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Enlisted Environmental/Safety Rating

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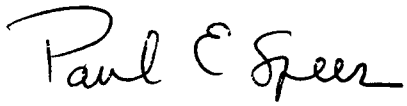

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Summary

Background

Current Navy policy identifies eight collateral-duty environmental protection (EP), general safety, and Navy occupational safety and health shipboard positions. The collateral-duty positions are currently assigned to several different personnel on any given ship. Each must receive formal off-board training at Navy training centers, and must be assigned in writing.

Navy safety/EP leaders have asked whether the assignment of these functions as collateral duties is causing problems. Are the safety/EP functions getting too little attention, and is the collateral-duty burden interfering with the performance of primary duties? Because these duties are scattered among so many different people is it hard to ensure that they are properly trained?

A possible solution to these problems is to dedicate enlisted personnel with a safety and EP-related technical rating to these duties as a primary duty on Navy ships. Such a rating would have to be created from scratch—something the Navy hasn't done in more than 20 years.

The Director, Environmental Protection, Safety, and Occupational Health Division (N45) in the Office of the Chief of Naval Operations asked CNA to examine the need for an enlisted shipboard environmental protection/safety specialist rating, to help him decide whether he should consider creating such a rating. This report documents the results of that study.

Methodology

We approached this issue by asking four basic questions:

- What are the current shipboard safety/EP personnel requirements?
  - — And what training is required?
- How are ships organized to meet these requirements?
- What are the problems with the current state of affairs?
- If problems exist, would creation of a rating be the best way to solve them?

We reviewed Navy instructions [1 through 4] to determine just what the current safety/EP requirements are. We then visited eight ships of various classes, and met with safety and environmental personnel at both the TYCOM and fleet levels. We visited the Navy Safety Center and the Board of Inspection and Survey (INSURV) to discuss safety and EP performance on board ships. We also visited the Naval Manpower Analysis Center (NAVMAC) in Millington, Tennessee, to discuss the issues involved in the creation of a rating.

Summary of findings

Current requirements and organization

Current Navy directives specify eight shipboard safety/EP positions which must be assigned in writing and formally trained:

- Afloat Environmental Protection Coordinator (AEPC)
- Hazardous Materials Coordinator
- Hazardous Materials Minimization (HazMin) Center Supervisor
- Afloat Safety Officer
- Traffic Safety Officer
- Recreation, Athletic, Home Safety Officer
- Respiratory Protection Officer
- Electrical Safety Officer.

Carriers, large amphibious warfare ships, and large tenders have primary-duty Safety Officers and staffs, but on all other ships these positions are filled as collateral duties.

Assignment of these duties varies slightly from ship to ship. The environmental positions related to hazardous materials are usually assigned to personnel from the Supply Department. The Safety Officer is usually the Operations Officer or the Chief Engineer, neither of whom has much time to devote to safety.

In addition to the eight duties listed above, ships are required to designate Division Safety Petty Officers (DSPOs), and additional personnel are required to staff the HazMin Centers (on all ships) and the Safety Divisions (on large ships only).

What are the problems with the current system?

We found no evidence of an immediate safety/EP crisis in the fleet. Afloat injury rates (based on very limited data held by the Naval Safety Center) have been on a steady decline. However, the management and administration of most ship safety/EP programs can be improved. INSURV inspections continually uncover numerous deficiencies, many of which are not minor paperwork items that can be easily dismissed:

- Many of the safety deficiencies could cause injury to personnel.
- Many of the environmental problems uncovered by INSURV would have resulted in a notice of violation (NOV) if they had been uncovered by an environmental regulator at a Navy shore facility.

Shipboard personnel who are assigned collateral safety/EP duties often do not have sufficient time to dedicate to these tasks. As a result, the tasks are often neglected until an inspection or incident requires action. Off-board training requirements that go with these assignments are an additional burden on ships:

- Required classes fill up or are not given in convenient locations.

— This might be an issue for the training community, indicating a disconnect between fleet needs and training resources.

- Ships find it difficult to part with personnel who are needed onboard.

In the case of ships with primary-duty Safety Officers and Safety Divisions, temporary additional duty (TAD) assignments to the Safety Division can have a negative effect on sailors' career progression by taking them out of their ratings for up to two years.

Potential solution/recommendation

The problems noted above can best be addressed by creating a primary-duty shipboard safety/EP specialist similar to the 3-M Coordinator. This person would be responsible for general safety/EP program management and recordkeeping, just as the 3-M Coordinator is responsible for maintenance (and as the Afloat Safety Officer is supposed to be responsible for safety).

A new rating is not needed for shipboard safety/EP. This position can be manned by creating an NEC (just as in the case of 3-M). We envision this NEC as being some combination of the 9595 (Hazardous Materials Control and Management Technician) and 9571 (Safety Technician) NECs. Some additional training might be required; details would have to be worked out with the manpower and training communities. Personnel should complete required training and hold this NEC before they arrive on board.

If Navy safety and environmental protection leaders decide to create such a specialist, they must first address the issue of where this person would come from:

- Would this position be part of the current shipboard complement?
- Or: Would the Navy create an additional shipboard billet?

Organization of this report

This report is organized as follows:

- The first section following this introduction describes the safety/EP requirements and how ships are organized to meet these requirements.
- The next two sections review current safety/EP performance and other (fleet) issues associated with the current system.
- The last section discusses alternative shipboard safety/EP organizations.

Requirements and current organization

Program requirements

Table 1 lists the numerous components (known as "program elements") of the safety [1] and EP [2] programs required of Navy ships.

Table 1. Safety and EP program elements mandated by Navy instruction

Safety program elements	EP program elements
Asbestos control	Sewage
Heat stress control	Air
Hearing conservation	Oily water and waste
Sight conservation	Hazardous waste and HazMat
Lead control	Solid waste
Respiratory protection	Medical waste
Electrical safety	OHS spills
Gas-free engineering	Ship ballast water and anchor sediment
Radiation protection	Marine mammals
Tag out	Floating drydock
Hazardous material control and management	Noise
Mercury control	
PCBs	
Man-made vitreous fibers	

Table 2 lists the eight collateral-duty safety/EP positions that must be assigned in writing, along with their training requirements.[1] On large deck ships (carriers, LHA, LHD, AS, and AOE), the Safety Officer is a primary-duty position; these ships also have a Safety Division,

1. Training classes are described in [5].

staffed, on average, with four to eight people. On all other ship classes, the Safety Officer is a collateral-duty position.

Safety/EP responsibility and training are not limited to the eight persons listed in table 2. Personnel staffing the HazMin Centers and Safety Divisions (large ships) take the HazMat Control and Management Technician and Safety Programs Afloat classes, respectively, and all Division Safety Petty Officers are required to take the Safety Programs Afloat class. On some ships, Division Safety Petty Officers rotate as often as every 6 months (average is probably about every 12 months), thus placing an additional training burden on ships. All hands receive general safety/EP training (I-Division) as well as safety/EP training specific to their work center.

