U.S. Fire Administration/Technical Report Series

Special Report: Fire Departments and Maritime Interface Area Preparedness

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FEMA

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U.S. Fire Administration
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Special Report:
FIRE DEPARTMENTS AND MARITIME INTERFACE AREA PREPAREDNESS
(April 2008)

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INTRODUCTION

Waterfronts, where commercial, industrial, and recreational activities are established, are part of our critical infrastructure. They are facilities, systems, and networks essential to the health, safety, and economic well-being of the United States. These maritime interface areas are protected by the local emergency services agencies, the U.S. Coast Guard, and sometimes, industrial fire brigades.

This report addresses fire department preparedness for incidents in maritime areas and the importance of establishing a multiagency response capability that includes law enforcement, the U.S. Coast Guard (USCG), port authorities, the private sector, and emergency management agencies. Stakeholders in maritime emergency preparedness include Federal, State, and local governments as well as commercial private-sector entities and labor organizations. In many communities, these stakeholders only recently have begun working together for disaster preparedness and emergency response planning.

Every year United States seaports handle over 2 billion tons of goods, and more than 95 percent of U.S. international trade moves by water.[1] Losing a major port, even for a few weeks, can have a national economic impact. In 2002, 29 ports along the west coast from Seattle, Washington, to San Diego, California, shut down as the result of an impasse between the 10,500 members of the International Longshore and Warehouse Union (ILWU) and the Pacific Maritime Association, which represents shipping lines and port terminal operators. The 10-day shutdown produced economic waves felt across the country. At the time, the president of the Federal Reserve Bank of San Francisco estimated the cost of the port closings to be approximately $1 billion a day for the first 5 days and as much as $2 billion a day for each day thereafter.[2] These figures clearly show the massive economic impact of even short-term port closures.

Protecting ports and terminals from the risks of natural disasters, accidents, and terrorism is a significant challenge to our Nation's disaster preparedness and emergency response agencies, not only at the local level but for the Federal Government as well. In addition to the aforementioned commerce-related importance of ports, ports also are key locations for recreation, tourism, and employment through myriad related businesses. Such businesses include land-based transportation of goods to and from ports, construction and maintenance of port facilities and equipment, and the actual operations of the port and vessels. Ports are multi-model transportation centers where rail and truck and off-loading operations are tied to maritime commerce. Pleasure craft, cruise ships, commercial vessels, warehouses, heavy lifting equipment, passenger terminals, rail lines, and retail operations are also commonly associated with port operations and areas.

At the local level, fire departments usually provide fire suppression, emergency medical services (EMS), and special operations as part of their operational response at the maritime interface. Many local departments also are involved in providing fire prevention services to port areas, including code enforcement, building plan reviews, inspections of new construction, and testing of fire detection and suppression systems.

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[1] *Risk Management: Further Refinements Needed to Assess Risks and Prioritize Protective Measures at Ports and Other Critical Infrastructure*, Government Accountability Office, December 2005.

[2] Isidore, C. *Hope in West Coast Port Talks*, www.money.cnn.com, October 2, 2002.

Several incidents, including the Nation's largest industrial disaster and the most deadly natural disaster in the United States, demonstrate the critical importance of interagency port and waterway planning. On April 16, 1947, a fire on the ship *Grandcamp* led to a massive explosion of the ship's cargo of ammonium nitrate. The explosion and the ensuing fire led to the explosion of a second vessel, the *High Flyer*, which also was loaded with ammonium nitrate. The total fuel load is estimated to have been equivalent to as many as four kilotons of trinitrotoluene (TNT). The resulting fires and falling debris killed approximately 600 people, injured thousands, and destroyed much of Texas City, Texas. The scale of the incident almost immediately overwhelmed the response capability of the 26 volunteer firefighters and the four fire engines of the Texas City Volunteer Fire Department as well as the firefighting team sent by the Republic Oil Refining Company.

The Nation's deadliest natural disaster, the Galveston Hurricane of 1900, struck on September 8, 1900. The storm washed over the island city of Galveston, Texas, killing an estimated 8,000 people, or 20 percent of the city's population of 40,000. In 2005, Hurricane Katrina served as another reminder of the disastrous impact that storms can bring to coastal areas. The estimated death toll from Katrina was over 1,900, and there were over 6,000 injuries. The estimated total economic losses were in excess of $125 billion, only $40.6 billion of which were insured losses.

Some port cities have developed specific emergency plans to address the risks within the waterfront area, while others are operating without the benefit of unified planning or a structure for addressing surge requirements. Most, if not all large American ports, have an Area Maritime Security (AMS) Committee created and managed by the Captain of the Port, U.S. Coast Guard. Members of these committees play a key role in evaluating the risks and vulnerabilities of a port's infrastructure and operations, and in developing plans to enhance port security. The AMS Committee typically becomes involved in exercises at the port and other activities aimed at reducing the risk of illegal activities that could harm people at the port and cause significant economic damage. Sometimes, there are challenges in getting strong interagency partnerships established at the outset; a situation that the Port of Duluth at Superior, Wisconsin, faced at the outset of their efforts. Their situation was not unique, but has since evolved to achieve a "very robust" level of coordination and communications among the stakeholders, according to some Duluth AMS Committee members.

The Port of Duluth is located at the western most point of Lake Superior, where the St. Louis River widens and enters the Great Lakes. It is the largest port on the Great Lakes, and is also one of the world's largest inland ports. In 2001, the Port of Duluth handled $1.9 billion worth of cargo transported by 1,100 vessels. The Port of Duluth handled more transfers than any other port in the Nation and ranked fifth for coal shipments.

The harbor encompassing the port spans the border between Duluth, Minnesota, and Superior, Wisconsin. The Duluth Seaway Port Authority is the regulatory body overseeing the activities of the port. The Authority is an independent public agency established under Minnesota law, with representatives appointed by the Governor of Minnesota, the St. Louis County Board of Commissioners, and the Duluth City Council.

Duluth is an example of a jurisdiction that could significantly be challenged by any maritime interface incident beyond those expected in day-to-day operations. Originally, a lack of funding hampered the development of a functional consortium and a critical incident plan for protecting the maritime interface area in Duluth and Superior. Organizational leaders in Duluth sought better cooperation and interoperable radio equipment, the absence of which had been a major obstacle to coordination among incident responders.

There are numerous resources at the Port of Duluth, which are working on operating as a functional unit, sharing protocols on how to combine resources and manage a major incident together. The Port of Duluth AMS Committee has many members who also serve on the local Port of Duluth Emergency Management Committee. The Duluth, Minnesota, and Superior, Wisconsin, Fire Departments also have a mutual aid agreement for fire protection. However, neither jurisdiction has the full capability to handle a major fire incident on board ships that may call on the Port of Duluth. The State of Minnesota locates hazardous materials units regionally throughout the State. The Duluth Fire Department operates one of these regional hazmat teams and its associated equipment for the northeastern portion of Minnesota. Training money for this unit has been very limited.

According to sources in the Duluth area, the primary impediment to coordinated planning is a lack of funding. Despite repeated efforts, the area has been unsuccessful in obtaining grant funds to use for the benefit of all stakeholders. Federal money has been spent to upgrade communications equipment in the Minneapolis and Saint Paul metropolitan area, but none has been committed in the Duluth area.

Communications among organizations in the Duluth area are limited, at best. While all of the stakeholders have good working relationships, communications equipment is not interoperable. During a recent full-scale Hazmat exercise, the Duluth Fire Department passed out spare portable radios to the heads of other agencies to facilitate communications. However, such expedient efforts underscore the lack of resources and capabilities necessary for effective operations during emergencies.

This report examines how three maritime communities have approached preparedness and response planning, including the inland Port of Portland, Oregon, on the west coast; Portland, Maine, on the east coast, and the Port of Houston, Texas, on the gulf coast. Each is described in the case studies in the next section. These jurisdictions have encountered different obstacles and challenges and experienced different degrees of success in developing joint planning mechanisms. We identify the common experiences found in each jurisdiction and the considerations that went into emergency preparedness planning, as well as any unique conditions specific to each jurisdiction. The use of mutual-aid agreements and the establishment of consortiums as tools for joint preparedness are discussed, with attention given to Incident Command, lines of authority, and incident coordination.

