

Puget Sound 1999 Area Oil Spill Exercise: Evaluation Report

Ronald J. Filadelfo
Jonathon D. Mintz
Scott Zimmerman, Washington State Dept. of Ecology
and The Puget Sound 1999 Exercise Evaluation Team

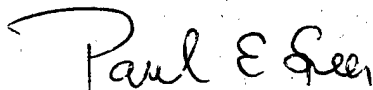
Center for Naval Analyses

4401 Ford Avenue • Alexandria, Virginia 22302-1498

DTIC QUALITY INSPECTED 4

19990908 003

Approved for distribution:



Paul E. Speer, Director
Resources Team
Resource Analysis Division

This document represents the best opinion of CNA at the time of issue.
It does not necessarily represent the opinion of the Department of the Navy.

CLEARED FOR PUBLIC RELEASE

Distribution limited to DOD agencies, specific authority: N00014-96-D-0001.

For copies of this document call: CNA Document Control and Distribution Section at 703-824-2943.

REPORT DOCUMENTATION PAGE

Form Approved
OPM No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources gathering and maintaining the data needed, and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)		2. REPORT DATE May 1999	3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE Puget Sound 1999 Area Oil Spill Exercise: Evaluation Report			5. FUNDING NUMBERS C - N00014-91-C-0002 PE - 65154N PR - R0148	
6. AUTHOR(S) Ronald J. Filadelfo, Jonathon D. Mintz, Scott Zimmerman, Washington State Dept. of Ecology and the Puget Sound 1999 Exercise Evaluation Team				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Center for Naval Analyses 4401 Ford Avenue Alexandria, Virginia 22302-0268			8. PERFORMING ORGANIZATION REPORT NUMBER CRM 99-44	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) COMNAVREG NW			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Cleared for Public Release			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This report serves as the Navy's formal evaluation for the 1999 Puget Sound Area Oil Spill Exercise. The report includes exercise results, lessons learned, and recommendations. The basic aim of the exercise was to improve the Navy's ability to interface with the local response community in the effort to organize and respond to a worst-case oil spill and to test the response strategies set forth in the region's Area Contingency Plan and Geographic Response Plans. The report examines both the success of the exercise in meeting its fundamental goals and the success of the spill response. Recommendations include conducting additional Incident Command System (ICS) training, ensuring greater familiarity with exercise goals and roles in future exercises, and predetermining where the command center should be established in the event of a real oil spill.				
14. SUBJECT TERMS Contaminants, Environmental protection, Exercises, Naval operations, Oil pollution, Oil spills, Preparedness for response exercise program (PREP), Waste disposal			15. NUMBER OF PAGES 67	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT SAR	

Acknowledgements

The following members of the Puget Sound 1999 Exercise Evaluation Team contributed to this report:

BM1 Eugene Day, USCG, Pacific Strike Team

Robert Frazier, Hart Crowser, Inc.

MTSC Shane Hooker, USCG, Pacific Strike Team

Robert Miles, PCCI, Inc.

John Owens, Navy Region Southwest

Roy Robertson, Washington State Dept. of Ecology

Paul Teasley, Commander Naval Base Pearl Harbor

Carolyn Winters, Commander in Chief, U.S. Pacific Fleet

Contents

Introduction and summary	1
Background.	1
Evaluation methodology	3
Summary of results	3
What do these results imply?	5
Recommendations	6
Organization of this report	6
Scenario and narrative of events	9
What type of spill is likely?	9
Scenario.	9
Response organization	11
Narrative of key events	12
Results	19
Unified command	19
Organization	19
Initial command actions	19
Information flow	21
Documentation	22
Command staff	22
Organization	22
Legal.	22
Safety	24
Medical	25
Public affairs	26
Operations	27
Initial actions	28
Information management	29
Planning	29
Major actions	30
Incident action plan	30
Logistics and Finance	31

Lessons learned in terms of the standard PREP evaluation	
objectives	35
Command organization	35
Notifications.	35
Mobilization.	36
Ability to operate within the UCS	37
Response operations	39
Discharge control.	39
Assessments	39
Containment, recovery, disposal	40
Protection	41
Support	42
Communications	42
Transportation	43
Personnel support	43
Equipment maintenance	44
Procurement	44
Documentation	45
Information technology (REDSS)	47
What is REDSS?.	48
Effectiveness of REDSS.	48
Conclusions and recommendations.	49
Incorporating a computer-based system.	50
Appendix: Player post-exercise comments	53
Unified Command	53
What went well	53
What didn't go well	53
Command Staff	54
What went well	54
What didn't go well	54
Joint Information Center	55
What went well	55
What to work on next time	55
What resources do we need?	55
Operations	56
What went well	56
What didn't go well	56

Planning	57
What went well	57
What didn't go well	58
Logistics.	59
Lessons learned	59
Finance	59
What went well	59
What didn't go well	60
References	61
List of figures	63
List of tables	65
Distribution list	67

Introduction and summary

Background

Section 311 of the Federal Water Pollution Control Act of 1972 (the Clean Water Act) called for the formation of a National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and resulted in 40 CFR-300, which set up the National Response System for dealing with oil and hazardous substance emergencies.

The *Exxon Valdez* disaster of March 1989 revealed major shortcomings in this nation's ability to deal with major oil spills, and resulted in the passage of the Oil Pollution Act of 1990 (OPA-90). OPA-90 called for increased preparedness for major oil spills by requiring formation of area committees, preparation of area plans, and periodic exercises. In response to this requirement for periodic exercises, the Coast Guard (USCG), Environmental Protection Agency (EPA), Research and Special Programs Office of Pipeline Safety (Department of Transportation), and the Minerals Management Service developed the Preparedness for Response Exercise Program (PREP).

One type of exercise mandated under PREP is the large-scale, multi-agency, Area Exercise. Each Area Exercise is put together by a design team made up of representatives from the major participating agencies. PREP guidelines [1] describe 15 "core components" of a response which should be exercised and evaluated. The design team decides which of the 15 could be worked into the exercise, with the local Coast Guard District Commander holding final say in matters of exercise design.

On 2 and 3 March 1999, Commander Navy Region Northwest (COMNAVREG NW)¹ hosted a large-scale area exercise of this type.

1. This command was known until recently as Commander Naval Base Seattle.

COMNAVREG NW serves as the Navy's regional Naval On-Scene Commander (NOSC) for Navy spill prevention and response in their area of the country. Although this exercise was held voluntarily by COMNAVREG NW and was not scheduled within the PREP program, it was conducted—and evaluated—just like a PREP area exercise.

The basic aim of the exercise was to improve the Navy's ability to interface with the local response community in the effort to organize and respond to a worst-case oil spill, and to test the response strategies set forth in the region's Area Contingency Plan (ACP) and Geographic Response Plans (GRPs). Specific goals included:

- Test the response plan of COMNAVREG NW² and its compatibility with the region's ACP and GRPs
- Develop good working relationships between the Navy and the various federal, state, and local spill response agencies in the region
- Provide training to those who would be called upon to respond in the event of an actual emergency
- Fulfill OPA-90 and State of Washington mandated exercise requirements.

Although the Navy led the exercise, it was not solely a Navy event. Participating organizations included elements of the U.S. Navy as the responsible party; the U.S. Coast Guard local Marine Safety Office as the predesignated Federal On-Scene Coordinator; and various state, county, and local natural resource and emergency response organizations.

The exercise focused on response management organization (command and control) rather than equipment deployment. The response management phase consisted of a 2-day (March 2–3) exercise in which players had to form and assemble an Incident Command System (ICS) and develop an Incident Action Plan (IAP).

2. The COMNAVREG NW plan is being updated to reflect recent Navy regionalization.

Because the Center for Naval Analyses (CNA) led the reconstruction and evaluation of the Navy's 1995 PREP Area Exercise in San Diego, COMNAVREG NW asked us to provide similar support to this exercise. Our task was to observe, reconstruct, and prepare an exercise evaluation report of the type mandated by PREP guidelines, just as if this was a scheduled PREP exercise.

This is our report. It serves as the Navy's formal evaluation report for the 1999 Puget Sound area exercise.

Evaluation methodology

We placed members of our evaluation team throughout the response organization to observe and document events and collect data. At the end of the exercise, we collected copies of all logs maintained in the various cells, status boards, and press briefings, and we participated in debriefs of all players. The goal of our reconstruction and analysis was to evaluate plans and organizational structure—not the performance of individual people. References [2, 3] describe our evaluation methodology in more detail.

Summary of results

In summarizing the results of this exercise, we must address two separate issues:

- How successful was it as an *exercise* in meeting its fundamental goals: training personnel, pointing out areas of weakness in the response organization, and building a solid working relationship between the Navy and local, state, and USCG response personnel?
- How did the spill response go?

In terms of the first issue, this exercise was generally successful. All personnel learned a great deal about the difficulties of organizing a large-scale oil spill response, and Navy leaders saw many organizational issues that will have to be addressed in the future. The Navy also learned valuable lessons regarding the staging of similar exercises in the future. The exercise was generally successful in developing

response relationships between the Navy and the other agencies noted above. Agencies integrated well in most sections of the response organization although, in a few cases, better communication would have helped.

This brings us to the second issue—the spill response itself. A great deal was learned because this response organization indeed has a need for additional training in ICS information management. Most all the players were competent in their specific responsibilities, but they didn't understand their relationship to the overall response command organization. Information flow throughout the organization was a problem, and by the middle of the first day, the various section leaders could not provide the unified commanders with a consistent story of who was doing what with what assets. At this point, the exercise controllers called a "time-out" and joined the response team to help the players unscramble the situation. (All players agreed that this produced a very successful learning experience.)

Specific findings related to response command and control include:

- Notifications were not played realistically. Personnel from the vessel that spilled did not make the required immediate notifications to the USCG National Response Center (NRC) and to the State Emergency Management Department (EMD). Although we could not trace the flow of information from the vessel to NOSC, the NOSC notified all required local, state, and federal agencies. At any rate, the NOSC did successfully test all the notification lists (points of contact (POCs) and phone numbers) in the NOSC plan.
- The many agencies involved in the response quickly formed a unified team. The ICS was put in place very early in the response, and all personnel understood the organizational structure and their individual responsibilities.
- Although each section in the command structure functioned adequately, communication between sections was a problem. Information flow is the Achilles' heel in every exercise we've seen; in this exercise, it was especially problematic.