Table 2. Shipboard safety/EP assignments and required training

Assignment	Required training class	Class number	Duration (days)
Afloat Environmental Protection Coordinator	AEPC	A-4J-0021	3
Hazardous Materials Coordinator[a]	Afloat HazMat Coordinator	A-8B-0008	2
HazMinCenter Supervisor[b]	CHRIMP/HICS	N/A	4
	HazMat Control and Management Technician	A-322-2600 (SNEC 9595)	5
Afloat Safety Officer[a]	Afloat Safety Officer[c]	A-4J-0020	10.5
Traffic Safety Officer	None		
Recreation, Athletics, and Home Safety Officer	None		
Respiratory Protection Officer: small ships	Managing a Respiratory Protection Program	A-4J-0082	2
Respiratory Protection Officer: large ships	Respiratory Protection Manager's Course	A-493-0072	5
Electrical Safety Officer	None	N/A	

a. Navy instructions [1, 2] require this person to be an officer.
b. Not applicable to submarines.
c. This class is embedded in the SWOS Department Head Course "Shipboard Readiness Training."

Current shipboard organization

We visited eight ships to determine how the fleet was meeting the safety/EP requirements discussed above.[2] Although assignments varied from ship to ship, the following organization is typical of smaller ships (i.e., those without primary-duty Safety Officers):

- The AEPC task is assigned to a department head, usually the Chief Engineer (CHENG).
- The HazMat Coordinator is usually the Supply Officer, and the HazMin Center Supervisor is a senior enlisted person from the Supply Department.
  - — On some ships, the HazMin Center Supervisor and/or the personnel staffing the Center rotate every year or so. This increases the training burden associated with this position.
- The Safety Officer is a department head, often the Operations Officer. He also handles traffic safety and recreation, athletics, and home (RAH) safety.
- The Electrical Safety Officer is always the Electrical Officer.
- The Respiratory Protection Officer is often the first lieutenant or the corpsman.

On larger ships (those with primary-duty Safety Officers), the typical arrangement is:

- The AEPC task is assigned to the Assistant Safety Officer, or to an O-3 from the Supply Department.
- The HazMat Coordinator is usually the Supply Officer, and the HazMin Center Supervisor is a senior enlisted person from the Supply Department.
  - — On some ships, the HazMin Center Supervisor and/or the personnel staffing the Center rotate every year or so. This increases the training burden associated with this position.

2. Detailed results are given in appendix A.

- Four of the five safety positions are filled by the Safety Division; the Electrical Safety Officer position is filled by the Electrical Officer.
    - — On some ships, enlisted personnel assigned to the Safety Division rotate out every year.

Data collected by INSURV show that on a typical warship, it takes about 47 hours per week to properly perform these duties [6].

Current safety and environmental performance

We located three data sources related to fleet safety/EP performance:

- We obtained summary data on afloat mishaps over recent years from the Naval Safety Center.
- From INSURV, we obtained data summarizing their Underway Material Inspections (UMIs) for EP and occupational health (OH).
  - To assess the impact of having safety leadership handled as a collateral duty, we compared safety performance data from ships that have a primary-duty shipboard Safety Officer and Safety Division (CV/N, LHA, LHD) with the smaller combatants, which have collateral-duty Safety Officers.
- We looked at the Navy's oil spill databases, particularly the one maintained by Commander Navy Region Southwest (NAVREGSW).
  - We used these data because of concerns about the completeness of the Navy's oil spill database [7]. COMNAVREG SW has worked hard to compile a reliable database of Navy spills in the San Diego area.

Safety Center data

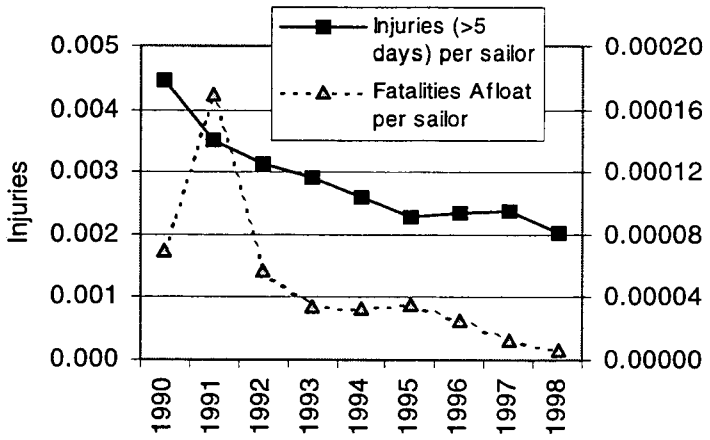
In any attempt to assess Navy safety performance, the first question to ask is: Are injury rates on Navy ships excessively high? To answer this question, we visited the Naval Safety Center in Norfolk, Virginia.

Figure 1 shows the numbers of Navy shipboard fatalities and injuries over recent years.[3] Mishap numbers are normalized by the number of

3. The data we were able to obtain did not break out results by ship class.

sailors assigned to afloat billets. The Safety Center feels that Navy shipboard injury rates are satisfactory and, as this figure shows, are steadily improving.[4]

Figure 1. Numbers of afloat mishaps, 1990–98, based on Naval Safety Center data



One issue does arise here: The Navy compiles injury reports only for cases in which 5 or more work days were lost to the injury, so figure 1 may be telling only half the story. Furthermore, the Safety Center tells us that reporting is often inconsistent among ships. For example, some define "5 lost days" to include weekends, and some do not.

INSURV inspections

INSURV performs four types of inspections:

- Acceptance Trials (ATs), on new ships prior to purchase
- Final Contractor Trials (FCTs), to look at warranty items when the ship is 1 year old

4. The spike in fatalities in 1991 is due to the gunpowder accident aboard the battleship *Iowa*, which killed several sailors.

- Surveys (SUR), prior to a ship's decommissioning
- Underway Material Inspections (UMIs), which include inspections of OH and EP programs and equipment. They are conducted on ships in service at least once every 5 years.

We looked at UMI results only. UMIs, which are normally done between deployments, take place over a 1-week period while the ship is underway from its home port. We obtained summary data on UMI results from 1994 through 1998. For both "occupational health" and "environmental protection," INSURV places results into two categories: program compliance and "deficiencies."

Occupational health

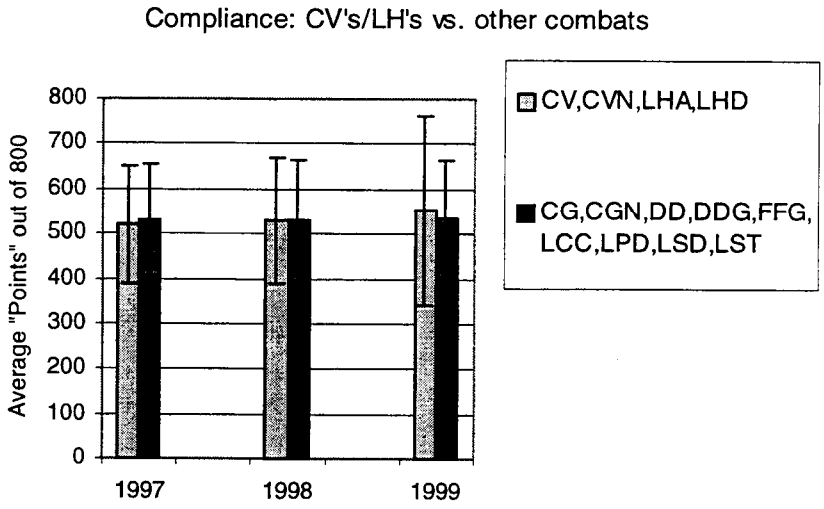
Program compliance

For each of the OH programs, INSURV rates ships for compliance based on a matrix divided into five performance categories: instruction or guidance, point of contact, training, associated equipment, and program self-evaluation (see appendix B). Performance in each of the five categories is scored on a scale of 0 (unsatisfactory) to 20 (outstanding); a maximum score is 100 points. INSURV considers a ship to be compliant for a program if it scores 60 or more points.