The report's focus on these major commercial ports should not be construed to limit its applicability to those major maritime interface areas alone. Almost any fire or emergency services organization that has navigable waterways within their response district will confront similar challenges, to various degrees, in their planning and response activities. By examining the preparedness efforts at these relatively more complex maritime interface areas we intend to highlight issues and risks that likely exist as well in smaller venues with less robust capabilities. Departments with more modest capabilities should readily appreciate an even greater need for the type of comprehensive preparedness planning suggested herein.

CASE STUDIES

HOUSTON, TEXAS

Background

The original Port of Houston was located at the confluence of Buffalo Bayou and White Oak Bayou in what is now downtown Houston. In 1909, the current modern port was authorized, and it opened November 10,1914. Today, the port has grown into the sixth largest port in the world.

In 1971, the Texas legislature gave the Port of Houston Authority expanded powers for fire and safety protection. The Port Authority is an independent political subdivision of the State of Texas and is governed by a seven-member commission. The City of Houston and Harris County each appoint two commissioners and jointly appoint the chair of the port commission. The Harris County Mayors and Councils Association and the City of Pasadena each appoint one commissioner. Daily operations are overseen by an executive director.

The Houston Port Authority covers an enormous area 25 miles long that stretches from the edge of Houston south through Harris County to Galveston Bay. The diverse complex of 200 public and private facilities handles over 6,000 vessels each year delivering over 215 million tons of cargo annually. One of these complexes constitutes the Nation's largest petrochemical facility, which is valued at $15 billion.[3] The port activities support nearly 287,000 jobs related to business along the Houston shipping channel and generates nearly $650 million in State and local tax revenues. The port also links Houston shipping with more than 1,000 ports worldwide.

Municipal and private industry leaders who were involved in the activities of the Port of Houston recognized that no single agency possessed the capability on its own to mitigate a major disaster. The scope of the incidents experienced in Texas City and Galveston, combined with five ship fires in an 11-month span from April 1997 through March 1998, sharpened awareness that cooperation among the multiple stakeholders was essential. The municipal organizations that are involved directly in protecting the port corridor are the City of Baytown, the City of Houston, the Cloverleaf Volunteer Fire Department, and fire departments from Deer Park, La Porte, Pasadena, and Seabrook. From Harris County, the affiliated agencies include the Constable, Fire Marshal's Office, Office of Homeland Security and Emergency Management, and the Sheriff's Department. The Port of Houston Authority and the USCG also respond to any incidents. Their cooperative effort has grown. The Captain of the Port and leaders within the Port of Houston work hard to ensure a positive atmosphere for sharing personnel and equipment.

Structure of Consortium

The primary consortium of agencies involved in emergency mitigation is Channel Industries Mutual Aid (CIMA). Formed in 1955 as the Houston Ship Channel Disaster Aid Organization, the name was changed to CIMA in 1960. According to CIMA's Web site, "The objectives of this organization were and continue to be the joining together of firefighting, rescue, and first aid manpower and equipment among Houston Ship Channel industries and municipalities for mutual assistance in case of emergency situations–either natural or man-made."[4] The CIMA model promotes the benefits of

[3] Source: Port of Houston Authority Web site, http://www.portofhouston.com/geninfo/overview2.html

[4] Retrieved from the Channel Industries Mutual Aid Web site, http://www.cimatexas.org/cima/Default.aspx?tabid=60

joining their mutual-aid organization, namely, maximizing resource availability while minimizing the financial burden of maintaining a large response complement for infrequent large-scale incidents. CIMA's current membership consists of approximately 100 members from local, State, and Federal government agencies as well as private industry.

CIMA provides a variety of services to their member organizations. Among these services are a centralized dispatch system for the radio network, a prearranged alarm list database, a multicasualty incident plan, high-volume foam pumpers, and fully-equipped ambulances. Sophisticated Command vehicles link CIMA members via a radio system with a coverage range of 500 square miles. Joining CIMA is affordable for most organizations. There is an annual membership fee of $950, plus a $3 per employee charge.

CIMA participants respond to incidents in the Greater Houston Metropolitan Area as a function of their mutual agreement. The response capabilities of CIMA are activated when requested by a member organization. Equipment used in responses, whether a CIMA response or any other response involving member organizations, is owned and operated by the individual organizations and their own trained personnel.

CIMA has produced clear bylaws that identify virtually all aspects of their operations. In these bylaws, the consortium agrees to handle incident response according to the National Incident Management System (NIMS). NIMS allows for an expandable or contractable management structure, based on the dynamic circumstances encountered at the emergency incident scenes. The bylaws also specify members' responsibilities, particularly the equipment and staffing that must be made available; stipulate compatibility requirements for communications equipment necessary to join the consortium; provide for indemnification; and provide guidance, direction, and structure for the consortium. These bylaws can be viewed through the following link: http://www.cimatexas.org/cima/Documentation/tabid/56/DMXModule/388/Default.aspx?EntryId=47

Private industry representatives are a major component of CIMA. The combination of the many governmental agencies and over 90 private sector members results in one of the largest formal public/private partnerships in the Nation. CIMA bylaws stipulate that each member must be able to provide both equipment and personnel for emergency response. The minimum capabilities that full members must provide include a four-person crew with personal protective equipment (PPE). This crew must be available 24 hours a day, 7 days a week, though they may be available on call. By January 1, 2011, members also will be required to provide an industrial emergency response vehicle.

Funding

CIMA's activities are funded through its member organizations. As was noted, member organizations pay an annual fee as well as a small amount per employee. That fee structure ensures that each organization commits financial resources, but that the amount is partly scaled to the size of the organization. Each member organization is responsible for maintaining its own equipment and personnel, which are available to the other members of CIMA during major incidents. When a large-scale response is required, the jurisdiction where the incident occurred is billed to reimburse the costs incurred by the other CIMA members who respond.

CIMA is well positioned to apply for Federal grants to support homeland security and emergency preparedness acquisitions and activities. Most Federal grant programs (port security grants, emergency management planning grants, fire prevention grants, homeland security grants, etc.) place a premium on regional coordination as a factor in evaluating applications. Thus, CIMA would be a strong contender. Field exercises, planning, training, consequence management tools, and other initiatives all qualify for funding. According to leaders of several CIMA members, however, CIMA has not sponsored any grant applications. Separate grants have been awarded to some of the counties and cities and the Port of Houston, with much of this money earmarked for communications interoperability.

One grant program, the Urban Area Security Initiative (UASI) can be a source for state-of-the-art gear, communications equipment, training, and related expenses that improve responder's abilities to handle major disasters: those that require above-average resources to mitigate. Typically, guidelines prohibit jurisdictions from using grant funds to pay for regular first-responder equipment, such as firehoses, nozzles, or pumps. In Houston, UASI grant dollars are just beginning to flow in, and are earmarked to improve the interoperability of communications equipment among CIMA organizations.

Communication

Maintaining the flow of information and ideas through such a large consortium is complex. The leadership structure on which CIMA's communications are based is excellent. There is a sense of mission and recognition from the top that cooperation is not just desirable, but essential. Both elected and appointed officials convey this message throughout their respective organizations. CIMA members communicate about their capabilities, concerns, and constraints. They employ NIMS and use that structure to build interoperable communications which have been essential when assets are commingled during critical incidents.

Communications equipment interoperability among the players at the tactical level currently is good and getting better. This aspect of area-wide communications is the tangible part of the communications strategy and is focused primarily on radios, cell phones, and other communications tools that allow responders from throughout the consortium to communicate during large-scale incidents. It is essential that organizations responding to incidents in the maritime interface agree upon and obtain interoperable communications equipment. CIMA has made great strides in this area.

