Port of Mobile, Alabama, After Action Report

Introduction.

A Port Risk Assessment was conducted for the port of Mobile, Alabama 9-10 August 1999. This report will provide the following information:

- Brief description of the process used for the assessment;
- List of participants;
- Numerical results from the Analytical Hierarchy Process (AHP); and
- Summary of risks and mitigations discussion.

Follow-on strategies to develop and implement unmitigated risks will be the subject of a separate report.

Process.

The risk assessment process is a disciplined approach to obtaining expert judgements on the level of waterway risk. The process also addresses the relative merit of specific types of Vessel Traffic Management (VTM) improvements for reducing risk in the port. Based on the Analytic Hierarchy Process (AHP)[1], the port risk assessment process involves convening a select group of expert/stakeholders in each port and conducting structured workshops to evaluate waterway risk factors and the effectiveness of various VTM improvements. The process requires the participation of local Coast Guard officials before and throughout the workshops. Identification of local risk factors/drivers and selecting appropriate risk mitigation measures is thus accomplished by a joint effort involving experts and stakeholders, including both waterway users and the agencies/entities responsible for implementing selected risk mitigation measures.

This methodology hinges on the development of a generic model of vessel casualty risk in a port. Since risk is defined as the product of the probability of a casualty and its consequences, the model includes variables associated with both the causes and the effects of vessel casualties. The model uses expert opinion to weight the relative contribution of each variable to the overall port risk. The experts are then asked to establish scales to measure each variable. Once the parameters have been established for each risk inducing factor, the port's risk is estimated by inputting values for the variables specific to that port into the risk model. The model also produces an index of relative merit for five VTM levels as perceived by the local experts assembled for each port.

[1] Developed by Dr Thomas L. Saaty, et al to structure complex decision making, to provide scaled measurements, and to synthesize many factors having different dimensions.

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
AUG 1999		**00-00-1999 to 00-00-1999**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Port Risk Assessment Port of Mobile, Alabama, After Action Report	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **U.S. Coast Guard Academy ,31 Mohegan Avenue ,New London ,CT,06320-8103**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**12**	

Participants.

The following is a list of stakeholders/experts that participated in the process (Ant Mobile combined with CWO Seymour):

Captain Dave Carey	Port of Mobile	Dcarey@asdd.com
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Patrick Wison	Mobile Bar Pilots	
David Wittendorfen	Mobile Bar Pilots	

Numerical Results.

Book 1 - Factors *(Generic Weights)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
10.4	**22.2**	**14.2**	**26.4**	**11.9**	**15.0**

Analysis:

The participants contributed the above scores to the National Model. They determined that

- the Waterway Configuration was the most risky factor at 26.4 percent
- followed by Traffic Conditions,
- followed by Long Term Consequences.

Book 2 - *Risk Subfactors (Generic Weights)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
10.4	**22.2**	**14.2**	**26.4**	**11.9**	**15.0**
% High Risk Deep Draft	Volume Deep Draft	Wind Conditions	Visibility Obstructions	Volume of Passengers	Economic Impacts
7.7	**2.6**	**2.3**	**5.9**	**2.6**	**4.7**
% High Risk Shallow Draft	Volume Shallow Draft	Visibility Conditions	Passing Arrangements	Volume of Petroleum	Environmental Impacts
2.6	**4.1**	**7.2**	**6.6**	**3.0**	**5.7**
	Vol. Fishing & Pleasure Craft	Currents, Tides, Rivers	Channel and Bottom	Volume of Chemicals	Health & Safety Impacts
	8.2	**3.0**	**9.7**	**6.3**	**4.6**
	Traffic Density	Ice Conditions	Waterway Complexity		
	7.3	**1.8**	**4.2**		

Analysis:

The participants contributed the above results to the national model. In particular, they determined that the following subfactors provided the greatest risk of a casualty:

- For Fleet Composition, High Risk Deep Draft
- For Traffic Conditions, Volume Of Fishing And Pleasure Craft
- For Navigation Conditions, Visibility
- For Waterway Configuration, Channel And Bottom
- For Short Term Consequences, Volume Of Chemicals
- For Long Term Consequences, Environmental Impacts

