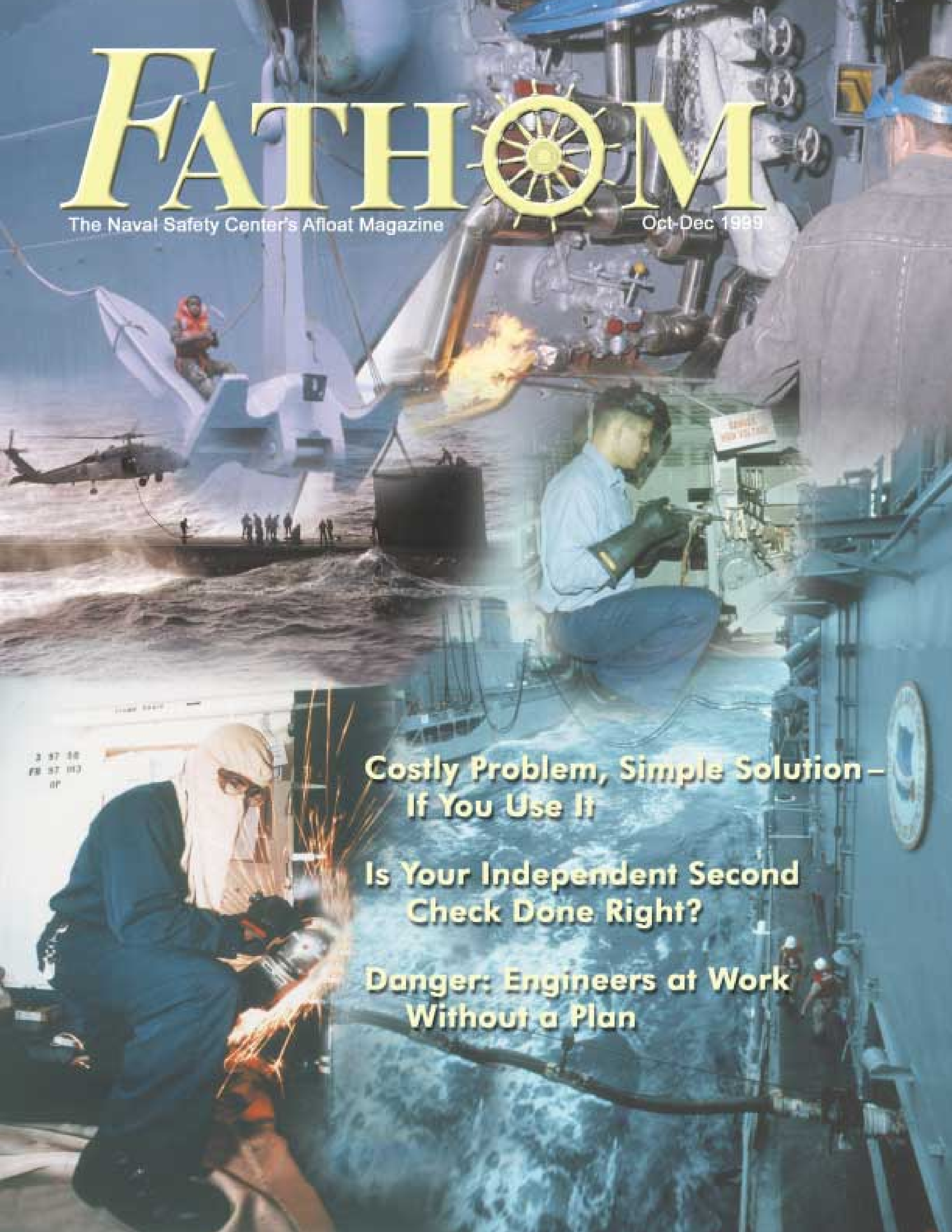
FATHOM

The Naval Safety Center's Afloat Magazine

Oct-Dec 1999



Costly Problem, Simple Solution – If You Use It

Is Your Independent Second Check Done Right?

Danger: Engineers at Work Without a Plan

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October-December 1999

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Features

Correction

"The Key to Mishap Prevention: Not What Happened, But Why" in the July-September 1999 issue contained incorrect information. The error is in the category "medical," listed under unsafe crew conditions in the identification of causal factors. Here is the correct information:

"For mishaps caused by medical conditions, the following categories are to be identified: (1) adverse physiological conditions, meaning conditions such as illness, obesity or intoxication, which affect job performance, or (2) adverse mental conditions, such as loss of situational awareness, overconfidence or complacency, which affect job performance."

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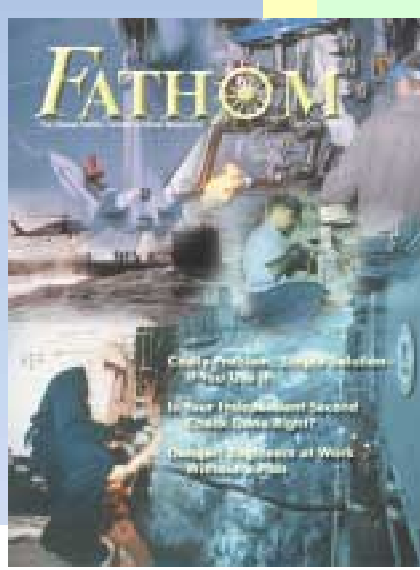

Cover

Sailors do a wide variety of hazardous jobs. With operational risk management, though, they can reduce the risks to themselves and the equipment they use.

Volume 31, Number 4, 1999

Articles

Departments

“I Won’t Be Able To Eat Steak Tonight”

By Lt. Tom Binner, Naval Safety Center

That was the only complaint a mariner aboard a Military Sealift Command (MSC) replenishment ship had after an unrep mishap landed him in a Navy dentist’s chair for treatment of a swollen lip and three broken teeth.

The mariner’s problems started as he was sending a fueling rig to a frigate that was alongside the MSC ship to starboard. An aircraft carrier was alongside to port. The shotline and messenger for the rig already were across to the frigate when the mariner released the lower restraining strap (“belly band”) on the fueling hose. An unexpected roll put a heavy strain on the line, causing the quick-release device to disconnect and smack him in the face.

A helo took the injured mariner to the aircraft carrier where the dentist treated him and sent him back to his ship. If ORM had been used for this event, the unrep would have been a piece of cake, and the mariner would have been able to have his steak, too.

If you’re one of the skeptics who aren’t sure ORM works, read these praises from the fleet:

USS Kinkaid *(DD 965)*-“Since receiving ORM training and using the process, we have greater knowledge and understanding of routine operations. We pay more attention to detail.”

USS Clark *(FFG 11)*-“We have reduced injuries and liberty incidents. Before a holiday-leave period started, we held ORM training, and everyone came back without a scratch.”

USS The Sullivans *(DDG 68)*-“We have had fewer incidents, thanks to ORM.”

USS Elliott *(DD 987)*-“We have not had any incidents while using ORM. Unrep and navigation evolutions are safer, and watchstanders are more confident about the processes involved.”

USS Decatur *(DDG 73)*-“ORM has become a part of our everyday life for all evolutions and drills. It makes the crew think twice about what they’re doing and how to prevent mishaps.”

USS Supply *(AOE 6)*-“I feel that if ORM wasn’t used during our unrep briefs, we wouldn’t have a track record of incident-free unreps.”

USS John C. Stennis *(CVN 74)*-“We used ORM for our two swim calls in the Arabian Gulf and successfully put 5,000 people in the water without an incident.”

We know there are more ORM success stories out there, and we’d like to have you share them with us, so we can pass them along to the fleet. We will feature similar stories in every issue of *Fathom*. Here’s a chance to blow your own horn. Sound off and be counted for ORM. It’s not just another program; it’s a way of life. Send your contributions to the *Fathom* editor, e-mail ktestorff@safetycenter.navy.mil.

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Editorial:

Feel Secure? Better Watch Out

By GSCS(SW) Bradley Spahnie,
Naval Safety Center

You're at the end of a major operation. The sea-and-anchor detail has gone smoothly, and the new FA has learned quickly. Only one task remains: The EOOW has ordered the shaft-jacking gear engaged. "Might as well take advantage of an opportunity to give the new guy some hands-on training," you think. The only problem is that you haven't held any other training or explained the procedure and all the precautions.

"Grab a wrench and place it on the motor shaft, ratchet the shaft, and align the markings," you tell him. "Now pull the engagement lever into place." As you jump down to the controller level, you add, "Remove the jacking-gear wrench." For some reason (perhaps he doesn't hear or understand this order), the FA doesn't remove the wrench before starting the jacking-gear motor. When the supervisor energizes the controller, the wrench flies off and hits the FA's arm. He spends five days in a hospital, 36 days off the job, and 45 days on light duty after an operation to realign his broken arm.

That's what happened in a ship's engineroom. The task was the last in a series of complex events required to secure the propulsion plant. The engineroom supervisor was trained and knowledgeable. Engineering operational sequencing system procedures were used. The mishap report listed several causes, including the fact people weren't communicating, and no one checked to see if the FA had removed the wrench. An important cause may have been overlooked: The people involved made the mistake of assuming the job would go smoothly, and they didn't pay enough attention.

If you believe this is an isolated incident, consider the case of an EM2, who was doing maintenance on the arc-fault detector system of a switchboard. He removed an access cover from the switchboard, which he thought was tagged out because other electrician's mates had been working on it. When he reached inside to test a photo-electric sensor, a 450-volt shore-power circuit breaker (isolating an energized bus) jolted him.

The mishap report stated that tagout requirements had been added to an existing job, and no one thoroughly researched the tagout. This error, however, wasn't spotted by anyone in the planning and review chain. The EM2 assumed he didn't need to check for energized circuits because of the earlier work done in the switchboard.

The NSTM[1] states, "Be sure electrical equipment is de-energized before working on it." The supervisor had left the area after making sure the necessary tools and procedures were on station, even though the crew never had done the maintenance before. A critique after this mishap determined that a weak knowledge of tagout procedures and supervisory failure weren't the only problems. The electrician's mates exhibited unacceptably lax attitudes toward electrical safety, even though they should be most sensitive to it.

The mundane, the ordinary, the obvious... these elements are the ones that can be the most dangerous. When we feel comfortable and secure, we tend to drop our guard. Training cannot always save us from a lapse of focus while doing a routine job. It takes a conscious effort to stay alert to the hazards of a job. Learn to assess the risks in all tasks—from beginning to end—before starting work.