Eight of the OH programs identified by INSURV (safety, asbestos control, heat stress control, hazardous material, hearing conservation, sight conservation, respiratory protection, and man-made vitreous fibers) are common to all ships. We used inspection data from these eight programs to compare the performance of ships that have full-time safety staffs with those that don't.

We summed each ship's compliance scores in the eight separate programs to get a combined score for each ship, where the maximum possible score is 800 (8 programs x 100 maximum points for each). We then averaged these scores by year (1997 through August 1999). Neither the type of staffing (small ship, collateral-duty Safety Officer vs. large ship, primary-duty Safety Officer) nor the year appear to affect the results (figure 2). On average, both ship groupings had passing scores in all three years, although they didn't pass by very much.

Figure 2. Average combined scores in eight programs common to all surface ships (minimum score = 0, maximum score = 800). Error bars indicate one standard deviation.

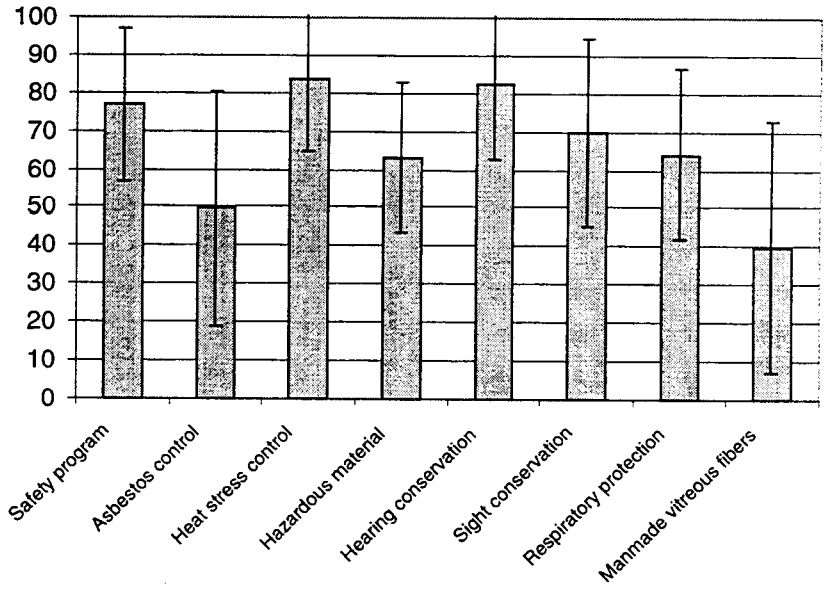


For the 15 UMI inspections performed in 1999, we looked at data for each of the five categories of the OH program areas.[5] Most ships performed well in the instruction and point-of-contact requirements, with the maximum 20 points in each category given to at least half the ships. Most ships did not perform as well in the other categories (training, associated equipment, and program self-evaluation), with many ships earning 10 points (i.e., average) or less.

Although performance was fairly consistent across staffing and year, it varied widely across the different program areas (figure 3). Two programs show average scores below 60: the related programs of asbestos and man-made vitreous fibers. Fleet-wide performance in the man-made vitreous fibers program was worst overall, with 0 points (i.e., unsatisfactory) assigned to nearly half the ships in each of the program categories. Because only 3 of the 15 ships inspected through August 1999 were large-deck ships, we did not compare by type of staffing. Detailed results are in appendix C.

5. This breakout by program area was not available for 1997 and 1998 in the data we were provided.

Figure 3. Average ship scores in eight individual programs common to all surface ships for 1997 through August 1999 (minimum score = 0, maximum score = 100).



Deficiencies

Deficiencies found during ship inspections are noted as "cards"—pre-written deficiency descriptions that are drawn from the INSURV Inspector Catalog (INSCAT). The inspection report is essentially a collection of issued cards with accompanying notes.

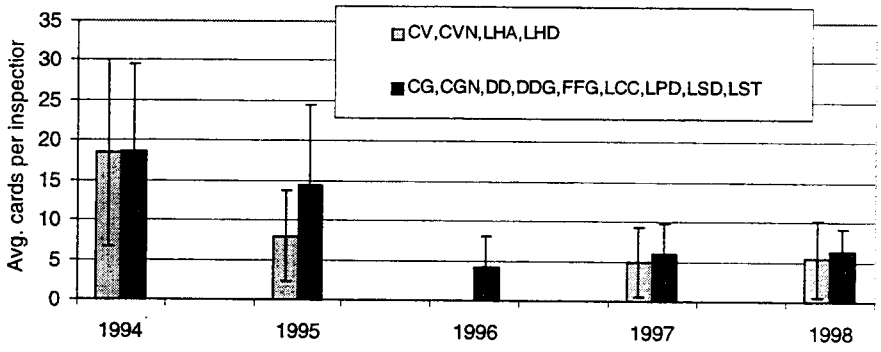
The same set of cards is used for all surface ships (a different set is used for submarines), but not all cards are applicable to all ships. For our analysis, we looked only at deficiencies that are common to all ships (to better compare deficiencies across ship classes).

Part number: Each card in the INSCAT has a "part number" (the first digit in its ID code) that denotes the importance of the deficiency. The part number ranges from 1 to 3, with 1 denoting deficiencies that are most important.[6] (Details are in appendix D.)

6. INSURVINST 4730.11H.

Overall, INSURV has been finding between 5 and 20 Part-1 deficiencies per ship inspection. Several instances of improper labeling, handling, and storage of hazardous waste were noted—items that would result in NOVs had they been uncovered by an environmental regulator at a Navy shore facility. The average number decreased over time from 1994 to 1998 (as has the variance between ships), with no obvious differences according to staffing (figure 4). The same number of deficiencies on small and large ships might actually indicate better performance on the part of the large ship, where there are more personnel and presumably more opportunities for deficiency. However, we have no data on the specific number of individual items inspected on each ship.

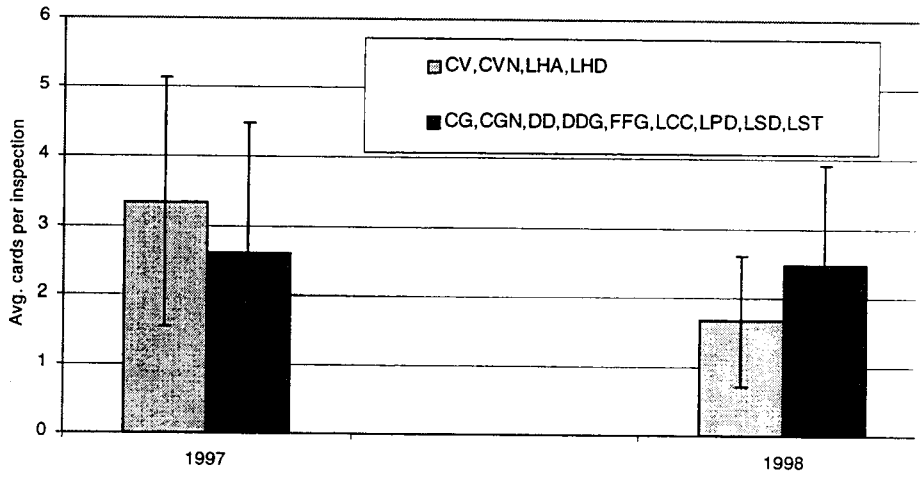
Figure 4. Average number of OH Part-I deficiencies per inspection



Risk Assessment Code (RAC): Starting in 1997, when issuing a card for a safety inspection, inspectors have assigned a Risk Assessment Code (RAC) to each deficiency. The RAC is scored from 1 to 5, with 1 representing the highest risk. Risk is defined as a combination of the severity of the hazard and likelihood of it happening (see appendix D for more details).