- Some sections held critical information concerning the size of the spill that was unknown to the Unified Command (UC) early in the response.
- The Operations and Planning Sections had difficulty communicating their equipment needs to the Logistics Section.
- Documentation and record keeping varied. Some sections kept good records and logs, and some sections, including the UC, did not.
- Command spaces were generally adequate in this exercise, and the location used (a county fairgrounds pavilion) is one the Navy could use as response headquarters in the event of a real spill.
- Communications between the response command center and field assets were realistically tested and did not work as planned in all cases.

What do these results imply?

In general, all exercises, whether fleet battle group exercises or oil spill response exercises, serve two main purposes: training and development or refinement of tactics:

- *Training*: improve the response capability of the agencies in this area, through practice for those who would respond to an actual spill.
- *Tactical development*: test the ability of this organization to conduct a response as specified in the relevant plans.

This exercise might allow us to draw some conclusions concerning our ability to execute the area plan, but even these conclusions must be interpreted cautiously. The most important function in executing the plan, especially when dealing with a light oil such as marine diesel fuel (DFM), is mobilization: getting people and equipment on the scene quickly. Unfortunately, this type of exercise doesn't play this aspect very well. A no-notice drill would test mobilization much more realistically.

This is not to say we can't learn valuable lessons from this type of exercise. We can, and we did. However, as we evaluate this exercise and interpret results, we must be careful not to try to extrapolate exercise results to expected success in combating a real spill. This issue is discussed in more detail in [4].

Recommendations

Based on the results of this exercise, we recommend that COMNAVREG NW, as the NOSC for the Puget Sound area:

- Conduct additional ICS training for all intended members of their oil spill response organization
- Ensure that in future exercises, all players are familiar with exercise goals and know what they are expected to do. For example, are they expected to actually make notifications as if this were a real spill?
- COMNAVREG NW needs to predetermine where their command center is to be established in the event of a real spill.

Some high-level issues concerning the Navy's role in oil spill response and oil spill exercises also emerged. In these exercises, we often see the Navy struggle with ICS oil spill command and control protocols, while experts from other agencies are on the scene. Therefore, the Navy should engage other agencies (most notably the Coast Guard) to clearly define the Navy's role in oil spill response and train to that role.

Organization of this report

This report is organized as follows:

- The first section describes the exercise scenario, the response command organization, and the main events that occurred during exercise play.
- The next two sections describes exercise results, lessons learned, and conclusions. These two sections are somewhat repetitious, but it was necessary to present our findings in two ways:

- The Results section is organized in terms of the various sections of the response organization and is geared to participants who want to know how their individual sections fared.
- The Lessons Learned/Conclusions section is organized in terms of the major functions comprising an oil spill response, as given in [1]. This format facilitates input to USCG's oil spill exercise lessons-learned database.
- The final section describes the computer information system used in this spill response.
- An appendix documents the lessons learned described by the players during the immediate post-exercise debrief.

Scenario and narrative of events

What type of spill is likely?

Almost all the fuel handled by the Navy is either DFM or JP-5. Both are much lighter and more volatile than heavy crude oil such as that spilled by the *Exxon Valdez*—the type we most often associate with oil spills. Because of these properties:

- Almost 50 percent of these lighter fuels would evaporate in the first day after a spill, and about 20 percent would evaporate each succeeding day. This volatility greatly increases the danger of fire or explosion.
- They are very difficult to recover if uncontained.
- These fuels are much more toxic to marine life than heavier oils.

Based on these facts, the Navy should prepare for a spill of light oils near one of its fuel-handling facilities. It should place more emphasis on protecting sensitive areas and containing the spill rather than recovering the oil, and it should be prepared for fire. There will probably be no need to scrape thick coatings of oil from beaches after a Navy spill. These considerations led to the scenario used in the exercise.

Scenario

The exercise scenario assumed that USS *Camden* (AOE-2) was outbound from the FISC fuel depot, Manchester, with a full load of JP-5 and DFM. A T5 tanker under contract to the Military Sealift Command (MSC) was inbound to the FISC at this time; visibility was limited. At 0454 (pre-dawn) on March 2, the inbound tanker suffered a mechanical failure, lost control, and collided with *Camden*, in the vicinity of Point No Point (figures 1 and 2). *Camden* sustained a crack,

and 357,000 gallons of DFM and JP-5 were released. Soon after the collision, the fog lifted and visibility returned to normal. All agencies were responsible for making the necessary notifications, and COMNAVREG NW, as the regional NOSC, assumed the role of responsible party for this Navy-related spill.

Figure 1. Locator map of exercise area

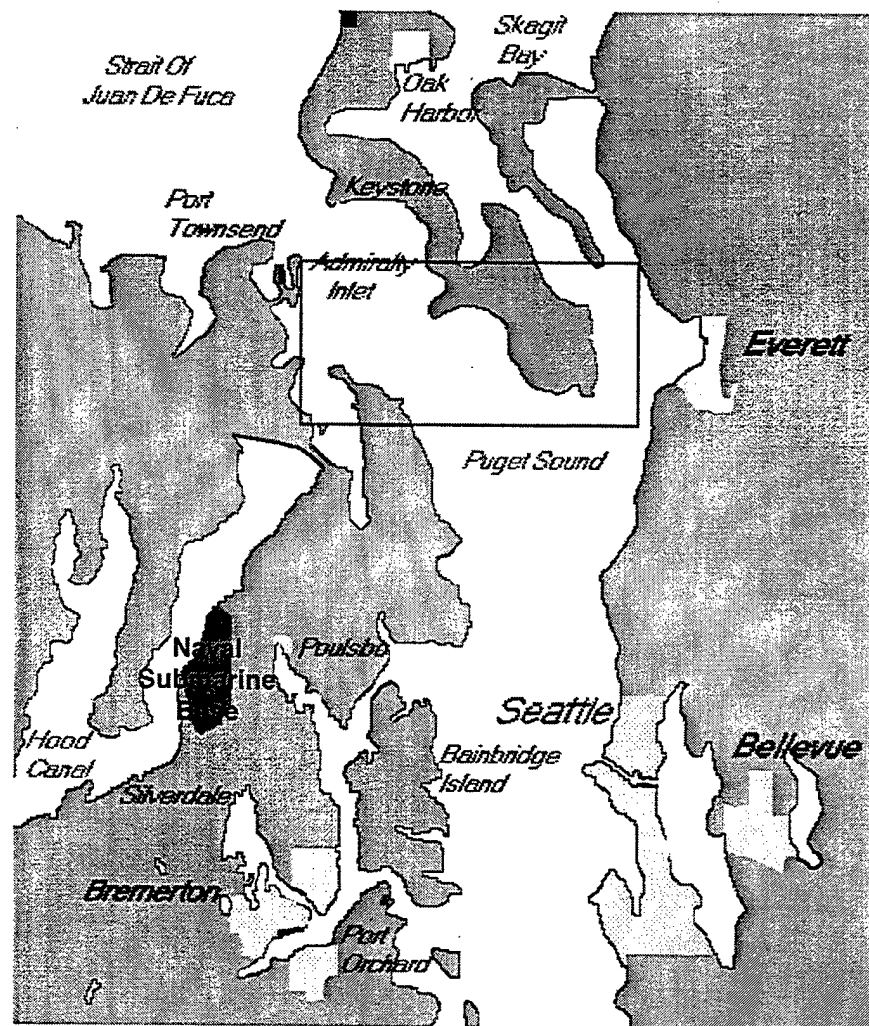
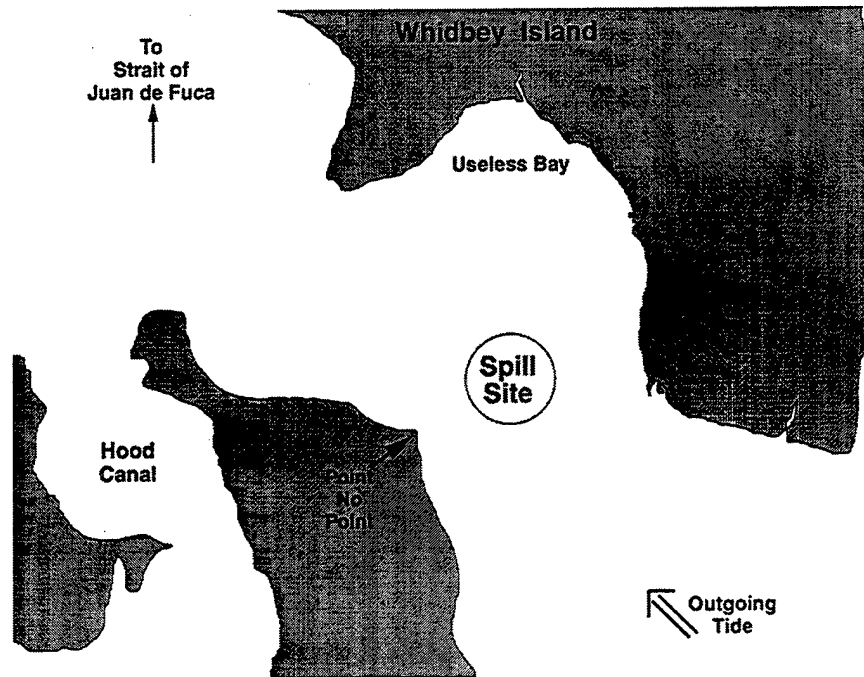


Figure 2. Exercise scenario



The exercise scenario used actual Puget Sound tides for the day of the exercise. The spill occurred at high-slack water, so, as the tide ebbed for the first 6 hours of the event, the oil was transported northward. The exercise assumed that winds were light and not much of a factor.