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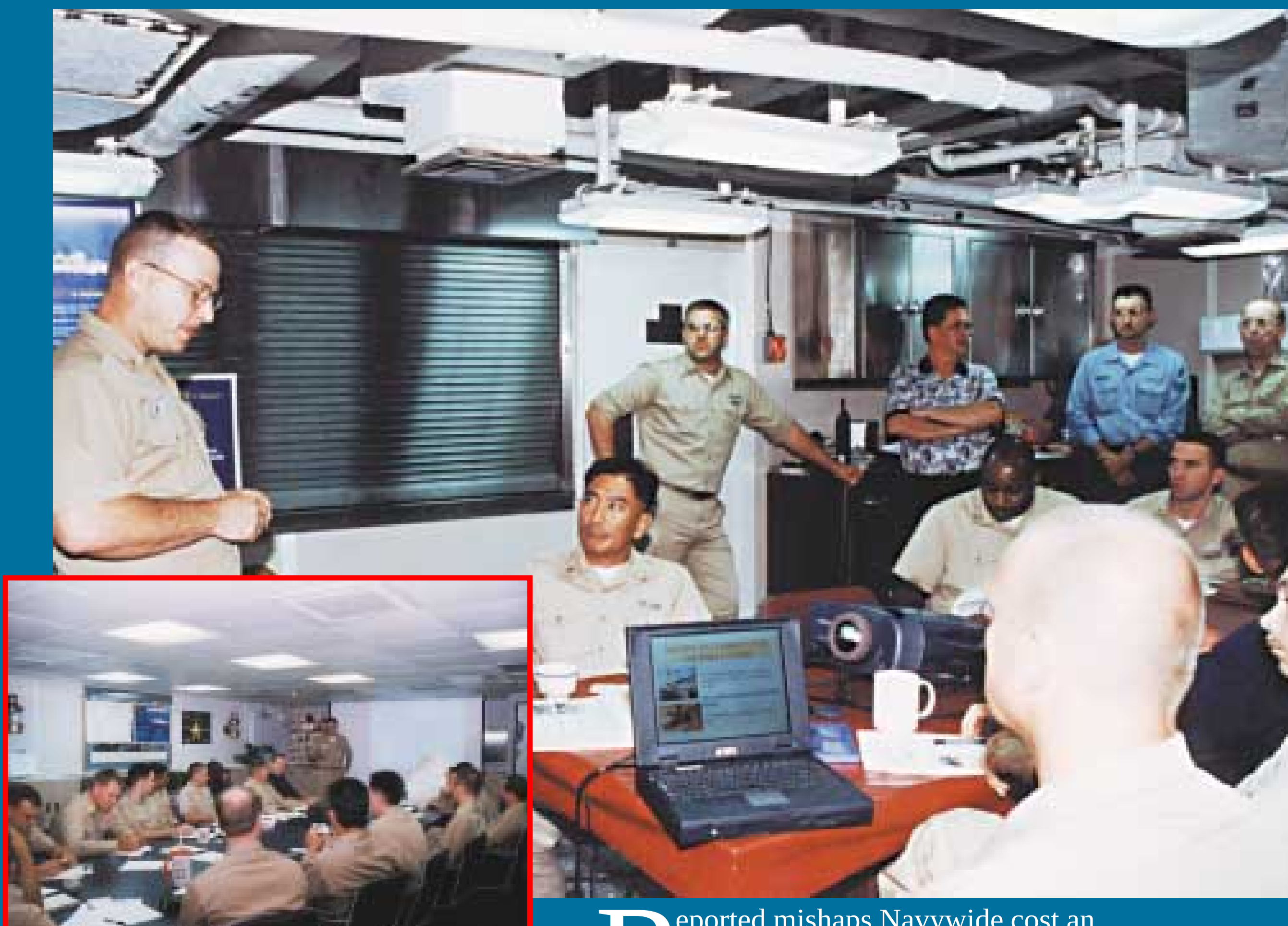
For More Info...

[1] Chapter 300 (Electric Plant General) of the NSTM covers the requirements for working on electrical equipment.

Costly Problem, Simple Solution—If You Use It

By Cdr. Tom Warner,
Cdr. Elizabeth Rowe,
Steve Scudder,
and Ken Testorff,
Naval Safety Center



ORM training aboard USS *Yorktown* and USS *Ticonderoga* started with individual sessions for department heads, division officers, CPOs, and enlisted personnel. Work-center sessions followed, in which USS *Yorktown* and USS *Ticonderoga* Sailors applied what they had learned from the Naval Safety Center Sailors.

Reported mishaps Navywide cost an average $4.3 billion every five years. That's enough money to build two *Ticonderoga*-class cruisers. Money, though, isn't the only loss from mishaps. More important is the number of Sailors killed: 838 in the past five years. That's enough people for the crews of the same two cruisers.

What's the answer to this costly problem? We'd like to say it's as easy as 1, 2, 3, but in this case, the key numbers are 3, 4, and 5. There are 3 levels of application, 4 principles, and 5 steps in the common-sense process known as operational risk management, or ORM. The goal of this process is to help you do your daily tasks more efficiently and safely.

First, though, you have to know how ORM works. Toward that end, Sailors from the Naval Safety Center's Afloat Directorate flew to Pascagoula, Mississippi, and held training aboard USS *Yorktown* (CG 48) and USS *Ticonderoga* (CG 47). The crews of these two ships, a new breed of what the Navy calls "smart" ships, got a close look at all the basics of ORM.

The Safety Center Sailors began by explaining the three levels of application. To get everyone to concentrate on this part of the ORM process, the Safety Center Sailors urged *Yorktown* and *Ticonderoga* crews to "think taxes." It's just as important to select the correct ORM application as it is to use the right form when doing your taxes. In both cases, your choice must fit the needs of your situation.

When you don't have much time, risk assessments need to be made on-the-run. Comparing this application (called ***time-critical***) to the 1040EZ tax form usually filed by young, single Sailors, the Safety Center Sailors noted that most ORM processes are "time critical" at the work-center level.

Deliberate applications allow time to consider all aspects of a situation. For example, the operations brief before getting underway requires a thorough look at potential hazards and the corrective actions that can help you avoid them. The Safety Center Sailors compared this application to the standard 1040 tax form filed by most families.

In-depth applications, which compare to the multiple tax schedules someone like Bill Gates might file, involve other considerations outside the local chain of command. A battle-group commander does a detailed analysis of the process to manage the risks for an exercise.

The four principles, as well as the five steps of the process, apply to each of the preceding applications. Safety Center Sailors explained the first principle ("accept risks when benefits outweigh the cost") with an unrep example. A ship needs food, supplies and ammunition, but the process of getting them while underway is hazardous. The ship must decide whether the benefits realized by doing the unrep outweigh the risks involved. The second principle ("accept no unnecessary risk") would dictate not doing an unrep in a sea state of 5 or higher. The hazards are too severe to accept the risk. The third principle ("anticipate and manage risk by planning") means to use the ORM process during the planning phase of any evolution to identify and assess the hazards and do what you can to decrease the risk. Don't forget, supervision is the key to any successful event. The final principle ("make risk decisions at the right level") means if you can reduce the hazards at your level, do it. If you need higher authority, don't hesitate to push the decisions up the chain of command.

The introduction to the basics of ORM ended with a discussion of the five steps in the process. The Safety Center Sailors used a scenario like this:

While underway in the Caribbean Sea, a commanding officer wants to hold a swim call for the crew. Swim call will last about two hours. The weather forecast calls for clear skies, easterly winds at 2 to 3 knots, and temperatures in the 90s.

During a brainstorming session of the first step (identify the hazards), crew members listed these hazards:

- shark attack
- injuries while lowering or raising the anchor
- damage as a result of collision with another ship
- injuries or equipment damage while launching the ready lifeboat
- drowning
- ship unable to respond rapidly to emergency sortie.

Discussion of the second step (assess hazards) involved acquainting everyone with the risk-assessment matrix *(see graphic pg. 7).* This matrix has a vertical axis for the severity of the hazard: what would happen to the equipment, ship and people if this hazard occurred. There are four categories of severity, starting with Category I, which is the most severe, and ending with IV, which is minimal. The matrix also has a horizontal axis for the probability of occurrence (e.g., what is the likelihood a hazard will occur?). The probability ranges from "A" (likely or immediate) to "D" (unlikely). The box where the "severity" and "probability of occurrence" intersect gives you the risk-assessment code. These codes are as follows: 1 = critical, 2 = serious, 3 = moderate, 4 = minor, 5 = negligible. As noted by the Safety Center Sailors, the risk-assessment matrix may not always be necessary to rank hazards. However, during the first few times you apply ORM, it is very helpful to use the matrix to prioritize the risks when you consider probability and severity. By applying the matrix to the scenario described a little earlier, you end up with this ranking of hazards:

Hazard	Risk		
	Severity	Probability	Code
Drowning	Cat. I	B	1
Injuries while lowering or raising the anchor	Cat. I	C	2
Injuries or equipment damage while launching the ready lifeboat	Cat. 1	C	2
Shark attack	Cat. II	C	3
Damage as a result of collision with another ship	Cat. II	C	3
Ship unable to respond rapidly to emergency sortie	Cat. III	C	4

In the third step (make risk decisions), you prioritize the hazards and decide whether you should conduct or postpone the event. If the benefits outweigh the risk, you then discuss controls or things you can do to reduce the risks. In the fourth step (implement controls), the objective is to do what's necessary to reduce the risks, as you've identified them in step 3. Here is a list of controls developed for our sample scenario:

Hazards	Controls
Drowning	Station SAR swimmer
Injuries while raising or lowering the anchor	Station anchor watch
Injuries or equipment damage while launching the ready lifeboat	Review, update and execute ready lifeboat bill
Shark attack	Station lookouts and gunner's mate
Damage as a result of collision with another ship	Station sea-and-anchor detail
Unable to respond rapidly to emergency sortie	Maintain communications with the battle-group commander

In the last step of the ORM process (supervise), the most critical of all the steps, it's important to study the controls in place and to watch for unexpected changes during an event. If you see any, such as a change in the weather or an unexpected vessel in the area, do a time-critical, on-the-run evaluation to find out if new or modified controls are necessary or if you should reschedule the event.

Then it was time for the Naval Safety Center Sailors to find out how much *Yorktown* and *Ticonderoga* crewmen had learned. This part of the training involved more scenarios in which each ship's crew applied the ORM process. One of these scenarios went like this:

You are aboard a *Ticonderoga*-class ship, and a cooling-skid temperature gauge is reading high for one of the vital electronics systems. Investigation by technicians reveals that the on-line-pump bearings are going bad. The off-line pump doesn't work because of defective windings. An accompanying supply ship has a new pump and can fly it over within the next two hours. Using ORM, develop a plan to replace the pump and restore the cooling skid to operation.

The crews first were asked to identify the hazards involved with this task. They quickly responded with mission degradation, flooding, electrical shock, equipment damage, and personnel injury. After they had assessed these hazards and made the necessary risk decisions, they started outlining which controls they could implement. Their list looked similar to this one:

Hazard	Control
Mission degradation	Shift mission
Flooding	Wire valves shut
Electrical shock	Red tag
Equipment damage	Shut down equipment
Personnel injury	Use equipment dolly and chain falls

When the crews reached the last step (supervise) in this training scenario, they suggested these items:

- Verify that red tags are hung on the correct valves and electrical components.
- Make sure the pump is rigged correctly before removal.

Risk Matrix

Risk Assessment Code

1 = Critical
2 = Serious
3 = Moderate
4 = Minor
5 = Negligible

Severity	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

Probability

A – Likely to occur immediately or within a short period of time.

B – Probably will occur in time.

C – May occur in time.

D – Unlikely to occur.

I – May cause death, loss of facility/asset.

II – May cause severe injury, illness, property damage.

III – May cause minor injury, illness, poroperty damage.

IV – Minimal threat.

- Make sure everyone wears PPE. Also ensure that an equipment dolly and chain falls are available before starting the job.

Many painful, disfiguring injuries can be traced to people failing to think through an entire process. An analysis of Navy mishaps shows that human error caused more than 90 percent of all operational mishaps this year. In contrast to mechanical or material problems, human failures are much more difficult to predict and control. Despite extensive training and standardization programs, people still make mistakes. Those mistakes, however, can be minimized with ORM.

The training sessions held aboard *Yorktown* and *Ticonderoga* were an effort to drive the ORM concept to the deckplates. As one Safety Center spokesman remarked, “We want our youngest Sailors to apply the same risk-management tools as our leaders.” Sailors at the deckplate level may initially view ORM as just another buzzword, but it’s more than that. They must learn to recognize and reduce the risks inherent in the jobs they do. To be effective, ORM must become part of an organization’s culture, guiding the way everyone from seaman to admiral conducts day-to-day business.

As John Paul Jones once wrote, “It is true I run great risk; no gallant action was ever accomplished without danger.” The key to success is learning to control that danger by managing the risk.

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Minimizing Risk—Our Idea for a New Approach

By Capt. Thomas M. Keithly, Navy International Programs Office, and Lt. Thomas L. Williams, USS Dwight D. Eisenhower *(CVN 69)*

Despite our regrets in saying goodbye to USS *Arkansas* (CGN 41), the last *Virginia*-class cruiser, our task was to decommission the good ship. Experience had taught us that without adequate planning, we likely would face many problems. After all, horror stories abound about the many pitfalls of ships and shipyards working together.

"How could they have let that happen?" or "Who in the world gave them permission to pull such a stunt?" These are questions nearly everyone has asked after a job went wrong, and someone was injured or a piece of equipment was damaged. The problem usually is something basic: no supervision, lack of planning, or poor communications.

Here's what got our attention while we were in Puget Sound Naval Shipyard:

A chief in A-Gang told a petty officer to go to the pump room and help some civilian technicians remove the lube-oil cooler from an air-conditioning plant. Engineers aboard another ship urgently needed this part to correct a casualty.

Our young, eager machinist's mate headed off to do the job with no planning, no tagout, no procedures, and no precautions. He calmly handed over the cooler to the civilians, then left the space.

Two hours later, the space was filled with freon. Six crewmen were exposed to this potentially lethal atmosphere, but no one was injured seriously.