Book 3 *Subfactor Scales - Condition List (Generic)*

	Scale Value
Wind Conditions	
a. Severe winds < 2 days / month	1.0
b. Severe winds occur in brief periods	2.9
c. Severe winds are frequent & anticipated	4.9
d. Severe winds occur without warning	9.0
Visibility Conditions	
a. Poor visibility < 2 days/month	1.0
b. Poor visibility occurs in brief periods	2.8
c. Poor visibility is frequent & anticipated	5.1
d. Poor visibility occurs without warning	9.0
Current, Tide or River Conditions	
a. Tides & currents are negligible	1.0
b. Currents run parallel to the channel	2.4
c. Transits are timed closely with tide	5.0
d. Currents cross channel/turns difficult	9.0
Ice Conditions	
a. Ice never forms	1.0
b. Some ice forms-icebreaking is rare	1.7
c. Icebreakers keep channel open	4.9
d. Vessels need icebreaker escorts	9.0
Visibility Obstructions	
a. No blind turns or intersections	1.0
b. Good geographic visibility-intersections	1.7
c. Visibility obscured, good communications	4.6
d. Distances & communications limited	9.0
Passing Arrangements	
a. Meetings & overtakings are easy	1.0
b. Passing arrangements needed-ample room	2.0
c. Meetings & overtakings in specific areas	5.8
d. Movements restricted to one-way traffic	9.0
Channel and Bottom	
a. Deep water or no channel necessary	1.0
b. Soft bottom, no obstructions	1.7
c. Mud, sand and rock outside channel	4.6
d. Hard or rocky bottom at channel edges	9.0
Waterway Complexity	
a. Straight run with NO crossing traffic	1.0
b. Multiple turns > 15 degrees-NO crossing	2.6
c. Converging - NO crossing traffic	4.8
d. Converging WITH crossing traffic	9.0
Passenger Volume	
a. Industrial, little recreational boating	1.0
b. Recreational boating and fishing	3.1
c. Cruise & excursion vessels-ferries	5.6

d. Extensive network of ferries, excursions	9.0

Petroleum Volume

a. Little or no petroleum cargoes	1.0
b. Petroleum for local heating & use	2.1
c. Petroleum for transshipment inland	4.9
d. High volume petroleum & LNG/LPG	9.0

Chemical Volume

a. Little or no hazardous chemicals	1.0
b. Some hazardous chemical cargo	2.1
c. Hazardous chemicals arrive daily	5.0
d. High volume of hazardous chemicals	9.0

Economic Impacts

a. Vulnerable population is small	1.0
b. Vulnerable population is large	3.1
c. Vulnerable, dependent & small	5.2
d. Vulnerable, dependent & Large	9.0

Environmental Impacts

a. Minimal environmental sensitivity	1.0
b. Sensitive, wetlands, VULNERABLE	3.0
c. Sensitive, wetlands, ENDANGERED	5.8
d. ENDANGERED species, fisheries	9.0

Safety and Health Impacts

a. Small population around port	1.0
b. Medium - large population around port	2.3
c. Large population, bridges	5.1
d. Large DEPENDENT population	9.0

Analysis:

The participants contributed their determination of the degree of severity of risk the above subfactors on the national model. Each subfactor above has a high and a low severity limit of 9 and 1 respectively. Inside those limits, the participants determined the scale of risk for the two intermediate risk measures.

Book 4 *Risk Subfactor Ratings (Mobile)*

Fleet Composition	**Traffic Conditions**	**Navigational Conditions**	**Waterway Configuration**	**Short-term Consequences**	**Long-term Consequences**
% High Risk Deep Draft	Volume Deep Draft	Wind Conditions	Visibility Obstructions	Volume of Passengers	Economic Impacts
4.6	**5.2**	**5.3**	**2.2**	**2.4**	**6.5**
% High Risk Shallow Draft	Volume Shallow Draft	Visibility Conditions	Passing Arrangements	Volume of Petroleum	Environmental Impacts
4.5	**4.6**	**4.4**	**4.0**	**5.7**	**6.4**
	Vol. Fishing & Pleasure Craft	Currents, Tides, Rivers	Channel and Bottom	Volume of Chemicals	Health & Safety Impacts
	5.1	**4.2**	**1.9**	**4.4**	**3.8**
	Traffic Density	Ice Conditions	Waterway Complexity		
	4.8	**1.2**	**8.0**		

Analysis:

Based on the input from the participants, the following top risks occur in Port Arthur (in order of importance):