This oil spill command-and-control exercise lasted from 0500 to 1600 on March 2, and picked up again at 0800 on March 3. While players were directing the response to the spill, exercise controllers injected a series of problems for players to deal with (i.e., angry boatowners, injured personnel, oiled birds, etc.). These scripted problems were designed to exercise all elements of the response organization. The command-and-control phase of the exercise ended at 1115 on March 3, with the preparation of an IAP by the players.

Response organization

The exercise command post was set up at the Kitsap County Fairgrounds Pavilion, about 10 miles from the site of the incident.

Predesignated spaces for each section were equipped with phones and basic office supplies, and were toured by all players prior to the exercise.

Figure 3 shows the basic command structure, as specified in the Northwest Area Contingency Plan [5].³ The Unified Command consisted of COMNAVREG NW (the NOSC, as the responsible party), the Washington State Department of Ecology as the state on-scene coordinator (SOSC), the Kitsap County Office of Emergency Management as the local on-scene coordinator (LOSC), and the local USCG MSO. The Commanding Officer of the USCG Marine Safety Office (MSO), as the Federally Designated On-Scene Coordinator (FOSC), held ultimate authority over the spill response.

Narrative of key events

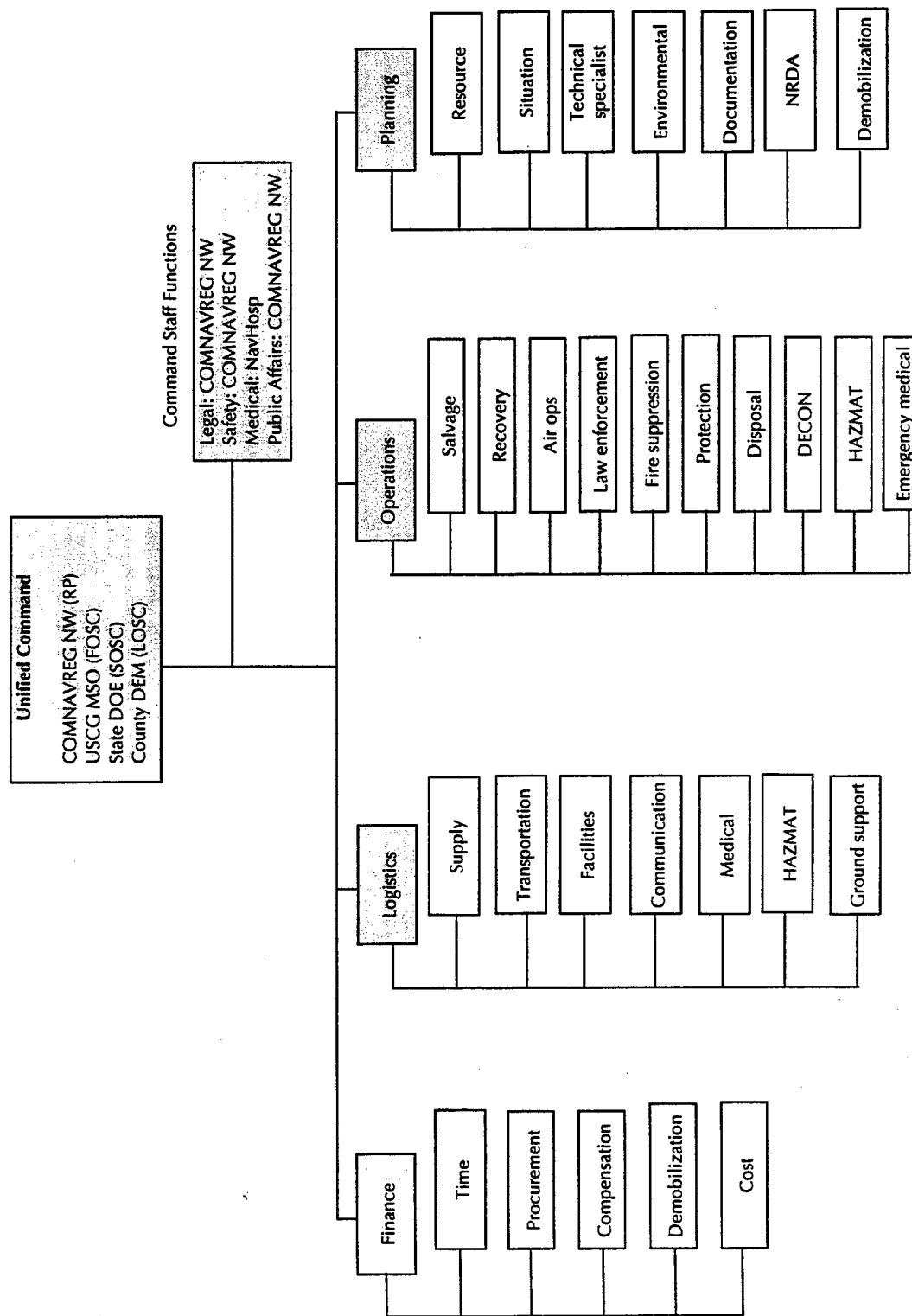
When the exercise began, USS *Camden* (AOE-2) was moored at Pier D, Puget Sound Naval Shipyard. At 0505,⁴ an exercise controller walked aboard and read to the Officer of the Deck (OOD) a script initiating the exercise. The OOD was told that *Camden* was outbound from FISC Manchester with a full load of DFM and JP-5. In the vicinity of Point No Point, a T5 tanker lost control and collided with him. No personnel were injured; however, a major breach of one or more fuel tanks was suspected (strong smell of fuel). At this time, the tide was at slack before ebb, and winds were about 10 knots from the southeast.

The OOD immediately put out word of the accident on vessel channel 16, which the USCG monitors. He then notified USCG Vessel Traffic Control (VTC), and repeated the notice on vessel channel 16 (there was a lot of static the first time). No tanks were sounded, no other notifications were made, and no emergency response (boom, skimmers, etc.) occurred. This concluded the ship's play in the exercise.

3. A note on ICS terminology: The major functions (shaded boxes in figure 3) are called "sections." The subgroups under Finance, Logistics, Operations, and Planning are referred to as "Units."

4. All times in this report are local.

Figure 3. Response command structure



Shortly after VTC was notified (we were unable to reconstruct the exact time), VTC notified the local USCG MSO. Based on what we were able to reconstruct from our observations and from player logs, the actual notification chain seems to end at this point (although as we note below, upon arriving at response headquarters, COMNAVREG NW immediately fulfilled all notification requirements).

People began arriving at response headquarters shortly after 0600. By 0620, the COMNAVREG NW Chief of Staff was on the scene in the UC space and had assumed duties as the NOSC. At 0700, the Operations Section began calling around looking for assets, but at this point they didn't know what had been spilled or how much. They (and everyone else) were just playing from the exercise script. By 0710, the Planning Section began to form, and COMNAVREG NW was making all the notifications called for in the NOSC and Area plans.

By 0730, the NOSC was still the only member of the UC on the scene, and he had received no information concerning the spill; he still hadn't been told what had spilled or been given any estimate of how much. The NOSC and the Planning Section Chief announced their primary objectives (personnel safety, secure the source, etc.) at 0740, but there was still no estimate of how much (or what) had spilled.

At 0741, the USCG MSO and the Kitsap County Emergency Services Director arrived on the scene, and the Washington State Department of Ecology representative arrived 5 minutes later (none of them had been notified that morning). The UC was now in place:

- COMNAVREG NW (the NOSC), playing the role of the responsible party
- USCG MSO Puget Sound as the FOSC
- Kitsap County Emergency Management as the LOSC
- State Department of Ecology as the SOSC.

All sections throughout the organization were staffed and running by 0800.

At 0740, the Operations Section (OPS) learned that 357,000 gallons of DFM had been spilled (they did not pass this information to the

UC), and at 0839, the UC told the section chiefs to brief the UC at 0900. The UC first received information about the spill at 0846, when the OPS chief told them that a helicopter pilot reported the slick to be 2 miles wide, 1 mile north of the spill site.

The section chiefs briefed the UC at 0900. At this meeting:

- The UC put out an updated list of strategic objectives:
 - Protect the health and safety of people
 - Secure the source
 - Boom in accordance with the applicable GRPs
 - Conduct open-water containment operations as necessary
 - Provide timely and accurate public information
- OPS reported the spill to be 357,000 gallons. This was the first time the UC had been informed of the spill size.
- The SOSC informed the section chiefs that there would be no in-situ burning, dispersant use, or decanting.
- The Public Affairs Officer (PAO) stated that a press conference was scheduled for 1500.
- The FOOSC decided to close the shipping channel, thus cutting off shipping into and out of Seattle.

At 1120, the section chiefs provided an updated situation brief to the UC:

- No more oil would be forthcoming; the ruptured tanks on *Camden* were empty.
- Many of the GRP booming strategies had been implemented
 - 16,000 additional feet of boom were en route.
- Skimming would have to be suspended for about 30 minutes until a barge for offload arrived.
- Skimming operations would not be conducted after dark.

Inconsistencies between the information offered by various sections became evident during this briefing. No one was really sure what assets were on the scene, en route, or being ordered. Exercise control called a "time-out" to allow the players 30 minutes to resolve their problems. At 1335, this briefing was repeated, with exercise controllers actively involved in guiding the players from that point on.

A planning meeting was held at 1518, and play was suspended for the day at 1600, by which time:

- National Oceanic and Atmospheric Administration (NOAA) models estimated that 33 percent of the spilled oil had evaporated.
- One-quarter mile of shoreline had been affected.
- 250,000 gallons of oil-water mixture, estimated to be about ten parts water to one part oil, had been collected.

The exercise resumed at 0800 the next day (March 3), and concluded with the presentation of an incident action plan at 1115 that day. Table 1 summarizes the time line of major events.