For far too many of us, experience is the best teacher. Why don't we learn from the mistakes of others? Where do we turn for mature guidance on how to do a job right? Would a simple form keep people out of trouble and help supervisors control risky events?

In response to these questions, a team of Sailors from our ship and engineers from the shipyard, supported by the type-commander maintenance staffs, developed a new user-friendly work permit *(see accompanying sample)*. This permit, which had to be filled out before starting any job, incorporated the principles of operational risk management (ORM). Although simple and easy to use, it asked some important questions:

- What are the hazards associated with this job?
- What controls should be put in place to keep the risk of mishap or injury to a minimum?

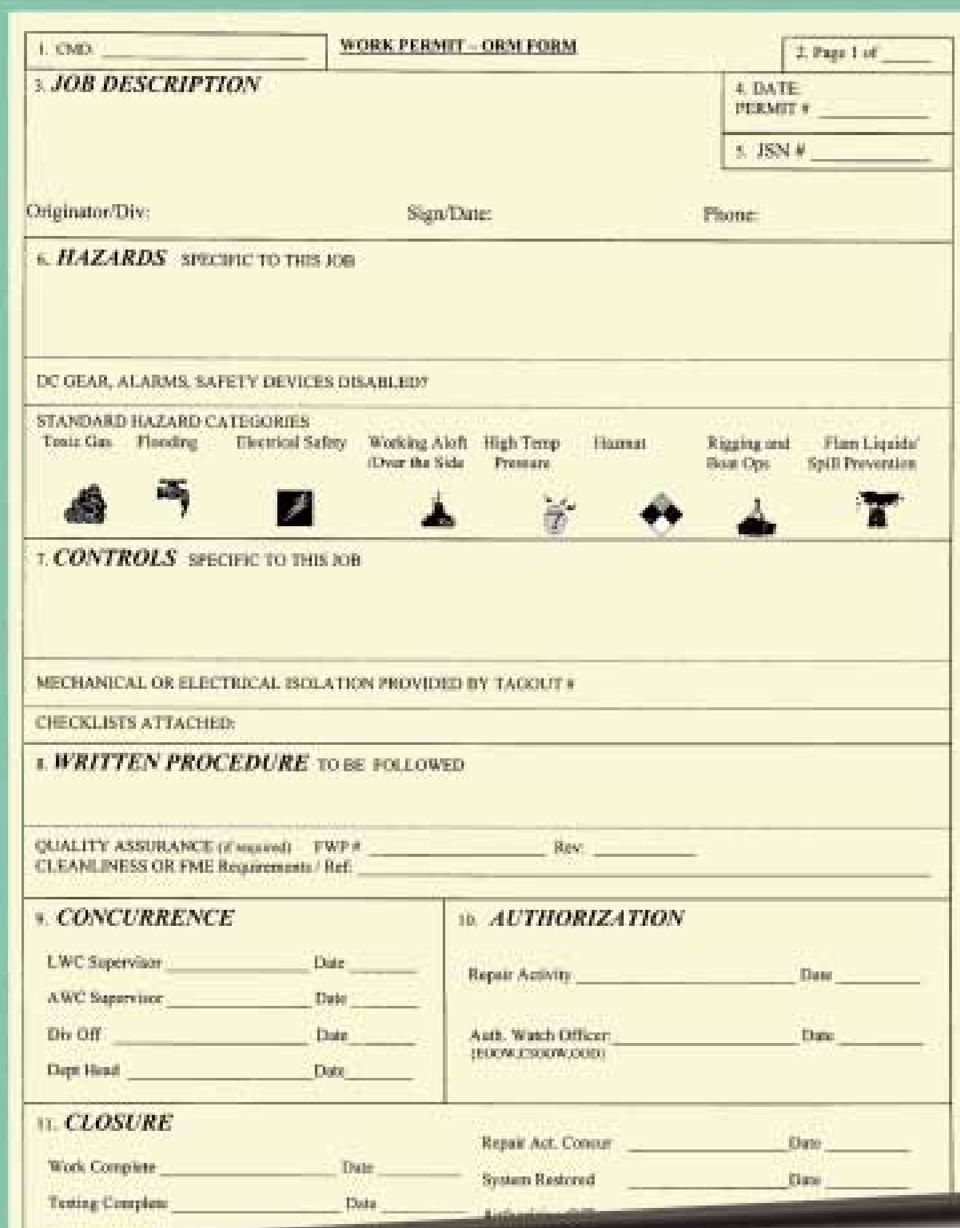
As far as learning from others' mistakes, the form addressed a number of known hazard categories: electrical safety, toxic gas, and working single-valve to sea. These categories employed checklists or special controls to make people understand what's at stake and to minimize the risks of the job at hand. The checklists were a valuable source of hard-earned insights for doing things right. They also reminded us of the correct references and NavOSH requirements.

Will our concept work for you? Take a look and decide for yourself. You can call up the entire project in the ORM area of the Naval Safety Center's web site (both the download page and FTP site) at www.safetycenter.navy.mil. It's also available on the Safety Center's bulletin board (under ormwork.zip and ormwkrea.dme) at (757) 444-7927 (DSN 564). Perhaps you'll want to use our idea to develop your own method for ensuring ORM is applied.

Our plan may sound like more admin, but it actually makes tasks quicker, and the paperwork is user-friendly. We're talking about repairs here, but the format is suitable for other risky activities, such as operating boat davits or working aloft, where planning is the key to success. The result could be better teamwork Navywide.

This plan can be used as a supplement to—not replacement for—the official guidance found in the NSTM and other publications. Capt. Keithly's e-mail address is Keithly.Thomas@hq.navy.mil.

Why don't we learn from the mistakes of others? Where do we turn for mature guidance on how to do a job right? Would a simple form keep people out of trouble and help supervisors control risky events?


1. CMD: ____
WORK PERMIT – ORM FORM
2. Page 1 of ____
3. JOB DESCRIPTION
4. DATE PERMIT # ____
5. JSN # ____
Originator/Div: Sign/Date: Phone:
6. HAZARDS SPECIFIC TO THIS JOB
DC GEAR, ALARMS, SAFETY DEVICES DISABLED?
STANDARD HAZARD CATEGORIES
Toxic Gas, Flooding, Electrical Safety, Working Aloft /Over the Side, High Temp Pressure, Hazmat, Rigging and Boat Ops, Flam Liquids/ Spill Prevention
7. CONTROLS SPECIFIC TO THIS JOB
MECHANICAL OR ELECTRICAL ISOLATION PROVIDED BY TAGOUT #
CHECKLISTS ATTACHED:
8. WRITTEN PROCEDURE TO BE FOLLOWED
QUALITY ASSURANCE (if required) FWP # ____ Rev: ____
CLEANLINESS OR FME Requirements / Ref: ____
9. CONCURRENCE
LWC Supervisor ____ Date ____
AWC Supervisor ____ Date ____
Div Off ____ Date ____
Dept Head ____ Date ____
10. AUTHORIZATION
Repair Activity ____ Date ____
Auth. Watch Officer: ____ Date ____
(EOOW,CSOOW,OOD)
11. CLOSURE
Work Complete ____ Date ____
Testing Complete ____ Date ____
Repair Act. Concur ____ Date ____
System Restored ____ Date ____

Is Your Independent Che


Navy photo by PH2 Jeffrey S. Viano

By MMCM(SS) John Mosholder, Naval Safety Center

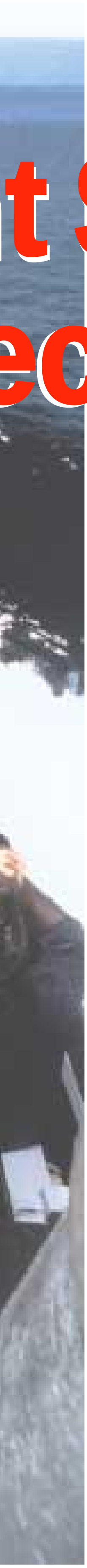
It is dark, cold and raining as a submarine approaches the dive point. The OOD shifts the watch to control while the off-going OOD and lookout scramble to rig the bridge and bridge-access trunk for dive. With only five miles to the dive point, tension is building because many things must be done before the ship submerges.

The off-going OOD and lookout are having problems rigging the bridge, so now they really are feeling pressure. Finally, the bridge is rigged, and all that's left is to rig the access trunk.

The off-going OOD and lookout drop into the trunk and, a few minutes later, complete the rig. Right on time, the submarine slides beneath the surface, and everyone breathes a sigh of relief.

Later, the captain orders, "All ahead flank, cavitate." As the ship increases speed, the watch hears something bumping in the sail area. The chief of the watch announces that the radar mast no longer indicates down. Sound familiar?

It might, because there have been a number of these incidents during the past several years. In many cases, part of the problem was attributed to someone omitting the required independent check. The tagout procedure (used Navywide) and the rig-for-dive procedure (used by submarines) specifically require independent second checks. When this requirement is overlooked, expensive equipment gets damaged, and even worse things can happen.



t Second
eck Done Right?

Two rig-for-dive incidents reported to the Naval Safety Center involved ships' radar masts. In each case, the submarine was preparing to submerge, and the off-going OOD and lookout had rigged the bridge for dive. Unfortunately, these people didn't fully understand how the locking mechanism on the radar mast works. Another problem was that they did the required checks together, instead of independently, as outlined in the procedures. Together, they incorrectly concluded that the locking mechanism for the mast was engaged. The submarine then submerged, and when the OOD ordered normal transit speeds, the force of the water flowing across the sail pulled the radar mast from the housed position and bent it.

Doing the first and second check together is not the only way to bypass the independent check. During a rig-for-dive operation aboard one submarine, a petty officer aligned the bow planes for submerged operation. Because he wasn't familiar with all the valves involved, he had a watchstander in the space help him. Later, the officer second-checking the rig-for-dive had the same problem as the petty officer and got help from the same watchstander—who also didn't understand the system. Both the petty officer and the officer got the same incorrect information. When the watch tried to extend and test the bow planes, they wouldn't move.

In another case, a Sailor was assigned to hang a tagout, and when he found a valve he wasn't familiar with, he, too, got help from someone in the area. As you might have guessed, the second-checker had the same problem and got help from the same person. In this case, though, a third person doing a weekly tagout audit recognized the valve was out of position before maintenance started.

For tagouts, independent checks are required both during the process of preparing the tagout[1] and while hanging the tags[2]. Similarly, the rig-for-dive procedure requires the designated officers to check the rig-for-dive in each compartment level. They must follow the checklists as a separate action—not in company with, but after the designated petty officer completes the check.

Clearly, other causes were involved in these examples, but in each case, the all-important independent check could have prevented a mishap. Procedures that protect people and ships must be at the top of everyone's priority list. The only acceptable standard is absolute compliance.

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For More Info...

[1] As outlined in paragraph 630.17 of Standard Organization and Regulations of the U.S. Navy, OpNavInst 3120.32C, "When tags and tagout-record sheet are filled out, a second person shall make an independent check of tag coverage and usage, using appropriate circuit schematics and system diagrams as necessary, and shall indicate, by signing the record sheet, satisfaction with the completeness of the tagout action."

[2] As outlined in OpNavInst 3120.32C, "After completion of tag attachment, a second person shall independently verify proper positioning and tag attachment, sign the tag, and initial the tagout-record sheet... The second person shall not accompany the person initially installing the tag(s)."

Bullets Are Flyi

By Ken Testorff,
Naval Safety Center

"Hey, this is great. I get to show a group of people what I can do, and I might be on TV. How much more could a guy wish for?" That's what a GM3 may have been thinking as he prepared for a weapons demonstration in a ship's hangar.

The ship was holding a family-day cruise, and about 400 guests filled the hangar bay when the GM3's big chance came. Unfortunately, the event didn't go as planned. Because he didn't follow the procedures for checking out and turning over his 9mm pistol, the only excitement the GM3 generated is the kind that causes COs to develop ulcers. He chambered a round, then accidentally fired it into the deck.

The bullet splintered and sent fragments flying into nearby gear, but no one was injured. The only other good news was that the television crews and reporters were in a different area at the time and didn't find out what had happened.

