Navy and Coalition MCM assets and capabilities, and pre-/post-conflict operations.

Finally, Andrew Lambert's "The Naval War" chapter in *The Gulf War Assessed* (1992), provides a detailed analysis of the naval campaign, generally, but offers sharp judgment from a U.K./Royal Navy/ European perspective about the "major weakness" of USN MCM.

These four books make a significant contribution to the historiography of Desert Shield/Storm/Candid Hammer MCM ops.

Center for Naval Analyses Reports

I call out CNA because of its unique position as the Navy's think-tank.

Three reports figure into the historiography of mine warfare in Candid Hammer/Shield/Storm, but we could not find anything specific regarding Intense Look.

- Sabrina Edlow and colleagues provided a chronology of U.S. Navy *mining*, as opposed to mine *countermeasures*. CNA notes, "the United States employed naval mines during the opening days of *Operation Desert Storm*.... Four A-6s from *USS Ranger* sortied, but only three returned.... On-scene commanders recalled no impact on Iraqi operations from this mining effort. They chose to discontinue mining operations." This was the last time the Navy deployed mines in real-world ops — at least as far as I can tell.
- Dwight Lyons and CNA colleagues discussed "The Mine Threat: Show Stoppers or Speed Bumps" (July 1993) and concluded, "the lesson from Desert Storm is not that mine fields are impenetrable, but that if you ignore the threat, you pay for it."
- The third is Ralph Passarelli, *et alia*, *Desert Storm Reconstruction Report, Volume IV: Mine Countermeasures*, October 1991. This remains classified. Colleagues who have had access to this report note it is very comprehensive and objective.

Command Histories

Squadron and ship command histories provided some insight into the "operators' viewpoint" in both operations. I've included here an excerpt from the **USS Shreveport (LPD-12)** history 1984:

"...in response to orders received calling for embarkation of Helicopter Mine Countermeasures Squadron FOURTEEN, with four RH-53D helicopters. SHREVEPORT had been assigned as the support ship for Airborne Mine Countermeasures in conjunction with Operation "Intense Look" in response to the mining of the Gulf of Suez and the Red Sea.... [A]nchored off Ras Shukheir on the 16th and was joined by USNS HARKNESS. The remainder of the day was spent conducting briefings.... For the next thirty days, mine hunting operations continued in the Gulf of Suez from sunrise to sunset...."

In all, I was able to locate command histories of five ships — USS *Avenger*, *John T. Hall*, *Impervious*, *Leader* and *Shreveport* — and Helicopter Support Squadron Four.

But, the command histories of the following ships and AMCM helicopters deployed to either Intense Look or Candid Hammer/Gulf ops were not available:

- AMCM Helicopter Squadron Fourteen [classified]
- USS *Adroit*
- USNS *Harkness*

Government Publications

The Department of Defense in April 1992 submitted its *Final Report to Congress: Conduct of the Persian Gulf War*. It concluded that the Iraqi mine threat affected almost all naval operations during the Persian Gulf Conflict.

The May 1991 Department of the Navy/Chief of Naval Operations report, *The United States Navy in "Desert Shield/Desert Storm,"* served as a stepping stone in the development of the Navy's first post-Cold War MINE WARFARE PLAN. The conflict had "...again illustrated the challenge of mine countermeasures (MCM) and how quickly mines can become a concern... [and] highlighted the need for a robust, deployable U.S. Navy MCM capability."

The January 1992 MINE WARFARE PLAN: Meeting the Challenges of an Uncertain World (U), was produced initially at the request of the Assistant Chief of Naval Operations (OP-03) but, as a result of increased awareness of the mine threat, Chief of Naval Operations Admiral Frank Kelso personally approved the plan and the programs it championed.

One objective of the 1992 Plan was to put mine warfare within what later that year would be the ...*From the Sea* strategic context. The Plan surveyed post-World War II mine crises and examined the changed strategic framework, the nature of the global mine threat, enduring as well as emerging requirements, in-service capabilities to meet these needs, programs to address gaps and shortcomings, and resources to carry bring reality rather than rhetoric to the Nation's mine warfare mission area.

Academic Publications

Only a handful of international law-related articles touched upon the Red Sea mine crisis, if only tangentially, for example:

- Abunafeesa's "The Post-1970 Political Geography of the Red Sea Region with Special Reference to United States Interests" (1985);
- Reed's "'Damn the Torpedoes!': International Standards Regarding the Use of Automatic Submarine Mines" (1984); and
- Wainwright's "Navigation through Three Straits in the Middle East: Effects on the United States of Being a Nonparty to the 1982 Convention on the Law of the Sea" (1986)

There has been a surprising number of mine warfare papers at war colleges and postgraduate schools. However, there is little that is new, and most use the "Mines of August" and Desert Shield/Storm/Candid Hammer experiences to advocate for policies and programs. For example:

- Dr. Ray Widmayer — "A Strategic and Industrial Assessment of Sea Mine Warfare in the Post-Cold War Era" (Industrial College of the Armed Services, 1993) — outlined a strategic framework for a robust mine warfare industrial base.