Large-deck ships (with primary-duty safety staffs) inspected in 1997 had an average of 3.3 deficiencies meriting an RAC of 1 or 2, compared to an average of 2.6 for the other ships inspected. In 1998, large-deck ships averaged 1.7 such deficiencies compared to 2.5 for the other ships (figure 5).

Figure 5. Average number of OH "high-risk" deficiencies per inspection



Environmental protection

Program compliance

INSURV inspection for EP program compliance consists of one overall program with six performance categories. INSURV considers a ship that scores 60 total points (out of 100) to be compliant. Summary results for 15 such inspections during 1999 are shown in table 3. The first two items refer directly to the AEPC; the other four items refer to general on-board crew training. Most ships "pass" in most of the categories, but a surprisingly high fraction do not.

Table 3. Results of 1999 INSURV EP program compliance inspections (15 total)

Performance category[a]	Points	Ships scoring "yes" (% of total)
EP coord. designated in writing	Yes = 20, No = 0	13 (87%)
EP coord. attended course	Yes = 20, No = 0	5 (33%)
EP "I" div. training	Yes = 20, No = 0	9 (60%)
Annual EP training	Yes = 20, No = 0	9 (60%)
OHS spill team trained	Yes = 10, No = 0	11 (73%)
OHS annual drill	Yes = 10, No = 0	6 (40%)
Totals	100 max; 60 = pass	9 (60%)

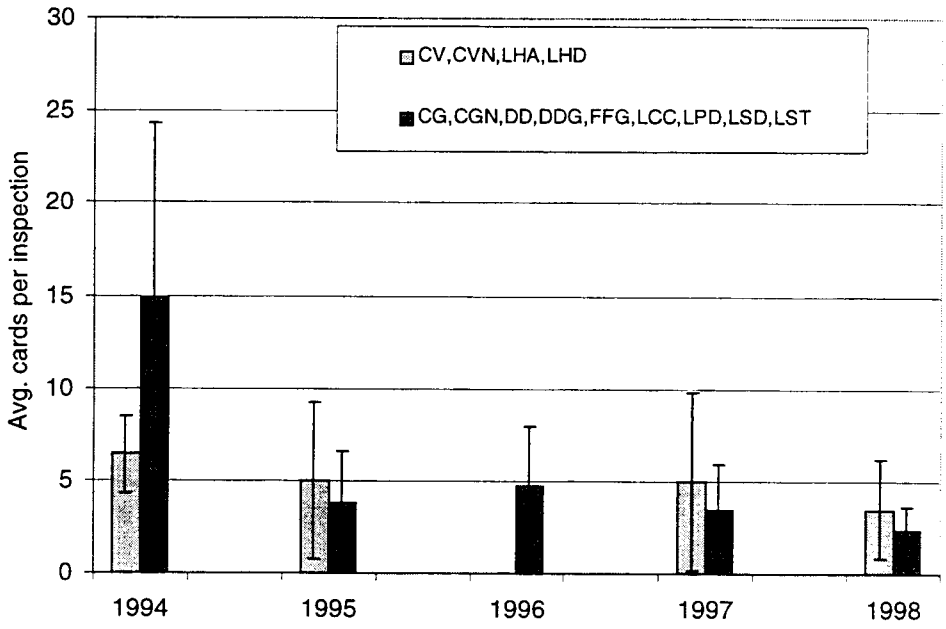
a. The last four categories refer to general crew on-board training, not schoolhouse training for the eight assigned safety/EP personnel.

Does this represent good or bad performance? With nothing to benchmark these results against, we simply don't know. As we've seen in the case of safety inspections, results are ambiguous. Although most ships pass, there appears to be room for improvement, particularly in regard to AEPC training.

Deficiencies

Figure 6 shows the average number of Part 1 EP deficiencies. Overall, performance seems to be improving slightly over time; there are no significant differences related to type of staffing.[7]

Figure 6. Average number of EP Part I deficiencies per inspection



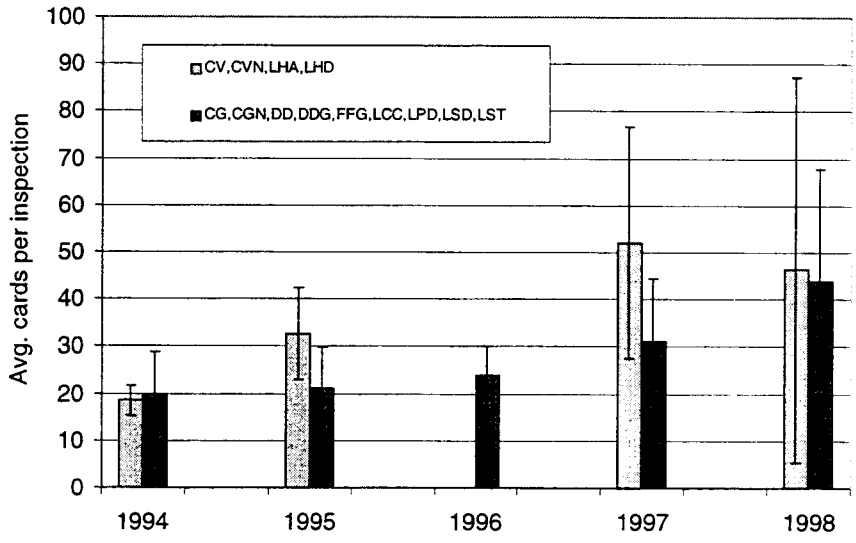
INSURV does not assign a specific risk rating (similar to the RAC) for EP deficiencies, so we attempted to separate out the seemingly

7. Although the staffing differences are with regard to ship safety organization, we show this breakout for EP also because in some cases the Assistant Safety Officer serves as the AEPC.

administrative items. We did this by removing the cards that contained the following words, parts of words, or phrases: "placard," "not posted," "procedure," "sign," "mark," "guide," "label," "engrave," "color code," and "train," because we assumed that these indicate administrative or training deficiencies. We then analyzed the remaining records, including Part 1, 2, and 3 deficiencies.

From 1994 to 1998, the average number of these potentially more serious deficiencies increased overall, to a level of about 45 per ship per inspection (although the variances did as well). These numbers certainly seem to suggest room for improvement although, again, we have no benchmark to help us interpret them. Examples of deficiencies noted include improper handling and storage of medical waste. Type of staffing had no apparent effect (figure 7).

Figure 7. Average number of EP cards indicating (nonadministrative) problems per inspection



Oil spill performance

Fuel spills from Navy ships have recently been a subject of much discussion, by both the public and senior Navy officials. A widely held perception is that oil spills represent one area in which the Navy's environmental performance is lacking; summary statistics suggest that numbers of Navy spills have remained fairly flat over recent years, despite the Navy's efforts to improve in this regard. In addition, some citizen and regulatory groups have concluded that the Navy has a higher spill rate than does the commercial shipping industry. Past CNA studies have analyzed the Navy's oil spill performance in great detail [7, 8, 9]. In general, these studies have found that although the Navy's fairly high spill rate is due to its uniquely military mission which requires it to transfer fuel very often, the Navy could certainly improve its performance in this area.