This wasn't an isolated case of small-arms mishandling; the problem is widespread. Consider the tales that follow, all of which occurred in three months:

Steel-Toed Boots Pay Off

An E-3 was stowing a 9mm pistol in his closet when the weapon fell and fired. The bullet hit the steel toe of his left boot, breaking the first toe. He was taken to the emergency room of a local hospital for treatment, and doctors returned him to full duty.

Security Alert Nearly Becomes Medical Alert

While preparing for a security-alert drill, a duty armorer loaded a 12-gauge shotgun with five rounds of 00-buckshot. He then left the weapon standing upright, with the butt on the deck and the muzzle resting against a tool bench. A watchstander entered the space in time to see the weapon falling and lunged for it. While grabbing for the gun, it fired, but no one was hurt, and no equipment was damaged.

I'd Like a Different Weapon, Please

Members of a visit, board, search and seizure team were on a ship's flight deck getting ready to go to work. They were placing their weapons in a condition-one status. Everyone was on the disengaged side, with weapons pointed in a safe direction while locking and loading. When the slide on one team member's 9mm pistol wouldn't go all the way home after he had inserted the magazine, he decided to check the weapon. He saw that the safety wasn't completely toggled on, but he couldn't get it to move. Finally, he butted the rear of the slide with the palm of his hand to put the weapon in battery. This action, though, caused the weapon to discharge. The team member then released the magazine, ejected the next round that had chambered as a result of the recoil action, and verified the weapon was clear and safe. After telling the team leader what had happened, he exchanged the weapon at the armory.

Let Me Show You How To–Uhh, How Not To

At 1545, an oncoming OOD assumed the watch. As part of the turnover, the offgoing OOD inspected the 9mm pistol by moving the slide back to make sure no rounds were loaded. He also checked the ammunition in each clip and found 15 rounds (the standard loadout) in both. An hour later, the CDO walked onto the quarterdeck and discovered that the oncoming OOD still hadn't put on the holster and gun. Instead, he had left everything on a table, with the pistol's safety in the off position. After chewing out the OOD, the CDO decided to demonstrate the importance of maintaining positive control of the small arm. He

ng Everywhere

picked up the gun, inserted a clip, and activated the action lever by moving the slide forward—unwittingly chambering a round. He then removed the clip, and, thinking the chamber was empty, pulled the trigger, firing the gun.

Better Go Back for More Training, Ensign

At 2310, a petty officer of the watch (POOW) passed his 9mm pistol to the OOD so that he could wake up watch reliefs. The OOD, an ensign, had completed 9mm PQS, but he hadn't completed the familiarization firing necessary for final qualification. While the POOW was gone, the OOD decided to review the 9mm training he had just received. He loaded the weapon, aimed at the water, and fired one round. Because nothing had happened with the dummy rounds used during training, the OOD didn't believe his actions would cause the weapon to fire the live round.

"Standby for Shotline!"

With that word passed and the appropriate whistle signals given, a GMSN fired a shotline to a receiving ship during an underway replenishment. The other ship, however, still was standing by when the shotline snapped back, smacking the GMSN in his right eye. He went to sickbay where a doctor diagnosed a corneal abrasion, applied a dressing, and told him to return the next morning. That second visit revealed significant vision loss in the GMSN's eye, so he went to a naval hospital for treatment by an optometrist. He returned with 80 percent of his vision and a promise for more treatment designed to regain the other 20 percent. To prevent similar mishaps, the ship's commanding officer recommended that Sailors holding

There is no end to mishap reports about Sailors who have trouble with this part of turning over the watch.

Navy photo by PH2 Matthew J. Thomas

the shotline and gunner's mates firing the line-throwing gun wear protective goggles.

Before deciding to arm sentries, take some time to analyze the threat. Do you really need armed sentries? Have you assessed the risks to see what can go wrong? What are the rules of engagement?

When armed sentries are required, use these controls:

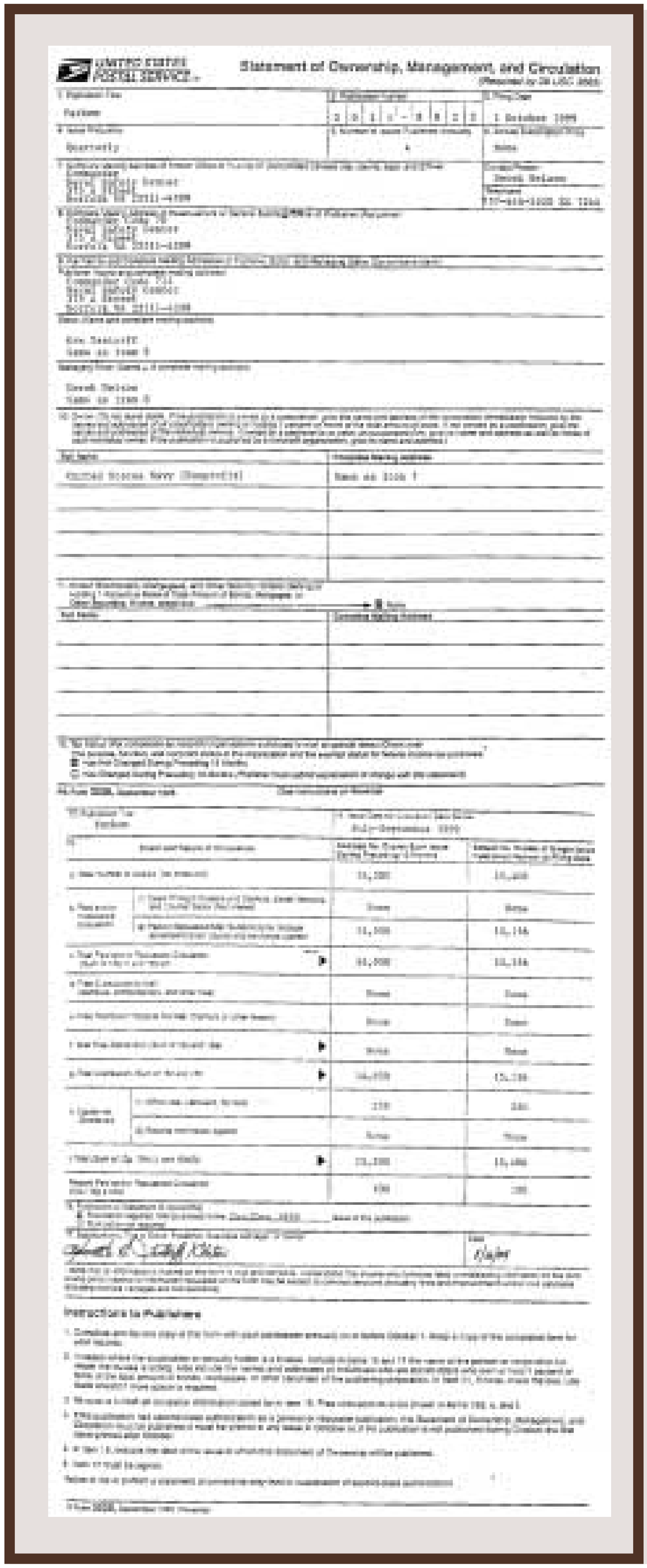
- Make sure everyone authorized to be armed is qualified to use their weapon. Afloat personnel must complete annual classroom training for handguns, shotguns or rifles, and they must qualify on a range before duty assignment.
- Ensure everyone knows the criteria[1] for petty officer of the watch or qualifications for afloat– security personnel.
- Make sure everyone understands standard procedures (e.g., they must remove a loaded magazine from a weapon before actuating the slide, unless they intend to load the weapon).
- Ensure armed sentries are briefed thoroughly and understand the CO's policies about armed sentries and the Navy's policy on use of deadly force.
- Teach everyone respect for a weapon with an actual firing demonstration at an approved target under controlled conditions.
- Always treat a weapon as though it were loaded. Use a clearing barrel.
- When inspecting a weapon, point it in a safe direction in case it accidentally fires. If the weapon is loaded and you point it upward, consider where a fired round may fall or ricochet.

The author's e-mail address is ktestorff@safetycenter.navy.mil. Some information for this article came from GMC(SW) William Fisher, a surface-weapons analyst in the Ashore Safety Programs Directorate at the Naval Safety Center. His e-mail address is wfisher@safetycenter.navy.mil.

For More Info...

[1] Refer to the Standard Organization and Regulations of the U.S. Navy (OpNavInst 3120.32C) and Small Arms Training and Qualification (OpNavInst 3591.1C) for information about POOW requirements and qualifications for afloat security personnel. Questions concerning explosive mishaps or deficiencies can be directed to the explosive division (Code 43) at the Naval Safety Center.

Call AOCS (AW) Dale Swartz, Code 431, at (757) 444-3520, Ext.7142 (DSN 564), or send e-mail to dswartz@safetycenter.navy.mil.



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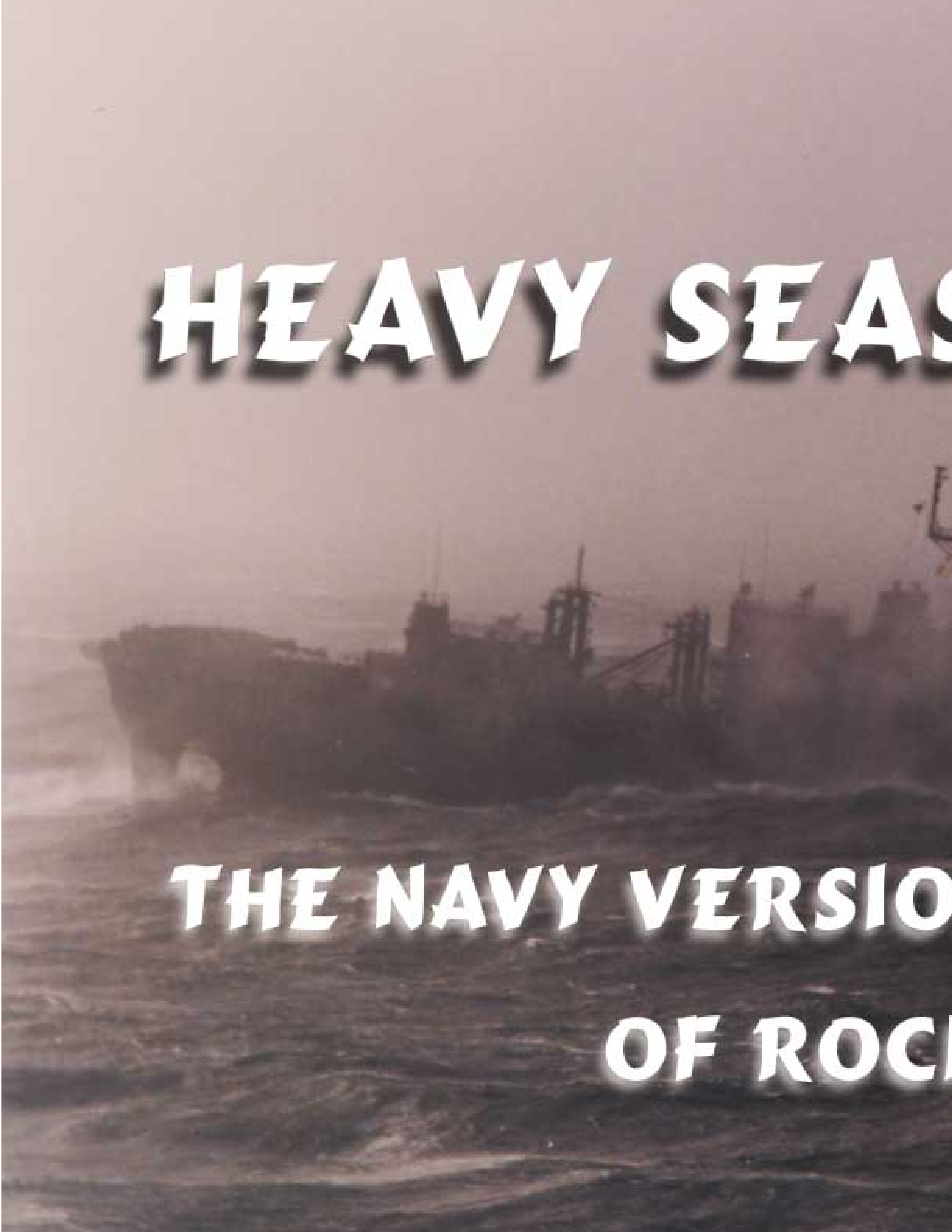
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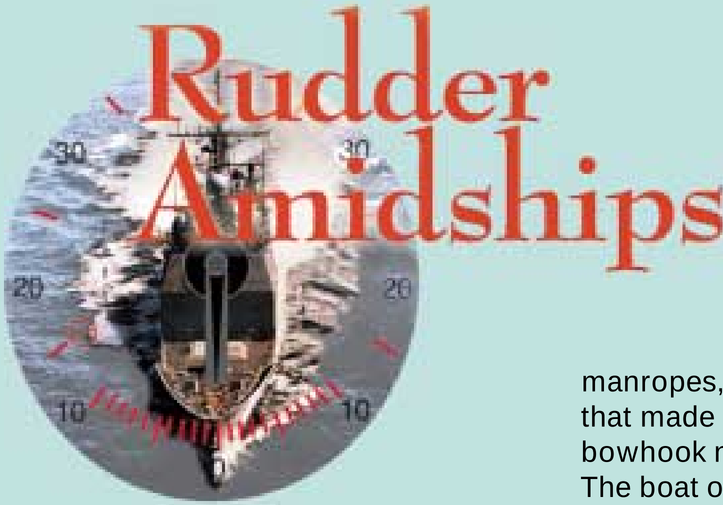

Keep That Tow During a Big Bl

By BMC(SW/DV) Richard Vitez, Naval Safety Center

We were towing a 500-foot target ship to an operating area for a joint-task-force exercise that would end with Navy and Air Force aviation squadrons sinking the ship. This simple task quickly turned difficult, however, when we encountered rain, 30-knot wind gusts, and 9-to-12-foot seas.