Obstacles and Challenges

There were primarily three hurdles to overcome in the development of a consortium in the Houston area. The first was the development of a plan from which to operate. Even the most complete plan will have areas that need improvement, and any complex plan, particularly a plan early in its lifespan, will be subject to numerous amendments. CIMA held exercises that identified many areas in need of improvement. That experience was somewhat discouraging to several leaders and initially led to some doubt about whether the consortium was a workable idea.

Obtaining the "buy-in" of the myriad stakeholders involved in the port area proved to be the second major hurdle to overcome in the development of an effective consortium. Each stakeholder had to recognize the inherent value of CIMA and appreciate the different strengths that each party brought to the table. The leaders were especially sensitive to showcasing the strength of each partner and they created a positive environment for cooperation. Even so, several members have commented that

maintaining buy-in is still an ongoing challenge because personnel changes rotate new people into leadership roles, and some of the new leaders do not appreciate the need for the consortium until they have been exposed to the benefits of each cooperative operation.

The third hurdle related to obtaining equipment and providing appropriate training to members of the consortium. This hurdle has had two challenges: obtaining the funding necessary to purchase equipment and provide training, and ensuring that equipment and training were compatible throughout the consortium. This challenge proved to be the most daunting one for CIMA members. Through CIMA, for example, consensus on what type of communications equipment to obtain was reached. Further spending in this area will enhance member organizations' ability to communicate while on the scene of an incident that requires a multi-agency response.

PORTLAND AND SOUTH PORTLAND, MAINE

Background

Since the 1600s when the first Europeans arrived in Portland, Maine, the Fore River and the natural harbor of Portland have been important resources. In the 1800s Portland thrived as a distribution point for Montreal, Canada, and developed as a railroad hub and major east coast seaport, eventually growing well beyond its original boundaries. At the end of World War I, the port saw a decline in commerce as Canada developed its own ports, but still remained active with commercial fishing, and passenger trade. During World War II, the shipbuilding industry became a significant economic engine for Portland.

In the 1960s, cargo volumes at the Port of Portland dropped because container vessels that needed larger and deeper ports became more commonplace. The port could not accommodate the larger vessels that began moving to bigger ports further south. Shipbuilding also declined, and only the fishing industry stayed strong. Around 1980 the port was rejuvenated when a European businessman made Portland a homeport for a new international ferry. A ship repair facility was developed and a pipeline delivering crude oil to Quebec, Canada, was placed in operation, prompting the City of Portland and private investors to invest in other waterfront projects and property redevelopment.

Today, the Port of Portland includes petroleum, container, and break bulk terminals; as well as cruise ship facilities, international and domestic ferry terminals, and commercial fishing facilities. Portland is the second largest oil port on the east coast and the second largest fishing port in New England. There are 16 major commercial terminals in the port, mostly located near the entrance on the northern side.

Growth in the Port of Portland and the surrounding waterfront area has strengthened the economy, but also has increased the threat potential to the area. The Portland Fire Chief and other first responder leaders in the region saw the need for better emergency planning within the area in order to address this increase in risk.

Emergency Preparedness

The fire chiefs of Portland and South Portland serve as the city's emergency management directors. Several years ago, Portland's fire chief developed a leadership group with the goal of addressing risks to the port and working together on response guidelines. He sought Federal funding and earmarked local dollars to support port security planning and exercises. One result was the development of Incident Action Plans (IAPs) that cover initial command, control, and communications actions for the primary response stakeholders at the port. The city of Portland hired a consultant to help it develop critical incident scenarios and reach consensus on which agency would be in charge as well as what the primary actions of all response agencies should be. The following agencies were the principal stakeholders:

- Portland and South Portland Fire Departments;
- Portland and South Portland Police Departments;
- Portland and South Portland Emergency Management;
- USCG;
- Portland and South Portland Ports, Transportation, and Waterfront Departments; and
- Cumberland County Emergency Management Agency.

This core group worked with the consultant to identify scope, nature, and impact of various major incidents that could threaten the port area. The six incident scenarios that evolved were

- sick ship (actually two different scenarios–one at dock and one at anchor);
- terrorist takeover of ship during docking;
- tank farm/pipeline fire;
- vessel fire;
- transportation collision with mass casualties; and
- credible bomb threat at the port.

Each of these scenarios is described in Portland's Standard Operating Guidelines (SOGs),[5] which identify the agency that is to lead mitigation efforts, the actions for other stakeholders, and other considerations. The guidelines present the immediate actions that would be required of responding agencies, including who should be notified and how, the notifications to make, actions to save lives and prevent the incident from worsening, and the initial steps to mitigate the damage already caused. Table 1 describes each scenario.

[5] *Greater Portland Standard Operating Guidelines for Command and Control at Port Incidents*, developed by TriData, a division of System Planning Corporation, Arlington, Virginia, 2006.

Table 1: Incident Summaries

Scenario	Initial Lead Agency	Situation
Sick ship at anchor	U.S. Coast Guard	A ship en route to port has several persons who are ill with similar flu-like symptoms. The number of affected persons is increasing rapidly.
Sick ship at dock	Portland or South Portland Fire Department	After disembarking from ship and moving to various destinations, many passengers fall ill with similar flu-like symptoms. Some return to the vessel; others go directly to local health-care facilities.
Terrorist takeover of ship	Portland and South Portland Police and U.S. Coast Guard	While docking, a cruise ship is taken over by armed terrorists who claim to have placed explosives throughout the port area.
Tank farm/Pipeline fire	South Portland Fire Department	Lightning causes a fire in a fuel storage tank, threatening other tanks and spreading toxic fumes.
Vessel fire	Portland or South Portland Fire Department	A vessel at dock experiences a fire caused by a fuel leak. The ship's captain requests assistance.
Collision with mass casualties	Portland or South Portland Fire Department	A passenger plane lands short of the airport and crashes into a ship at dock. There are many dead and seriously injured people. Fuel is spilled into the water.
Credible bomb threat at port	Portland or South Portland Police Department	A caller reports overhearing a plan to carry out coordinated attacks on several vessels sometime in the next 3 days.

The guidelines clarify Incident and Unified Command procedures and depict the working relationship between the Emergency Operations Center (EOC) and the Command Post (CP).

In another section of the guidelines is a list of questions that serve as a quick-check for readiness, and a section that contains a comprehensive contact list to be used in the event of a disaster at the port. This list includes

- local officials (city managers, police, fire, and emergency management);
- State officials (Governor, State Police, Emergency Management Director, and Environmental Protection Agency (EPA));
- Federal (Department of Homeland Security (DHS), Federal Bureau of Investigation (FBI), USCG, Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF));
- healthcare and medical facilities;
- disaster assistance agencies;
- utility companies;

- private industry resources; and
- mutual-aid resources.

Cooperation is the key to emergency preparedness and response, particularly for incidents on a scale as large as can be expected at the maritime interface. Portland's success in organizing a group of stakeholders to work cooperatively serves as an excellent example of how agencies with different legal, geographic, and functional responsibilities can plan and interact effectively. This can be accomplished when someone has the vision and leadership skills to get the job started, as was the case with the City of Portland Fire Chief.

An example of the broad reach of this stakeholder group was seen during a weapons of mass destruction (WMD) drill conducted in May of 2005. That drill, which is discussed in greater detail in the Appendix, practiced Unified Command and Control incidents involving personnel from nearly 40 agencies at multiple sites. The agencies that participated included

Federal Government

- FBI;
- USCG;
- Transportation Security Administration;
- EPA;
- Occupational Safety and Health Administration (OSHA);
- Office of U.S. Attorney, Maine District; and
- Federal Emergency Management Agency (FEMA), Urban Search and Rescue (US&R).

State Government

- Maine Emergency Management Agency;
- State Police;
- Fire Training and Education;
- Maine National Guard's 11th WMD Civil Support Team; and
- Vermont Fire Academy.

City of South Portland

- fire;
- police;
- emergency communications; and
- emergency management.

City of Portland

- fire;
- police;
- emergency management; and
- emergency communications.

Cumberland County

- Sheriff's Office;
- Communications Center; and
- Emergency Management Agency.