For the data quality reasons discussed earlier, we focused here on spills in the San Diego area as a gross indicator of any differences between ship classes. From January 1996 to June 1999, ships homeported in San Diego spilled fuel 137 times into San Diego Bay (this includes only spills greater than, or equal to, 1 gallon). The breakdown by ship class is shown in table 4. There is no apparent trend with respect to ship staffing.

Table 4. San Diego Bay oil spills (greater than, or equal to, 1 gallon) by Navy ships currently homeported in San Diego, January 1996 through June 1999

Hull type	Spills	Homeported ships	Spills per ship
CG	25	7	3.6
CV	4	1	4.0
CVN	4	1	4.0
DD	23	5	4.6
DDG	8	6	1.3
FFG	24	9	2.7
LHA	9	2	4.5
LHD	4	3	1.3
LPD	19	5	3.8
LSD	17	6	2.8

Summary

What do we conclude from the data presented in this section? Navy ships are a unique working environment, and without a benchmark for comparison, we cannot say whether these data indicate clearly good or clearly poor performance. However, some inferences are possible, particularly from the INSURV results.

Regarding safety:

- There is no immediate safety crisis in the fleet. The Naval Safety Center feels that injury rates are low and are steadily decreasing.
- However, there is room for improvement in the administration and management of shipboard safety programs. INSURV consistently finds large numbers of shortfalls. In general, training in shipboard safety programs appears to be a weak area.
- There is no apparent difference in performance between ships that have primary-duty Safety Officers and those that do not.

Regarding environmental protection, there isn't much data by which to measure performance. Navy ships do not receive environmental "notices of violation," and, except for oil spills, no environmental "mishap" statistics are compiled. However:

- The Navy has come under public criticism regarding ship oil spills.
- INSURV inspections reveal a seemingly high number of shortcomings in ship environmental programs and equipment.
  - — Training of ship AEPCs appears to be an especially weak area.

We will address the training burden associated with safety/EP assignments in the next section.

Other issues regarding the current system

Task loading

On almost every small ship we visited, crewmembers said there was not enough time to adequately perform collateral-duty safety/EP assignments. For example, on a typical destroyer the Operations Officer is assigned as the Afloat Safety Officer (ASO). It is no surprise (or problem) that the ASO job takes a distant back-seat to the operations job. The ASO job is generally addressed only when an inspection, required report, or some such need for action comes up. Most ship personnel feel that this system works fairly well: "We might go a couple of months without doing anything related to ASO, but the important ASO stuff gets done when necessary...."

Some important things do get passed over, however. One collateral-duty ASO we visited offered the following example, and we suspect it is not a rare case. While pulling together safety records and data in preparation for an upcoming inspection, he noticed that he was seeing a large number of hand injuries involving hatches, particularly among the Marines who periodically embark. In response, he put up signs and created a modest hatch safety awareness program. The frequency of these injuries dropped significantly. He is confident that had there been a full-time Safety Officer keeping track of accident reports and trends, this problem would have been noticed and corrected much earlier.

Collateral-duty assignments are often inadequately addressed during personnel turnover. In one instance, review of a ship's collateral-duty list during our visit resulted in one officer being surprised to see that he was listed as the ship's AEPC.

Career impacts

Large ships—those with primary-duty Safety Officers—typically have four to six enlisted personnel assigned to the safety office. These sailors come from various ratings and are drawn from various departments around the ship. They typically are assigned to safety for periods ranging from 6 months to 2 years. This time spent working outside of their rating could have a negative impact on their career progression. Of course, this problem isn't unique to safety/EP assignments. There are many instances aboard ship in which sailors are put in TAD assignments outside of their ratings.

Training burden

The current shipboard Safety/EP organization places a significant training burden on the Navy: a burden borne at both the Navy level, in the form of the requirement to maintain a large safety/EP schoolhouse training program, and at the ship level, in the form of lost work-days as sailors leave the ship to attend schoolhouse training. On all the ships we visited, offboard training requirements were seen as a problem:

- Ships sometimes find it difficult to obtain seats in the required classes (i.e., classes fill up or are not given in their location).
- Ships find it difficult to part with personnel who are needed onboard.

The issue of classes filling up is not so much a weakness of the way responsibilities are delegated aboard ship, but might be a communication problem between the fleet and the organization(s) responsible for providing the training. Perhaps the training community does not have the proper information to accurately project training requirements. For example, if the school wasn't aware that some ships rotate a particular job every year, they could significantly underestimate the annual training requirements for the associated course.

Table 5 summarizes the number of training days required for safety/EP personnel (see table 2). Totals shown are "per 2 years," assuming a nominal 2-year tour aboard a typical ship.

Table 5. Training burden under the current system, per ship

Small ship	
8 "assigned personnel:"	26.5 man-days[a]
2 enlisted in HazMin Center: rotate annually	20 man-days
15 Division Safety Petty Officers:	75 man-days
Large deck ship	
8 "assigned personnel:"	29.5 man-days
4 enlisted in HazMin Center: rotate annually	40 man-days
4 enlisted in Safety Dept:	20 man-days
40 Division Safety Petty Officers:	200 man-days

a. Man-days equals the number of students times the training days per student.

For example, on a small ship, the eight collateral-duty safety/EP positions require a total of 29.5 days of formal training. Two enlisted personnel in the HazMin Center, rotating annually, equals four people every 2 years; with each taking the 5-day HazMat Technician class, that totals 20 training days every 2 years. Fifteen DSPOs, each taking the 5-day Safety Programs Afloat class, equals 75 days.

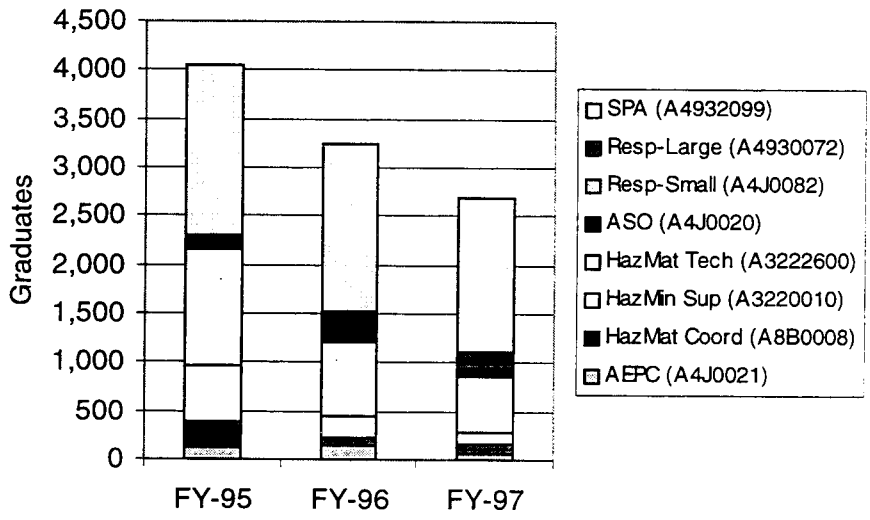
The situation is similar for the large ships (those with primary-duty Safety Divisions). Note that on a large ship, the HazMin Center has a staff of four (versus two for the small ship), and the Safety Division is staffed as well. Remember too that on a carrier or a large-deck amphibious ship, there are more than 40 divisions.