The morning after our CO, salvage officer, master diver, and rigging team had inspected the tow and found it fit, tugs brought it alongside. A short while later, we were headed out of the harbor (in our ATS), with the tow at short stay on a two-and-a-quarter-inch wire.

The trip would take two days. The first day, we had 15-knot winds, with moderate 3-to-5-foot seas. By the second morning, the winds had increased to 20 knots, and the seas were building to 6 to 8 feet. Weather reports indicated a major storm was moving into the area. When we arrived on station the second evening, we held a meeting to discuss the procedures and safety issues for the next day's operation, which was scheduled to start at 0500.

The rain, 30-knot wind gusts, and 9-to-12-foot seas that greeted us the next morning made us realize the day was going to be interesting. Our first task was to lower and launch the ship's 35-foot aluminum work boat, which would be used if anyone fell overboard while releasing the tow.

An experienced boat crew and all their gear were ready. As the Sailors held on to the manropes, we lowered the boat into waves that made it buck like a wild bronco. The bowhook nearly got thrown over the side. The boat officer, a BMC, had to jump 11 feet to get in the boat. With good engines and communications, the boat moved away from the ship and took its standby position.

Meanwhile, members of the towing team started bringing in the tow to short stay, as the CO did his best to keep the ship turned into the strong headwinds. He used just enough speed to maintain steerageway. In heavy weather, the scope of the tow catenary is increased, which provides more shock absorbtion. As the rigging team brought in the tow, however, it became harder to control. The tow wire could yaw only a couple of feet as it was fed through the stern rollers.

With water coming over the port side aft, the rigging team stood by to capture the chain pendant from the tow so they could disconnect the towing shackle and trip out the tow from the pelican hook. The towing shackle was 35 feet away when, suddenly, the tow was closing our stern, and personnel began clearing the deck. An HT1 standing by with a cutting torch stayed put, however, in case he had to cut the tow wire.

The tow missed smashing our stern by a couple of feet, but we had another problem. A 12-foot wave crashed into the fantail on the port side, and a rigger nearly went flying overboard. Throughout this chain of events, the salvage officer on the fantail maintained communications with the CO, who was on the bridge.

The towing machine payed out the tow wire as the ship increased speed to open the distance between our ship and the tow. The CO altered course again to bring the tow to short stay so we could try releasing it. When this effort failed, the CO altered course a third time, but, once more, the tow nearly smashed the stern, and the rigging team couldn't capture the chain and trip the tow loose.

Weather reports were calling for another 24 hours of the same conditions, so the CO decided to abort the mission. He cited the safety of his people and risk to the ship for his decision. We recovered the 35-foot work boat without incident. The next morning, the winds and seas were even worse. Because the window for the exercise had expired, we set course for home and arrived there three days later.

When this event occurred in 1989, our CO had only Navy instructions and directives[1] to help him make the decision to abort the mission. Operational risk management (ORM) as such didn't exist yet. It was 1991 before we first talked about ORM, and the ORM instruction[2] wasn't signed until April 1997. However, I feel that good leaders like my former CO always have used a systematic process to identify and assess risks, make risk decisions, and implement controls. I'm convinced his decision to keep the tow that day saved lives and equipment.

The author was a BM1 on the rigging team for this operation. His e-mail address is rvitez@safetycenter.navy.mil.

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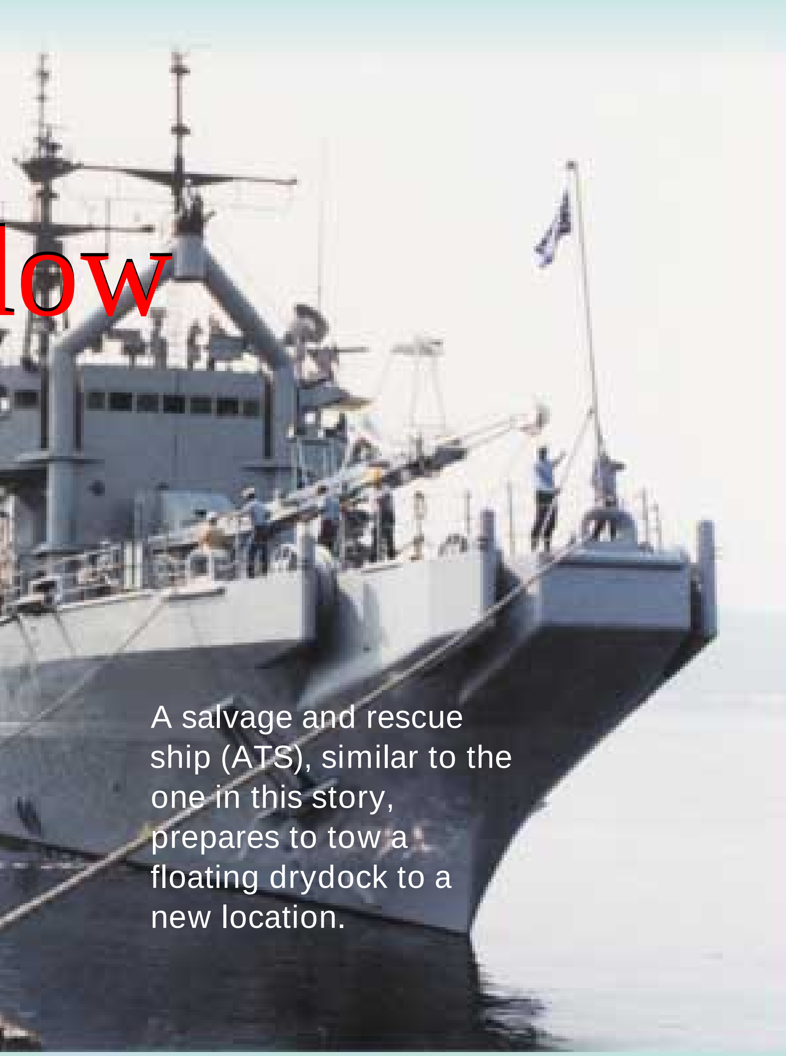
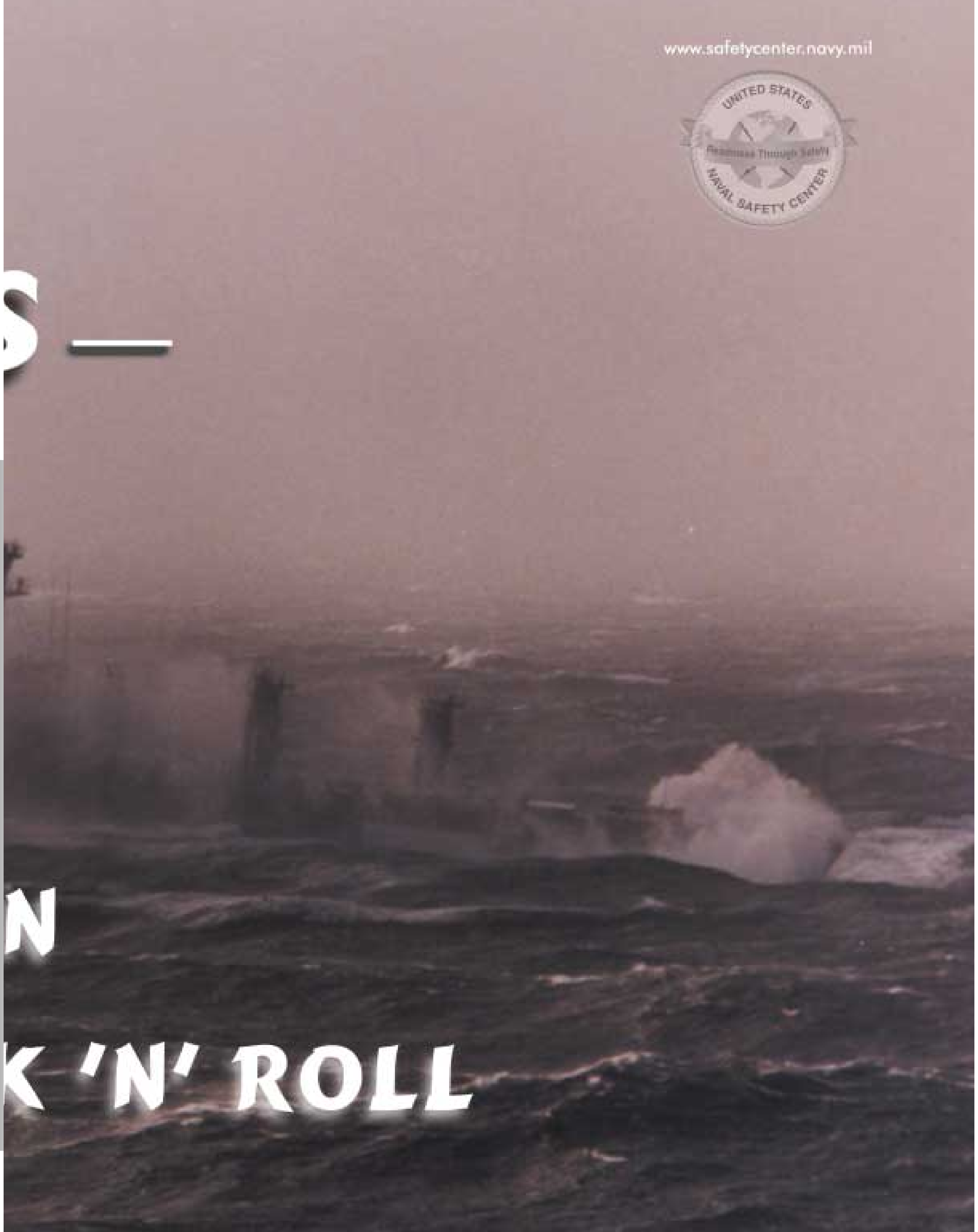


A salvage and rescue ship (ATS), similar to the one in this story, prepares to tow a floating drydock to a new location.

For More Info...

[1] The CO used the NavOSH Program Manual for Forces Afloat (OpNavInst 5100.19A); ComServRon Eight instructions; and The U.S. Navy Towing Manual in making his decision to abort the mission.

[2] The principles of ORM are spelled out in OpNavInst 3500.39.



Navy photo by PH3 Gregory L. Campbell

The Not-So-Good Old Days

By Lt. John Wiedemann, USN(Ret.)

Before the days of indoctrination division, PMS, PQS, and OPPEs, a Sailor barely had time to unpack his seabag when he reported aboard a ship. The routine was to check in and go right to work. My introduction to shipboard life wasn't any different.