Table 1. Summary time line of major events

Time (local)	Event
0505 March 2	Spill occurs
0506	Vessel channel 16 is called by vessel OOD; CG VTC is notified
0620	People begin to arrive at response headquarters (pavilion); NOSC (COMNAVREG NW COS) arrives on scene and assumes role of RP
7000	Operations cell begins to look for additional assets
0710	Planning section notifies State Dept. of Emergency Management
0740	NOSC announces strategic objectives; OPS cell finds out (from truth cell) that 357K gal are in the water
0741-0746	FOSC, LOCS, SOCS arrive
0833	UC is told that oil is in shipping channel
0846	OPS informs UC that slick is 2 n.mi. wide, 1 n.mi. north of spill site, based on helo overflight
0850	0700 press release is authorized to go out

Table 1. Summary time line of major events (continued)

Time (local)	Event
0900	Section heads brief the UC; UC is informed of spill size for the first time
1120	Situation brief to UC; confusion regarding assets on-scene; controllers call an exercise time-out
1335	Situation briefing to UC is repeated
1518	Planning meeting
1605	End of first day of exercise play
0820 March 3	Exercise play is resumed
1115	IAP is delivered to UC; exercise ends

Results

In this section, we present results in terms of the sections of the response organization. It will allow players in this exercise, as well as players in future exercises, to focus on their particular group.

Unified command

Organization

The UC consisted of representatives of the responsible party (Navy), the FOSC, the state of Washington, and Kitsap County. These roles were filled by the COMNAVREG NW Chief of Staff, the USCG Captain of the Port of Seattle, the state OSC from the Washington Department of Ecology, and the Kitsap County Director of Emergency Management, respectively.

The UC was located in a meeting room off the main floor of the pavilion. All players felt that this space provided suitable accommodations for the UC.

Initial command actions

Elements of the UC began forming at 0620, when the NOSC (COMNAVREG NW COS) arrived and assumed duties as "Incident Commander." The exercise artificiality resulting from players having seen the script ahead of time clouded play at this time. The NOSC (and most others who were on the scene early) seemed to be waiting for a kick-off briefing to get the exercise going sometime around 0800. No information concerning the situation was passed to him from any of the other players on the scene, although he and the Planning Section chief briefed the group with preliminary objectives at 0740, still having no estimate of what was spilled or how much was spilled.

The other three members of the UC arrived at about 0800 (FOSC and LOSC at 0741; SOSC at 0746). They had no sense of urgency and were not following any notification; the theme was: "I thought we were beginning at 0800." No one seemed to be fighting any spill or crisis at this point. The first attempt to gather critical information came at 0815, when the FOSC demanded to know why tanks hadn't been sounded, and why 3 hours after the spill, no one could estimate how much (or what) had been spilled. In summary, we cannot learn much from the initial crisis phase because it wasn't played realistically.

All members of the UC and their staffs (and, in fact, all members of the entire ICS) seemed to understand their roles and responsibilities immediately upon reporting. The UC employed the principle of "command by negation," and was especially successful in not micro-managing the spill response. The only issues addressed by the UC at the outset were strategic response objectives, controlling public access to the spill area, and the scheduling of briefings by the section chiefs to the UC.

Of course, the big issue in any discussion of a UC is: How unified was this group? Did they form a single team, or did each pursue his own agenda? On this issue, results are ambiguous.

The four members of the UC had no trouble agreeing on strategic objectives, and were consistent in their approach toward managing the response organization (the various agencies worked well together throughout the organization). However, more interagency discussion would have been useful in a few cases. For example:

- Sometime before the 1120 situation briefing, the Navy decided to move the damaged ship (*Camden*). The FOSC (whose permission is required) was never consulted.
- At 1120, the Navy temporarily suspended skimming operations because storage capacity for the recovered volume was used up, and they had to await the arrival of vacuum trucks. Not until 1300 did the LOSC tell anyone that the county had about ten such trucks available.

- The Navy was unaware that the Coast Guard had activated several Basic Ordering Agreements (BOAs) to procure additional assets for storage and disposal.
- No UC discussion of the pros and cons of night skimming operations took place until after the Operations Section had decided that night skimming wouldn't be done.

Information flow

Flow of information throughout the response organization has been a problem in all previous PREP exercises, and this one was no exception. Often, important information needed by a particular section was held somewhere in the response organization but was unknown to those who needed it.

COMNAVREG NW hoped to avoid this problem by installing a computer-based emergency command and control system known as the Regional Emergency Decision Support System (REDSS). This system, when working, will allow any section to instantly receive and transmit information, including graphics, to and from all others. The system, still in the early stages of development, did not perform as hoped and was the leading cause of the information flow problems in the exercise. Too much reliance was placed on REDSS, and backup plans were not made. REDSS is discussed in detail in the last section of this report.

The lack of critical information flow into or out of the UC became apparent early in the exercise. By 0740 on the first day, the Operations Section knew that 357,000 gallons of fuel had been spilled; UC did not find this out until the 0900 briefing. Conversely, information concerning the availability of county-owned vacuum trucks, or the meeting schedule set by the UC,⁵ did not flow out of the UC to the Planning Section.

5. Early in the exercise, the Planning Section presented a draft meeting schedule to the UC, only to be told that the UC had placed a schedule in REDSS. The Planning Section could not access REDSS.

Documentation

The UC did not adequately document events. It did designate a record keeper, but no watch log was generated. During the planning phase, it was hoped that the REDSS would provide the needed documentation; when REDSS failed, no other arrangements were made.

Command staff

Organization

The Command Staff (CS) in this organization included the functions of Legal, Safety, Medical, and Public Affairs, with all five positions headed by responsible party (Navy) personnel. The CS space was located in the pavilion in an area adjacent to the UC office. The facilities provided were generally adequate, although the Medical and Public Affairs officers noted that a few more phone lines and another computer would have been useful.

Legal

The Legal Officer (COMNAVREG NW Seattle staff attorney) was on the scene early in the exercise, and by 0745 had notified her counterparts at Navy Headquarters (CNO N45), Pacific Fleet, and Military Sealift Command of the incident. The four major issues worked by the Legal Officer were: use of volunteers, private property incursions by on-scene response personnel, the Natural Resources Damage Assessment (NRDA), and claims by various parties. All four went well in the exercise, and point out issues that should be thought out and planned for in the event of a real spill.

Use of volunteers

At 1130 on March 2, the Planning Section contacted the Legal Officer and asked about using a local fisherman's group (with boats) that volunteered to help deploy boom. The Legal Officer informed Planning that volunteers were not to be used. This was not discussed in the UC, so the Navy apparently has a policy regarding the use of volunteers. To our knowledge, neither the state nor the CG accepted any

volunteers during the exercise although the state does use volunteers for bird rescue.

Private property

This issue arose at 1430 on March 2. An owner of shorefront property in the vicinity of the spill (or perhaps an attorney representing that person) called to complain about response personnel going on his property to collect oiled birds. The legal officer called the USCG's attorney to see whether the USCG, as the FOSC, has authority to enter private property in such a situation. The lesson learned is that in the case of a real spill, access to private property must be worked out with landowners early in the response and communicated to waterfront response personnel.

NRDA

Although NRDA was not a major factor in this exercise, the legal officer was concerned enough about this issue to make inquiries as to potential damages on the first day of the response. At 1240 on March 2, the Legal Officer met with the NRDA Unit of the Planning Section, to obtain a rough estimate of possible costs. She produced an estimate of \$8.9 million to \$12.5 million (\$25 to \$35 per gallon, times 357,000 gallons). It is not clear whether this information had any impact on subsequent decision-making, or to whom this estimate was forwarded in the response organization.

Claims

Outside inquiries regarding claims began coming in at 1005, when the Public Affairs Officer (PAO) informed the Legal Officer that various shipping interests wanted to know how to file claims for losses resulting from closure of the shipping lanes into and out of Seattle. A large claim came in at 1410, when the Marine Exchange (a group representing commercial shipping) called to ask how 45 ships that couldn't get into Seattle could file a claim. Legal took two simple actions regarding claims:

- They told the Finance Section to be diligent in their record keeping, to help with later claims both by and against the Navy.

- They answered all outside inquiries by informing callers where and how to submit claims, while reminding them that the submission of the claim request does not guarantee that it will be decided in their favor.

The UC appeared not to appreciate the potential costs of these claims because the idea of ordering a night-time cleanup operation to open the channel by the second morning was never discussed. If the Navy (as the responsible party) was indeed potentially responsible for these claims, that should have been a high priority.

Safety

The largest issue facing the Safety Officer is to ensure that site safety plans are in place and that all response personnel have the appropriate qualifications (i.e., are certified for hazardous waste operations) required to participate. The Safety Officer has the authority—in fact, the responsibility—to completely shut down the on-scene operations if he or she is not convinced that these conditions have been met. In this exercise, these functions were addressed early in the response and appeared to go well.

There was, however, some minor confusion concerning both these issues, and this was symptomatic of the information flow problems throughout the organization. Personnel responding to the spill site apparently had their organizations' site safety plans in effect, and informed the Safety Officer of this. Later in the day, questions were raised about personnel at the site working without safety plans, so the Safety Officer had to reconfirm that plans were indeed in effect.

A similar issue occurred concerning the hazardous waste qualifications of response personnel. The Safety Officer had difficulty getting the information she needed from the Operations Section, and noted that in a real spill, she would threaten to shut down the on-scene response until she had this information. A lesson here is that leaders of all sections need to be aware of the need to send the required safety-related information to the Safety Officer.

In the post exercise debriefs, several people were concerned about the access of the Safety Officer to the UC. At the 1120 situation

briefing to the UC, the Planning Section chief told the Safety Officer that she couldn't attend ("...attendance is being kept to a minimum..."), and the chief agreed. We see this as an exercise artificiality, and not a real issue. The Planning Section chief happened to be the COMNAVREG NW staff member who had taken the lead in putting on the exercise, so the Safety Officer assumed this was being done for some exercise purpose. She was well aware that a spill response could not proceed without her assurance to the UC that all safety requirements had been met, and she made it clear that she would never allow this to happen in the event of a real spill.

Medical

Medical operations went well in this exercise, although the need for a large immediate medical response was not tested. Local medical support was more than adequate for the needs of this exercise scenario. Had this incident produced mass casualties, local emergency assets (civilian) would have been first on the scene, to be followed by Navy assets.