The bottom line here is that these training requirements are very substantial and place a real burden on our under-manned ships.[8]

8. NAVOSHENVTRACEN is well aware of this training burden on fleet ships, and has several initiatives in place to reduce it. For example, requirements for classroom training for DSPOs are being relaxed. They have also proposed to embed HazMat Technician (9595 NEC) training in the SK curriculum, so ships would not have to send supply personnel offboard for this training upon their assignment to the ship's HazMin Center.

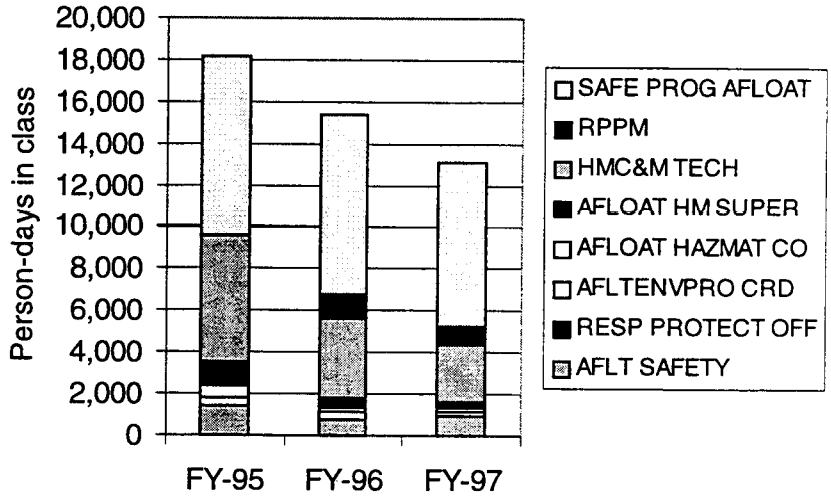
Figure 8 summarizes the Navy-wide totals for the number of personnel taking the Safety/EP classes shown in table 2. Data used in this figure are from [10]. The numbers in figure 8 are roughly consistent with those in tables 2 and 5. For example, if each ship has to have one person take the AEPC class every 2 years, that yields about 260 people every 2 years or 130 per year Navy-wide—numbers that are roughly consistent with those in figure 8. Of course, the numbers don't match exactly because some personnel might not take the required classes, or personnel who are not assigned to one of the shipboard safety/EP positions might take some of these classes (most notably the Hazardous Waste related classes).

Figure 8. Number of personnel attending safety/EP schoolhouse training, FY 1995 to FY 1997, broken out by course



Overall, the Navy cycles a large number of people through these classes—an average of about 3,300 per year over the 3 years shown. Multiplying by the duration of each class yields an average of slightly more than 16,000 person-days per year (figure 9).

Figure 9. Total person-days in class for safety/EP schoolhouse training, FY 1995 to FY 1997, broken out by course



Potential course of action

Although Navy Safety Center data do not suggest a safety crisis in the fleet, we saw three problems with the current system:

- Program administration/recordkeeping aboard ship
- Training
- Career impact issues
  - — Although these only apply to safety divisions on large ships.

Having a primary-duty safety/EP specialist aboard ships would address these problems. Creation of a new rating for this specialist is one way to get such a person into the fleet.

Creation of a new rating would be very difficult, however. The Navy is currently trying to consolidate and eliminate ratings. A few years ago, the Navy had more than 100 ratings; today there are 79, and the Navy would like to reduce this number to about 40 [11]. The Navy has not created a new rating in many years.

Creation of a safety/EP NEC, patterned after the 3-M Coordinator, would be a much more workable course of action. A 3-M Coordinator-type position is a perfect fit to the first two problems noted above. This person would help improve shipboard safety/EP performance in two ways: by directly overseeing the various safety/EP programs aboard ships, and by ensuring that all personnel are properly trained. In fact, the duties and command organization of the 3-M Coordinator are very similar to those of the Afloat Safety Officer. Table 6 shows the similarities of these two positions.

Table 6. Safety Officer and 3-M Coordinator duties

Safety Officer (small ship)	3-M Coordinator
CO's primary advisor	same
Reports via XO	same
Administers the safety program	Administers the maintenance program
Collateral duty	Primary duty
Keeps all records	same
Maintains directives	same
Advises dept. heads, others	same
Monitors and schedules training	same
Coordinates w/planning board for training	same

Creation of a 3-M type NEC for safety/EP would help relieve the ships' safety/EP training burden in two ways:

- This specialist would not perform all the shipboard safety/EP functions. Some functions would still be assigned as collateral duties (Division Safety Petty Officers, for example), and those sailors would retain their supervisory responsibilities and would still need to be trained. However, this person would take over most of the eight currently required safety/EP collateral duties.[9] He would be trained before reporting aboard, and would serve in this position for his entire tour.
  - — For example, on a small ship this person might assume all eight collateral-duty assignments except Electrical Officer, which would likely stay with the Engineering Department.
  - — On a large ship, this person would be assigned to the Safety Division.

9. Some changes might have to be made to Navy instructions. For example, OPNAVINST 5100.19C [1] now requires the Safety Officer to be an officer of department head rank. Or, to avoid issues of rank/access to the CO, the Safety Officer would remain an officer billet and this specialist would be officially listed as the Assistant Safety Officer.

- Where possible, this person would coordinate and oversee shipboard computer-based safety/EP training, thus reducing the need to send personnel off-board for classroom training.[10]

Duty in this billet should be considered a plus in promotion evaluations, as is the case with the 3-M Coordinator. Creation of this NEC could help indirectly with the career issue for Safety Division personnel by raising the perception of the importance of shipboard safety/EP assignments. Safety divisions on large ships should be staffed at the E-6 level, and these assignments should be considered a plus by promotion boards.

This new NEC could be built from the currently existing 9595 (Hazardous Materials Control and Management Technician) and 9571 (Safety Technician) NECs. Tables 7, 8, and 9 show the numbers of people now holding the 9595 NEC, 9571 NEC, and both NECs. Out of a total enlisted force of about 325,000, more than 3,000 personnel hold the 9595 (HazMat Tech) NEC, slightly more than 900 people hold the 9571 (Safety Tech) NEC, and only 91 people hold both. Details concerning specific training requirements, sea-shore rotation, and number of personnel needed in this new community will have to be worked out in conjunction with the training and manpower communities.

In summary, we found that although there is not a safety/EP crisis in the fleet, shipboard oversight and administration could be improved by creating a primary-duty safety/EP specialist. However, if the Navy safety and environmental protection communities wish to pursue the creation of such a shipboard specialist, the big issue that must be addressed is: Where does this person come from?

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10. INSURV estimates a potential $2.4 million annual savings by eliminating the need to train collateral duty shipboard safety/EP personnel [6]. Using INSURV's training cost figures, we estimate that the type of specialist described here could potentially save about $0.5 million annually, by eliminating the training needs for the AEPC, HazMat Coordinator, HazMin Center Supervisor, and Respiratory Protection officer. This estimate ignores the training costs for the safety/EP specialist.

- Is the billet carved out of the current shipboard complement? If so, what current shipboard billet would be given up to create the proposed safety/EP specialist?
- Or, could the Navy create an additional shipboard billet for a safety/EP specialist?