This survey of the historiography of two U.S. MCM operations revealed what might have been expected at the outset. As much as mines have had strategic, operational and tactical impacts, MCM remains a niche warfare area — even more so when the Navy's mines and mining are brought into the discussion.

And so it seems for histories of mine warfare operations, too.

There are the challenges of working USN subjects that have classified materials. The CNA library has "thousands" of classified materials/reports/ message traffic relating to Desert Shield/Desert Storm MCM, but I had no access to them. Even NHC had materials I couldn't see.

That begs the question: where to look for mine warfare historical resources within the U.S. Navy? This is problematic, given the challenges of a fragmented warfare community. Mine Warfare in the Office of the Chief of Naval Operations — the Navy's headquarters — is centered in the Director of Expeditionary Warfare, but other naval warfare "sponsors" have overlapping and sometimes competing responsibilities for ships, helicopters, and unmanned systems.

The Navy's mine warriors suffer from organizational "churn." For example, prior to 2006, the Commander Mine Warfare Command — in Charleston, SC, and Ingleside, TX — had operational control of the MCM "triad" and mines. Then the Navy disestablished COMINWARCOM and stood

Needs, Opportunities, Agenda

- MCM “niche warfare area” reflected in “niche-historiography”
- My experience with constraints of access will repeat in future mine warfare histories
- Begg question: Where to look for MIW data?
 - Fragmented warfare community
 - No single repository of historical information, exacerbated by shooting self in foot
- Last serious book-length MIW history 1992
- Now, about those other 156 USN operations since 1980...

up the Navy Mine and Anti-submarine Warfare Command “N-MAWK” — at San Diego, CA — which commanded mine warfare as a secondary mission. The Navy disestablished NMAWC in 2015 and established Surface and Mine Warfighting Development Command — “SIMWIDIC” still in San Diego — for ships and weapons, but no operational control. The force responsibility for the AMCM helicopters resides in the Commander, Naval Air Forces — San Diego — but the two AMCM helicopter squadrons are based in Norfolk, VA. And, the Naval Expeditionary Combat Command — Little Creek, VA — has had EOD cognizance.

Conducting historical research in mine warfare thus looks to be a “Where’s Waldo?” evolution.

It does not help when the community shoots itself in the foot. Mine warfare expert George Pollitt explained,

When COMINWARCOM was in Charleston, there was an MIW archive kept at the Naval and Mine Warfare Training Center. This archive had operational data going back to before WW I. When COMINWARCOM moved to Corpus Christi, the archive was culled and the part that was retained was stored in boxes in the SECRET vault at COMINEWARCOM. I was told that, when COMINEWARCOM was disestablished, all the remaining archive was destroyed.

Looking ahead, since 1992 there has been no book-length publication focused solely on the history of mine warfare in the U.S. Navy. But, much has transpired since then: MIW visions; strategies; threats; requirements; capabilities; R&D and acquisition programs; and operations — all have been in flux.

The U.S. Navy confronted a Iraqi mine threat in Operation Iraqi Freedom (2003), but nothing like 1990-1991 or 1950 for that matter.

And, underscoring the terrorist threat, in May 2008 Tamil Black Tiger commandos used limpet mines to sink the (ill-named) MV *Invincible*, a Sri Lankan navy cargo ship loaded with explosives.

Perhaps it *is* time to update/revise *Weapons that Wait*.

Another prospect would be a book-length history of the Navy’s Marine Mammal Systems program.

My experience on the historiography of Operations Intense Look and Candid Hammer/Gulf War MCM ops could easily be repeated with the other 156 or so global 1980-2010 U.S. Navy Operations outlined at the beginning of this paper. Official sources will remain difficult to access due to classification, and where to locate materials remains uncertain.

But that’s the stuff that *real* Navy historians deal with every day!

At the end of the day, then, the issue is not *whether* we will experience a mining “event,” but *when* and *where* it will happen and whether we will be ready to defeat the A2/AD mine threats.

I recall reading something about either learning from history or repeating it.

And, in that regard, I have no doubt that naval mines, like The Poor, will be with us, always.

Again, my thanks to:

- Michael Crawford and the NHHC for the opportunity to share my thoughts;
- the Command’s Archives Specialist, Tim Duskin, for his help with command histories;
- my colleagues George Pollitt, Norman Polmar, Peter Swartz and Rick Williams for their broad-spectrum assistance; and

- Greta Marlatt at the Naval Postgraduate School library and Tim O'Hara at CNA for bibliographic support.

NOTE: A MORE COMPREHENSIVE AND DETAILED DISCUSSION OF THIS TOPIC HAS BEEN SUBMITTED TO THE NHHC FOR POSTING AND POSSIBLE PUBLICATION.

A mine is...



...a terrible thing that waits...