Other Local Fire Department Participants (seven mutual-aid departments)

Medical Facility Participants

- Maine Medical Center;
- Mercy Hospital;
- Southern Maine Medical Center; and
- American Red Cross (ARC).

Other Participants

- Americorps;
- Civil Air Patrol;
- Salvation Army;
- National Semiconductor;
- Fairchild Semiconductor; and
- UnumProvident Insurance Company.

Structure of Consortium

The emergency response consortium in Portland, Maine, is based on mutual-aid agreements. This structure differs from that of Houston, Texas, and Portland, Oregon, where there are separate, stand-alone organizations comprised of representatives from all of the stakeholders involved. The less structured arrangement in Portland, Maine, is one that can work effectively because Portland is a smaller jurisdiction where mutual aid is used routinely and where the parties know each other well and know the abilities of each agency.

Authorization

The formal mutual-aid agreement was written by the City of Portland, and subsequently was reviewed and accepted by the USCG and South Portland's City Council. The process of developing and ratifying mutual-aid agreements is less intensive than developing separate organizations. Most fire departments already have some form of automatic aid or mutual aid in place, and extending existing agreements to cover specifics within the maritime interface can be a relatively straightforward task.

Funding

Minimal funding was required to develop the mutual-aid pact in Portland, Maine. Money from a DHS grant was used to prepare the *Greater Portland Standard Operating Guidelines for Command and Control at Port Incidents*. Grants also could be used to plan and train across multiple agencies. This funding is described in greater detail in the *Common Obstacles* section of the *Findings* chapter.

Communication

By all accounts, communications among members of the public safety community in Portland, Maine, are excellent, both during response to incidents and administratively. All parties use the NIMS Incident Command System (ICS), which allows all parties to operate under the same set of nomenclature and procedures. Communications equipment is compatible for all the major players in the area. At the organizational level, regular facilitated meetings and a common understanding of the need for cooperation have resulted in the establishment and maintenance of clear lines of communication among the participating agencies.

Obstacles and Challenges

After the 2005 exercise was completed, the major players critiqued the drill and prepared a report which identified three areas for improvement. There was great value in learning when the plans needed to be altered, and actions then could be taken to correct the deficiencies.

1. Communications problems were identified during the exercise. The group cited the need for a communications plan for major incidents to help preplan how multiple, responding local, county, State, and Federal agencies operating from various locations should communicate. Such a plan would address several of the communications problems that arose.
2. Additional Special Resource and Tactics (SRT) team joint drills are necessary to improve communications issues and evidence collection issues identified during the exercise.
3. The ICS was not used as effectively as it could have been. Key leadership positions were not filled by the Unified Area Command Post (UACP) or the Incident Commander (IC), including an EMS Coordinator and a Planning Section. As a result of the EMS Coordinator vacancy, problems in victim and emergency responder triage, medical care, and transportation were reported. Because the Planning Section was not established, an IAP was not developed.

The after-action report also identified four major strengths that were apparent during the exercise.

1. The exercise was designed to overstress resources, including personnel and equipment, and it succeeded in doing so, allowing them to identify problem areas in advance of an actual emergency.
2. All teams (law enforcement SRT teams, fire department Hazmat teams, FBI/State/local teams) worked very well together. There were very few "turf issues" during this multiple event scenario with responders from over 30 different agencies and companies.
3. Use of incident dispatchers to help communications at various locations (scene, UACP, and EOC) was an effective and successful strategy.
4. Emergency response equipment (substantial portions of which were purchased using Homeland Security funds) worked well, and team members were familiar with the use of each other's equipment.

Having completed this exercise and others like it, plus having developed SOPs, the members of the Portland, Maine, maritime interface response team are in a strong position to handle a major port incident. The Executive Summary from the After-Action Report can be found in the Appendix.

Portland, Oregon

Background

The Port of Portland, Oregon, is a municipal corporation that operates four terminals (2, 4, 5, and 6) at the confluence of the Columbia and Willamette Rivers, with facilities located adjacent to both bodies of water. Portland International Airport is located along the Columbia River and, as in Portland, Maine, lies in close proximity to the waterfront area. Portland is not a coastal city. To access the port by water requires vessels to navigate approximately 103 miles of the Columbia River.

Marine operations associated with the port generated $67.7 million in revenue in 2006.[6] Revenues earned in these activities came from the import and export of $16 billion worth of products and directly supported 40,000 jobs in the greater metropolitan Portland area.[7]

Public safety organizations came to appreciate the need for better emergency preparedness and cooperation largely through an incident in 1983 involving the ship *Protector Alpha*. A fire in the engine room of that ship quickly overwhelmed the ship's fire suppression system. The resulting disaster claimed the life of one U.S. Coast Guardsman and seriously injured a local firefighter. The incident also highlighted the lack of firefighting equipment, training, and an understanding of the issues in the maritime environment among public safety agencies. As a result, the Maritime Fire and Safety Association (MFSA) was created, which increased cooperation among organizations responding to maritime emergencies.

Emergency Preparedness

The MFSA was the first organization developed to improve maritime safety in the port region. The organization is actually a consortium of public and private agencies that responds cooperatively to incidents in the maritime interface area. The MFSA focuses on more than just fire incidents. The group also responds to oil spill emergencies both in the open water and within member's facilities. Organizations within the MFSA that are involved in fire emergencies are members of the Fire Protection Agencies Advisory Council (FPAAC), which is described in greater detail in the following section.

Another entity that brings together responding agencies is the River Public Safety Coordination Committee, which consists of local agencies including Portland Fire and Rescue, the Portland Police Bureau, and the Multnomah County Sheriff's Office. This committee also coordinates preparedness activities with Coast Guard units. In the Port of Portland, the Coast Guard is represented by members of the 13th District, which encompasses Coast Guard Sector Portland, Coast Guard Station Portland, a Coast Guard cutter, as well as air units from throughout the 13th District.

Another group operating in the Portland, Oregon, area is the Regional Maritime Security Coalition (RMSC). This public-private partnership focuses on security, surveillance, and intelligence along the river. The information this group collects would be valuable to the IC and first responders at a multitude of maritime emergencies. Through a Transportation Security Administration grant, the RMSC developed a comprehensive data-collecting network and data fusion center. Among other features, this group increases interoperability of communications systems and improves flow of data among responding organizations so that all parties are working with a common understanding of the potential threat at hand.

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[6] Annual Audit Report 2006. http://www.portofportland.com/PDFPOP/Audit_POP_Annual2006.pdf

[7] Channel Deepening Overview. http://www.portofportland.com/ch_home.aspx

As with many jurisdictions, the number of organizations in Portland, Oregon, that must coordinate emergency preparedness efforts can be problematic. Written protocols are still being developed (see ***Obstacles and Challenges***), and efforts for such coordination currently are handled by the Harbormaster.

Structure of Consortium

The MFSA currently is comprised of 24 public and private entities, which are roughly grouped into three divisions: merchants, oil spill response, and fire response organizations. The FPAAC is the division that focuses on firefighting issues dealing with ports along the Columbia and Willamette Rivers.

FPAAC is a group of 10 fire agencies within the consortium that have an agreement to share equipment, manpower, and any other resources necessary to mitigate a fire situation anywhere along the navigable areas of the Columbia River and its tributaries. These agencies each contribute necessary resources, assuming a portion of the expense on their own while also receiving financial assistance in the form of training and equipment through MFSA. More information regarding the recouping of expenses will be discussed in the next section. MFSA responds only to major incidents along the Lower Columbia Region, while individual jurisdictions are responsible for mitigating localized events and day-to-day incidents.

Funding

The consortium operates based on several resources. One is the collection of in-kind services and equipment from each jurisdiction. Another source is grants provided by the Federal and State governments. These funds have provided Portland-area service providers with training and equipment. Finally, the MFSA decided that a regular source of funds was needed to minimize dependence on governments as well as to provide stable funding. MFSA now collects fees from ocean-going ships that call on the ports throughout the Lower Columbia River region.