Table 7. Number of personnel with 9595 NEC, broken out by rating

Ratecode	Ratecode description	Total in rating	Number with 9595 NEC	% of NEC
SK	Storekeeper	6,638	738	24.1
BM	Boatswain's mate	7,435	298	9.7
AMS	Aviation structural mechanic-structures	5,634	293	9.6
MM	Machinist's mate	19,208	206	6.7
EN	Engineman	6,276	158	5.2
AMH	Aviation structural mechanic-hydraulics	3,056	137	4.5
AK	Aviation storekeeper	4,016	113	3.7
DC	Damage controlman	3,645	84	2.7
AD	Aviation machinist's mate	7,324	79	2.6
ABH	Aviation boatswain's mate-aircraft handling	2,777	57	1.9
	Other	258,682	894	29.2
Total	All Navy enlisted endstrength	324,691	3,057	100.0

Table 8. Number of personnel with 9571 NEC, broken out by rating

Ratecode	Ratecode description	Total in rating	Number with 9571 NEC	% of NEC
MM	Machinist's mate	19,208	78	8.6
BM	Boatswain's mate	7,435	69	7.6
ET	Electronics technician	16,171	53	5.8
ABH	Aviation boatswain's mate-aircraft handling	2,777	42	4.6
EM	Electrician's mate	9,251	42	4.6
HT	Hull maintenance technician	4,179	41	4.5
AO	Aviation ordnanceman	6,544	39	4.3
DC	Damage controlman	3,645	38	4.2
FC	Fire control technician	7,930	33	3.6
HM	Hospital corpsman	23,834	30	3.3
	Other	223,717	443	48.8
Total	All Navy enlisted endstrength	324,691	908	100.0

Table 9. Number of personnel with both 9595 and 9571 NECs, broken out by rating

Ratecode	Ratecode description	Total in rating	Number with both 9595 and 9571 NECs	% of NEC
BM	Boatswain's mate	7,435	15	16.5
MM	Machinist's mate	19,208	15	16.5
SK	Storekeeper	6,638	8	8.8
EM	Electrician's mate	9,251	5	5.5
ABH	Aviation boatswain's mate-aircraft handling	2,777	4	4.4
AO	Aviation ordnanceman	6,544	4	4.4
DC	Damage controlman	3,645	3	3.3
GM	Gunner's mate	4,207	3	3.3
OS	Operations specialist	8,936	3	3.3
SM	Signalman	1,860	3	3.3
	Other	254,190	28	30.8
Total	All Navy enlisted endstrength	324,691	91	100.0

Appendix A: Shipboard safety and EP organization

This appendix shows the safety/EP collateral-duty assignments of the eight ships we visited.

Table 10. Shipboard organization: LANTFLT DDG

Duty	Assignee
AEPC	Chief Engineer (with a HT-1 as asst.)
HazMat Coordinator	Supply Officer
HazMin Center Supervisor	BM-2 (primary duty)
Safety Officer	Operations Officer
Traffic Safety	Operations Officer
Recreation, Athletics, Home Safety	Operations Officer
Respiratory Protection Officer	Auxiliary Officer
Electrical Safety Officer	EMC

Table 11. Shipboard organization: PACFLT DDG

Duty	Assignee
AEPC	Chief Engineer
HazMat Coordinator	Supply Officer
HazMin Center Supervisor	Supply Officer
Safety Officer	Weapons Officer
Traffic Safety	Weapons Officer
Recreation, Athletics, Home Safety	Weapons Officer
Respiratory Protection Officer	Corpsman
Electrical Safety Officer	Electrical Officer

Table 12. Shipboard organization: PACFLT DD

Duty	Assignee
AEPC	Chief Engineer
HazMat Coordinator	SK-1
HazMin Center Supervisor	SK-1
Safety Officer	Chief Engineer
Traffic Safety	Chief Engineer
Recreation, Athletics, Home Safety	Chief Engineer
Respiratory Protection Officer	First Lieutenant
Electrical Safety Officer	Electrical Officer

Table 13. Shipboard organization: PACFLT CG

Duty	Assignee
AEPC	MPA
HazMat Coordinator	Supply Officer
HazMin Center Supervisor	SK-1 (primary duty)
Safety Officer	Weapons Officer
Traffic Safety	Weapons Officer
Recreation, Athletics, Home Safety	Weapons Officer
Respiratory Protection Officer	First Lieutenant
Electrical Safety Officer	Electrical Officer

Table 14. Shipboard organization: PACFLT LPD

Duty	Assignee
AEPC	Supply Officer
HazMat Coordinator	Supply Officer
HazMin Center Supervisor	Chief from Supply
Safety Officer	Asst. Air Ops Officer
Traffic Safety	Asst. Air Ops Officer
Recreation, Athletics, Home Safety	MPA
Respiratory Protection Officer	Medical Officer
Electrical Safety Officer	Electrical Officer

Table 15. Shipboard organization: LANTFLT LHD

Duty	Assignee
AEPC	Auxiliary Officer
HazMat Coordinator	Stores Officer
HazMin Center Supervisor	Chief from Supply
Safety Officer	Safety Officer (primary duty)
Traffic Safety	Safety Officer (primary duty)
Recreation, Athletics, Home Safety	Safety Officer (primary duty)
Respiratory Protection Officer	Safety Officer (primary duty)
Electrical Safety Officer	Safety Officer (primary duty)

Table 16. Shipboard organization: PACFLT LHD

Duty	Assignee
AEPC	Lieutenant from Supply
HazMat Coordinator	Lieutenant from Supply
HazMin Center Supervisor	Chief from Supply
Safety Officer	Safety Officer (primary duty)
Traffic Safety	Safety Officer (primary duty)
Recreation, Athletics, Home Safety	Safety Officer (primary duty)
Respiratory Protection Officer	Safety Officer (primary duty)
Electrical Safety Officer	Electrical Officer

Table 17. Shipboard organization: LANTFLT CVN

Duty	Assignee
AEPC	Assistant Safety Officer
HazMat Coordinator	Supply Officer
HazMin Center Supervisor	Lieutenant from Supply
Safety Officer	Safety Officer (primary duty)
Traffic Safety	Chief from Safety Division
Recreation, Athletics, Home Safety	Chief from Safety Division
Respiratory Protection Officer	Assistant Safety Officer
Electrical Safety Officer	Electrical Officer

Appendix B: INSURV OSH compliance scoring matrix

This appendix shows the matrix used by INSURV to evaluate shipboard OSH program compliance.