One day soon after I had reported to my first ship, a destroyer, the HT-shop supervisor told shipmates and me that we would be testing the portable P-250 pumps (forerunner of today's P-100 pumps). He said I would hold the nozzle of the fire hose. I remember standing around for at least a half-hour while senior petty officers argued about how to get one of the stubborn pumps started. Each time they would get ready to pull the starter cord, the supervisor would holler for me to get ready. I would take hold of the nozzle and signal "OK."

My problem was that I couldn't remember if I was supposed to have the bail of the nozzle in the open or closed position. Without any training or PQS programs in place, I hadn't been required to demonstrate my knowledge. Instead, I just did as I was told.

While I was wrestling with my decision about the bail, the division chief showed up. He sent someone to get a can of starting fluid, and things then started moving fast. Before long, I became so engrossed in what was happening around me that I forgot about the nozzle in my hand and the fact its bail was in the solid-stream position.

I was the only person holding the hose when the division chief squirted some starter fluid into the pump's engine and hollered for me to get ready. Figuring that the pump still wouldn't start, I wasn't really prepared when the pump roared to life about the same time the chief yelled, "Let 'er rip!"

Once my feet left the deck, I knew I couldn't let go of the hose. I was living every nozzleman's nightmare. The hose was like a huge snake, twisting and turning with a mind of its own. Water was going everywhere—against the gun mount, into the harbor, on the shipmates, and, yes, even the chief. My wild ride continued after the hose slammed me into the gun mount and then to the deck. I didn't let go until a shipmate finally secured the pump, and the hose went limp.

Despite two cracked ribs, the loss of skin on several fingers (along with a nail), and several bruises and scratches on my face, I walked away from this episode. When all the pain had subsided, I was left only with the memory of that event and the realization that perhaps those really weren't "the good old days" after all.

The author was assigned to the Afloat Safety Programs Directorate at the Naval Safety Center when he wrote this article.

Worn threads on a sounding-tube cap figured into a mishap. Would you want to trust the threads on this cap? Not if you're smart.

Engineers at Work Without a Plan

Story and photos by CWO3 Dave Cerda, USS Mount Whitney *(LCC 20)*

First came word that a ship's engineers would have to transfer fuel from storage tanks to service tanks. Then came an order for the fuel-oil top watch to make it happen.

The fuel-oil top watch sent a valve operator to the manifold and a sounder to the sounding tube. He ordered the valve operator to open the fill valve to a service tank. At the same time, he told the sounder to report when he saw a rise in the tank level.

When everyone was on station, the top watch ordered the transfer-pump operator to start the pump on low speed. The sounder reported a slight

(Below) A maintenance man verifies procedures and compares valve numbers with damage-control central. If the top watch in this story had done the same thing with the manifold operator, the ending could have been different.

rise in the level of the service tank. The top watch then ordered the transfer-pump operator to run the pump on high.

With no more reports from the sounder about a change in the tank level, the top watch asked the valve operator if he was at the correct manifold. The operator first said yes, but he soon realized he was wrong and told the top watch. The top watch ordered all pumping stopped and told the valve operator to secure the fill valve. He also told the sounder to go to the service tank that mistakenly was being filled.

The sounder went to the No. 2 deck-edge, elevator-machinery room, which housed the sounding tube to the tank being filled. As he opened the quick-acting, watertight door to the space, he saw white smoke and felt intense heat. He quickly backed out, dogged the door, and went to DC central to report a fire *(see related article, "The Rest of the Story," on pg. 22).*

Several factors contributed to this $82,200 mishap:

- Participants spent too little time discussing who, when, how, and any potential problems involved with the decision to transfer fuel from the storage tanks to the service tanks.
- Communications were poor during the entire process.
- The top watch didn't use EOSS procedures to verify and compare valve numbers with the manifold operator.
- The top watch ordered the pump operator to shift to high speed without knowing if there was a definite rise in the fuel level.
- Worn threads on the sounding-tube cap of the tank being filled prevented the cap from being tightened. Investigators found 11 other caps in the same condition.

If operational risk management (ORM) had been used, this mishap could have been avoided. The engineers would have identified the hazards (transferring a hazardous liquid and poor communications). Then they would have assessed the hazards. They would have determined the probability of the hazards occurring and their severity.

Next, the engineers would have made risk decisions. First, they would have determined if they were going to transfer fuel (yes/no). If yes, they would have ranked the hazards in RAC order and decided what could be done to mitigate the hazards.

The next step in the ORM process would have been to implement controls. This would have involved putting into effect those things that were identified to mitigate the hazards.

Finally, supervise. The personnel involved with a task must ensure that all steps and procedures are followed. While supervising, they have to watch for change. If anything in the plan changes, you need to stop the evolution and reevaluate the task, using the five-step process.

The author was assigned to the Afloat Safety Programs Directorate at the Naval Safety Center when he wrote this article.

The Rest of the Story

Navy photo by PH2 August Sigur

Communication between repair lockers and the scene is an essential part of all firefighting efforts.

By CWO3 Dave Cerda,
USS Mount Whitney *(LCC 20)*

When the watch in DC central received the sounder's report of white smoke and intense heat in the No. 2 aircraft-machinery room, he called away the at-sea fire party. The first people on the scene were members of the rapid-response team. They entered the space and, upon seeing the white smoke and feeling the intense heat, retreated to don self-contained breathing apparatuses (SCBAs).

Investigators then re-entered the space and noticed that the white smoke appeared to be a mist. One of them saw lagging on fire at the base of a catapult's steam-drain line and tried to douse the fire with a portable CO_2 extinguisher. He emptied the CO_2 cylinder, but the fire kept burning.

At this point, the investigators saw that the deck was covered with three inches of liquid, which they assumed might be fuel. They immediately started leaving the space but not before they felt a rush of air that ignited the fuel and created a fireball. They could feel the pressure of expanding gases as they backed out of the space. By the time they all were outside, the primary and secondary attack teams had formed.

Meanwhile, the No. 4 main-machinery room, the second deck, 03 level, and hangar bay No. 1 had started filling with smoke. The bridge watch had called away general quarters. The primary attack team entered the burning space and extinguished the fire in about 20 minutes.

The fire party's success can be attributed to their training, aggressive leadership, and the SCBAs they used. Some aspects of the operation, however, could have been been done better. For example, the electrician's mate with the rapid-response team could have secured ventilation to the burning space and surrounding areas. Someone also had left an escape-trunk hatch open when setting smoke boundaries and material condition Zebra.

Material deficiencies were another problem. An access panel for a ventilation-supply line was missing 40 percent of its bolts. Heat in the space caused the panel to buckle, which let smoke travel to the No. 4 main-machinery room.

More air compressors had to be brought on line because of an increased demand for HP air. The ship could have used the diesel compressor that came with the SCBA outfitting package but didn't.

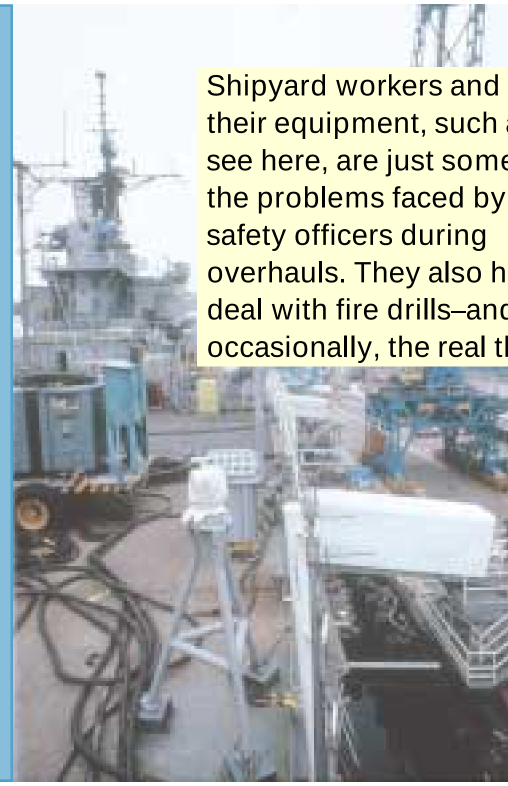
Hand-held radios would have provided better communication between the repair lockers and the scene.

This operation, like the one that led to it, had its share of problems—all of which could have been reduced or erased with ORM.

The author was assigned to the Afloat Safety Programs Directorate at the Naval Safety Center when he wrote this article.

Wow, That Was a Close One!

By Lt. Michael Steiner, USS *Wasp* (LHD 1)



Shipyard workers and all their equipment, such as you see here, are just some of the problems faced by ships' safety officers during overhauls. They also have to deal with fire drills–and, occasionally, the real thing.

Heat, noise, sandblasting dust, poor ventilation, shipyard workers, contractors, long hours. These ingredients comprise the safety officer's nightmare otherwise known as a complex overhaul.

As if all this isn't enough to drive you insane, you also have to deal with safety stand-downs, space walk-throughs, and divisional training. Then, one day as you're thinking about how lucky you've been not to have someone injured, you hear an alarm. The word that follows over the 1MC goes something like this: "Fire! Fire! Fire! Class Bravo fire at frame 84, starboard side, forward hangar bay..."

I was sitting at my desk reading the messages on the LAN when I heard that word passed. Like most people, I waited a fraction of a second to hear the words... "This is a drill." No dice. I quickly dialed the shipyard fire department, not knowing if the quarterdeck watch would have the presence of mind to pull the firebox located there. With assurance the shipyard fire department was on the way, I hustled down to the hangar bay, fearing the worst but hoping for the best.

As I arrived on the scene, I heard the quarterdeck watch pass the word, "Secure from Class Bravo fire." At the same time, I saw a mass of shipyard and ship's-force personnel huddled around a welder's oxy-acetylene rig. I also immediately noticed a fireproof cloth draped over lines in the overhead—directly above the oxy-acetylene bottles!

I made my way through the crowd until I found the fire marshall and asked him, "What the heck happened?" He told me a corpsman had been walking past the bottles and saw a 4-to-5-inch flame at the mechanical joint connecting the gauge adapter to the gauge. The corpsman then ran to the quarterdeck, screaming, "Fire! Fire! Fire!"

Meanwhile, a BMCS in the area grabbed a nearby CO_2 bottle and put out the flame. When the fire marshall arrived on the scene, he closed the cylinder valve, which ended the episode.

Investigators found that a welder had been working directly above the oxy-acetylene cylinders another welder had been using. When work ceased at 1030, a ship's-force fire watch stood by for 30 minutes. He and the welder then left the job site, claiming to have inspected for any smoldering material or hot metal.

Investigators learned the earlier worker had left his oxy-acetylene bottles on (with the gauges and hose attached) while he went to a training class. They also found he had not bled pressure from the hose. Although they aren't sure what caused the fire to ignite, they believe the source was hot sparks from the welder in the overhead.

As the investigators explained, a very responsible petty officer was standing fire watch. The problem was he didn't question the position of the oxy-acetylene bottles because the fireproof cloth was in place. However, he should have moved the bottles clear of the area or had the hot-work secured overhead until he could move them.

No one was hurt in this mishap, but I can't help thinking what a catastrophe we could have had if that corpsman hadn't noticed the flame and the BMCS hadn't extinguished the fire. With all the traffic you find in the hangar bay in a shipyard, there would have been dead and injured people everywhere if those oxy-acetylene bottles had exploded. In our case, constant damage-control training (yes, even in the yards) and quick, decisive action by ship's-force personnel made the difference.

Flooding — What Flood

By DCC(SW) Randy Wright, Naval Safety Center

What time is it when two trunk spaces and two adjacent ammunition-storage areas flood before someone finds and reports the problem? As Sailors aboard an amphibious ship learned, it's time to check the covers on all your ballast tanks. It's also time to make sure all your flooding alarms are in the "on" position and that they work.

An hour and 15 minutes after the Sailors had secured from ballast operations, flooding was reported in a fifth-deck access trunk. The flying squad investigated and found the sixth-deck trunk space directly below also flooded. After the watch called away general quarters, still more flooding was found in nearby ammunition storage areas on the fifth and sixth decks.

Repair-party personnel dewatered the spaces with peri-jet eductors and submersible pumps. Investigation revealed that a shipyard contractor had caused the flooding by leaving the manhole cover open on a ballast tank. The cover was hidden under a pile of cargo netting. Flooding alarms in the magazines were in the "on" position, but they never sounded.