Communication

The Portland, Oregon, maritime area jurisdictions have made strides in improving interagency communications. Unique needs, procedures, and traditions in each community, as well as concerns with equipment compatibility, had resulted in a less-than-perfect situation for transmitting valuable information. Interagency communications were addressed through several channels. The River Public Safety Coordination Committee is a group that allows representatives from all involved agencies to discuss and delineate mission responsibilities prior to an emergency occurring. This also helps to minimize, though not eliminate, turf issues among agencies, and aids in the implementation of Unified Command on incident scenes.

Another means of coordinating activities is through the Harbormaster. In Portland, this position is staffed by a uniformed member of Portland Fire and Rescue. The Harbormaster, because of the fire department training, is familiar with many of the potential incidents to which public safety organizations would respond, including Hazmat incidents and unique or dangerous cargos. Additionally, the use of NIMS/ICS in nearly all fire department operations generally means that fire department personnel are very familiar with the development and expansion of the Unified Command structure that would need to be put into place rapidly in case of an incident.

FINDINGS

This section discusses the results of our analysis of the case study cities and their port safety activities. These findings are divided into three categories: organization and management, common practices, and common obstacles.

ORGANIZATION AND MANAGEMENT

The organization and management of emergency response and preparedness in the maritime interface area depend to a large extent on the ability of senior organizational leaders to understand and leverage the strengths of the Unified Command System. Additionally, these leaders must understand the capabilities and limitations of the other members of the consortium.

Unified Command

The establishment of a Unified Command System in the NIMS format is a common feature in the consortiums that have developed maritime interface plans effectively. Unified Command is still a relatively new structure to many organizations. In order to be familiar with the operations of the Unified Command structure, exercises and practices must occur which involve all of the players who would be involved in a major response. A key aspect of the successful consortiums is the clear definition of roles and responsibilities for each agency. This, in conjunction with the establishment of Unified Command, helps all participants in emergency preparedness and response to understand their roles.

Major incidents will signal the need for Unified Command, which enables agencies with different legal, geographic, and functional responsibilities to coordinate, plan, and interact effectively as a team. Unified Command overcomes much of the inefficiency and duplication of effort that can occur when agencies from different functional and geographic jurisdictions, or agencies at different levels of government, operate without a common system or organizational framework. In a Unified Command structure, the leaders jointly determine objectives, plans, and priorities and execute them together.

A major incident anywhere, by definition, stresses a jurisdiction's resources and creates demands that require aid from other sources. Whenever multiple levels of government are involved in response there has to be a system for assigning resources and directing response activities. Understanding the mission and capabilities of all as they relate to Unified Command will be imperative. More than knowing one's own place in the structure, successful leaders also will understand the role of the other organizations and will recognize that others may be in a better position to assume Command or other major functions, depending on the nature of the incident.

Standard Operating Guidelines

The case study of Portland, Maine, noted that they have developed a set of Command and Control guidelines for all key response agencies involved in port safety. These guidelines define responsibilities as well as basic actions that must be taken early in an incident by each of the primary response agencies. Topics covered in the document include a discussion of the implementation of the ICS and Unified Command as well as the relationship between the Incident Command Post (ICP) and the EOC.

Incident Command in the maritime interface in the Greater Portland, Maine, area is governed by the USCG's Maritime Security Plan and related requirements. Civilian agencies respond in accordance with local plans built on NIMS and the National Response Framework (NRF). NIMS provides a consistent, flexible, and adjustable framework within which government and private entities at all levels can work together to manage domestic incidents, regardless of their cause, size, location, or complexity. NIMS provides a set of standardized organizational structures based on ICS. The choice of the lead agency to manage an incident is driven by both the nature and the location of the incident.

Agencies in the Greater Portland, Maine, maritime interface worked together to develop Command and Control guidelines that define early action guidelines for primary response agencies. Though these guidelines do not, nor were they intended to, cover all contingencies, they do lay out a plan that defines the initial lead agency, with mutual-aid involvement that can evolve to a Unified Command. The success of a response operation will depend upon how well each agency uses a common plan to mobilize resources.

Jurisdictional Mandates

Disasters often highlight the challenges of operations involving the conflicting mandates among the various local, State, and Federal agencies. The hierarchy of rules requires that State regulations do not assume more responsibility than allowed under Federal statute, and local agencies must assure their policies do not run counter to State and Federal regulations. With regard to disaster response, the issue of who is in charge—who has the lead mandate to respond—frequently poses some challenges to command and control of the incident. In many municipalities, the authority to take command of an incident that is on land but in the maritime interface rests with the fire chief, the police chief, and other local officials. The nature of the maritime interface, is such that there is a significant gray area at the land and sea interface with regard to jurisdictional authority. Major emergencies in this area will often impact both land and water, requiring cooperative effort between the Coast Guard and other responders. Since the U.S. Coast Guard moved organizationally into the Department of Homeland Security, coordination with other Federal agencies and with local agencies has increased significantly. Prescripted Mission Assignments (PMAs) have been implemented between FEMA and the Coast Guard which speed the deployment of Coast Guard resources across the range of emergency support functions during major disasters.

COMMON PRACTICES

In reviewing existing, successful components of plans for integrating local fire departments with other agencies at maritime interfaces, several commonalities were noted. These elements of planning multi-agency operations were deemed to be of particular significance. Suggestions for implementing these proven methods are presented in the *Recommendations* section.

Interoperable Communications Equipment

Each of the jurisdictions described in the case studies have succeeded in developing communications systems that allow members from multiple agencies and jurisdictions to communicate with one another. In some cases, these communications were radio-based, either on the same frequency or through the patching of communications systems during drills and incidents. In other cases, the use of cellular telephones or direct-connect cellular communications, particularly between organizational leaders, proved invaluable. Regardless of the method of communications employed, these jurisdictions clearly demonstrated the benefits obtained when operational-level members are able to communicate directly with each other in often chaotic and close-quartered environments.

The area surrounding Portland, Oregon, has developed a unique wireless communications system that provides actionable real-time data to all stakeholders in the maritime interface. The system supports multiagency communications and decisionmaking on several fronts. In addition to supporting interoperability of communications equipment, the system also allows electronic documents, data, information, and surveillance video to flow seamlessly among participants. This system was developed and implemented through funds from the Port Security Grant Program.

Familiarity Among Key Stakeholders Through Extensive Drills and Exercises

Differences in organizational objectives, practices, and procedures among the agencies involved in the maritime interfaces can create challenges. With multiple response agencies, each with their own hierarchy and structure, some level of conflict or confusion is inevitable. Through frequent drills and exercises, much of this conflict can be worked out in a nonemergency situation. Each of the case study jurisdictions regularly conducts drills and exercises that enable leaders and operational units to work together and to identify each other's strengths and weaknesses. It is through these learning opportunities that organizational leaders fine-tune their mutual expectations and learn how to operate effectively as a group.

It is important to note that not all of these drills and exercises undertaken in the case study jurisdictions went smoothly. In fact, several jurisdictions found that operations in the first several exercises were rather unsuccessful, with one fire chief claiming that a certain exercise "failed miserably." This experience underscores exactly why it is so crucial to practice disaster response together. One could say that the more problems encountered during the exercises, the more realistic the drill, and the more valuable the exercise learning experience.

Understanding the Need for Cooperative Effort

Another commonality among the case study jurisdictions was that leaders of all of the agencies involved in the maritime interface accepted the fact that no single organization had the range of resources necessary for mitigating a large incident. They collectively recognized that drawing upon many leveraged resources would be the only way to successfully handle incidents of mass impact facilitated by their joint efforts.

Formal Organization

The agreements among organizations in any given area are varied, but most successful, collaborative groups have either a formal, written mutual-aid agreement among all key stakeholders or a separate organization composed of representatives from each key agency that plays a role in the maritime interface. The Port of Houston's CIMA is an example of an effective organization with a well-defined structure. The existence of a formal group appears to increase the likelihood of effective maritime area interface planning.

COMMON OBSTACLES

The development of a regional, multiagency emergency response plan for the mitigation of emergencies in the maritime interface, manmade or natural, is a complex task with many obstacles to overcome. While the nature of these obstacles varies from one jurisdiction to the next, several broad categories were common to most of the assessed interface areas.