	Outstanding 20	Above Average 15	Average 10	Below Average 5	Unsatisfactory 0
INSTRUCTION OR GUIDANCE	Instruction current. References current. Unique to ship. Provides clear deckplate usage. Enclosures included and current.	Instruction current. References out of date. Unique to ship. Provide clear deckplate usage. Enclosures included and current.	Instruction current but in draft format. References current on draft. Repeats 19C, not unique to ship. Does not provide clear deckplate usage. Enclosures included but not current.	Instruction not current. References out of date. Repeats 19C, not unique to ship. Does not provide clear deckplate usage. Enclosures not included.	No instruction or guidance for command.
POINT OF CONTACT	Assigned in writing either on Collateral Duties List or by Letter of Designation. (By Name not Title)	Assigned in writing either on Collateral Duties List or by Letter of Designation. (By Name not Title) Not current or Collateral Duties List is in draft.	Assigned in writing either on Collateral Duties List or by Letter of Designation. (By Title)	No Point of Contact assigned in writing either on Collateral Duties List. POC known by word of mouth.	No Point of Contact assigned.
TRAINING	For POC. For Supervisors. For Operators or Specialty Training (eg. CPR). For Crew Initial and Annual >90%.	For POC. For Supervisors. For Operators or Specialty Training (eg. CPR). For Crew Initial and Annual 80-90%.	For POC. For Supervisors. For Operators or Specialty Training (eg. CPR) within year. For Crew Initial and Annual 75-80%.	For POC. Supervisors not trained. Operators or Specialty Training (eg.CPR) not trained. For Crew Initial and Annual 75-50%.	POC not trained. Supervisors not trained. Operators or Specialty Training (eg. CPR) not trained. For Crew Initial and Annual <50%.
ASSOCIATED EQUIPMENT	Equipment and materials were very well maintained. It was evident that assigned personnel took care with in their equipment. Correct type and amount of equipment was available and used correctly.	Equipment and materials were well maintained. The material condition of the equipment were satisfactory. Correct type and amount of equipment was available and used correctly.	Equipment and materials were properly maintained and stored. Correct type and amount of equipment was available and used correctly.	Equipment and materials were properly maintained: however, most of the equipment indicated need for some form of maintenance and/or preservation. Equipment was missing parts. Equipment was improperly stored. Equipment was available, but not in adequate amounts/types or used correctly.	Equipment and materials required maintenance with potential of either equipment damage or personnel safety hazard. Equipment was improperly stored. Equipment was not available in adequate amounts/types or used correctly.
PROGRAM EVALUATION	Program Review was completed and reflected a true assessment. Evaluation was dated. Corrective Actions taken. Command Safety Council/ISIC had reviewed Program.	Program Review was completed and reflected a true assessment. Evaluation was dated. Some Corrective Actions taken. Command Safety Council/ISIC had not reviewed Program.	Program Review was completed and reflected a true assessment. Evaluation was dated. Corrective Actions were not taken. Command Safety Council/ISIC had not reviewed Program.	Program Review was not fully completed. Evaluation was not dated. Corrective Actions were not taken. Command Safety Council/ISIC had reviewed Program, but reviews were over 1 year old.	Program Review was not performed.

Appendix C: INSURV inspection results—"program compliance"

This appendix shows detailed results of INSURV program compliance inspections for 15 ships inspected during Underway Material Inspections from January to August 1999. Data represent the percentage of ships achieving the score in the top row.

Table 18. INSURV inspection results

Safety program	20	15	10	5	0
Instruction/document	53%	7%	20%	20%	0%
Point of contact	93%	0%	7%	0%	0%
Training	33%	40%	13%	13%	0%
Associated equipment	33%	33%	27%	7%	0%
Self-evaluation	13%	20%	40%	7%	20%
Asbestos control	20	15	10	5	0
Instruction/document	53%	7%	0%	7%	33%
Point of contact	47%	13%	7%	0%	33%
Training	27%	13%	20%	0%	40%
Associated equipment	33%	7%	20%	7%	33%
Self-evaluation	33%	13%	7%	7%	40%
Heat stress control	20	15	10	5	0
Instruction/document	80%	7%	7%	7%	0%
Point of contact	80%	7%	13%	0%	0%
Training	60%	13%	20%	7%	0%
Associated equipment	27%	20%	53%	0%	0%
Self-evaluation	33%	20%	27%	0%	20%
Hazardous material	20	15	10	5	0
Instruction/document	73%	7%	20%	0%	0%
Point of contact	93%	7%	0%	0%	0%
Training	27%	13%	53%	7%	0%
Associated equipment	13%	0%	67%	20%	0%
Self-evaluation	33%	20%	33%	0%	13%

Table 18. INSURV inspection results (continued)

Hearing conservation	20	15	10	5	0
Instruction/document	87%	0%	7%	0%	7%
Point of contact	87%	0%	13%	0%	0%
Training	53%	27%	13%	7%	0%
Associated equipment	27%	27%	40%	7%	0%
Self-evaluation	27%	33%	20%	7%	13%

Sight conservation	20	15	10	5	0
Instruction/document	73%	0%	7%	0%	20%
Point of contact	73%	0%	13%	0%	13%
Training	20%	40%	20%	7%	13%
Associated equipment	7%	7%	60%	27%	0%
Self-evaluation	33%	13%	27%	7%	20%

Respiratory protection	20	15	10	5	0
Instruction/document	53%	20%	13%	7%	7%
Point of contact	87%	7%	7%	0%	0%
Training	40%	27%	20%	13%	0%
Associated equipment	13%	13%	60%	13%	0%
Self-evaluation	40%	20%	27%	0%	13%

Man-made vitreous fibers	20	15	10	5	0
Instruction/document	43%	0%	7%	0%	50%
Point of contact	43%	7%	7%	0%	43%
Training	14%	21%	14%	0%	50%
Associated equipment	14%	21%	7%	7%	50%
Self-evaluation	29%	14%	7%	7%	43%

Appendix D: INSURV inspection methodology—"deficiencies"

This appendix describes the "part number" and "risk assessment code" categories used by INSURV in their inspections of "deficiencies."

Part number[11]

Denotes "importance" of deficiency (1, 2, or 3)

- 1 = most important, and likely to
  - — Cause the ship to be unseaworthy
  - — Substantially reduce the effectiveness of personnel or essential material
  - — Reduce the ability of the ship to perform its mission
  - — Cause personnel injury or damage to vital material
- 2 = less important, but should be corrected
- 3 = requires design change on future ships.

Risk assessment code (RAC)

The RAC is explained in INSURVINST 4730.11 as follows:

The RAC represents the degree of risk associated with the deficiency and combines the elements of hazard severity and mishap probability. The RAC is derived as follows:

11. INSURVINST 4730.11H.

1. *Hazard Severity. The hazard severity is an assessment of the worst possible consequence, defined by the degree of injury, occupational illness, or property damage which is likely to occur as a result of deficiency. Hazard severity categories shall be assigned by Roman numeral according to the following criteria:*

   a. *Category I - Catastrophic: The hazard may cause death or loss of a facility.*

   b. *Category II - Critical: May cause severe injury, severe occupational illness, or major property damage.*

   c. *Category III - Marginal: May cause minor injury, minor occupational illness, or minor property damage.*

   d. *Category IV - Negligible: Probably would not affect personnel safety or health, but nevertheless in violation of a NAVOSH standard.*

2. *Mishap Probability. The mishap probability is the probability that a hazard will result in a mishap based on an assessment of such factors as location, exposure in terms of cycles or hours of operation, and affected population. Mishap probability shall be assigned an Arabic letter according to the following criteria:*

   a. *Subcategory A - Likely to occur immediately or within a short period of time.*

   b. *Subcategory B - Probably will occur in time.*

   c. *Subcategory C - May occur in time.*

   d. *Subcategory D - Unlikely to occur.*

3. *Risk Assessment Code (RAC). The RAC is an expression of risk which combines the elements of hazard severity and mishap probability. Using the matrix show below, the RAC is expressed as a single Arabic number that can be used to help determine hazard abatement priorities.*

Mishap Probability	*A*	*B*	*C*	*D*
Hazard Severity				
Category I	1	1	2	3
Category II	1	2	3	4
Category III	2	3	4	5
Category IV	3	4	5	5

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[10] *NITRAS: Navy Integrated Training Resource Administration System.* (Navy standard database held by CNA)

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