During the past year, ships have reported several flooding incidents, with damage totaling $370,000. About one-fourth of these cases could have been prevented if ship's force had taken the time to make sure their flooding alarms worked. Here are three more examples of problems:

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In an incident aboard an FFG, a sounding-and-security watch saw water seeping around the edge of a watertight door leading to the plastic-waste-processing room. The water reached a depth of 4 feet before anyone could find and secure the source of the problem: the salt-water cooling system. A flooding-alarm sensor installed in the space didn't sound until dewatering had started.

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When a watchstander in a ship's central-control station saw an abnormal fluctuation of pressure on the gauge for the high-pressure air compressor, he told the EOOW. A chief petty officer went to investigate and found the No. 3 auxiliary-machinery room flooded with 3 feet of water. He reported this problem to the bridge watch, who sounded general quarters. Crewmen then isolated the firemain to the space and rigged dewatering equipment. By this time, the water level had risen to 5 feet.

Investigation of this mishap revealed the flooding alarm had sounded earlier in the afternoon as a result of standing water (from condensation) in the bilges. Watchstanders couldn't lower the bilge level then because the ship was operating too close to a coastline. As a result, they placed the alarm in the cutout position but didn't constantly monitor the space.

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A damage-control watchstander received an alarm for a high level in the bilge and told the sounding-and-security watchstander to check the forward CHT pump room for flooding. He found 12 inches of water on the deck. The in-port emergency team responded and stopped the flooding by putting a DC plug in a ruptured salt-water-supply line.

Two factors kept this incident from being serious:

● The damage-control watchstander was alert. He didn't assume the alarm was a false indication. Instead, he had the sounding-and-security watchstander investigate.

● The high-level alarm worked, and it was positioned correctly in the normal mode—not in cutout or standby.

Problems with flooding alarms are nothing new to Naval Safety Center surveyors; we find them on most ships. How do you stop them? Follow the example of fellow surveyor, Lt. Tom Binner, who spent two years as the DCA aboard an LHD without a single flooding incident.

"I highlighted problems with our flooding alarms by testing them monthly," explained Lt. Binner. "Knowing there were 63 protected spaces, I divided that number by 28, the number of days in the shortest month. Shipmates and I then tested three spaces on the first day of each month, three on the second day, two on the third day, and so on. Each day's tests took about 30 minutes of two people's time: an IC electrician, who activated the alarms, and the duty engineer (in port) or DCA (underway), who watched the alarms in damage-control central."

As a minimum, Naval Safety Center surveyors recommend that supervisors take a hard look at the condition and location of their flooding alarms and sensors. Take time to train your people about the importance of these devices. If you can't find the necessary references[1], call me at (757) 444-3520, Ext. 7119 (DSN 564).

The author's e-mail address is rwright@safetycenter.navy.mil.

For More Info...

[1] General Specifications for Overhaul of Surface Ships, Section 436, Pages 9 and 10, explain the guidelines to install or relocate flooding alarms. PMS requirements are outlined in MIP IC-004/066-95, MRC A-5. The Engineering Department Organization and Regulations Manual (ComNavSurfLantInst and ComNavSurfPacInst 3540.22), Chapter 3, Section 3, Paragraph 3301e, and ComNavAirLantInst 5400.32A discuss the bypassing of interlocks, safety devices and other portions of the flooding-alarm system. According to that guidance, any bypassing "which may affect the safe operation of the propulsion or electrical plant or the safety of personnel" requires the approval of the commanding officer.

An amphibious ship ballasts down to backload equipment and personnel from an LCU. After a similiar operation aboard another ship, flooding was reported in several spaces.

Navy photo by PHC Larry Nixon

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PICKING THE PI

By Cdr. Kevin Nicholas, Staff, ComPhibRon Six

A smell of jet fuel filled the air, and hundreds of pieces of fuselage and wings littered the water's surface when we arrived on the scene. An F-14 had crashed in the local operating area. With the pilot and radar-intercept officer safely rescued, we were tasked to recover as many pieces of the multi-million-dollar aircraft as possible. Our day of planned mine-hunting training would have to wait.

As we started our job that day, we never discussed the hazards involved. To be honest, we didn't pay them much attention—as demonstrated by the fact we passed out gloves only to Sailors who handled pieces of the wreckage. It was years later before I realized the potential risks involved that day, and with the material in today's inventory, we need to be extra cautious during recovery operations.

Here's what we should be concerned about:

Modern aircraft, such as the FA-18, use composite fiber material to make them stronger and lighter. Composite aircraft components are essentially graphite and boron fibers bonded together in epoxy material and formed into the desired shape. The fragmented fibers are so fine they can penetrate your skin.

Itching and infection can result from this type of exposure. If the composite material has been burned and allowed to dry, it can release these same fibers into the air. Everyone who handles composite material should take these precautions:

● Wear leather gloves, surgical masks and goggles, and cover as much of your exposed body as possible.

Navy photo by PH2 Dennis Taylor

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Shipboard personnel recover the twisted wreckage of a downed F-14.

When a modern aircraft like this FA-18 crashes, recovery personnel have to handle pieces of the wreckage carefully. The graphite and boron fibers used in the aircraft's components are so fine they can penetrate your skin without causing any sensation.

- Limit access to the handling area during retrieval.
- Coat all composite material with floor wax or a similar substance to seal the fibers.
- Wash the clothes worn by everyone who handles composite material separately when doing the laundry.

Although the chance of finding ordnance that was attached to the aircraft is rare, ejection seats and their explosive charges have been known to float. Any ordnance you find may be unstable and, therefore, dangerous. If EOD technicians are aboard, have them safe the seat; if there aren't any aboard, store the seat in a safe location until experts can take care of it.

A variety of aviation fuels, synthetic lubricants, and petroleum-based products may be in the water and on the parts being recovered. Accordingly, personnel should follow precautions similar to those used when dealing with composite materials to reduce exposure to toxic and hazardous substances. With fuel in the water, don't use flares or smoke to mark the wreckage.

If you find any actuators or other movable components among the items from a wrecked aircraft, wash them with fresh water, but do not move them.

This list isn't all-inclusive. However, it should remind you to consider special precautions when "picking up the pieces" from an aircraft mishap.

The author was assigned to the Afloat Safety Programs Directorate at the Naval Safety Center when he wrote this article. LCdr. Dave Clark, an aircraft-mishap investigator in the Aviation Safety Programs Directorate at the Naval Safety Center, contributed some information.

From Gloom to Fruit of the Loom

This is how the second PO3's forklift looked after it had fallen on its left side.

By LCdr. D. E. Nixon,
USS Ogden (LPD 5)

I read about a PO3 who was crushed to death when he tried to jump clear of an out-of-control forklift. He had been offloading empty containers from a flatbed semi-truck. To reach containers on the other side, he had to drive around an adjacent building. This route took him down a gravel embankment, which caused the forklift to slide sideways and roll on its side before he could jump clear.

Mishap investigators learned that the forklift had seat belts installed, but the fully trained and qualified operator had decided not to use them.

As I thought about how hard it must have been for the safety officer involved in that mishap to write his report, I was reminded of an incident aboard our ship.

It was the third day of a busy ammo onload. Although these operations always are difficult, this one was especially tough because we were a half-day behind schedule. Things were looking up, however. With the help of all hands, we were getting back on track to reach port early the next morning. No one could have predicted what was about to happen.

Here's how the victim described it to me for my report:

"I was backing down the upper-vehicle ramp, from the flight deck to the upper-vehicle storage, carrying a pallet of rocket warheads. About two-thirds of the way down, the left rear tire overran one of the wheel guards on the starboard side of the ramp, and I lost control.

"When I tried to stop and move back up the ramp to straighten the forklift, it rolled over and fell to the deck of the upper-vehicle stowage (a distance of about 5 feet). It came to rest on its left side."

After a few hours of rest—and a change of skivvies—the PO3 was ready to go back to work.

This incident could have ended like the first one if the operator had not been wearing his safety belt when he went over the edge of the ramp. It's important to stress this fact to everyone who operates forklifts. Otherwise, you also may have to write a story about an incident with an unhappy ending.

The author is the safety officer aboard USS Ogden.

Don't Ignore the Warning Signs

By MMCS(SW) Don Forrester and MMC(SW) Philip Anderson,
Naval Safety Center

A Sailor is scalded to death by steam in a ship's shower room and another is injured when a piping joint to a water heater fails... **A** 5-inch crack in the service-steam piping releases a major steam leak on the mess decks. Because it doesn't occur during meal hours, no one is injured... **T**wo valves in a shore-steam system rupture during system warm-up, severely burning a civilian worker... **A** CPO suffers second- and third-degree burns to one-third of his body when a pipe cap on service steam fails in a CPO berthing area.

Mishaps like these are why you alway should ask questions when you see warning signs of trouble. For example, why is there a constant puddle of water on the deck in the head? What is that loud hiss you hear as you cross the quarter-deck? What causes that hot, white plume that obscures your vision? All these signs indicate trouble with shore-steam risers and the service-steam system.

While a ship is in port, the shore-steam riser is the point of entry for steam supplied by a shore facility. From the riser, the service-steam system distributes steam throughout the ship to such things as water heaters, laundry presses, and steam kettles in the galley.

Why do you need to know this? Because shore steam is supplied at 100 to 150 psi and 300 to 350 degrees. In most cases, shore-steam risers are located close to a ship's quarterdeck, and the service-steam system runs through crew-living spaces, such as berthing, heads and the mess decks. Whenever you cross the quarterdeck, sit down in the mess decks to eat, or take a shower, you're within a few feet of this pressurized, high-temperature system. Anytime a piece of the piping ruptures or a component fails, you're exposed to deadly steam.

Do you assume it will never happen aboard your ship? Our surveys reveal a growing trend of deteriorated shore-steam risers and neglected service-steam systems like you see in the accompanying photo. We've found these problems:

- Piping and valves are severely corroded. This type of neglect can lead directly to catastrophic failure of piping and components.
- Fittings, such as pipe caps and gauges, are missing.
- Lagging on system piping and components is torn or missing, which creates a burn hazard. It also makes spaces hotter, which causes heat-stress problems.
- Piping, valves and fittings leak. Water-soaked and dripping lagging are good indications of a hidden steam leak.
- Shore-steam risers are not lagged and don't have a protective guard installed. One or the other is required[1] to keep people from touching the piping.
- Shore-steam supply hoses leak, bulge or are cracked. These problems should be reported to the OOD and your chain of command so they can have the hoses replaced.

Steam from any shipboard system is unforgiving when it isn't contained. If you're in the area when a steam system fails, you likely will be scalded and perhaps killed. The longer a leak continues, the worse it becomes. If you see one of the warning signs of trouble, report it immediately. Don't wait until tragedy strikes.

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For More Info...

[1] NSTM 505 (Piping Systems) and paragraph 253 of General Specifications for Overhaul of Surface Ships outline the inspection, testing and safety requirements for shore-steam risers and the service-steam system.

“It Shouldn’t Be

By MMCM(SW) Tony DeJesus,
Naval Hospital, Portsmouth, Va.

Those infamous last words are still ringing in my ears, even though I haven’t heard them since 1988. I was the M-division LCPO aboard a *Charles F. Adams*-class, guided-missile destroyer at the time and had weekend duty. Part of my job as duty engineer was to make sure all potable water tanks were topped off before getting underway Monday.

That unforgettable morning, the CDO mustered the duty department heads so he could tell us about the day’s events. When he mentioned a fire drill was scheduled that afternoon, I got concerned it would conflict with taking on fresh water. I asked him if he could wait to start the drill until we had finished topping off the water tanks.

“It shouldn’t be a problem,” he said.

I then told the CDO we would begin taking on fresh water after lunch and that the operation should take two or three hours.

At 1300, I sent the duty machinist’s mate (MM) to gather engineering duty personnel and start topping off our tanks. Two hours later, the duty MM reported that two tanks were full and that his crew was starting on the last one. I was headed to the after engineroom when the quarterdeck watch called away the fire drill that was *supposed* to come later.

The Sailor who was taking soundings on the potable water tank being filled called and said he had to leave the space he was in (the supply berthing compartment) because it was the site of the drill. I told him to cap off the sounding tube and go to the after engineroom to monitor the tank’s vent pipe.