Funding

Despite the availability of billions of dollars in Federal grants, each jurisdiction reviewed identified funding as an obstacle to progress in developing and implementing a plan for incidents in the maritime interface. Several grants are available through five separate programs, including the Urban Areas Security Initiative (UASI), State Homeland Security Program (SHSP), Law Enforcement Terrorism Prevention Program (LETPP), Metropolitan Medical Response System (MMRS), the Citizen Corps Program (CCP), and the Port Security Grants Program (http://www.dhs.gov/xnews/releases/pr_1184781799950.shtm).

Most specific to the maritime interface is the Port Security Grant Program. This program stems from the Security and Accountability For Every Port Act (SAFER Port Act). One of this Act's requirements is that DHS ensures proper communication among all stakeholders. Documents associated with the SAFER Port Act also define priorities for the maritime interface, specifying response needs including personnel and equipment required for response operations. Jurisdictions applying for a grant through this program should note that consortia representing municipal, State, and private stakeholders are specifically encouraged to apply.

Jurisdictions must consider the formula used to determine recipients when applying for grants. Decisions are based primarily on a determination of the greatest risks to the Nation as a whole. After allocations are made based on risk, amounts actually provided through grants are adjusted according to scores assigned to each grant application by peer reviewers and, to a lesser extent, the alignment of each grant with other grants to allow for overlap and integration with other grant programs. Jurisdictions that apply for grants as part of a larger group can show how their use of grant money will help a greater number of people and provide a better return to national security.

Grant money cannot be relied upon as the only source of funding. Jurisdictions must be willing to provide financial support through other means. This money could come through a public-private partnership, through fees, or through a special tax district. Money also can come through a one-time capital budget item or through a regular increase in an operations budget. Particularly when considering expensive activities, funding likely will come from diverse sources.

Overcoming Egos

The mission and objectives of the agencies responding in maritime interface areas are different. Local fire departments generally are to respond to what can be managed with relatively few resources. State response organizations often have regional response teams capable of responding to larger-scale incidents, but these teams can take substantial amounts of time to deploy properly. As a rule, Federal agencies are not positioned to provide immediate tactical resources to an incident. One exception is that the other Federal bodies do provide rapid tactical responses in the maritime interface, including the USCG. Leaders of these organizations all bring significantly different experiences in emergency mitigation to the table. Different backgrounds of leaders, too, can affect communications at both personal and organizational levels. Understanding the backgrounds of other people and the organizations they represent will help each party to communicate the needs of their organization more effectively.

Many of those who were interviewed for the case studies discussed problems where leaders had difficulty relinquishing control of an incident to the head of another organization. Individuals who are accustomed to being in charge can find it challenging to let others take the lead. These issues are best

resolved prior to an incident through the development of clear, concise protocols so that there is no ambiguity at the time of an emergency. Written agreements for the consortium should include an agreement about how disagreements will be handled, including clear definitions of responsibilities and chain of command.

Benchmarking

Measuring performance and procedures against a baseline built on minimum standards, Federal or State regulations, and best practices helps to identify areas needing improvement. Examples of good efforts against which benchmarks could be derived are the bylaws of CIMA in Houston, Texas, the interoperable communications in Portland, Oregon, and comprehensive SOPs in Portland, Maine. Benchmarking the progress a jurisdiction makes in increasing cooperative effort will help align strategic goals and objectives with an effective and efficient tactical action plan.

RECOMMENDATIONS

In reviewing the ports of Portland, Maine, Portland, Oregon, and Houston, Texas, we identified several effective practices and common obstacles. The following section provides recommendations that other jurisdictions can use in the development and implementation of their own maritime interface area preparedness planning.

1. Port communities with an established U.S. Coast Guard Area Maritime Security Committee, as well as those which are developing a similar committee modeled after an AMS, should ensure that emergency plans adequately address disaster response protocols for a range of threat/risk scenarios.

2. Where an AMS has not been developed, port community leaders should consider forming a task force that includes representatives from these agencies:

   Local

   - Fire & Rescue;
   - Emergency Medical;
   - Police;
   - Sheriff;
   - Public Works;
   - Port Authority; and
   - Hospitals.

   State

   - State Police;
   - National Guard;
   - Hazmat or technical rescue response teams; and
   - Natural Resources Police.

   Federal

   - Coast Guard;
   - Army Corps of Engineers;
   - Federal Bureau of Investigation; and
   - Department of Homeland Security (various units, e.g., Border Security and Immigration Enforcement).

3. Assure that all port safety and disaster response participants are knowledgeable of the National Incident Management System (NIMS), the Incident Command System (ICS), and the roles of each stakeholder.

4. Acquire and maintain interoperable communications equipment, (voice and data) for all agencies involved in the preparedness/response plan. These efforts should also include the use of a common mapping/geospatial reference system such as the U.S. National Grid (see Appendix B) which will facilitate coordination of responding Mutual Aid and Federal assets.

5. Perform drills and exercises on a regular basis to assure familiarity among organizational leaders who will take charge of an incident, and to help operational members to be familiar with each other's practices.

6. Develop a written formal agreement that defines roles, responsibilities, finances, command and control, and conflict resolution for each player in the consortium. A good example can be found in the Houston, Texas, case study.

7. Develop and maintain a comprehensive contact list.

8. Consider applying for Federal grant dollars as a multi-agency, multi-jurisdictional task force.

9. Consider the implementation of a dedicated source of funding in the form of a user fee applied to vessels operating within the port area.

10. Apply benchmarks to the planning process that apply to the planning process itself. Continually upgrade the document to include proven new technologies and practices.

11. Develop a long-range interface plan for emergency services at the port. Using the identified stakeholders as the working committee, set a plan for the next 2, 5, and 10 years. The long–range plan should have sufficient detail to maintain and adjust the structure, operations, and financial foundations for this essential service and to set a clear course for the foreseeable future.

STRATEGIC PLANNING PROCESS

A strategic process should be used to develop the long-range interface plans for ports and their emergency services. All stakeholders should be identified and included in this process, and all input should be well structured to avoid allegations of favoritism or exclusion.

Figure 1: Strategic Planning

PROCESS

Step #1–Using the identified stakeholders, develop the emergency preparedness mission and vision for the ports and their emergency services. This is the who, what, when, where, why, and how of the process. It is imperative that this process be consensual among the identified stakeholders, the emergency services, and the authorized administrations.

Step #2–Analyze and prioritize the critical issues that are identified in mission and vision discussion to develop direction for the plan. This triage of the issues will develop the working timetable for strategic process.

Step #3–Establish broad-brush goals to achieve the desired outcomes. These goals will be general statements of the processes needed to achieve and maintain the mission and vision of the identified port's emergency planning.

Step #4–Set objectives and activities under each goal area to achieve the desired results. This should include specific tasks and timelines for each task, as well as overall timelines for the overall objective.

Step #5–Implementing and assessing feedback and a re-evaluation of the plan is essential to the overall success of the process. This must be done routinely during the entire implementation cycle of the plan and at least annually thereafter. This process will keep the plan dynamic and create long-term focus for the stakeholders.

APPENDIX A–Portland/South Portland WMD FSE

Portland/South Portland WMD FSE
May 11, 2005
Maine Mall Cinema Complex
After-Action Report Form

EXECUTIVE SUMMARY

Participants from local, regional, State, and Federal public safety agencies and other key response organizations in Portland and South Portland, Maine, responded to a simulated multiple location weapons of mass destruction (WMD) event. This provided an opportunity to work together in a response requiring resources from all levels of government to resolve. Over 300 people from 38 local, county, State, Federal, and private agencies participated.

The exercise simulated multiple terrorist attacks within minutes of each other at venues in the Portland/South Portland area. For convenience, all scenarios were conducted at the Maine Mall Cinema Complex. The events began with a police incident involving the discovery of a weapons cache and a drug lab. Minutes later, an explosion in another location exposed 26 people to fumes from an unknown substance, injuring many of them.