The Medical Officer had to communicate with personnel at the spill scene through the Operations Section. (Operations was the only section that had direct contact with the waterfront). This was marginally adequate in the scenario exercised; a few minor injuries went unreported to the Medical Officer until the next day. Had there been a fire or an explosion with multiple injuries, the Medical Officer would have insisted on having his own communications system. Future exercises should look at the feasibility of this.

One very positive point is that the medical team exercised notification and mobilization quite realistically during the exercise. The Medical Officer called for an Industrial Hygienist (IH) at 0710 on March 2, and at 0845 an IH from Puget Sound Naval Shipyard was on the scene. The Medical Officer also contacted Naval Hospital Oak Harbor, and personnel there estimated that they could get a medical team to the site of the incident in about 30 minutes, although this wasn't played out in the exercise.

Based on lessons learned from this exercise, the Medical Officer is preparing a supply kit to be ready to go in the event of a real emergency—a clear example of the value of exercises such as this.

Public affairs

The Joint Information Center (JIC) was staffed by three representatives from COMNAVREG NW, one member of SUBGRU9, one member of Naval Air Station Whidbey Island (NASWI), a Coast Guard officer, and two members of the Washington State Department of Ecology (DOE). Most of the players agreed that, for this exercise, the amount of space was adequate. However, the one phone and one fax (which could not send consistently or receive at all until it was replaced at 1235) would not be sufficient in a real response.

The media were first informed of the spill at 0850, by a press release issued by the JIC. Subsequent press releases were issued at 1058, 1330, and 1630. All information used in the press releases came from Operations, Planning, and the Command Staff, and each press release went through the UC for editing prior to release.

Timeliness of released information was a problem. For example, a health advisory from the Medical Officer was not issued until more than 2 hours after the JIC first became aware of it. The actual delay in getting the information to the public was longer than that; the Command Staff was not initially aware that they were supposed to pass this information on to the JIC. Because of time constraints, no Public Affairs briefings were given, and both scheduled press conferences were cancelled.

The JIC provided information to all media and citizens groups that called in, although many callers whose questions could not be answered immediately had to wait several hours for a call back. Each of the other sections also provided information directly to whomever called in, and only some of the calls were (correctly) referred to the JIC.

The organization and effectiveness of the JIC may have been hindered by the nonappearance of two key Navy players. Subsequently,

there was a question as to who was to lead the JIC. Eventually, one of the non-Navy players assumed the lead role.

This may have had an adverse effect on how the other sections perceived the JIC. Most players from other sections did not seem to be aware that all public information was to be disseminated through the JIC, and many did not recognize the urgency of responding to the JIC's queries. It wasn't until the afternoon that JIC members began to ask one or two people from each section to act as points-of-contact. Once the lines of communication were established, however, the JIC demonstrated good cooperation with the other sections. And throughout the day, despite problems with inadequate phones, fax machines, and the computer system, JIC members were able to improvise enough to issue periodic press releases.

As part of their routine training, personnel expected to staff a JIC should be briefed on the role of the JIC within the ICS, and the respective roles within a JIC. They should also be familiar with the Area Contingency Plan, and the resources contained within. The NOSC should consider making the JIC manual [6], developed by Washington State and the Coast Guard District, required reading for its participants in future exercises.

Operations

The Operations Section occupied an area of the open pavilion floor adjacent to the Planning Section. Players noted that teamwork within the section went well, and delegation of authority and communications between the various units within the Operations Section was very good. However, they felt that they could have used more administrative support. They also noted that had this been a real spill in which they would have had to sustain operations for a long time, they would have needed more people—presumably enough people for multiple shifts to staff the section around the clock.

Players from the Operations Section also noted that they were not familiar enough with the outside resources that were available to them—particularly contractor resources. This is indicative of a general problem throughout the response organization: Most players

were not familiar with the Area Contingency Plan, which they should have read ahead of time. This seemingly negative result points out the value of this exercise as a whole: Most players agreed that this was a lesson well learned, and they will now be certain to become more familiar with all applicable plans.

Initial actions

The Operations Section was mobilized and at work very early in the exercise—largely due to the unavoidable exercise artificiality of the players knowing about the spill ahead of time. In fact, at 0700 the Operations Section was busy looking for assets and mobilizing response personnel, before they even knew what had been spilled or how much. Most players simply showed up for the exercise early in the morning, without regard to any need for notification.

Our review of notes and logs revealed that the Operations Section addressed decontamination of equipment, site safety, damage assessment, and recovery of oil, early in the response, although they often did not inform the other sections that they were addressing these issues. For example:

- By 0720 on March 2, the Decontamination Unit had been briefed on the situation (we could not determine exactly what information they were given), and at 0810 they began calling around and mobilizing assets.
- At 1038, the Operations Section Chief told the waterfront supervisor to ensure that 30 people who were to arrive soon be given appropriate safety briefings.
- At 0835, Operations informed the Planning Section and UC about the results of the first helicopter overflight, and by 0930 six NRDA teams were out assessing shoreline damage.
- At 0725, the Planning Section Chief briefed the Recovery Unit on the situation (again we cannot determine what information they were given), and at 0733 they called NAS Whidbey Island and told them to mobilize assets for deployment.

Information management

When it became clear that REDSS was not capable of maintaining the big picture, the Operations Section attempted to do so using a chart and grease pencils. This did not suffice for keeping the UC up to date, and both the UC and OPS section players noted in exercise debriefs that the lack of a single, big-picture display was a major shortcoming. The lesson here is that even though REDSS was supposed to handle this, backup plans should have been made. No matter how much information is conveyed in tables and messages, a single, all inclusive picture is critical to decision-makers.

The Operations Section was the only location within response headquarters that had actual communications with the field. Although these communications generally went well, the Operations Section still had trouble keeping track of what assets were on-site and what were en route. We suspect that some of this confusion is realistic, and some is an exercise artificiality due to the need to rely on the exercise "TruthCell" to tell them what has arrived and what hasn't. Some examples of information flow problems include:

- Early in the exercise, the Operations Section learned that 357,000 gallons were spilled, but they didn't pass this information to the UC. (Interestingly, this information did go to the Command Staff.)
- Early in the response, the Operations Section didn't tell the Safety Officer that they were arranging safety briefings for incoming response personnel.

Planning

The Planning Section was located in the center of the open pavilion floor, with the other cells surrounding it. Space for this section was adequate, and was set up ahead of time with the phone lines installed and REDSS up and running when all players arrived the morning of the spill. All members of this section were on the scene by about 0730 on March 2. In an attempt to facilitate information exchange with other sections, the Planning Section designated one full-time person as the liaison to the Operations Section, and one to the Logistics

Section. Interestingly, this was a recommendation voiced by Planning Section players during the debriefs at the Navy's 1995 San Diego PREP exercise.

Major actions

The Planning Section Chief made notifications his first priority upon arriving at response headquarters. All Navy and outside agencies requiring notification were listed in checklist form in the NOSC plan, and he made all necessary calls, verifying POCs and phone numbers. As we noted earlier, in exercise play we were unable to trace the notification process from the ship to the Planning Section.

The potential use of dispersants, in situ burning, and decanting of collected oil-water mixture were among the first issues addressed by the Planning Section:

- At 0700, Planning began to fill out dispersant use/in situ burning checklists
- At 0800, Planning prepared initial recommendations for use of alternative response methodologies
- At 0845, Planning prepared recommendations regarding decanting.

Early in the exercise, the Planning Section began to look at disposal of recovered oil. Work on a disposal plan began at 0910 on March 2, and the plan was completed at 0930 the following morning. The Environmental Unit was also active early in the response: By 1000 on March 2, NOAA projections of the location of the slick at 1200 and 1800 that day were available. Work on the Incident Action Plan began at 1005, and relevant GRPs were used extensively.

Incident action plan

The Planning Section briefed the main thrust of the IAP to the UC at 1518 on March 2, and presented a written version to the UC at about 1100 on March 3, marking the close of the exercise. The IAP covered the period 0600 on March 3 to 0600 the next day.

A Site Safety Plan was included along with the IAP. This plan was developed by filling in the blanks on the generic site safety plan developed by COMNAVREG NW. It also included the Oil/Hazardous Substance Spill annex to SUBASE Bangor OPLAN 3440B.

The IAP developed in this exercise looked to be a standard IAP: a lot of administrative information, such as the names of the players comprising the response organization, and various forms listing the assets to be brought on scene during the time period covered by the IAP. The UC seemed to find this IAP satisfactory, although we don't think anyone actually read it. However, we made the same observation regarding this IAP as we have in previous exercises: To a large extent, the development of the IAP appears to be more of an exercise in addressing paperwork requirements than a real attempt to communicate useful information:

- It contained a great deal of administrative detail that everyone already knew.
- It consisted entirely of forms and contained no coherent discussion of any strategy or plan of action, and no fall-back plans in the event of weather changes or failure of assets to arrive as planned.
- It contained no pictures. If the intent is to convey useful information, the simplest and most effective way to do this is to show a chart with locations of current and planned assets.

We don't mean to imply that the IAP developed here was deficient. According to standard ICS methodology, the IAP is an operational document and is not required to do the things suggested above. Perhaps the allowable form for an IAP is strictly governed by ICS protocol. If not, however, future exercises should explore alternative, more user-friendly formats for this very important document. Or, an "executive summary" type of supplement to the IAP should be prepared.

Logistics and Finance

The Logistics and Finance Sections were located adjacent to each other, in an area of the open pavilion floor on the side opposite the

UC and Command Staff. Both sections were up and running early in the exercise: By 0750, the Purchasing Unit in the Logistics Section was working on a contracting strategy, and by 0816, requests for equipment were coming in from the other sections.

Players from these sections felt they did not have enough phone lines and computers (by contrast, most players in the other sections did not have this problem). Problems with REDSS further compounded their problems in tracking and managing orders for outside assets, and affected their ability to share information with one another. For example, beginning at 0745, the Finance Section Chief was unable to get into the spill response website. The poor flow of information throughout the response organization is a special problem for the Logistics and Finance Sections, which are charged with obtaining assets required by the other sections and tracking costs. At 0800, other sections had activated several BOAs, but the Logistics and Finance Sections were not informed.