My next move was to find the duty MM and tell him to station someone in the after engineroom to monitor the relief valve on the fresh-water manifold. I told him to make sure the potable-water riser was secured as soon as water started pouring out the vent pipe or as soon as the relief valve started lifting. Then, I went to the scene of the fire drill.

When the CDO secured the fire drill, I headed back to the after engineroom to make log entries. A few minutes later, someone called and said that electronic equipment in missile plot was moving and that the deck in supply berthing was buckling. I immediately told the person watching the overflow tube to have the person on the main deck secure the potable-water riser. I then dashed off to see the reported damage in supply berthing.

I couldn’t believe what I found. The deck was buckled 4 to 6 inches. I was even more puzzled when the initial investigation revealed that the problem had been caused by excess pressure building inside the potable water tank. “How could this have happened?” I wondered. No water had come out the vent pipe or the relief valve to indicate the tank was topped off. Wanting to find an explanation, I rounded up the duty MM, and we started looking for the root cause.

Several hours later, we finally got to the bottom of the problem. We found a blank orifice installed on the flanges for the vent pipe, and the relief valve was blanked off with gasket material. Shipyard workers had installed the blank orifice during our DSRA so they could hydrostatically test the tank; unfortunately, they had forgotten to

Navy photo by PH3 Robert A. Catalano

a Problem”

remove it. The relief valve was blanked off to prevent excess water from accumulating in the bilge.

Nobody was injured in this mishap, but the ship had severe structural damage.

One factor that contributed to this mishap was a failure to follow precautions outlined in the *NavOSH Program Manual for Forces Afloat*[1]. It states, “Never tamper with or render ineffective any safety device, interlock, ground strap, or similar device intended to protect operators or the equipment without specific approval of the commanding officer.” In this case, the relief valve that protected the tank from being over-pressurized had been tampered with—without the CO’s approval.

Even with the cap in place on a sounding tube, you can verify the status of a tank being topped off by watching the vent pipe or relief valve. In fact, the job usually is done this way—but without any problems. It would have worked this time, too, if the blank orifice hadn’t been installed on the vent pipe.

Although this happened a long time ago, I still wonder who signed off the QA package (which should have included removal of the orifice) for our DSRA. It’s a good engineering practice to make sure the sounding cap is tight when a tank is aligned for filling or distilling to avoid flooding the space where the sounding tube is located.

The author was assigned to the Afloat Safety Programs Directorate at the Naval Safety Center when he wrote this article.

For More Info...

[1] Precautions are outlined in Chapters C1 and D1(Basic Safety) of OpNavInst 5100.19C, with change 2.

Twelve years ago, the author was M-division LCPO aboard this class of guided-missle destroyer when he witnessed a deck-buckling mishap that temporarily bewildered him.

A Tragedy Ne

By MMC(SW) Philip Anderson,
Naval Safety Center

With a short availability complete, an LPH gets underway. Suddenly, a bonnet on the root-steam-supply valve to the No. 1 ship's service turbine generator (SSTG) blows off. Massive amounts of 650-psi, 850-degree, superheated steam start pouring into the fireroom, instantly killing six Sailors. Four more escape this human pressure cooker but die several hours later from their burns.

It was 1990 when this tragedy occurred. The mishap investigation revealed these problems:

Ship's force aboard the LPH hadn't identified the valve as a Level I repair at the start of the availability.

Because of his inexperience with Navy steam systems, the ship-repair surveyor sent to check the job didn't recognize the valve as part of a Level I system.

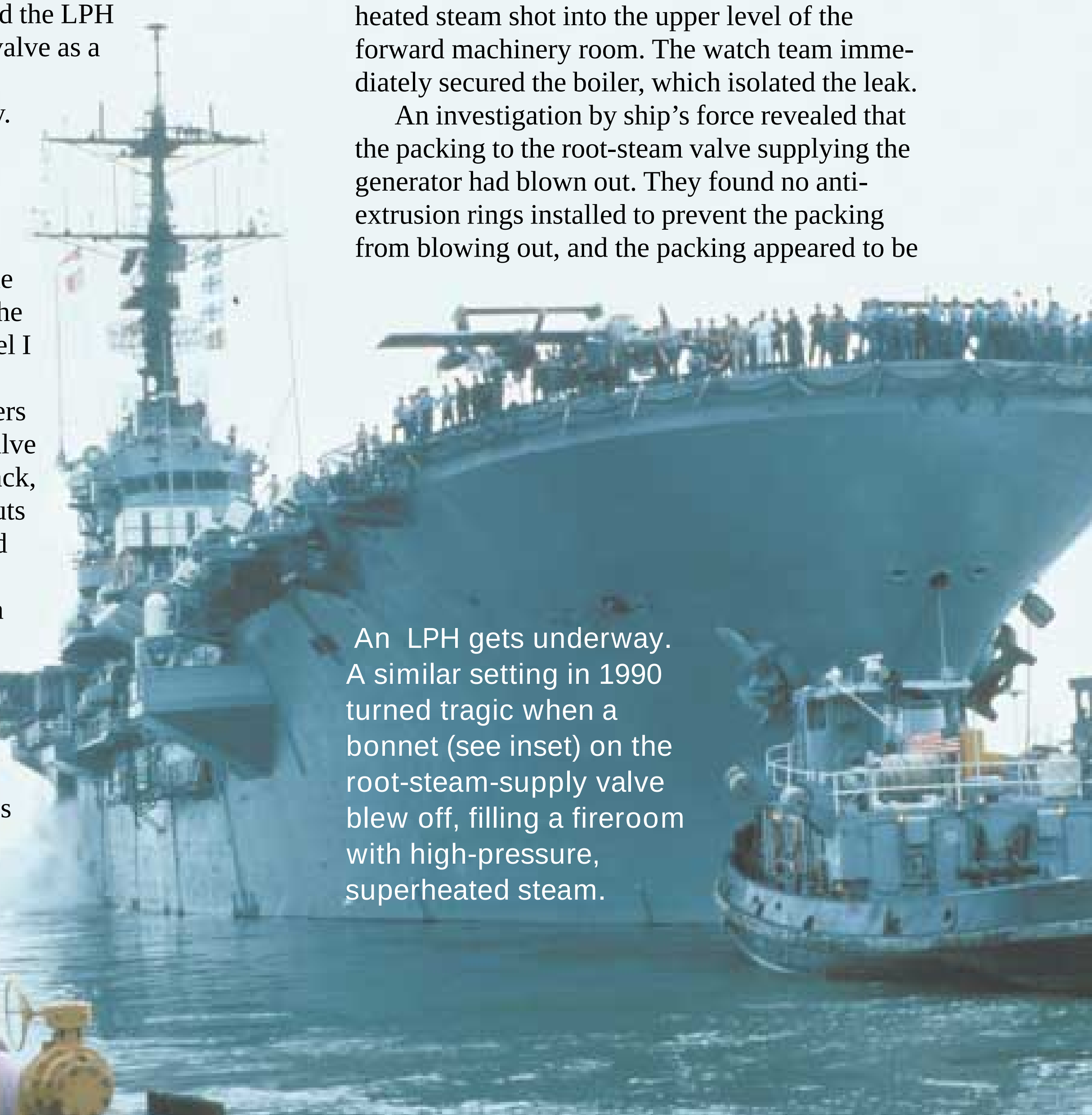
The civilian workers who assembled the valve unknowingly used black, oxide-coated, brass nuts instead of the required Level I, heat-treated fasteners. They used a hydrostatic test instead of the required operational-pressure test[1].

No one from ship's force supervised the job or visually inspected the valve when repairs were completed. Ship's force assumed the contractor had all QA responsibility.

How many lasting lessons did we learn from this mishap? Sailors aboard an LHD are saying, "Very few."

The LHD's Plan of the Day called for independent-steaming exercises. Little did the crew know how closely they would come to repeating the earlier disaster. About 20 minutes after the watch team had secured the No. 2 SSTG, they heard a loud blast. Quickly, 700-psi, 900-degree, superheated steam shot into the upper level of the forward machinery room. The watch team immediately secured the boiler, which isolated the leak.

An investigation by ship's force revealed that the packing to the root-steam valve supplying the generator had blown out. They found no anti-extrusion rings installed to prevent the packing from blowing out, and the packing appeared to be



An LPH gets underway. A similar setting in 1990 turned tragic when a bonnet (see inset) on the root-steam-supply valve blew off, filling a fireroom with high-pressure, superheated steam.

arly Repeated

the wrong type of material. Contractors recently had overhauled this valve and, according to ship's force, had the responsibility for quality assurance.

The only difference between this mishap and the 1990 tragedy was that no LHD crewmen were near the valve when the packing failed. As a result, no one was killed or injured.

It's becoming a too-common practice for shipyard workers, civilian contractors, and IMA personnel to work on a ship's systems with very little involvement of ship's force. Are you letting these people become the system experts aboard your ship? If so, you're asking for trouble. You must pay attention to the work being done by outsiders aboard your ship to ensure the job is done according to standards[2]. Never give up control or ownership of your equipment. When workers from outside repair activities come to your ship, ask yourself this question: What will happen if that system or equipment they're repairing fails?

To avoid problems like these, make sure you take care of your ship's-force responsibilities:

- Monitor the quality of work of outside activities daily[3].
- Visit sites and walk through spaces where workers from outside services are on the job. Note any questionable activities[4].

- Discuss problems found during inspections and walk-throughs with contractors. Ensure they fix the problems, and submit Quality Deficiency Reports when necessary[5].
- Ensure that equipment returned to the ship has passed the required tests and inspections[6].
- Have experienced personnel watch equipment and system tests, and make sure these tests meet the specifications for the level of work done[7].
- Verify that formal work procedures are accurate and in accordance with references[8].
- Inspect final work[9].
- Ensure all system and equipment specifications are included on work packages[10].

The responsibility for a ship rests with the crew. The time to find problems with repaired equipment and systems is during the repair process or the post-repair and inspections—not while you're steaming away from the pier. When the brow is lifted, the lines cast off, and the whistle indicates "underway," the only ones left to deal with problems are you and your shipmates. Take pride in ownership, because it may save your life.

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For More Info...

[1] Chapter 1, NSTM 505-1.4.3-2f requires an operational pressure test to verify valve tightness.
[2] Work done by outside sources must meet the standards outlined in the Joint Fleet Maintenance Manual (JFMM), CinCLantFltInst and CinCPacFltInst 4790.3.
[3] JFMM, Vol. 5, Part II-3.6.1.4C, requires daily monitoring of the work done by outside activities.
[4] JFMM, Vol. 5, Part II-3.6.1.4h requires site visits and space walk-throughs by ship's force when outside services are used.
[5] JFMM, Vol. 5, Part II-2.5.10m and 3.6.1.4j requires a discussion of discrepancies with contractors and submission of Quality Deficiency Reports when necessary.
[6] Work packages, technical manuals, and the JFMM require tests and inspection of repaired equipment before it is installed.
[7] JFMM, Vol. 5, Part II-2.5.10f, requires experienced ship's-force personnel to witness equipment and system tests.
[8] The verification of formal work procedures must be in accordance with provisions in the JFMM and NSTM.505 (Piping System).
[9] JFMM, Vol. 5, Part II-2.5.9b and k, requires that final work by outside activities must be inspected for satisfactory completion.
[10] JFMM, Vol. 5, Part II-2.5.10a, requires work packages to include all system and equipment specifications.

An Eager Beaver's Lament

By Ens. Jason Reinsch,
USS Coronado *(AGF 11)*

Aboard the mighty *Coronado,*
Served the proudest BM3,
Taking charge of all the deckplates,
Was this craftsman's specialty.

But a deep desire he fostered,
He really thought it was his fate.
The saltiest of Sailors wanted
To be an electrician's mate.

Though he lacked qualification,
And had no gear for safety's sake,
He found an electrical problem,
'Twas his golden chance to take.

It was energized equipment,
But he felt no fear within,
It was his happiest of hours,
He didn't think, he dove right in.

A screwdriver and motivation,
Were all it took to do this work,
440 volts of AC current,
Gave his arm a mighty jerk.

Every hair popped to attention,
Smoke billowed from both his ears,
Only then did he consider,
"This might not be the best idear."

After a trip down to medical,
BM3 learned his lesson true,
"I'll let the qualified EMs do their thing,
And then I'll live to see BM2."