Because of the multiple events occurring nearly simultaneously, the South Portland Emergency Operations Center (EOC) was activated and staffed with South Portland EOC staff, and with liaison staff from the FBI, Civil Air Patrol, USCG, and American Red Cross (ARC), as well as from Cumberland County Emergency Management Agency (EMA), and the Maine EMA. A Unified Area Command Post (UACP) was quickly established with over a dozen agencies represented in the UACP. A Joint Information Center (JIC) also was established near the UACP to conduct press briefings.

LESSONS LEARNED

Strengths

1. Portland and South Portland Hazmat teams worked very well together.
2. Very good initial decisionmaking; established a hot zone and called for mutual-aid help.
3. Very good hazard sampling and product identification within a few hours of the event.
4. Hazmat response and testing equipment worked well during the multiple scenario events.
5. Decon efforts were effective.
6. Units from various departments worked well together on scene.
7. Positioning dispatchers at each action site, including the UACP and the EOC, helped expedite communications flow.
8. A good facility with multiple rooms for managing large-scale emergency events is helpful.
9. 9-1-1 Dispatch Center staff did an excellent job keeping communications flowing between the Dispatch Center, field units, the EOC, and the UACP.

Weaknesses

1. Need to predict and eliminate equipment issues between organizations.

2. Incident Commanders (ICs) did not wear vests or other identifying insignia.
3. Need a universal communications channel to work scenes together.
4. Need better victim control.
5. Commanders ran out of manpower very quickly.
6. Firefighters need to be reminded they play a potential law enforcement role at a WMD scene–need to interview witnesses and victims and collect or at least preserve and mark evidence.
7. Victims and responders could have benefited from having a rapid decon system established until such a time as the full decon process could be made operational.
8. Consider having a separate staging area for emergency medical services (EMS) units, with a separate Staging Area Manager.
9. No one took command of the EMS sector, which delayed ambulance response and coordination.
10. No EMS positions were assigned (i.e., Loading Officer, Triage Officer) and no vests identifying who was doing what were issued.
11. Need portable situational awareness status boards to help keep Unified Command staff focused on key issues and actions.
12. Cell phones were used more than radios to communicate with field troops and with support staff, due to lack of frequencies and overuse of existing frequencies.
13. Need ability to call up and display area maps of the problem area, no matter where the problem is and no matter where the UACP is located.
14. No one wore vests, so it was difficult to determine who was supposed to be doing what at the UACP.
15. Incident Command System (ICS) was not used well. No Planning Section was established, and therefore no Incident Action Plan (IAP) was developed. No Planning was conducted for second operational period.
16. There was little communication between the EOC staff and the UC staff–evaluate live feed methods.
17. Need more maps in EOC.
18. Need additional phones and phone lines for management and for support areas.
19. Need more easel pads.
20. No Fire Department Rep in the EOC until late in the exercise.
21. Need an emergency resources list with phone numbers in the EOC.
22. Need more training for EOC staff to understand their roles and the roles of others.
23. Need an EOC sign-in board to keep track of who is present and who is doing what.

APPENDIX B

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POSITION REFERENCE PROCEDURES

This appendix emphasizes established doctrine in the use of earth referenced coordinates and position reference procedures in support of the National Incident Management System (NIMS). It provides for a consistent application and use of earth referenced coordinates in the NIMS that can supplement street addressing systems. In some cases, earth referenced coordinates may be the only standard means of referencing locations. The central tenet of this procedure is to provide a framework for interoperability and systems compatibility across jurisdictional and organization boundaries, while maintaining a balance between flexibility and standardization.

The USNG provides a nationally consistent standards-based language of location to improve coordination of ground, air-to-ground, and maritime operations involving private citizens, local communities, civil responder agencies, and national assets. It is easily obtainable across the spectrum of paper maps, digital maps, and GPS. A copy of the USNG standard, and additional information on it as well as training materials, are available at www.fgdc.gov/usng.

The National Search and Rescue Committee's (NSARC) Goereferencing Matrix (which follows), establishes interagency guidance for all responders during land based and Maritime interface operations.

National SAR Committee Georeferencing Matrix: Catastrophic Incident Search and Rescue (CIS).

Georeference System User	United States National Grid (USNG)	Latitude/ Longitude DD-MM.mmm[1]	GARS[2]
Land SAR Responder[3]	Primary	Secondary	N/A
Aeronautical SAR Responders[4]	Secondary	Primary	Tertiary
Air Space Deconfliction[5]	N/A	Primary	N/A
Land SAR Responder/ Aeronautical SAR Responder Interface.[6]	Primary	Secondary	N/A N/A
Incident Command: Air SAR Coordination Land SAR Coordination	 Secondary Primary	 Primary Secondary	 N/A N/A
Area organization and accountability[7]	Secondary	Tertiary	Primary

[1] During CIS operations (and to avoid confusion), Latitude and Longitude should be in one standard format: DD-MM.mmm. If required, use only 3 digits to the right of the decimal; 1 or 2 digits is acceptable. If required, allow 3 digits in the degrees field for longitude (i.e., DDD-MM.mmm). Do not use leading zeros to the left of the decimal for degrees or minutes that require fewer than the maximum number of possible digits to express their value. The minimum number of digits is always one, even if it is a zero. (Example: not recommended: 09-00.300N 004-02.450W; Recommended: 9-0.3N 4-2.45W).

[2] GARS: Global Area Reference System.

[3] Land SAR Responders **must** use U.S. National Grid; however, a good familiarity with latitude and longitude is necessary to ensure effective interface between Land and Aeronautical SAR Responders.

[4] Aeronautical SAR Responders will use latitude and longitude for CIS response. However, aeronautical SAR responders that work directly with Land SAR responders should understand the U.S. National Grid system for effective Land SAR/ Aeronautical SAR interface.

[5] Air space deconfliction will **only** be implemented and managed using Latitude and Longitude.

[6] **Aeronautical SAR Responders working with Land SAR Responders have the primary responsibility of coordinating SAR using USNG.** However, both groups must become familiar with both georeference systems.

[7] Describes the requirement for providing situational awareness of CIS operations geographically to Federal, military, State, local, and tribal leadership.

The US National Grid (USNG): *A Simple and Powerful Geospatial Tool*

Information Sheet 4 in this series. FGDC-STD-011-2001 From www.fgdc.gov/usng

The Problem. In a time of growing location based services (i.e. Global Positioning System, etc.), need to support homeland security/emergency services, the general public, and commercial activities with better geospatial information capabilities, we had no standard, nationally consistent map grid. *For example:* Washington, DC maps for consumers. - 35 maps, 30 different atlas grids. - Same street names, but different grids, none of which work with GPS. - No universal map index.

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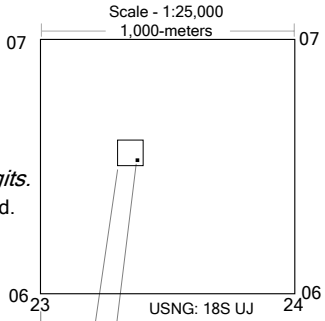
The Solution. US National Grid (USNG). This standard established a nationally consistent grid reference system, just as all street maps use a common set of street names. USNG provides a seamless plane coordinate system across jurisdictional boundaries and map scales; it enables precise position referencing with GPS, web map portals and hardcopy maps. Unlike latitude and longitude, the USNG is *simple* enough that it can be taught and effectively used at the 5th grade level. It enables a practical system of *geoaddresses* and the *universal map index*.

Point of Interest	Street Address	USNG Grid: 18S UJ	Telephone: (202)
Subway Sandwich & Salads	2030 M St., NW	2256 0826	223-2587
Subway Sandwich & Salads	1412 Good Hope Rd., SE	2781 0387	889-5888
Subway Sandwich & Salads	3504 12th St., NE	274 112	526-5999
Subway Sandwich & Salads	1500 Benning Rd, NE	2815 0757	388-0421

Three purposes of the USNG on larger-scale maps:
- Provide a N-S baseline for measuring direction.
- Provide visual scale and to measure distance.
- Provide a standard XY convention to describe locations.