Players from the Finance Section noted that clear procedures must be in place to allow timely access to spill response funds. In this exercise, there was some early confusion over how to access funds to allow the response to proceed. As was noted in the post-exercise debrief: No money means no spill response.

Similarly, the Logistics Section would have benefited from a complete directory of BOAs that included points of contact, phone numbers, and lists of exactly what equipment is available. Players suggested that such a directory should be maintained somewhere in the supply/EFA/FISC chain, ready to be brought to response headquarters in the event of a spill.⁶

Players from the Logistics Section also suggested that in the event of an actual spill, representatives from the USCG, state, and other agencies should bring with them such basic supplies as cell phones and reference materials. However, if personnel from other agencies need resources to aid in the response, the Logistics Section must be able to

6. BOA resources as well as all resources available in this region will be listed in the NW ACP shortly. This will be available to everyone on the ACP web site.

support them. Early in a response (the most critical period), the Logistics team would not be able to adequately supply all arriving personnel in a timely enough fashion.

Finally, many players in the Finance and Logistics Sections stressed the need for more ICS training. Most felt that they were familiar with their individual responsibilities, but they were not certain about how they fit in to the rest of the command system, and how they needed to interact with other sections.

Lessons learned in terms of the standard PREP evaluation objectives

Here we present lessons learned and conclusions in terms of the 15 PREP standard evaluation objectives [1], which summarize the basic tasks that make up an oil spill response. These 15 components fall into three categories:

- Command organization
- Response operations
- Support.

Several of the 15 objectives were not played in this exercise, which focused almost exclusively on command and control at the response headquarters level.

Command organization

Notifications

Notifications were not strictly played at the site of the spill, but the NOSC later exercised the entire notification procedure specified in the NOSC plan.

The exercise began with an exercise controller going aboard *Camden* and telling the Officer of the Deck (OOD) that the ship had been hit, a major breach of a fuel tank was suspected, etc. (This was not a “no-notice” drill; the OOD knew that the exercise was to be held that day.) The OOD immediately put out word of the accident on vessel channel 16, which the USCG monitors. He then notified USCG Vessel Traffic Control (VTC), and repeated the notice on vessel channel 16 (there was a lot of static the first time). No other notifications were made, not even to COMNAVREG NW, the local NOSC. The USCG

VTC passed the notification on to the local USCG Marine Safety Office, but we could not trace the information flow beyond that point.

We're not sure why the ship did not make notifications, but we suspect that this is an exercise artificiality. There was no immediate response at the ship, and the exercise controller at the site never told the ship that they were to make all notifications as if this were a real spill. Perhaps the OOD assumed this was unnecessary for the purposes of the exercise.⁷

Upon arriving at response headquarters, a member of the NOSC staff immediately made all required notifications. The Planning Section Chief used the notification checklists in the NOSC plan, and actually called every agency on the list, thus ensuring that all POCs and phone numbers were up to date. No problems in this regard were encountered.

Mobilization

For the most part, mobilization was not tested in this exercise. This is typical of all exercises of this type, and is unavoidable. Because this was not a no-notice drill, most players were in place much more quickly than would be the case in an actual event. In fact, virtually all the players at response headquarters were on the scene before they had been notified. To facilitate mobilization in the event of a real spill, COMNAVREG NW should pre-designate a response headquarters (the pavilion used in this exercise seemed to serve well).

One very positive point is that the medical team exercised notification and mobilization quite realistically in the exercise. The Medical Officer called for an Industrial Hygienist (IH) at 0710 on day-1, and at 0845 an IH from Puget Sound Naval Shipyard was on the scene. The Medical Officer also contacted personnel at Naval Hospital Oak Harbor, and they estimated that they could get a medical team to the

7. For that matter, the controller didn't tell the ship they *didn't* have to; it is our understanding that everyone was supposed to make all required notifications.

site of the incident in about 30 minutes, although this wasn't played out in the exercise.

One other aspect of the mobilization process was realistically played: the ability to quickly organize those who are present into a working organization. All players at response headquarters knew their positions in the organization in advance of the exercise and could immediately get down to work upon arriving at the pavilion. To some extent, this is an exercise artificiality. In a real event, there would no doubt be many untrained people arriving on the scene, and a great deal more chaos. However, this points out one major value of such exercises: They force the local response community (particularly the Navy, in this case) to make assignments and plan ahead. Presumably, these people would occupy the same positions in the event of a real spill.

Immediate mobilization of response assets (either shipboard or shore-based) at the site of the spill was not played in this exercise.

Ability to operate within the UCS

Upon reporting to response headquarters at the pavilion, all players knew their assignments, and the various agencies involved at response headquarters fit together and knew their roles well. Most players throughout the response organization were familiar with their individual responsibilities but did not understand how they fit into the overall command structure.

In a few instances, more interagency communication would have helped, and specific examples of this were discussed in the previous section, in our discussions of the Unified Command. We suspect that some of this was exercise artificiality—a case of the non-Navy members of the UC holding back and allowing Navy personnel to proceed without their interference.

Players throughout the organization often seemed too concerned with forms and paperwork at the expense of critical, tactical, thinking—an observation made in previous exercises of this type. For example:

- Instead of gathering critical information and ensuring that correct emergency actions were taking place, two of the first actions taken by the UC were to set up a schedule of meetings for the first day, and to publish a list of strategic objectives that were of marginal utility.
- The situation unit failed to provide a clear picture of where assets were and where additional assets were going to be placed.

Future ICS training must make clear that ICS forms and protocol are intended to support information flow and critical thinking, not replace it. Either one, in the absence of the other, will result in a failed response.

A crucial aspect of any command system is information flow, and it is almost always a problem in exercises of this type. In the command system exercised here, flow of information between sections was a particular problem. The Operations and Planning Sections often didn't know what the Logistics Section had ordered, and Logistics and Finance usually didn't know what type of equipment the others needed. Critical information, including the volume of oil spilled, did not flow through the organization.

Some of the problem with information flow was due to the failure of the computer-based information system (REDSS), but there were other problems:

- In many cases, personnel did not seek out information that would have been critical to their ability to perform their tasks.
- Most players felt that either the right number of personnel were involved, or that they could have used additional help. However, the more people there are in an organization, the harder it is to resolve the problem of information flow. A leaner response organization would almost certainly facilitate a better flow of information, and should be examined in future exercises.

This brings us to a more general issue: the size of the response headquarters organization. In almost every section, many people were crowding around with seemingly no important function to perform.

Much of this is an exercise artificiality—everyone just showed up at 0700 for the exercise. In the event of a real spill, we would hope that the command organization would grow naturally; as people are needed, they would be brought in. The size and rate of growth of the response organization is an important issue that should be looked at in future exercises.

Response operations

This category of response functions deals primarily with the actual on-water activities—controlling the discharge, recovering the oil from the water, etc. Of course, an exercise without any actual spill allows us to examine these issues only marginally.

Discharge control

Discharge control was not played in this exercise. Exercise controllers simply declared the ruptured tanks to be completely discharged early in the exercise. As a result, the UC deleted “control of the source” as a strategic objective.

Assessments

The Area Plan states that assessment of the potential health and safety threat is the immediate concern of the FOSC. Each agency is supposed to conduct an early assessment to determine if their participation is warranted; the ACP does not tell when, if ever, these assessments should be updated.

Early assessments by each agency were not played—an unavoidable limitation of exercises of this type. Not much training would be realized if half the participating agencies were to determine that they weren't needed in the response. All players simply showed up at response headquarters before they knew what was spilled or how much was spilled.

One important type of assessment was played very realistically, and was quite successful. Early in the exercise (around 0700 on March 2), the Operations Section actually called the Navy Supervisor of Salvage (SUPSALV), in Washington D.C., and gave them details concerning

the damage to *Camden*. SUPSALV engineers reviewed structural specifications for this type of ship, made recommendations on how the grounded vessel should be moved, and offered advice concerning the safety of the vessel for towing. This information was a major factor in the decision to put the vessel under tow.

Assessments were addressed early by the Planning Section. At 0725, Planning ordered a helicopter overflight, and their plan called for similar flights throughout the day. The initial assessment of spill size appeared to have minimal impact, and pointed to the ever present problems with information flow. The Operations Section knew the volume spilled by about 0745, but there is no indication that they passed this information to the UC or to the Finance and Logistics Sections. The lesson here—which we learn over and over in exercises of this type—is that information gathered by periodic assessments is of marginal use if it is not forwarded to those in the response organization who need it.

We saw no examples of other assets (i.e., boats) being dispatched to assess field conditions.

Containment, recovery, disposal

Of course, no oil was actually recovered or disposed of during this exercise. Due to the volatility of DFM and its tendency to disperse throughout the water column, the best time to recover this product from the water is as soon as possible after it is spilled (table 2). Therefore, recovery success is highly dependent on the ability to get recovery equipment in action as soon as possible. Containment at the source is a function of how quickly immediate booming at the site can be performed. This was not played in this exercise.

With no oil actually being spilled, there isn't much we can say about recovery and disposal. We can only look at how and when these issues were considered.

The Planning Section considered these issues very early in the response. They began work on a disposal plan at 0910 on March 2, and anticipated that about ten parts water would be recovered for every part oil. Valuable lessons were learned regarding availability of

assets for handling recovered oil and water. At the 0900 brief to the UC, the Operations Section noted that recovery operations would have to be suspended for about a half-hour while additional storage assets were brought in. Later, it was learned that the FISC and Kitsap County both had several vacuum trucks that could have been used to offload the skimmers.

Table 2. Evaporation/dispersal budget

Hours after spill	Percent evaporated	Percent dispersed	Percent floating
0	0	0	100
3	10	0	90
6	19	1	80
9	25	2	73
12	30	3	67
24	41	9	50
36	47	15	38
48	51	20	29

Protection

Protection of human health, natural resources, and property was the focus of the entire response and, of course, is the major challenge. This area of Puget Sound contains many valuable natural and recreational resources. Therefore, in the event of a spill such as the one played here, the response organization must—if at all possible—prevent any oil from reaching land anywhere.