1. Waterway Complexity
2. Economic Impacts
3. Environmental Impacts
4. Volume of Petroleum
5. Wind Conditions

	Risk Factors						
	Fleet Composition	**Traffic Conditions**	**Navigational Conditions**	**Waterway Configuration**	**Short-term Consequences**	**Long-term Consequences**	**Relative Merit Index**
VTS	23.2	19.9	17.5	24.5	22.1	20.0	**21.4**
VTIS	12.4	9.5	23.2	14.9	17.1	25.9	**16.5**
EAIS	24.8	19.3	21.1	25.3	23.7	23.9	**22.9**
AIS	20.6	32.6	19.5	16.2	16.0	14.1	**20.4**
Improve Current System	19.1	18.6	18.7	19.0	21.1	16.2	**18.7**

Analysis:

This table shows that the participants believe that the tool of EAIS will contribute the greatest potential for risk mitigation. This is followed closely by AIS and VTS.

PARTICIPANT IDENTIFIED RISKS AND MITIGATIONS

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
Fleet Composition % High Risk Deep Draft Vessels % High Risk Shallow Draft Vessels	• Large pleasure craft moving too fast in confined waterways • Fishing (shrimping) vessels in waterway • "Snowbird" recreational boaters not familiar with area • Failure of vessels transiting ICW to communicate with local traffic • Tug operators turn down/off Channel 13 • Failure to communicate caused by distraction of operator	• Improve security call procedures/requirements
Traffic Conditions Volume of Deep Draft Vessels Volume of Shallow Draft Vessels Volume of Fishing and Pleasure Craft Traffic Density	• Diverse mix of deep and shallow draft vessel types	• AIS planning needs to include fishing (shrimping) vessels and recreational boats

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
Navigational Conditions		
Wind Conditions	• Unpredictable thunder showers cause strong winds • Strong seasonal winds in winter and squalls in summer • Real time wind conditions at Dauphin Island not available	• Provide real-time weather information from Dauphin Island and mid-way to Mobile • Increase number of tugs used during periods of high winds
Visibility Conditions	• Fog conditions vary in port (mostly in spring) • Unpredictable thunder showers reduce visibility • Real time visibility conditions at Dauphin Island not available • Fog impacts scheduling of ship movements	• Provide real-time weather information from Dauphin Island and mid-way to Mobile
Currents, Tides and Rivers	• Strong currents at bar • Strong currents in river during winter months require outbound vessels to travel at higher than normal SOA to maintain proper control • Tidal currents • Real time tide and current conditions at Dauphin Island not available	• Provide real-time tide and current information from Dauphin Island and mid-way to Mobile • Widen channel to minimize control problems
Ice Conditions		
Waterway Configuration		
Visibility Obstructions	• Blind turn in vicinity of Atlantic Marine • Background lights in Theodore obscure range lights	
Passing Arrangements	• Crossing traffic at ICW and Mobile Ship Channel intersection	• Charts should show Mobile Cutoff at ICW and Mobile Ship Channel intersection • Remove dogleg at ICW and Mobile Ship

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
		Channel intersection
Channel and Bottom	• Obstacles (debris) floating in waterway • Narrowness of channel in vicinity of Atlantic Marine	• Widening Mobile Ship Channel to 550 ft may be more effective than any other mitigation measure discussed
Waterway Complexity	• Deep draft vessels moving too fast in narrow channel causing allisions with drydocks	• Widening Mobile Ship Channel to 550 ft may be more effective than any other mitigation measure discussed
	• Configuration of Mobile Ship Channel and Theodore Channel intersection	• Reconfigure Theordore intersection • Install turning ranges for Theodore intersection • Improve Theodore range light visibilty
	• Tows frequently damage ICW fixed ATON structures • Configuration of Theodore Channel and Mobile Ship Channel junction requires difficult turn for southbound traffic to Theodore	
Short-Term Consequences Number of People on Waterway		
Volume of Petroleum Cargoes	• High volume of petroleum products moving on tankers and barges	
Volume of Hazardous Chemical Cargoes	• High volume of hazardous material moving in ICW • Increasing volume of hazardous material	

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
	moving north from port in Chickasaw River	
Long-Term Consequences Economic Impacts	• Hazardous spill could cause severe impact on shrimpers, oystermen and tourist industry • Channel blockage will cause severe economic impact to port industries within two weeks • Closure of ICW for more than two days will severely impact power plants dependent on coal • Closure of lower bay for over two to four weeks will impact support of natural gas platforms • Channel closure will immediately impact Mobile River chemical companies and other dependent on just-in-time shipping	
Environmental Impacts	• Large expanse of environmentally sensitive wetland areas in Mobile Bay and upriver	
Health and Safety Impacts		