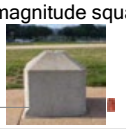


Organization and abbreviation of a USNG grid value.

Complete USNG value: 18S UJ 2337 0651 - World wide unique.
Without Grid Zone Designation (GZD): UJ 2337 0651 - Regional areas.
Without GZD and 100,000-m Square ID: 2337 0651 - Local areas.

A flexible reference system: Use the precision you require, truncate insignificant digits.
2 to 10-digits -- each additional digit pair improves precision by an order of magnitude squared.

How we graph locations with the grid: Read *right*, then *up*.



Locating the Jefferson Pier at: 18S UJ 23371 06519

Four digits: 23 06 Locating a point within a 1,000-m square.
Requires two more characters than the classic atlas grid (i.e. A3) , yet seamlessly ties into a standards based, globally extent, locally optimized grid reference system.

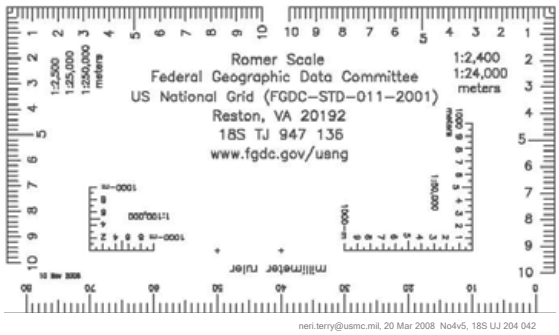
Six digits: 233 065 Locating a point within a 100-m square (football field size).
Think, "23.3 06.5" Another digit pair guides the eye to 1% of the 1,000-m grid square.

Eight digits: 2337 0651 Locating a point within a 10-m square (modest size home).
Adding another digit pair allows easy measurable, discrimination of 1 / 10,000 of the grid square.
This is too precise for visual estimation, but is easily and accurately measured with a Romer Scale.

Ten digits: 23371 06519 Locating a point within a 1-m square (manhole cover size).
Another pair of digits allows discrimination of 1 / 1,000,000 of the grid square.
This is far too precise for measurement on a map of this scale.
It is useful on maps larger than ~ 1:5,000 using a Romer Scale.

- The USNG enables a nationally consistent language of location, optimized for local applications.
- 6 and 8-digit grids: The most commonly used formats in a local setting.

Consumer GPS receivers (<$100) can locate a USNG point position to within 4-meters half of the time, and to within 8-meters 95% of the time.



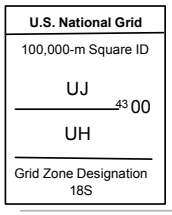
Examples of use include in New Orleans, LA during Hurricane KATRINA response, and adoption by Skagit County, WA, Clark County, CO, the State of Florida, FEMA Urban Search and Rescue (US&R), USGS, Census Bureau, DoD, Garmin, Magellan GPS, ESRI, Delorme, and others.

http://www.fgdc.gov/usng

Reading US National Grid (USNG) Coordinates: *"Read right, then up."*

Information Sheet 1 in this series. FGDC-STD-011-2001 From www.fgdc.gov/usng

The example below locates the Jefferson Pier at USNG: 18S UJ 23371 06519.



A USNG value has three components.

Some maps may give this leading information in a grid reference box.

Grid Zone Designation (GZD): 6° x 8° longitude zone / latitude band.

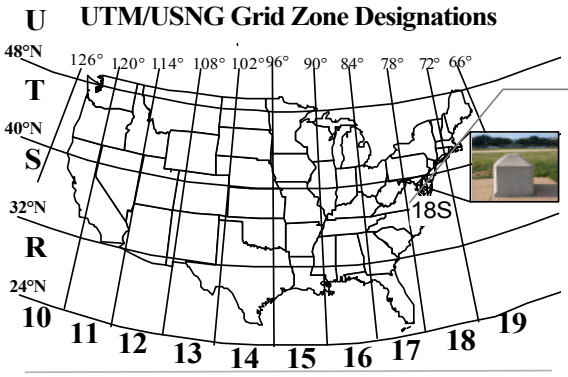
100,000-m Square Identification:

18S UJ 2337 0651

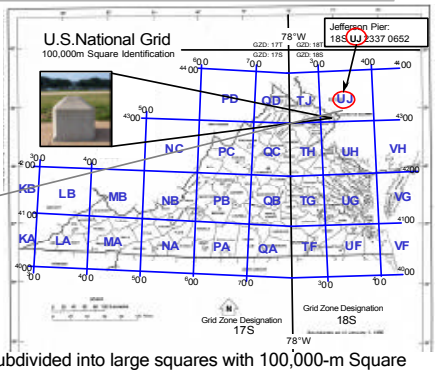
Grid Coordinates: Read *right*, then *up*.

"Read right, then up."

USNG values have three components as seen above. The GZD gives a USNG value world-wide context with 60 longitudinal zones each 6° wide. Zones 10 - 19 cover the conterminous U.S. as seen below left. UTM zones are divided into 8° latitudinal bands. Together these make up 6° x 8° Grid Zone Designations (GZD). Example: 18S



Example: 18S UJ



GZDs are further subdivided into large squares with 100,000-m Square Identifications. In this example, the Jefferson Pier is located in UJ. These squares are organized and lettered so they do not repeat themselves but every 18°, which is approximately 1,000 miles in the mid-latitudes. The illustration at above right depicts the organization of 100,000-m Square ID's over a particular state -- Virginia in this case. In the conterminous U.S. a given value such as UJ 2337 0651 is unique out of the entire state it is located in, as well as all surrounding states.

- Grid lines are identified by Principal Digits. Ignore the small superscript numbers like those in the lower left corner of this map.

Reading USNG Grid Coordinates.

- Coordinates are always given as an even number of digits (i.e. 23370651).

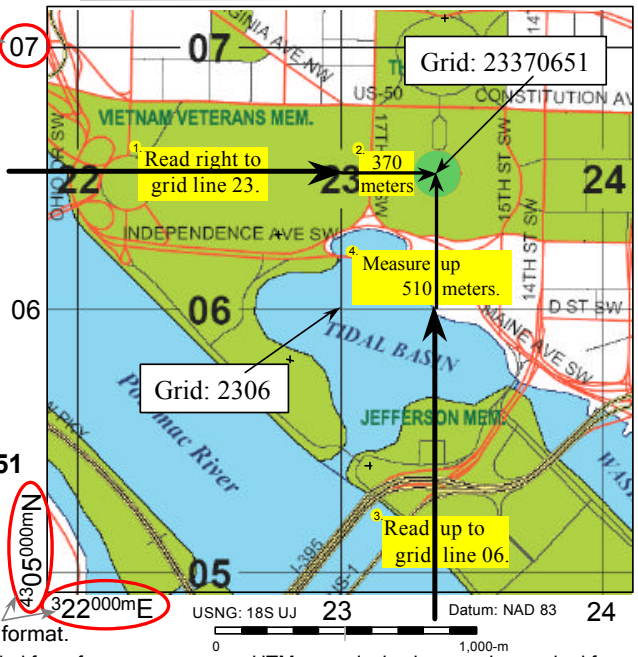
- Separate coordinates in half (2337 0651) into the easting and northing components.

- [1] Read right to grid line 23. [2] Then measure right another 370 meters. (Think 23.37)

- [3] Read up to grid line 06. [4] Then measure up another 510 meters. (Think 06.51)

***A complete reference is*: 18S UJ 2337 0651**

Grid:	Point of Interest:
228 058	FDR Memorial:
231 054	George Mason Memorial:
2338 0710	Zero Milestone:
2275 0628	DC War Memorial:
222 065	Lincoln Memorial:



UTM format.

Ignore the small UTM superscript numbers that are provided for reference purposes. UTM numerical values are best suited for determining direction and distance as in surveying. USNG alpha-numeric values are best suited for position referencing because they can be given as only grid coordinates in a local area and with only the precision required for a particular task.