The response organization in this exercise was able to address the protection priorities set forth in the GRPs. The GRPs were consulted early and often, and all areas identified in the plans were taken into account. The NOAA Scientific Support Coordinator (SSC) was able to provide various prediction products that allowed the response organization to keep one step ahead of changing tidal and wind conditions. One important lesson was learned in this regard: In this area, access to private property might be needed for shoreline protection operations. These legal issues must be considered and worked out

ahead of time, to ensure that an actual response isn't delayed while shoreline access is being worked out.

Early on, the Planning Section considered the use of dispersants, burning, and decanting but later dismissed the idea. It seems unlikely that these options will be used in the event of a spill of light fuel in this area of Puget Sound.

Public health concerns, including evacuation of nearby residents, were well considered, and the inclusion of Navy, State, and County health and emergency services personnel was considered a major plus in this regard. An important lesson learned in this exercise was the importance of bringing worker health and safety officials on the scene as early as possible, because field operations can be (and almost were) completely shut down until it is determined that worker safety conditions are satisfied.

Support

Communications

In large, complex command structures, information flow is almost always the Achilles' heel. This exercise was no exception. The flow of information between cells in the organization did not go as smoothly as hoped.

Part of this problem was due to the failure of REDSS, but part of it could have been avoided if the command organization had paid more attention. Members of the UC should be certain they understand what information major decisions being made in the various sections are being based upon. And, of course, the lesson that was well learned by the players in this exercise was that back-up plans must be made in case computer systems fail.

Some of the internal problems with information flow seen in this exercise might also be due to the size and level of compartmentation of the response organization. Information would probably flow more easily throughout a leaner organization. None of the section chiefs felt that they had too many players on the scene; in fact, some players

thought they could have used more help. However, we still think that future exercises should examine the pros and cons of smaller command organizations.

One aspect of communications that was realistically tested went very well: communications between the Operations Section in command headquarters and response personnel at the waterfront. Communications were established very early, through the use of a mobile communications van, and went well throughout the two days.

Transportation

All out-of-town personnel and equipment were staged to the area before the start of the exercise, so we cannot evaluate the ability of this response organization to transport assets quickly.⁸

Personnel support

Personnel support functions include coordinating assignments for incoming personnel, providing for messing and berthing, providing adequate administrative spaces, and properly addressing site safety issues.

Coordination of assignments in command headquarters went very smoothly because virtually all players were told ahead of time what positions they would occupy. It is unlikely that an actual spill would follow closely on the heels of an extensive organizational effort, so the ease in organizing seen in this exercise probably represents the best possible performance in this regard.

Berthing was not played in this exercise. The exercise area is near a major city and contains several large military installations, so these functions should not be a major problem. Messing was provided by the Red Cross, and seems a viable option for a real emergency.

8. Before the start of the exercise, SUPSALV conducted an actual mobilization drill that looked at the time required to get assets from their depot in Stockton, California, to the spill site. We were told all timeliness requirements were met. This event is beyond the scope of our exercise evaluation.

COMNAVREG NW relied on the Red Cross to provide lunches for all players during the command and control phase. The use of the Red Cross in this role went very smoothly.

Spaces in command headquarters at Kitsap Pavilion were very adequate. The idea of locating the Planning Section in the middle of the pavilion floor, with the other sections around it, was well received.

Site safety was generally handled early and effectively. Due to information flow problems, there was some early confusion as to whether or not arriving workers had the required safety qualifications. This exercise provided a clear illustration of what could happen if worker safety issues are not resolved and the importance of keeping the Safety Officer informed about all incoming personnel.

Equipment maintenance

Because long-term equipment deployment was not played in this exercise, we could not analyze the ability of the response organization to support and maintain equipment. However, those agencies that did participate (especially Navy SUPSALV) are self-sufficient, bringing extensive support infrastructure to the scene. Furthermore, this area is not a remote location, so one would not expect equipment support and repairs to be a major problem.

Procurement

The primary source of the procurement problems that were noted was a lack of communication flow between the Operations and Logistics Sections (some of the players feel that communications between the Operations and Logistics Sections should go via the Planning Section). Early in the exercise, members of the Logistics Section often did not understand exactly what types of equipment the Operations Section wanted them to order. Also, members of the Resources Unit in the Planning Section did not know the status of their equipment requests because the Logistics Section did not pass this information to any other cells upon making orders. These problems resulted in the exercise controllers temporarily halting exercise play so that these problems could be worked out.

The responsible party (the Navy) experienced some confusion in gaining access to Navy funds early in the exercise. Therefore, each agency that has access to oil spill cleanup funds should be included in the Finance Section to ensure that all available sources of funding are known.

Documentation

Documentation was clearly a weakness in this response organization. Most cells kept very limited watch and communications logs. The UC kept none. The level of documentation maintained did not allow us to analyze the information on which major decisions were based.

In a real event, the UC must take more responsibility for seeing that all cells maintain watch logs and that all major actions and decisions are documented.

Information technology (REDSS)

The effectiveness of the Incident Command System (ICS) hinges on good communication between the different sections; without it, decisions may be based on old or inaccurate information. Information flow has been a key problem in previous PREP exercises [4]. The planners of this exercise incorporated a computerized system known as the Regional Environmental Decision Support System (REDSS) in an attempt to improve communication between the different sections, and to ensure that the UC was continually given timely, accurate information.

Each section of the ICS was set up with at least one or two laptop computers and a laser printer. The Planning Section was equipped with a boxlight projector, to display video output (e.g., continually updated Geographic Information System (GIS) maps) from one of the laptops. The Planning Section also had a poster printer to output the marked-up GIS maps, which were then displayed at the front of the room. Each section had one phone line dedicated to dialing in to the Internet (to access the REDSS system). Computer support personnel were available on-site.

Other ICSs have recently incorporated computerized response systems [7, 8], citing the potential for a common system, shared by all sections simultaneously, to provide:

- Faster communication between sections than was previously possible
- Consistency of information across sections, thus minimizing conflict and duplication of effort
- Mapping of response activities via a GIS

- On-line tools (e.g., forms and templates) and resources (e.g., available personnel and equipment)
- Continuous documentation of the response effort.

What is REDSS?

REDSS is a web-based emergency information management system. Responders from the different sections log onto the system via the Internet, and use forms to enter information about the spill and the response. The Unified Command can then view the cumulative information (in the form of marked-up GIS maps, for example) in real time. The REDSS system is progressive in design; it requires no special software or hardware to install, and can run on any computer that is set up to use the Internet. Its interface should be familiar to most Internet users, and it can be set up to be accessible to the public.

But like any other computer system, REDSS has shortcomings. Besides the usual learning curve and cultural change associated with introducing users to a new system, running it from the Internet brings with it reliance on phone lines and security concerns. These shortcomings are exacerbated during crisis mode, which is the standard condition under which this type of system is intended to run. In addition, because REDSS was in development at the time of the exercise—with only limited prior testing—bugs were almost certain to surface during the exercise.

Effectiveness of REDSS

As in the Navy's 1995 San Diego PREP, the computer-based system that was designed to share information between cells did not perform as hoped. Specific problems noted with REDSS include:

- At the start of the exercise, responders from the various cells had trouble logging on.
- When the system was working, it became apparent that many responders were unfamiliar with it and thus had trouble navigating it.

- At several points during the day, more people were trying to log on than the system could handle.
- Once the response was well under way and runners were being used to pass information between cells, responders preferred not to use REDSS.
- Frequently, editing changes that users made to on-line documents (e.g., press releases, situation updates) did not “take.”
- Most responders seemed unaware that computer support (provided by KMX Corp., the designers of REDSS) was available on-site.

Exclusive use of laptops was a good idea. Laptops are portable, can run on battery power, and have a self-contained display, with video out capabilities. There was some awkward fumbling with the touch-pads on the laptops, however. In the future, in order to reduce the on-site learning curve as much as possible, each laptop should have a mouse attached to it. Touch-pads and trackballs are an acquired taste (and vary between laptop makes and models), and should be avoided where instant productivity is required.

Overall, there was a feeling that REDSS did more to get in the way than aid in the exercise, although it was not always clear which problems were related to technical difficulties and which were related to training. On the other hand, many felt that the system—admittedly still in the development stage—did not get a fair test, and that future exercises may benefit from using it.

Conclusions and recommendations

REDSS is a new system, developed specifically for use in this exercise. The concept of using computers to aid in the response to an oil spill is relatively new as well, and a computer will be used more effectively as new systems are designed, tested, used in real-life situations, and improved based on past performance. But, before going further in developing REDSS, we should ask: How can a computer-based system aid in the response to an oil spill?

It is tempting to think that integrating computers into any system would improve it. However, unless we can specifically define what we want the new system to do, we are likely to be disappointed with the results. To put it simply—before we can find the answers, we must define the questions:

- What specific objectives should the system accomplish?
 - Stating that we want to “improve communication” is not enough. It’s crucial to think about the mechanisms for accomplishing this. An example is by employing a shared database.
- Is such a system already available? If so, can its shortcomings be eliminated or minimized?
 - It’s important to avoid the unnecessarily costly and frustrating process of “re-inventing the wheel.” An investigation of existing products is well worth the time. Even if no suitable system exists, the investigation will help define criteria for a new system.

Incorporating a computer-based system

Both this exercise and the Navy’s 1995 PREP ended with the conclusion that the computer-based information management system was ineffective in aiding in the response, but was not adequately tested during the response. Improving response capabilities by integrating a computer-based system *is* possible, but steps should be taken to prevent a repeat of the same conclusion in the future. To increase the chances of success with a computer-based system (REDDS or any other), planners of future exercises must:

- Assess their needs
- Test the system
- Minimize the learning curve.

This basic methodology applies to hardware, software, or the combination.

Assess needs

In this regard, the planner must:

- Assess the current system or method, particularly its benefits and limitations.
- Define criteria for a replacement system, using the benefits and limitations of the current method as guidelines. Examples can include minimal training requirements, widespread accessibility, record-keeping, error-checking, and "version-control."
- Based on these criteria, seek out solutions that are already available (e.g., commercial off-the-shelf (COTS)), to avoid "re-inventing the wheel." Keep in mind that a proven system can often be tailored to specific needs. A proven system often brings with it vendor support and a perception of reliability, among other benefits.
- Consider developing a new system only after existing options are found to be unsuitable.

Test the system

Computer-based systems require rigorous testing before they can be considered reliable and effective. The Puget Sound exercise did not allow for testing of the REDSS system because that was not its primary goal; the primary goal was to perform an effective response to a simulated spill. Hence, when REDSS experienced problems, responders abandoned it for the more familiar (i.e., noncomputerized) techniques in order to continue the drill.

During an actual spill response, of course, a failure of the computer-based system would require reverting to runners, phone calls, and faxes. However, during an exercise in which a priority is to test the computerized response system, the problems would need to be defined, then worked through; this is the only way to improve the system's dependability (and, in turn, improve the response team's readiness by using it). If further development of REDSS is desired, the Navy should design and carry out a scaled-down drill that focuses on testing REDSS, which would include, at a minimum:

- A hands-on orientation to REDSS for all participants prior to the exercise, including written and on-line documentation/tutorials.
- Designating one or two responders from each section as operators. They would be expected to have the most familiarity with the system.
- Documentation by operators of problems as they occur, noting error messages, dialog boxes, etc.
- Immediate notification of on-site support personnel of “show-stopper” problems, to bring the system on-line ASAP.
- After the exercise, meeting with all participants for change suggestions, then, incorporating agreed-upon changes to the system and the documentation.

Minimize the learning curve

In a response, responders will be in crisis mode from the very beginning. Therefore, it is important that they are proficient with the tools they will be using. Users, whether experienced or novice computer users, must receive formal training on the new system, in much the same way that on-scene responders are trained in deploying field equipment. Whether it's an exercise or a real spill, responders should not be seeing the system for the first time.

Appendix: Player post-exercise comments

In this appendix, we document the comments presented by the exercise participants during the post-exercise debriefs. We made no attempt to edit these comments here—we simply report them as briefed.

Unified Command

What went well

- Dialogue between the four UC players
 - Very honest give-and-take
- Constructive lesson: This group needs additional formal ICS training.

What didn't go well

- Exercise artificialities
 - We didn't really play the spill
- A 3-year training cycle does not appear adequate
- Need more REDSS training
 - It didn't really get tested because this group was unfamiliar with it
 - No information flow
 - No visual
- Information flow
 - Notably between OPS/Planning/Logistics
- Need more phone lines

Command Staff

What went well

- Had all necessary materials (preplanning)
- Scenario raised new and interesting legal issues
- Overcame communication problems with cell phones
- Professional response to injects
- Red Cross support
- Medical participation was realistic
- REDSS use.

What didn't go well

- Access to other section leaders
- Number of phones
- Lack of materials for the field
- No zone-marking kit
- No direct reading equipment
- Too few people on the safety staff
- Training was lacking
- Need better overall control of zones
- Lack of security at the scene
- Information flow was slow
- Not informed about mishaps as they occurred
- Lack of briefing time for safety
- No staging area manager
 - The site safety manager filled in
- No JIC support in the field

- Need to expand safety plan
- Need more computer assets for REDSS use
- Improper PPE for field personnel
 - Showed up without PPE
- Lack of safety control
 - Safety plan was not read or signed by ALCON
- Not enough REDSS use
- Not enough admin support for the field
- Scenario had no high-level Navy inquiries
- Equipment deployment information was not passed to safety section.

Joint Information Center

What went well

- Adequate number of personnel
- Good communication/cooperation once assignments were made
- Improvisation.

What to work on next time

- Organization of JIC, especially definition of roles
- Identify/promote JIC to rest of ICS
 - Especially POCs in other sections
- Documentation.

What resources do we need?

- Typewriter (backup to PC)

- More phone lines
- FAX that works
- Training of JIC personnel
 - Especially, cooperation with other agencies
- More qualified personnel
 - Briefed in P.A. protocol
- Kit with forms, letterhead, office supplies.

Operations

What went well

- Internal communications
- Good knowledge of government resources
- Good teamwork within the section
 - Excellent delegation and leadership
- Adapted to change in situations.

What didn't go well

- Documentation
- Mapping
 - Needed display board
- Lack of ICS familiarity
 - What Resources were provided?
 - Information flow between sections
 - Acronyms/terminology
- Less familiar with contract resources
- Updated GRPs

- Training
- Accurate inventory/understanding of equipment on site
 - Due to lack of communication
- Needed an equipment tracker
- Shortage of admin support
- Lack of qualified persons to sustain a large-scale response.

Planning

What went well

- Good teamwork within agencies
 - Especially for first-time players
- NRDA assessment teams
 - Individuals ID'ed
- Learned a lot: regrouped well
- Good support from OPS
- Working with state peers went very well (EU)
- Good face-time with SMT
- Free flow of information
- Great resource tracking/display support
- Postmaker was great
- Great knowledge pool
- Instant integration of EU
- Cooperative attitude
- Kitsap County players: interest and participation
- Did well with stress level and tech support
- People were very thoughtful and patient with REDSS

- Desire to succeed
 - People knew what to do.

What didn't go well

- Need to work on communication between units outside of planning
- Need a centralized collection point before going outside of planning
- Need more support to use REDSS effectively
- Need more ICS training
 - What is job; forms; pre-drill training
- Need more faxes, copiers, and REDSS help
- Make sure date of GRP is same and all are using it
- Better way to track resources
 - Field observers
 - Better information from OPS
- Need better control between OPS and Logistics
- Situation map; documentation on what to put up
- Need truth for equipment mobilization:
 - Use of T-cards
- More realistic MSELs: timing, truth
- ICS training morning of drill or day before
 - Refresher training
- Review GRPs prior to drill
- Need ICS organizational training and ICS positional training
- Planning needs to be more assertive and work with OPS early on
 - One situation map, etc.

Logistics

Lessons learned

- Nuisance calls
- Tracking system
- Vague requirements: where, who...
- Duplications
- Communication functions
- Inadequate forms
- In-house organization/use
 - Role definition
- Need centralized receiving
- Tracking number problems
- No defined process, desk guides
- Communications plan was weak
- REDSS doesn't work
- No prior training
- But...we made it work.

Finance

What went well

- Good teamwork with Logistics
- Internal document/fund tracking system (nonlabor)
- Learning experience.

What didn't go well

- Need credit cards for small purchases
 - At least one for each base
- Labor hours need to be tracked by sections
 - Civilain and military
 - Contractor by contracts section
- Communications between sections and communications lines
- Predetermined funding level
- Personnel shortage in finance
- Present local accounting system (FASTDATA) not workable (time delay)
- Computer hardware/software (old)
- Lack of ICS training/guidance.

References

- [1] *National Preparedness for Response Exercise Program (PREP) Guidelines*. Joint Publication of the Department of Transportation U.S. Coast Guard and Research and Special Programs Administration, the U.S. Environmental Protection Agency, and the Department of the Interior, Aug 1994
- [2] Ronald Filadelfo. *A Methodology for the Evaluation of PREP Area Exercises*, Feb 1996 (CNA Research Memorandum 95-240)
- [3] Commander Naval Base Seattle, *Puget Sound 1999 Exercise Rainbow Sheen Handbook*, Mar 1999
- [4] Ronald Filadelfo. *San Diego 1995 Preparedness for Response Exercise Program Exercise Evaluation Report*, Feb 1996 (CNA Research Memorandum 95-192)
- [5] *1997 Northwest Area Contingency Plan and Geographic Response Plans*. U.S. Coast Guard Captain of the Port of Puget Sound, U.S. Coast Guard Captain of the Port of Portland, U.S. Environmental Protection Agency Region Ten, and the states of Washington, Oregon, and Idaho. Published at: <http://www.uscg.mil/d13/units/msopuget/acpgrp.html>
- [6] Washington State Department of Ecology and U.S. Coast Guard District 13. *Joint Information Center (JIC) Manual*. Published at: <http://www.uscg.mil/d13/units/msopuget/9610JICMan.PDF>
- [7] D.E. Fritz and J.P. Stone. *Using Computers to Manage Crisis Information Across an Organization*, Proceedings of the 1999 International Oil Spill Conference, 1999
- [8] S. Wischmann and L. Thomas. *Developing a Technological Toll for Managing Complex Environmental Incidents*, Proceedings of the 1999 International Oil Spill Conference, 1999

List of figures

Figure 1. Locator map of exercise area	10
Figure 2. Exercise scenario	11
Figure 3. Response command structure	13

List of tables

Table 1.	Summary time line of major events	16
Table 2.	Evaporation/dispersal budget	41

Distribution list

Research Memorandum 99-44

SNDL

21A1 CINCLANTFLT NORFOLK VA
Attn: GARY EDWARDS
21A2 CINCPACFLT PEARL HARBOR HI
Attn: C. WINTERS (CODE 4655)
23A2 COMNAVFORJAPAN YOKOSUKA JA
Attn: K. VERKENNES (N452)
41A COMSC WASHINGTON DC
Attn: DR J. AUSTIN
ASN ASN I&E
FA24 COMNAVREGION SE JACKSONVILLE FL
FB10 NAVSTA SAN SIEGO CA
FB28 COMNAVREGION NW SEATTLE WA
Attn: 5 COPIES
FB28 COMNAVREGION SW SAN DIEGO CA
FB28 COMNAVREGION PEARL HARBOR HI
NAVY DASN ENVIRONMENT & SAFETY
MISC SUPSALV
Attn: W. HEALEY

OPNAV
N45

OTHER

B5 USCG WASHINGTON DC
Attn: OFFICE OF RESPONSE (G-MOR)
USCG MARINE SAFETY OFFICE PUGET SOUND
USCG NATIONAL STRIKE FORCE COORDINATION CENTER
USCG PACIFIC STRIKE TEAM
MISC WASHINGTON STATE DEPARTMENT OF ECOLOGY
Attn: S. ZIMMERMAN (5 COPIES)
MISC NATIONAL OCEANIC & ATMOSPHERIC ADMIN
Attn: DR S. CHRISTOPHERSON